

THE FAUNA OF INDIA

SCORPIONS SCORPIONIDA : ARACHNIDA Vol. III

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EDITOR'S PREFACE

Subsequent to India's Independence, the responsibility for editing and publishing the prestigious "Fauna of British India" series was transferred from the Secretary of State to the then British Government to the Director, Zoological Survey of India. As a sequel, the title of the series was also changed as "Fauna of India" and a beginning was made to select and assign the volumes to available specialists within the country itself, as far as possible.

Under the new title 13 volumes have been so far published and four more are in the press. Assignments have been made to 26 scientists to write further volumes on groups so far not covered or which require an upto date revision and these are expected to be published within a couple of years.

The present volume on Scorpions by the undersigned and his student Dr. D. B. Bastawade is the 14th Volume to appear under the new set-up.

Scorpions have remained a much neglected group for many years and the information available on this group of animals is 82 years old, the last publication being by R. I. Pocock (1900) in the *Fauna of British India* series. In this publication only 80 species and subspecies were listed by Pocock whereas we have been able to update it to 99 species in this volume. This has been mainly possible due to the sustained and painstaking collection and research studies of the senior author. This volume is the third in the series of projected volumes on Indian Arachnida.

The volume begins with a short but clear and well illustrated account of the taxonomic characters of the Scorpions and their biology, followed by a key to the five families known from India; keys to the genera and species with their descriptions with adequate illustrations. All species are arranged according to key positions and the families and genera have been arranged according to their interrelationship.

It is my privilege that I am able to write the preface to this prestigious series of publications of "Fauna of India" by virtue of my position as Editor and to this volume on Scorpions for which I happen to be the senior author also. It is earnestly hoped that the present volume will provide a handy tool to specialists, research students and naturalists in India and elsewhere, interested in the study of Indian scorpions.

CALCUTTA
Maghi Purnima
28th January, 1983.

B. K. TIKADER
Director
Zoological Survey of India

AUTHOR'S PREFACE

The scorpion fauna of India which comprises the families Buthidae, Charilidae, Vaejovidae, Ischnuridae and Scorpionidae are very common and abundant in our country but have received little attention by the taxonomists. Pocock (1900) in his "*Fauna of British India Arachnida*", volume has dealt with scorpions. Apart from spiders, Uropygi, Amybiopygi, Solifugae, he recorded about sixty species and twenty sub-species of scorpions from India, Burma and Sri Lanka.

The present volume deals with ninety-nine species, contained in eighteen genera of the families Buthidae, Chaerilidae, Vaejovidae, Ischnuridae and Scorpionidae. Of these, one genus, four subgenera, and eleven species are new to science. A detailed account of morphology of scorpions, characters of taxonomic importance, origin, habitat, food and feeding habits and breeding biology of some scorpions have been given, special importance has been given to the trichobothrial pattern on pedipalp which is very important for modern taxonomy of scorpions and we have also given the necessary illustrations for these patterns for almost all the species dealt in this volume. In addition to descriptions of species the pictorial keys for identification of families, genera, species and sub-species as well as the full diagrams for each species have been provided.

We felt it very essential to examine the type materials of the above mentioned works and to provide redescriptions and detailed illustrations for clearing the confusion of the workers in this field. Fortunately we have received and studied the type material of Pocock and Hirst from the British Museum (Natural History) London, type materials of Henderson from the National Collections of the Zoological Survey of India, Calcutta. Only due to the availability of these materials this faunal work was possible.

The measurements are given related to the holotypes only. The descriptions are also based on holotypes. Where holotypes

are not designated, the description and measurements are based on a syntype. (The syntype specimen being separated and kept in a separate tube and labelled as "drawn and described").

Registration numbers of holotypes or syntypes are given. Type specimens of new species or subspecies described in this account are deposited in the National Collections of Zoological Survey of India, Calcutta. ..

This study could not be brought to completion without many kinds of help from numerous individuals and institutions. We take this opportunity to express our gratitude for loans of type-specimens and many scorpion specimens and other help to :—

Prof. Dr. M. Vachon, Museum National d' Histoire Naturelle, Paris, France for sending his valuable reprints on scorpions, identifying some of the scorpion specimens sent to him and his constant encouragement. Mr. F. R. Wanless, Arachnida Section, British Museum (Natural History) London, for loan of type specimens of scorpions and Drs. H. L. Stahnke, Poisonous Animals Research Laboratory, Arizona State University, Tempe, USA; O. F. Francke, Texas Tech University, Lubbock, Texas, USA; M. E. Soleglad, San Diego, California, USA; S. C. Williams, Department of Ecology and Systematic Biology, San Francisco State College, California, USA; E. A. Maury, Museo Argentino de ciencias Naturales Argentina; G. Newlands, Department of Entomology, South African Institute for medical Research, Johannesburg, South Africa; H. W. C. Couzijn, Netherland and P. J. Deoras, Haffkine Institute, Bombay, India, for sending their valuable reprints on scorpions to us.

The following gentlemen were kind enough to supply the scorpion materials for our studies :—

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We express our grateful thanks to Dr. T. N. Khoshoo, Secretary, Department of Environment, Government of India, New Delhi for encouragement and honouring one of us (BKT) by assigning the writing up of fauna volume on scorpions.

CALCUTTA
Maghi Purnima,
28th January 1983.

B. K. TIKADER
and
D. B. BASTAWADE

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Abbreviations used in the text :

ZSI : Zoological Survey of India, Calcutta. B.M. (N.H.) : British Museum (Natural History) London. MNHN : Museum National d' Historie Naturelle, Paris. SMF : Forschungsinstitut Senckenberg, Frankfurt am Main, West Germany.

INTRODUCTION

Scorpions are most venomous Arachnids which comprise the order Scorpionida (Scor-pi-oni-da). All species of Scorpions are poisonous though all are not fatal to human beings. Studies on Scorpions of India have received very little attention as compared to other animal groups. This may be due to their poisoning sting, very specialised habitats, nocturnal habits and other difficulties for collecting them.

Scorpions are found all over the world except in some very cold northern countries. But so far no comprehensive studies are made on scorpion fauna of the world. During the end of nineteenth century scorpions received some attention of the naturalists and arachnologists who explored this group systematically to some extent from different countries of the world. Although considerable literature has been accumulated containing descriptions of several species and their toxicity but studies on their ecology and behaviour are scanty. After many decades this interesting group of animals has recently received the due attention by naturalists who worked on systematics, toxicity and general biological aspects. Studies are being made on their habits, habitats, populations, instincts, behaviour and toxicity and its use to human beings. It is out of scope to make a review of this literature in this volume. The most outstanding work which was proved to be of great help in present studies have been taken into consideration.

Few species of scorpions were recognised in a common genus *Scorpio* (Order : Scorpionida) by Linnaeus (1758) for the first time in his classical work "Systema Naturae" Fabricius (1775-1798) also described some species of scorpions in the same genus *Scorpio* and from the literature it seems that upto 1814 there existed the only genus *Scorpio* under which all the scorpion species were described. In the year 1815, genus *Buthus* was erected by Leach and subsequently genus *Isometrus* was erected by Hemprich and Ehrenberg in 1828. They also divided genus

Buthus into a subgenus *Heterometrus* which later on was separated by Peters (1861) and he raised it to the genus level. Prior to Thorell (1876), both the Indian and African species used to be described under the genus *Heterometrus* but Thorell was the first to distinguish between the Indian and African forms and to put the Indian forms under a new genus *Palamnaeus* with *P. petersi* Thorell, as the type species. C. L. Koch (1838-1845) also described many new genera and species of scorpions, which later on reported from India.

The literature during the second half of the nineteenth century shows that all the families under order *Scorpionida* were described between 1860-1900. The first family (1) Diplocentridae was erected by Peters in 1861, subsequently the following six families were erected by respective authors; (2) Vaejovidae Thorell 1876; (3) Buthidae Simon 1879; (4) Bothriuridae Simon 1880; (5) Scorpionidae Pocock 1893; (6) Chaerilidae Pocock 1900 and (7) Ischnuridae Pocock 1900. During the same period many other Arachnologists have erected many genera and described numerous new species of scorpions. While studying Indian Scorpions, many species were recorded by various authors such as Gervais (1844), Dufour (1856), Oates (1888), Kraepelin (1893), and Kessler (1876). Birula (1917). The works on Indian Arachnida were published in various journals which were compiled by Pocock (1900) for the first time in his classical work as *Fauna of British India, Arachnida* (including Burma and Sri Lanka) in which he has described many new species and genera of scorpions.

Though the scorpion fauna of India was explored in large scale for the first time by Pocock (1900), many scorpologists like Birula (1913-1928), Hirst (1915), Henderson (1913-1919) have added some new species and sub-species from India. Ceuins and Mhaskar (1934) have studied the aspects of the toxicity and the Ayurvedic remedy for the poison of scorpions. Apart from this they have also given the distribution of different species. Rahimulla (1937) has given a preliminary reports on scorpions from Hyderabad, Andhra Pradesh, India. Tembe and Awati (1940-45) have studied the external morphology and anatomy of *Buthus tamulus* (Fabricius). Remarkable work on embryology of some Indian scorpions is done by Mathew (1948-60). Deoras (1960-1970) has added

considerable knowledge in collecting and rearing techniques of scorpions and population of some species of scorpions is also valuable. Mani (1959) and Basu (1964) have described some new species of scorpions from Western Himalayan ranges and Hizaribagh, Bihar. Dubale and Vyas (1968–73) have studied the chela, its operation, endosternite, its associated muscles and myology of feeding apparatus. Sreenivasa Reddy (1950–68) has made efforts to give the systematic position to the genus *Charmus* Karsch and the species *Charmus indicus* Hirts. He has also revised some species of the family Ischnuridae. Vachon recently (1940–78) has revised the order scorpionida and mainly the family Buthidae from the world. His work is mainly based on the Neobothriotaxi. At present he is revising the family Vaejovidae from the world. Tikader (1973) has listed the scorpion fauna existing in Deccan, India. Very recently Tikader and Bastawade (1977) have described a new species from Maharashtra, India.

Stahnke and Francke (1973–77) have also revised few families and regarding the Indian forms of the family Vaejovidae, they have suggested that some new genera should be erected after quantitative studies.

The existence of the family Chaerilidae has been accepted by Prof. Vachon (1973) as it possesses the Neobotnriotaxi of the type 'B' as in text-figs. 51 to 56. The genus *Chaerilus* was first time reported by Simon (1877) from Malaya. Pocock (1900) included this genus in a separate family Chaerilidae and reported about nine species from India. According to Vachon's classification (1974) the family Ischnuridae has become a subfamily Ischnurinae under the family Scorpionidae and the genus *Buthus* of the family Buthidae has been splitted into many genera of which several species are reported in Indian fauna. All those species previously reported under the genus *Buthus* are transferred to the various genera and at present not a single species represents the original genus *Buthus* from India.

Newlands (1978) reported three different types of scorpions on the basis of their habits and habitats in a South Africa. Very little is known about distribution, habits and habitats of Indian Scor-

pions. Raj Tilak (1970) has reported an interesting burrowing habit in *Hormurus nigripes* Pocock from India. Recognition of certain species on the basis of paraxial organ (Maury 1973-75) and shape of spermatophore (Francke 1978) is receiving the attention of Scorpiologists of the world.

ORIGIN, HABITS AND HABITATS, FEEDING ACTIVITIES AND
REPRODUCTIVE BIOLOGY OF SCORPIONS

(Figs 1a—1d)

Origin : Though the phylogenic origin of Scorpion is not exactly known, it is presumed that they have been evolved from an extinct group, the Eurypterids or giant water scorpions. These eurypterids were fully aquatic in habits and existing before 400,000,000 years ago during Silurian period. During the same period the other parallel and well established aquatic group was Silurian Scorpions. Both of these had many common characters such as compound eyes, external gill books and similar chewing structure on the first segments (coxae) of the first pair of appendages.

The main evolution which made this Silurian aquatic scorpion to migrate from water to land was an evolution of external gills into an enclosed book lungs. Until upper Devonian period that is 345,000,000 years ago, almost all scorpions were aquatic in habits.

About thirty fossil scorpions species have been reported from Europe and North America and almost all have been found in Carboniferous rocks that is about 325,000,000 years ago. All of these fossil scorpions were air breathing, in other words they were terrestrial in habits.

A species of fossil scorpion *Eoscorpius carbonarius* Woodward 1976, found in the British coal measures, Sandwell Park, Birmingham is considered to be closely related to an existing species of the genus *Mesobuthus* and its related genera in India.

The scorpions are members of an ancient race whose fossils go back to very early times. Their essential acquired morphology has remained unchanged for hundreds of millions of years and only due to which they have been termed "Living fossils".

Habits and habitats : All Scorpions are strictly nocturnal in habits and very shy animals, try to hide under stones, barks and thin crevices, burrows and occasionally in dark corners of houses as in text-fig. 1a. They are equally defensive and sting if molested. Scorpions are world wide in distribution except very cold northern countries. They are very common and widely distributed in tropical and subtropical areas. They are abundant in arid and semi-arid zones of the world. They are found at very low altitudes at sea-shore and also at very high altitude ranges of Himalaya and Alps.

Very scanty information about Indian species is available regarding their habits and habitats. Considerable efforts have been made to know the particular habits, habitats influencing their distribution in some parts of southern Africa. According to the habitats, the scorpions are divided into three categories as burrowing (Psammophilous or Pelophilous), Rock dwelling (Lithophilous) and Arboreal. On the basis of available data about species of Indian Scorpions, they could possibly be divided into three above mentioned different categories.

Various genera of Indian Buthids such as *Odontobuthus*, *Androctonus*, *Orthochirus*, *Compsobuthus*, *Mesobuthus* and *Chactoids* like *Heterometrus* and Ischnurids are true burrowing in habits. Among these burrowing scorpions Buthids and *Heterometrus* species do not dig deep burrows, they use small pit like burrows for their shelter. The Ischnurids dig very deep (about 1' to 2' deep) burrow at the base of which a flask shape house is prominent where the animal stays during day time. The house contains heaps of small pieces of animal chitin (Arthropods), on which the scorpion feeds (Raj Tilak 1970). The Ischnurids are generally found in plains and soft grounds of low altitudes. *Heterometrus* burrows are usually protected by boulders and are not more than 6" to 9" deep. The animal usually found near the opening of burrow. Buthid burrows are difficult to locate as the burrows are very small in diameter and cannot be recognised. Some buthids habit in colony and all members of colony live in a same burrow or hole. The Vaejovids are flat scorpions prefer to habit in cracks and crevices. These scorpions are very active and run swiftly, if disturbed. Very little is known about the habits and habitats of Chaerilids, the

data from the labels of which show that they generally hide under stones and wood logs. Vaejovids and chaerilids are the scorpions of high altitude ranges. Chaerilids strictly inhabit in Himalayan ranges while Vaejovids show their distribution in Himalayan ranges as well as at some places of Sahyadri ranges in Deccan. Habits and habitats of the species belonging to the genera *Charmus*, *Stenochirus*, *Hemibuthus*, *Lychas* and *Isometrus* are not known from India.

Most scorpions avoid water, some live among plants near the sea-shore, moving about in the inter tidal zone and able to remain under tidal water for short time. Some scorpions are cave dwellers which lack both eyes and pigments.

Feeding activities : All scorpions are nocturnal in habits, actively feed during night. At the time of dusk, they are seen coming out of burrows, crevices, stones and stand with open pincers waiting patiently for the prey. Pincers are very sensitive tactile organs provided with sensory setae namely "*The trichobothria*". Soon after they sense that the prey has come in contact with pincers they close the fingers very quickly and hold the prey firmly as in text-figs. 1b & 1c. The capture of prey seems almost accidental. Sometimes scorpions show hesitation towards active prey and they may even withdraw for a time but finally achieve their prey. In case the prey is bigger and could not be overpowered only with pincers, the scorpion use its sting to paralyse the prey. All scorpions are carnivorous in nature and their food includes such animal they can overpower. The Buthids are highly neurotoxic generally prefer to sting the prey, whereas scorpionids (*Heterometrus*) use the strong pincers to crush the prey. In natural conditions cannibalism is very rarely seen in these animals. Fighting between Centipedes and Scorpions is very common in nature and Centipedes are always overpowered and eaten away by scorpions. Some scorpions feed on molluscs when the normal prey becomes scarce (Lamoral, 1971). Some African species prey upon small rodents in the Kalahari desert (Kock, 1969).

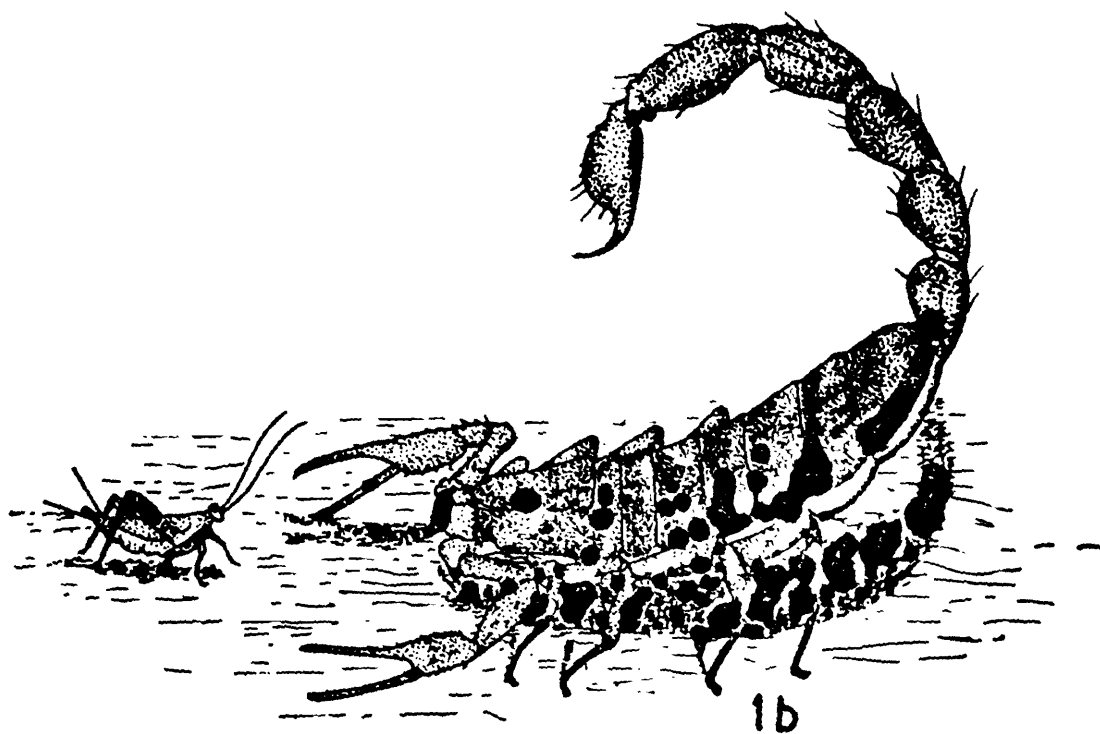
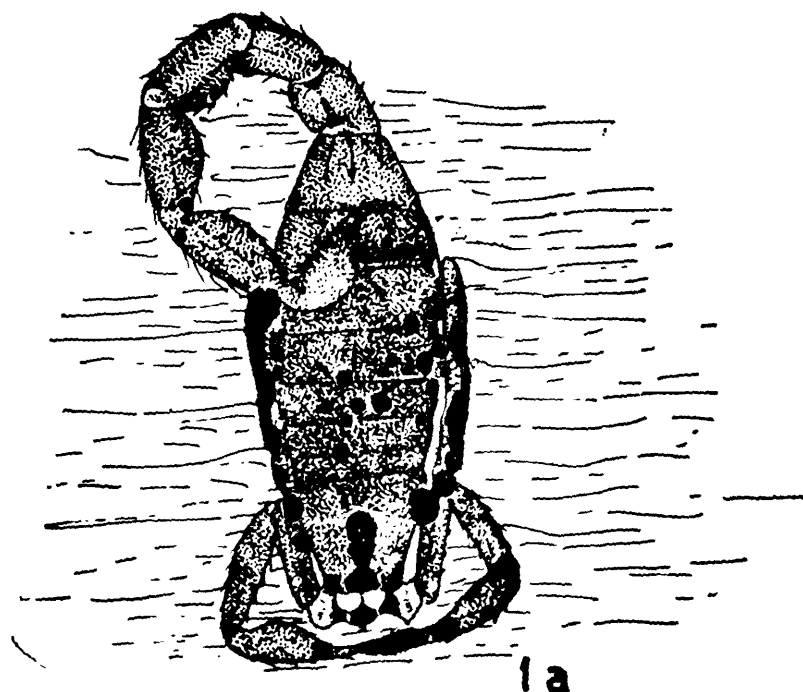


FIG. 1a. *Mesobuthus tamulus tamulus* (Fabr.) the most common species of India. Posture at rest.

FIG. 1b. *Mesobuthus tamulus tamulus* (Fabr.). Posture when on defensive or in research of prey.

Once the prey has been overpowered it is brought to chelicerae. If the prey is small, it can be tackled with only one pedipalp, and for bigger prey both the pedipalps are used. After having brought the prey to chelicerae, they are operated first to tear the prey. If the prey is hard and chitinous, it is softened by using the liquid secretion which is regurgitated on the prey. The operation of chelicerae is stopped until the prey gets softened. Once the prey is torn, the operation of chelicerae one after the other continues. The victim is crushed and chewed. The body fluid is sucked time to time by pumping action. The scorpion has to macerate its prey because the mouth parts and pharynx are developed to suck only the fine liquid contents of the prey. The prey is crushed and liquified to last drop of its body fluid and the remaining part of the prey is thrown away in the form of small ball. This feeding activity is very slow and continues for hours together. An adult female scorpion of a species *Mesobuthus tamulus tamulus* (Fabr.) required 4 hours to eat a medium size cockroach or a cricket. Scorpions can survive without food for a long time. Some species of desert scorpions survive upto a year without food (Newlands, 1978).

Breeding Biology : Though the sexes in scorpions are distinct they exhibit little sexual dimorphism, the males are usually slender, manus of pedipalp more robust and fingers are provided with a scallops at the base and number of pectinal teeth also differ. The differences are more prominent in the case of Pelydont buthid scorpions than in Oligodont chactoid scorpions. All male scorpions possess a pair of conspicuous male genital papillae. The genital openings of male and female are covered by genital operculum. Terrestrial adaptation of scorpion was evolved a structure and mode of mating procedure so as to prevent the drying out of eggs and spermatozoa. In these animals mating is very remarkable process, which has been rarely parallel in other groups. Actual courtship is initiated by male who faces and grasps the female by pedipalp and is followed by continuous entwining and disengaging displays. During which the abdomen is pressed to the ground and tails held high. This display is commonly known as an *abre droit* as in text fig. 1d. It takes place to form a pair. The pair directed by male moves sideways, backwards and forwards which appear as a dance like motion termed

promenade a deux (Maccary, 1810 and Fabre, 1923). This continuous action of pair finally results into finding out a suitable ground to stalk the spermatophore by male and also to bring the spermatophore near the open genital operculum of female. After perfect contact being established by the female with the stalked

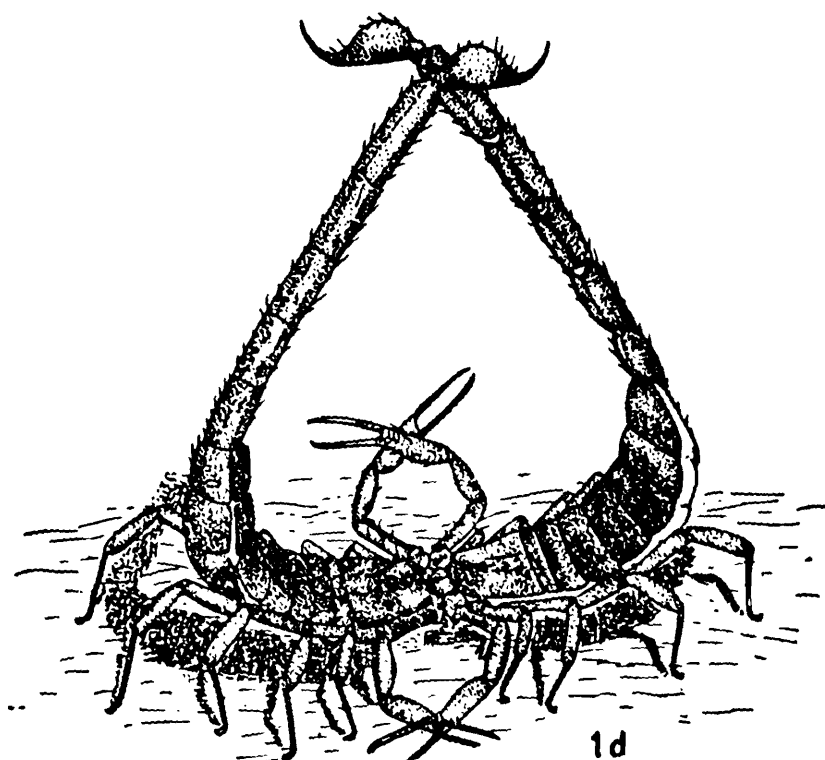
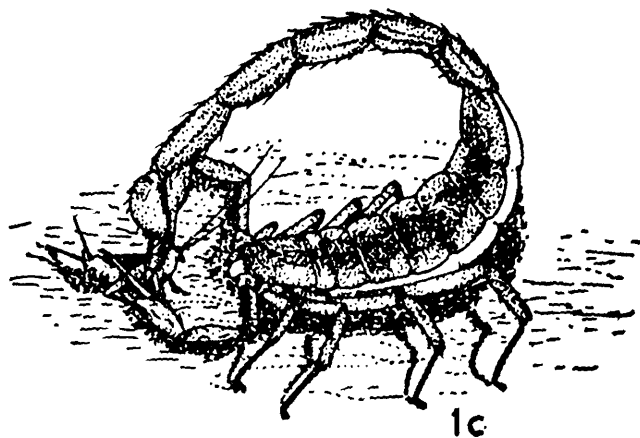


FIG. 1c. *Mesobuthus tamulus tamulus* (Fabr.), capturing and stinging prey.
FIG. 1d. Posture known as the 'arbre droit' (after Fabre and from personal observations), preceding copulation in *Mesobuthus tamulus tamulus* (Fabr.). The female is on the right.

spermatophore, in a particular angle, the sperms are sucked into the body by pumping action. No direct contacts of genital organs are involved during courtship. After mating generally males run away or sometimes are killed and eaten by females.

Fertilization is internal. The ova of buthids are rich in yolk whereas the ova of scorpionids are completely lacking in yolk (Vachon, 1953). Fertilized ova remain in body, in the ovarian tube and embryo develops in an enclosed sac or diverticula, which is attached to the ventral surface of uterine duct. During later stages the embryo possesses a tubular extension which acts as an umbilical cord applied to the wall of mother's intestine, which draws off nutrients by osmosis. These nutrients then led to the mouth of embryo through tube termed as "bottle and teat process" (A. P. Mathew, 1948). At this stage the embryo scorpion has a well developed pharynx and able to suck the fluid material. After full development of embryo it is detached and move into the uterus. The development of embryos in mother's body can be discerned several months before actual parturation by the appearance of blurred spots which gradually acquire the perfect form of tiny scorpions inside the females mesosoma (Rosin and Shulov, 1963). The gestation period differs from species to species.

A few minutes before the actual parturation of youngs, the female digs a little and takes a peculiar posture by bending its first pair of legs in patellar-tibial joint, thus fencing the area in front of genital operculum. Some North American species, form a "birth basket" using their first two pairs of legs holding above the ground (Williams 1969). Old world species differ from New world species in many aspects of birth behaviour activities. Parturation may or may not be continuous but on an average, female requires about 10 minutes to deliver one young. Maximum parturation period recorded is $7\frac{1}{2}$ hours in case of mexican species. Newly born youngs may or may not be encased in a thin transparent membrane. In case the youngs are enclosed in birth membrane, it is left within few minutes after birth and then only the youngs crawl on mother's back. The youngs remain on mother's back for 10 to 20 days during which they complete two molts. At the time of birth, the youngs of all species are white in colour and

after first molt they start changing their body colour. After second molt the youngs become very active and aggressive and are ready to lead an independent life. The youngs attain maturity very slowly and according to Fabre (1923) some of the scorpion species require about five years to reach their maturity.

GENERAL TAXONOMIC CHARACTERS OF SCORPIONS

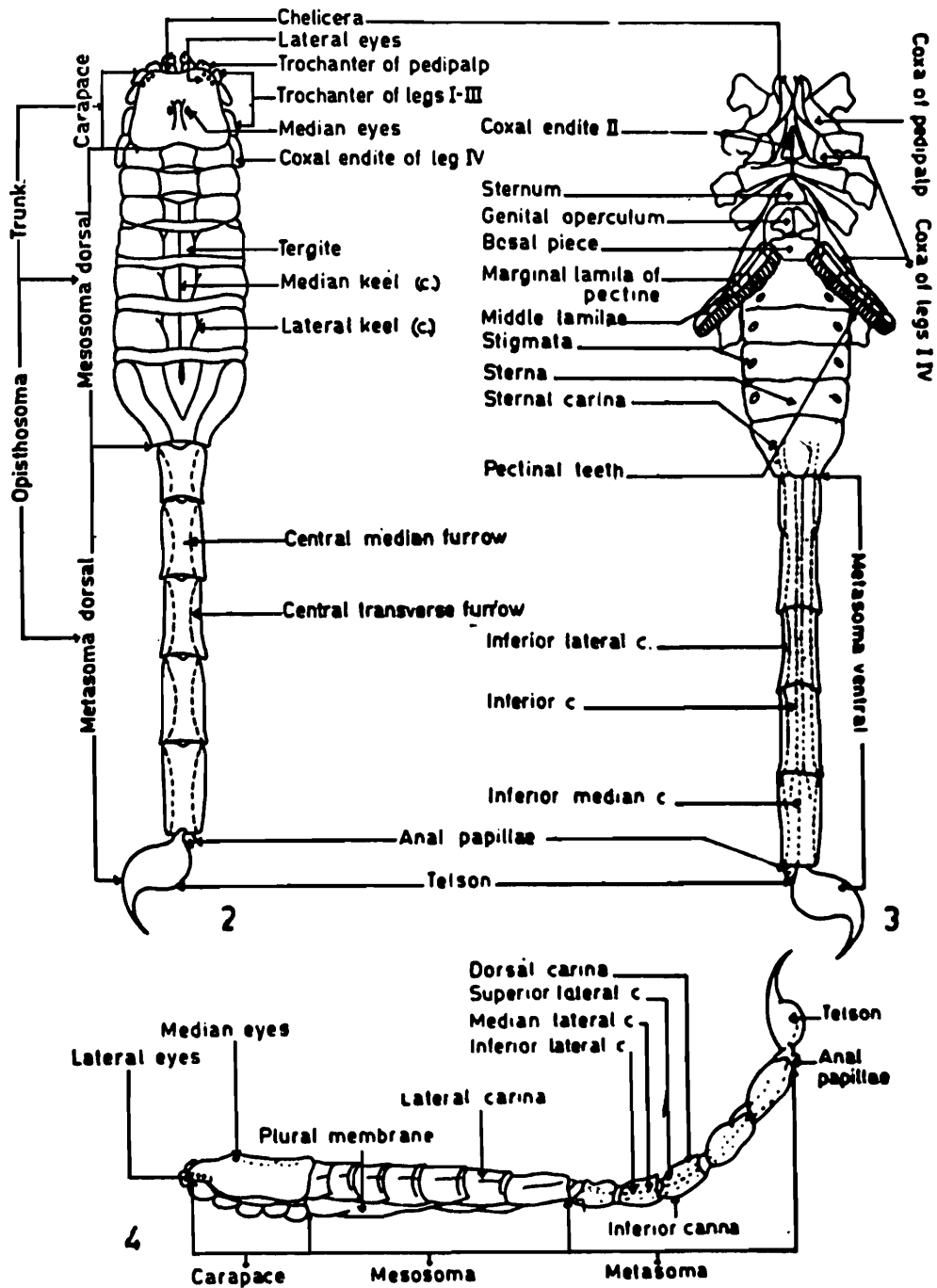
(Figs. 2-27)

The order Scorpionida is a member of the class Arachnida. The Arachnida may be distinguished from the Hexapoda (Insects) Chilopoda (Centipedes) and Diplopoda (Millipedes) by the entire absence of the pair of antennae, which are affixed to the front of the head in these three classes of animals. The abdomen is generally without appendages.

The order Scorpionida consists of the scorpions having the following important features: body elongated, cephalothorax compact broadly joined to abdomen; chelicerae small, pedipalp large with stout pincers, abdomen long, consisting of twelve distinct somites, of which the posterior five are narrowed and compressed to form the post-anal sclerite (or telson) a distinct tail as in text-figs. 2, 3 and 4; telson with two poison glands; a pair of comb-like and tactile pectines; 4 pairs of book lungs as in text-fig. 3.

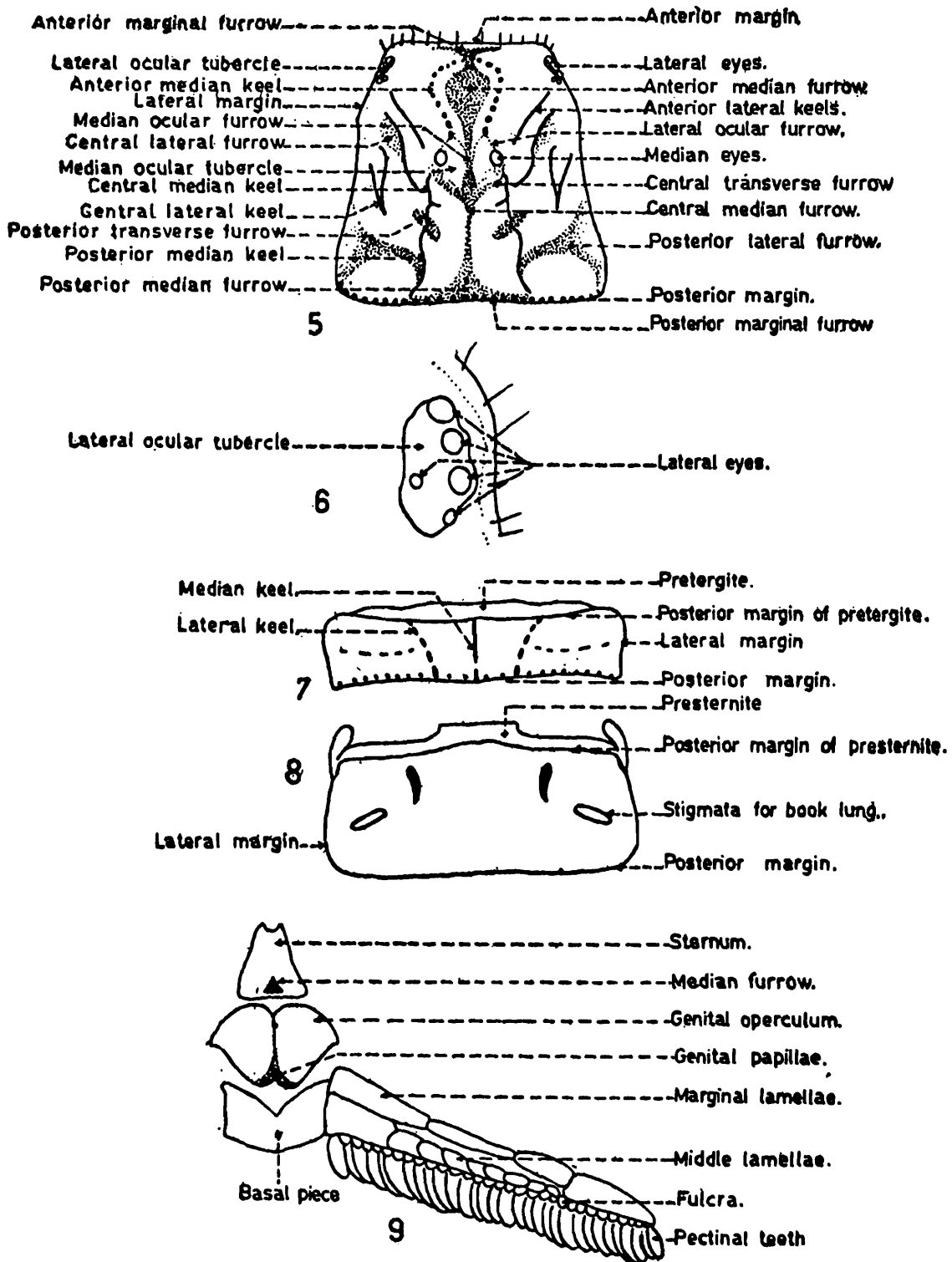
The terminology of body parts of scorpion is made upto date by Stahnke (1970). The anterior seven abdominal segments are as broad as cephalothorax and together with the later they form the trunk. The remaining five abdominal segments along with the telson form the tail. The terms, *carapace (prosoma)* and *opisthosoma* are also used for the cephalothorax and the abdomen respectively as in text-fig. 2. The *opisthosoma* is further divided into *mesosoma* and *metasoma* representing the anterior seven abdominal segments and the 'tail' respectively as in text fig. 2.

The unsegmented sclerotized plate covering the cephalothorax is the carapace as in text-fig. 2. Each of the anterior seven abdominal segments are dorsally covered by a sclerotized plate called *tergite* as in text-fig. 2, which has an anterior transversely raised



FIGS. 2-4. 2. Dorsal view of typical scorpion showing different parts
 3. Ventral view of typical scorpion showing different parts.
 4. Lateral view of typical scorpion showing different parts.

portion, the *pretergite*. The tergites become progressively longer posteriorly. The seventh tergite abruptly narrowing posteriorly so that its posterior width is nearly equal to that of the first caudal segment as in text-fig. 2. The ventral side of the carapace is covered

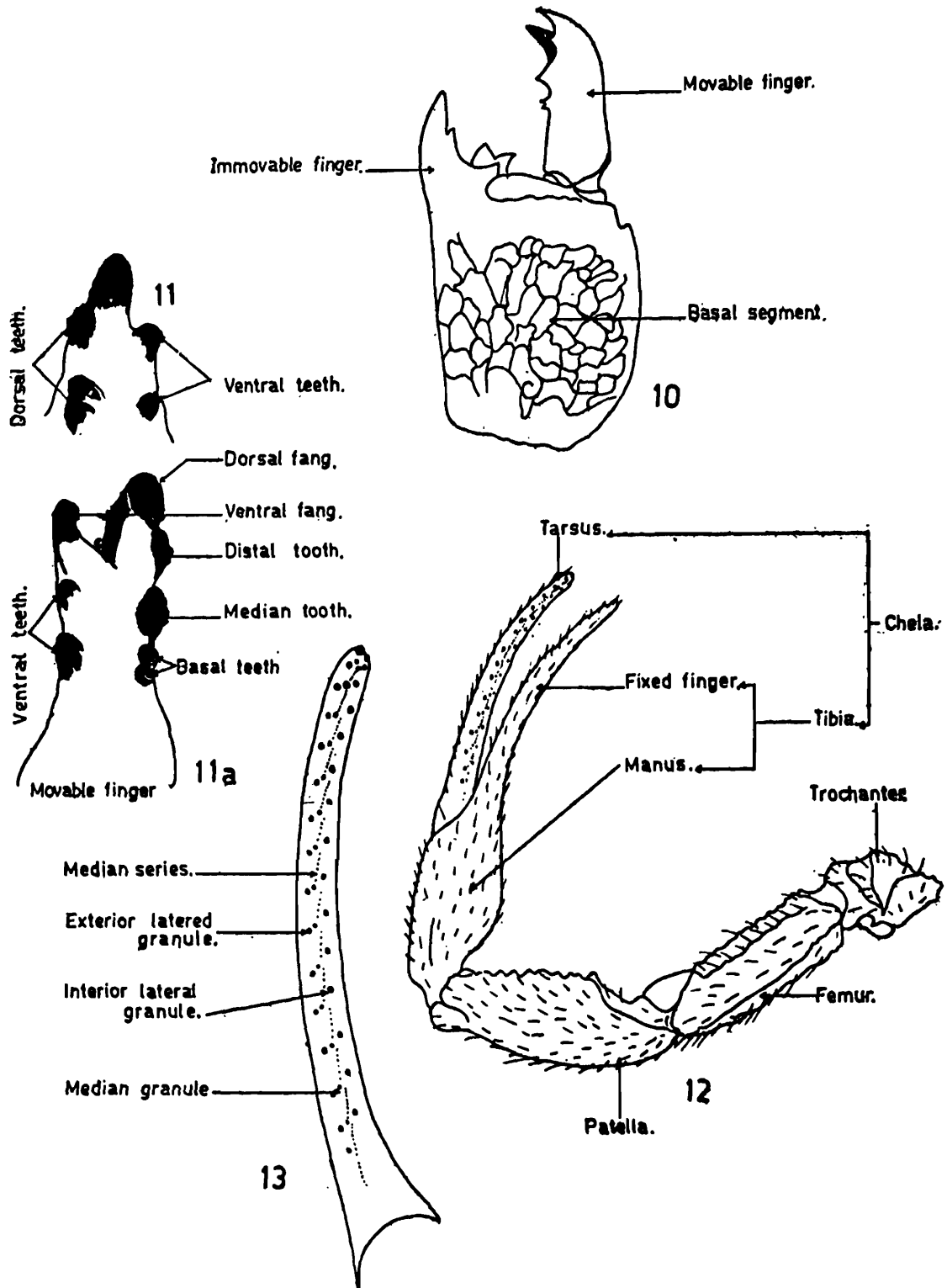


Figs. 5-9. 5. Dorsal view of generalized carapace showing different parts.
 6. Lateral view of anterior portion of carapace showing lateral eyes.
 7. Dorsal view of generalized mesosomal tergite showing different parts.
 8. Ventral view of generalized mesosomal sternite showing different parts.
 9. Ventral view of generalized sternum, Genital operculum, Basal piece of pectines.

anteriorly by the coxae of the walking legs and maxillary lobes (coxal endites) of first and second legs and posteriorly by the *sternum* as in text-fig. 3. The first abdominal segment has two small sclerotized plates, called the *genital operculae* as in text-figs. 3 and 9 which are usually united medially in the female and completely or partially separated in the male. In the female they cover the genital aperture, the *gonotreme* and in the male may partially or completely cover the two genital papillae. The second segment has a small sclerotized plate, called the *basal piece*, which serves as a point of attachment and articulation of the pectines as in text-fig. 9. Segments III-VII are completely covered ventrally by sclerotized plates called *sternites*, which occasionally has an anterior transversely raised portion, the *presternite*. Sternites I-IV each provided with a pair of *stigmata* for book lungs as in text-fig. 8. The *tergites* and *sternites* are laterally connected by the *plural membrane* as in text-fig. 4.

The *metasoma* (*tail*) consists of five sclerotized rings, (constantly increasing in length posteriorly) and the *telson* as in text-figs. 2, 3 and 4. Distinct tergites and sternites are not discernible. A dorsal furrow is present along the length of the *metasoma*, which sometimes shows sexual dimorphism. Five pairs of carinae, termed depending on their location, as dorsals, dorso-laterals, median laterals, inferior laterals and inferiors as in text-fig. 16 are present on the first four caudal segments. In the V caudal segment, which is generally the longest of the five, the dorsal carinae are absent. The median laterals are often weakly developed and only one inferior median carina is present. At the postero-ventral end of V segment is found the *anal rim*, which bears anterior and posterior transverse crests as in text-fig. 15.

The appendages of the cephalothorax consist of the chelicerae, pedipalps and walking legs. Each chelicera consists of a basal segment and a *chela* as in text-fig. 10. The pedipalps consist of the following segments from proximal to distal end : *coxa*, *trochanter*, *femur*, *patella* and *chela* as in text-fig. 12. The last can be subdivided into *manus*, its finger and tarsus. Tarsus is the movable finger as in text-fig. 12. Various *keels* (*carinae*) are present on the surface of femur, patella and chela, which are of taxonomic importance



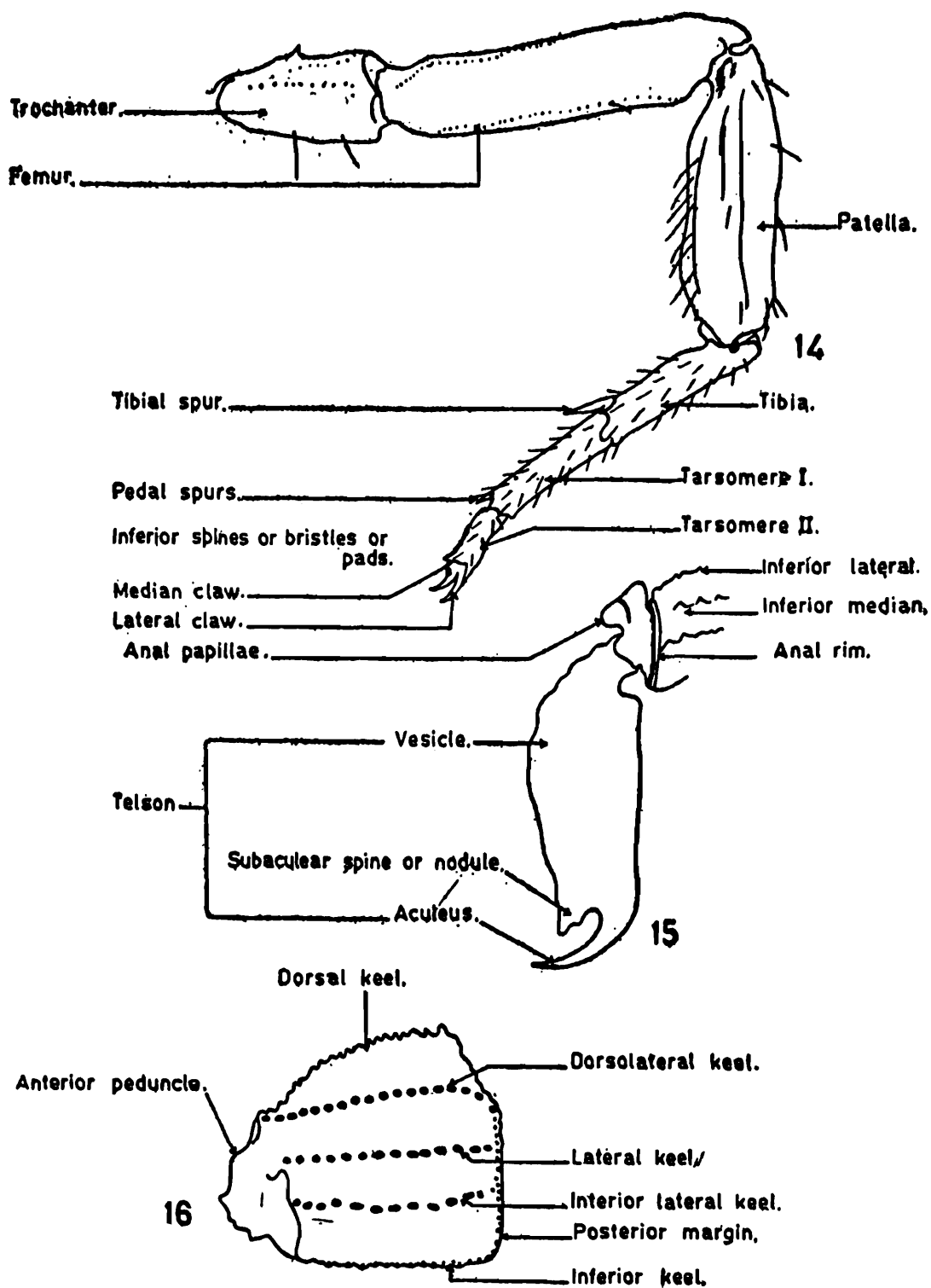
- FIGS. 10-13.** 10. Dorsal view of chelicera showing different parts. 11. Inner view of immovable finger of chelicera showing dorsal and ventral dentition. 11a. Inner view of movable finger of chelicera showing dorsal and ventral dentition. 12. Pedipalp showing different parts. 13. Movable finger of pedipalp showing arrangement of teeth.

as in text-figs. 17 to 22. Each leg is divided into the following parts from proximal to distal end : *coxa*, *trochanter*, *femur*, *patella*, *tibia*, *tarsus*; tarsus consisting of tarsomere I and tarsomere II and *pretarsus* which bears two lateral claws and a ventromedian claw as in text-fig. 14. A minute *tibial spur* is present in the tibio-tarsal connective tissues in some families of the order Scorpionida where as the *pedal spurs* situated in the connective tissue between tarsomere I and II are present in all scorpions as in text-fig. 14. These spurs are sometimes forked or have lateral subdivisions.

Pectines are tactile in function. Pectine consists of linearly arranged sclerotized structures which are termed, from the exterior to the inferior margins as marginal lamellæ, median lamellæ, subtriangular fulcra and pectinal teeth as in text-fig. 9. Ventro-anterior margin of each tooth is provided with numerous stubby bristles called *sensilla* or *sensory setae* whose number is variable. Marginal lamellæ are three in number. Median lamellæ vary in shape and numbers. Fulcra are small subtriangular sclerites situated between the base of the teeth. The teeth vary in shape and numbers. On the basis of numbers of pectinal teeth the scorpions are divided into two groups as polydont (Buthoid scorpions) and oligodont (Chatoid scorpions).

Scorpion taxonomy is based on characters such as the size and shape of the body parts, the number, size and shape of the superstructures found on these parts as well as on the markings and protruberances etc.

The structure of carapace is one of the useful characters used in taxonomy. Its general appearance, the surface features and the size and spatial relationships of the median and lateral eyes are useful for classification. The anterior margin (concave, straight or convex) is useful distinguishing character. Various carapacial measurements which are not subject to allometric developments are recommended by Stahnke (1970) : length (longitudinal distance between the anterior and posterior margins : if either margin is lobed), anterior width (the distance between the exterior margins of the first pair of lateral eyes), posterior width (maximum lateral margin to margin distance in posterior portion of carapace), first lateral eyes to median eyes (distance between adjacent



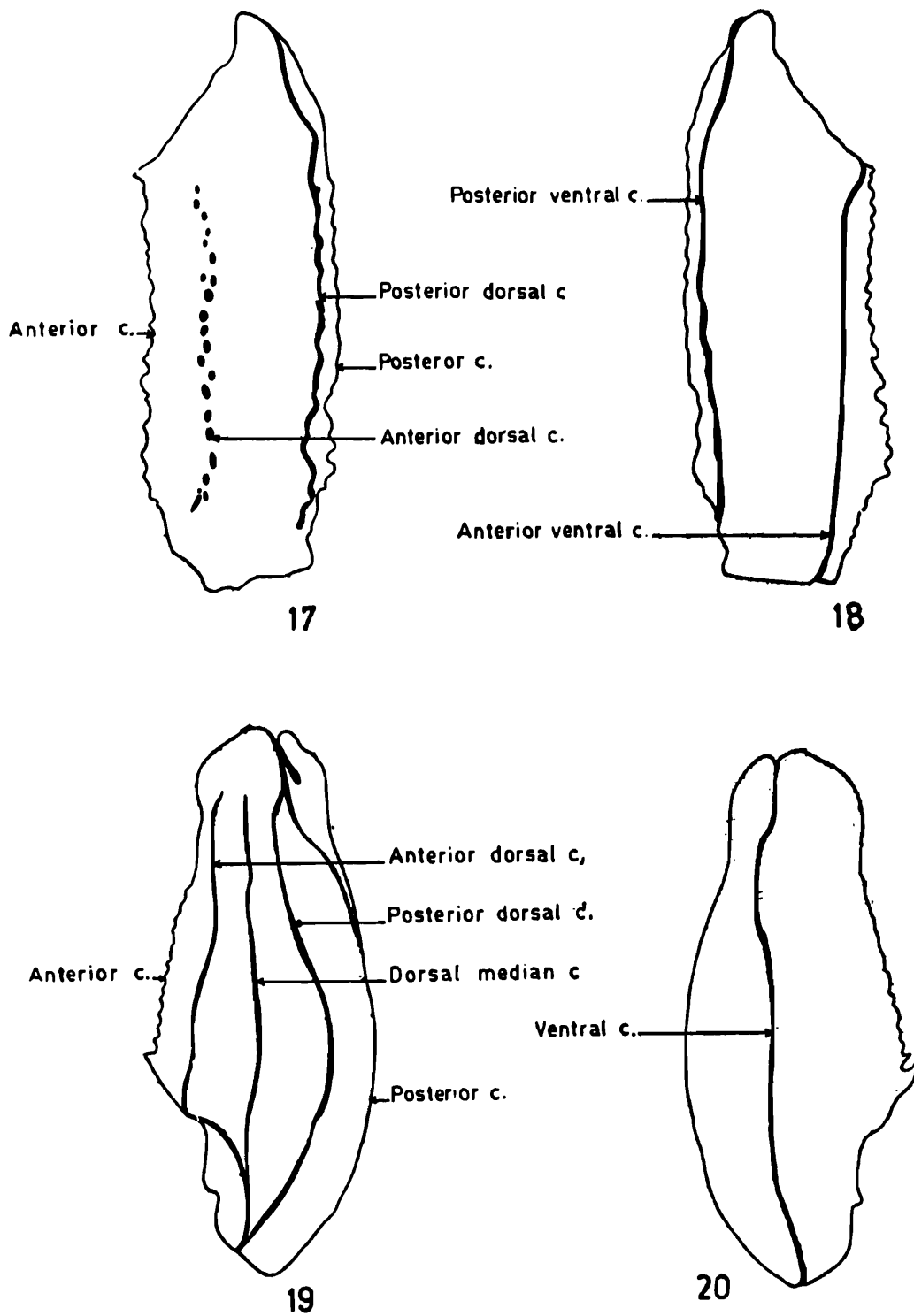
- FIGS. 14-16. 14. Legs showing different parts.
 15. Telson and posterior portion of metasomal segment V showing different parts.
 16. A typical metasomal segment showing different parts.

margins of these eyes), median eyes to anterior margin (distance from anterior margin to anterior margin of median eyes), width of median ocular tubercle (distance between the exterior margins of the median eyes). Other features of carapace useful in taxonomy are the size and density of the tubercles and the nature of furrows and carinae as in text-fig. 5.

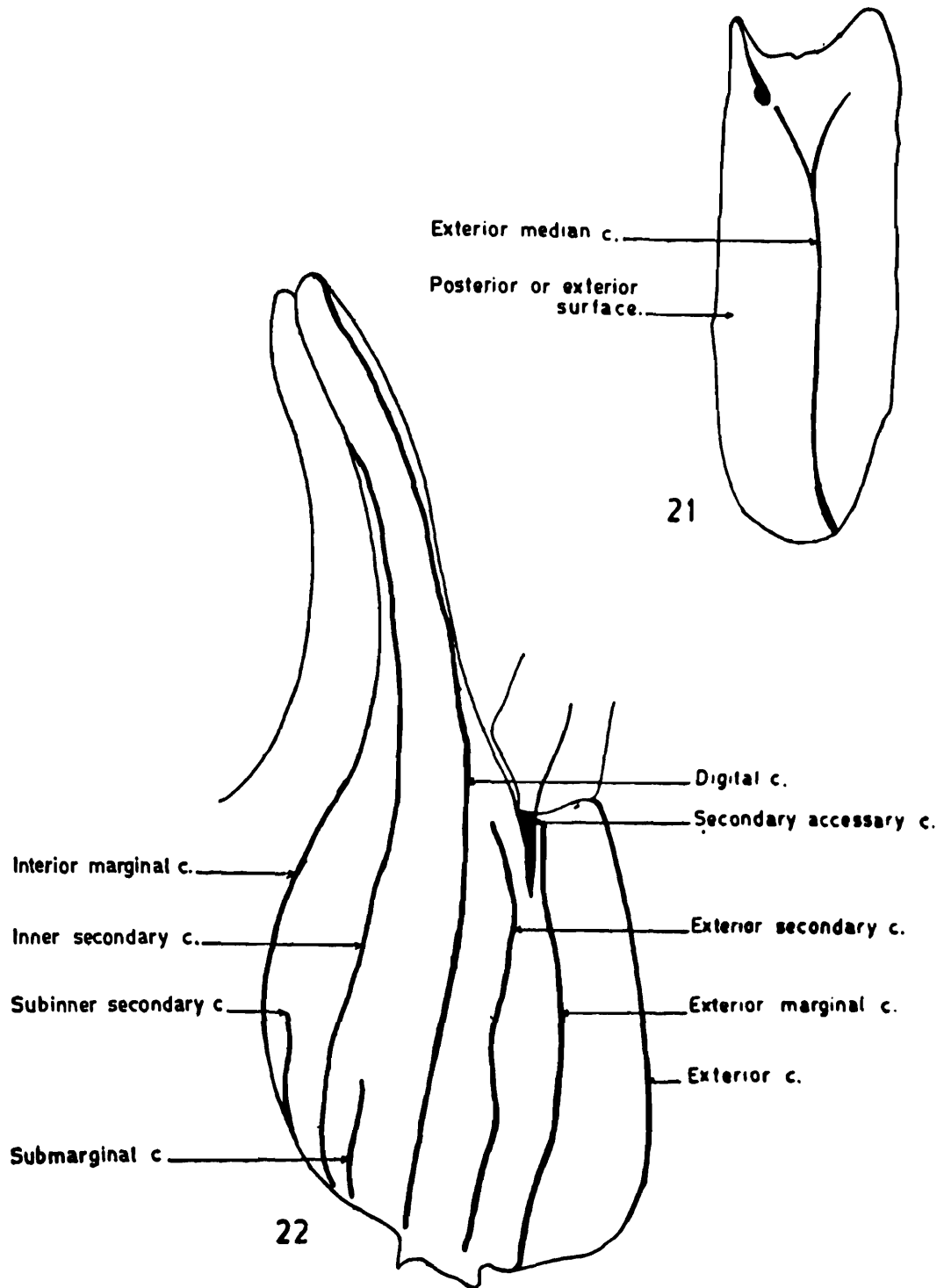
The denticles on the superior and inferior margins of chelicerae are also of some taxonomic value as in text-figs. 11, 11a.

In the pedipalps the manus of the chela has a system of ridges (keels, carinae) as in text-fig. 22; which can be used as distinguishing characters of higher taxa. The patella and femur of the pedipalp are also provided with carinae as in text-figs. 17 to 21, which are of taxonomic importance. The various measurements of pedipalp structures are : *total length* i. e. the sum total of the respective lengths of the femur, patella and tibia (coxal and trochanter lengths to be omitted because of their irregular form which would lead to error and make measurement meaningless) ; *tibia length* (shortest distance from proximal margin at point of biopatellae articulation, approximately through *trichobothria* to distal tip of finger); *manus length* (from proximal margin at the point of articulation to digital commissure); *manus width* (maximum interior to exterior marginal width); *manus thickness* (maximum distance between inferior and superior surfaces); *tarsus length* (the shortest distance from the most superior point of the tarsotibial articulation to the most distal point of the tarsus); *patella length* (the length of the non-telescoping portion along with the dorsal surface); *patella width* (maximum basic width at midway between distal and proximal margins); *femur length* (the length of the non-telescopic portion along with dorsal surface); *femur width* (maximum width at distal one-third).

The length of mesosoma can be best obtained by taking the sum of the individual tergal lengths, measured along with median line and including only the sclerotized area; this will include the pretergite. Nature of granulation and carinae on each tergite is also of great taxonomic value. Granulation and nature of carinae on last sternite can also be considered in many of the species. Size and



- FIGS 17-20.** 17. Dorsal view of femur of pedipalp showing different carinae.
 18. Ventral view of femur of pedipalp showing different carinae.
 19. Dorsal view of patella of pedipalp showing different carinae.
 20. Ventral view of patella of pedipalp showing ventral carinae.



FIGS. 21-22. 21. Outer or posterior view of patella of pedipalp showing outer carinae.
 22. Dorsal and exterior view of manus with immovable finger of pedipalp showing the arrangement of different carinae.

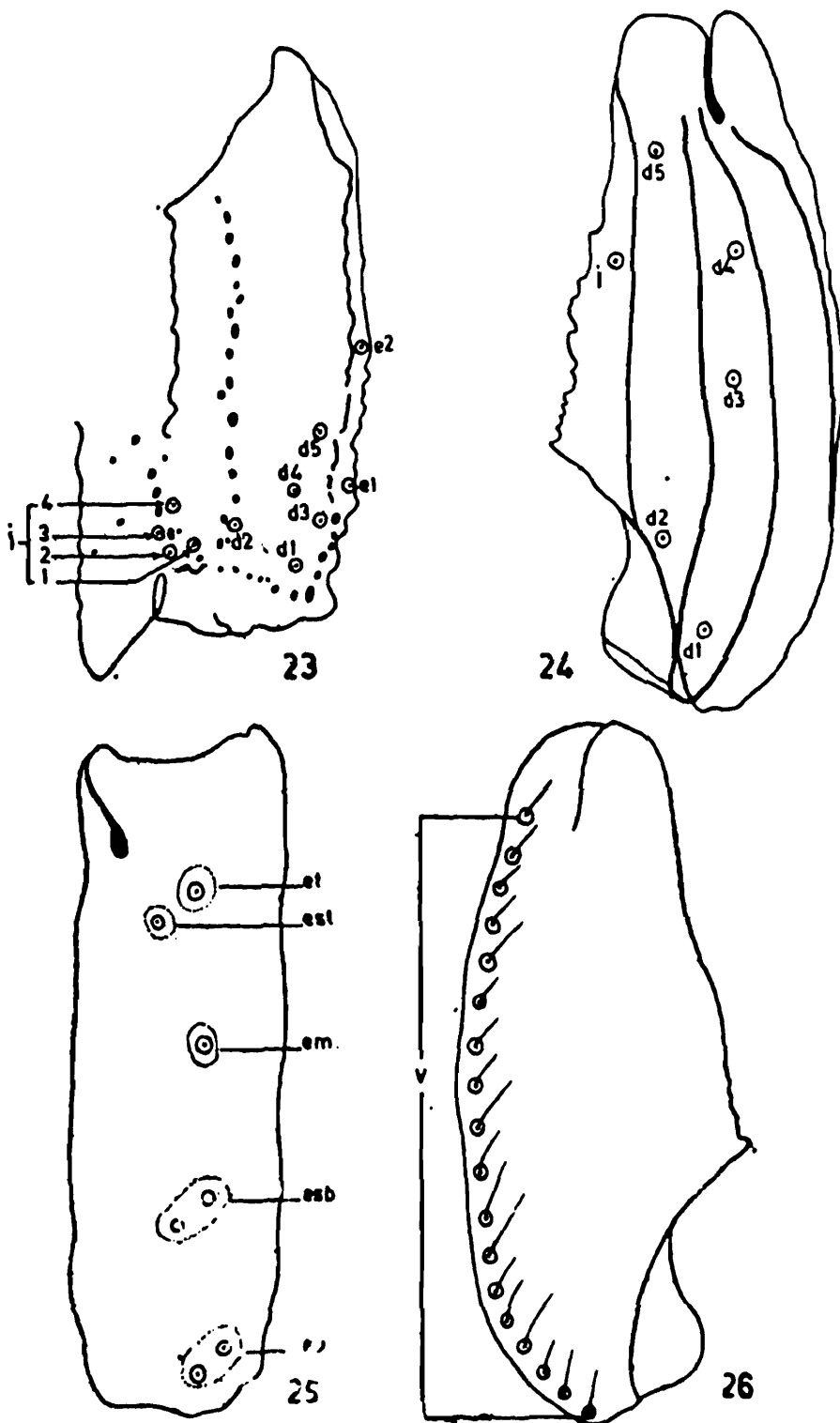
shape of book lungs is also important. The number and size of pectinal teeth and the number of sensilla on the pectinal teeth are also of taxonomic importance. The number of pectinal teeth and the sensilla are seen to vary with sex. The surface features, carinae and three dimensional variation in size of the tail i.e. *metasoma* are also of great taxonomic importance. Taxonomic variations in the telson are in the three dimensions of the vesicle, the surface features and the length, taper and curvature of the aculeus and the absence or presence of a subaculear tooth, spine or tubercle.

The accurate length of the tail (*metasoma*) is the sum total of the non-telescopic portion of each segment plus the length of telson. The length of telson is the shortest distance between the heels of the vesicle and the tip of the aculeus. Height and width measurements of each segment is taken separately. The measurements would not extend to the extremities of any large abrupt, protruberances but rather near their base.

The only movable projections of taxonomic value are the trichobothria, which are found on the *femur*, *patella* and *tibia* (chela i.e. manus and immovable finger) of the pedipalps as in text-figs. 23-27, Their numbers and the distances between each other are very important characters for specific differences. The different families have different types of trichobothrial patterns.

The family Buthidae is having the pattern of trichobothria of 'A' type on pedipalp as in text-figs. 46-50. The femur is provided with 4 internal, 5 dorsal and 2 external trichobothria as in text-fig. 46. The trichobothria *d1*, *d3* and *d4* on femur form α or β angles (Vachon 1975) which have generic importance as in text-figs. 391 and 426. The genera *Charmus* and *Stenochirus* always have α angle as in text-figs. 391, 411, 426 and 448. The posterior or outer surface of patella is having *eb*, *esb*, *em*, *est* and *et* groups

FIGS. 23-26. 23. Dorsal, interior and exterior view of femur of pedipalp showing the arrangements of dorsal (d), interior (i) and exterior (e) trichobothria. 24. Dorsal and interior view of patella of pedipalp showing the arrangements of dorsal (d) and interior (i) trichobothria.



25. Outer or exterior view of patella of pedipalp showing the arrangements of exterior basal (ob), exterior sub-basal (esb), exterior median (em), exterior sub-terminal (est) and exterior terminal (et) trichobothria.
26. Ventral view of patella of pedipalp showing arrangements of ventral (v) trichobothria.

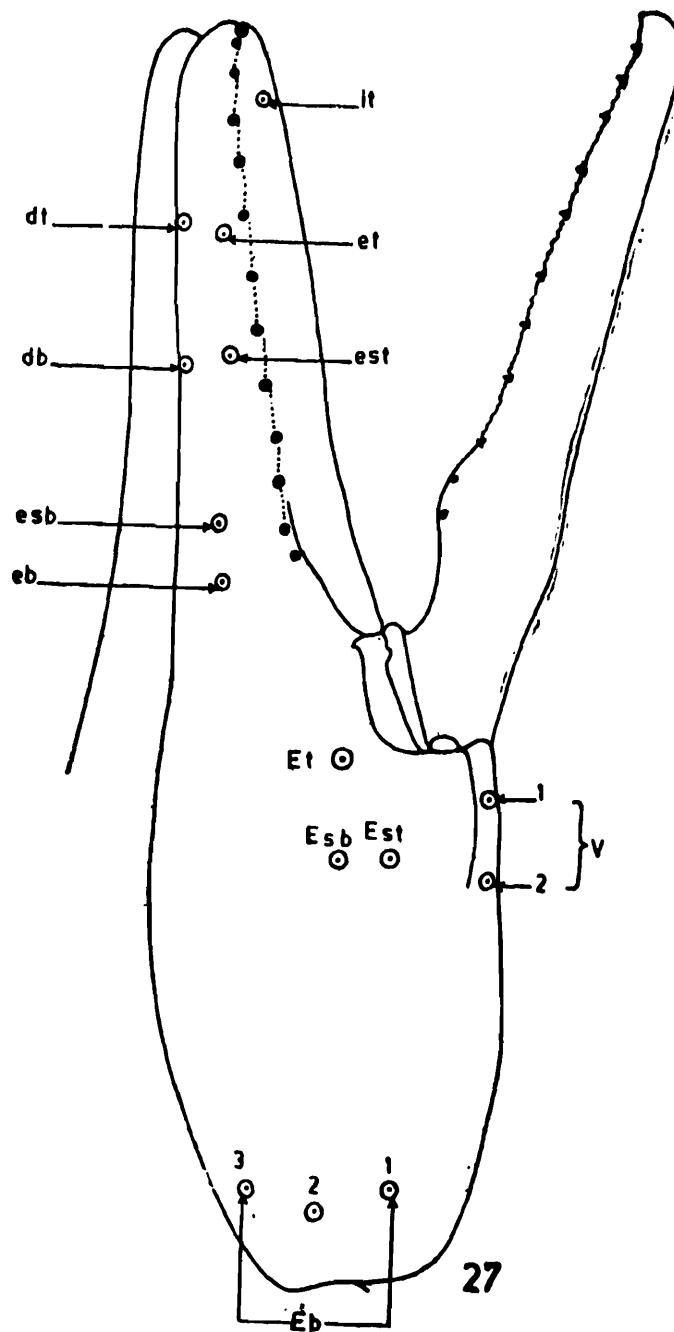


FIG. 27. Exterior dorsal and ventral view of manus and immovable finger of pedipalp showing Exterior basal (Eb), Exterior sub-basal (Esb), Exterior sub-terminal (Est), Exterior terminal (Et) and ventral (v) trichobothria on manus and exterior basal (eb), exterior sub-basal (esb) dorsal basal (db), dorsal terminal (dt), exterior subterminal (est), exterior terminal (et) and interior terminal (it) trichobothria on immovable finger.

of trichobothria as in text-fig. 48, which are important to determine some species. This family never possesses any trichobothria on ventral surface of patella. The trichobothria *Eb*, *Esb*, *Est* and *Et* on manus as in text-fig. 49 are important in differentiating some genera. Manus is always provided with two (V_1 and V_2) ventral trichobothria as in text-fig. 50. The immovable finger is provided with *eb*, *esb*, *et*, *est*, *db*, *dt* and *it* trichobothria in which *it* is always placed at the tip of immovable finger as in text-figs. 49-50 and relative positions of other trichobothria are used in determining the different genera and sub-genera.

The family Chaerilidae possesses the 'B' type of trichobothria on pedipalp as in text-figs. 51-56. The femur is having 1 internal, 4 dorsal and 4 external trichobothria as in text-fig. 51. Patella is provided with 2 internal, 2 dorsal and 3 ventral trichobothria as in text-figs. 52. and 54. The posterior or outer surface is provided with *eb*, *esb*, *em*, *est* and *et* groups of trichobothria as in text-fig. 53. In this family the manus is provided with 1-3 *Eb* at base, *Est* and *Et* on distal portion but *Esb* is totally absent as in text-fig. 55. Ventral surface is having only one ventral trichobothria and *ib* is a new trichobothria pertaining to this family as in text-fig. 56. The trichobothria on immovable finger show different pattern where *it* is almost at the base of finger; *eb* and *esb* are on the very distal portion of manus; *db*, *dt* and *est*, *et* are placed on immovable finger as in text-figs. 55 and 56 but their positions differ from that of type A.

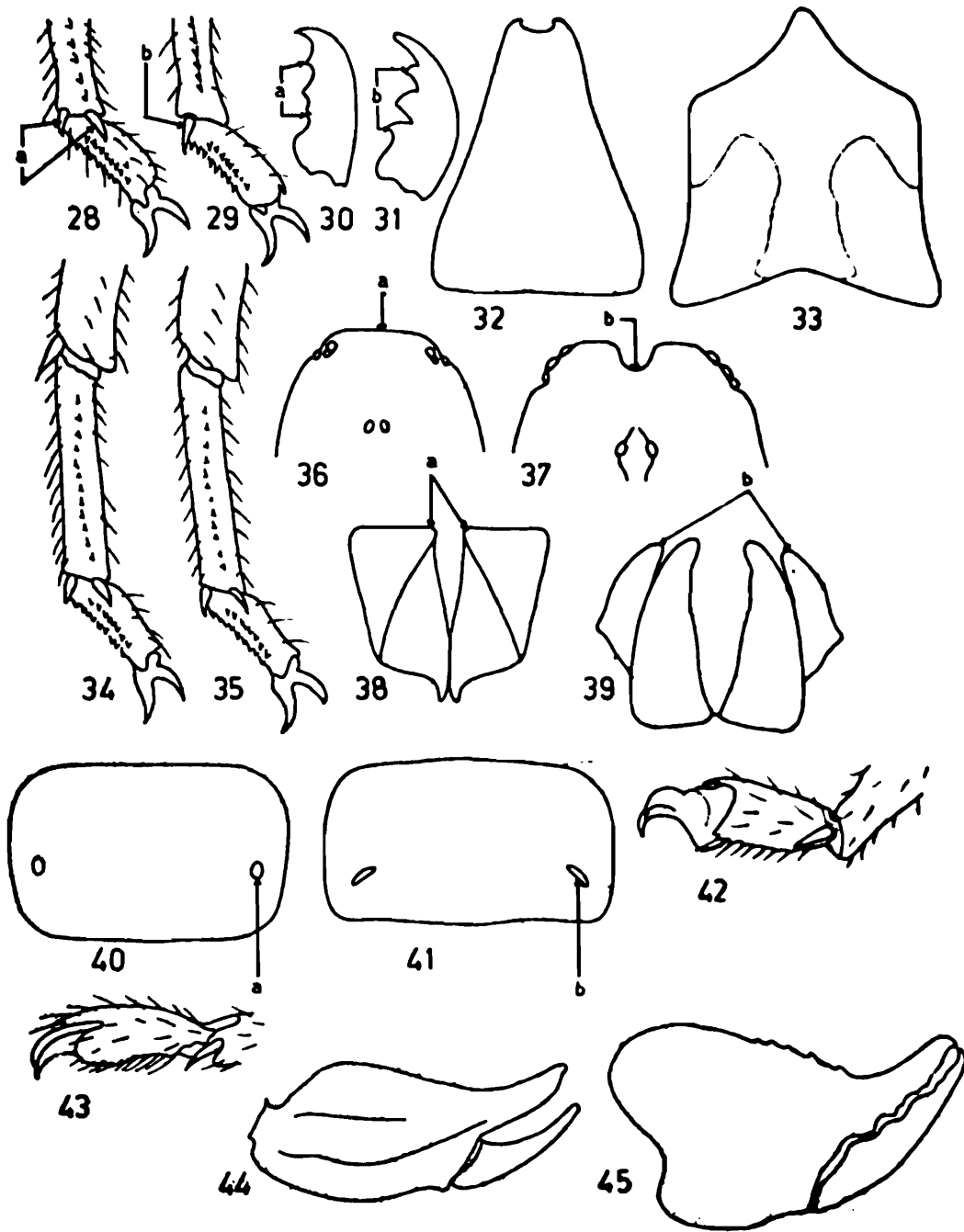
The three Indian families namely Vaejovidae, Ischnuridae and Scorpionidae possess the 'C' type of trichobothrial pattern on pedipalp, as in text-figs. 57-62. This pattern generally consists of 1 internal, 1 dorsal and 1 exterior trichobothria on femur as in text-fig. 57; 2 dorsal, 1 internal and 3 to 18 trichobothria on ventral surface of patella (in text-fig. 60 only 13 ventral trichobothria are shown). The posterior or outer surface is provided with *eb*, *esb*, *em*, *est* and *et* groups of trichobothria but number of trichobothria in each group vary in Vaejovidae and other two families. The most important group is *est* which sometimes determines the generic, sub-generic and on few occasion the species status. The number of ventral trichobothria is always three on

patella in families Ischnuridae and Scorpionidae but the number of ventral trichobothria are more than six in Vaejovidae. The number of trichobothria on manus and immovable finger are almost same but the positions differ from family to family.

KEY TO THE FAMILIES OF INDIAN SCORPIONS

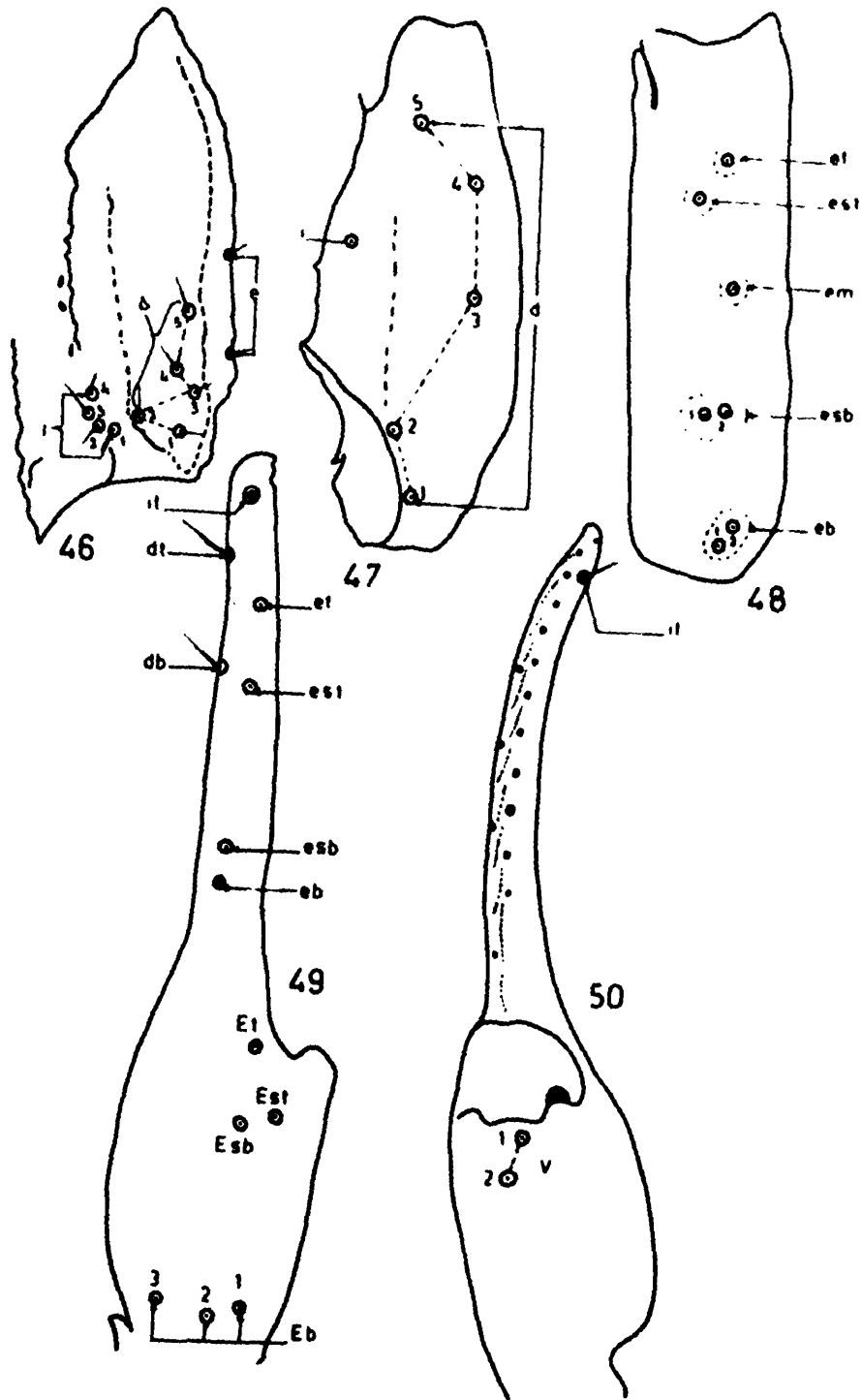
- 1. Legs furnished with two pedal spurs, (Fig. 28a). Trichobothrial pattern on pedipalp is A, B or C type (Figs. 46-50; 51-56 and 57-62).2

FIGS. 28-45. 28. Distal portion of tarsomere I with a pair of ped. spurs (a) of families Buthidae, Chaerilidae and Vaejovidae. 29. Distal portion of tarsomere I with single pedal spur (b) of families Ischnuridae and Scorpionidae. 30. Dorsal view of dorsal arm of movable finger of chelicera showing typical Buthid (a) dentition. 31. Dorsal view of dorsal arm of movable finger of chelicera showing dentition (b) for other families. 32. Ventral view of cephalothoracic sternum of family Buthidae. 33. Ventral view of cephalothoracic sternum of family Chaerilidae. 34. Lateral view of 4th leg showing tibial spur of family Buthidae. 35. Lateral view of 4th leg showing without tibial spur of family Chaerilidae. 36. Dorsal view of carapace of family Chaerilidae showing straight anterior margin (a) and lateral eyes with an amber colour spot. 37. Dorsal view of carapace of family Vaejovidae showing anterior margin with a median notch (b) and lateral eyes without an amber colour spot. 38. Ventral view of coxae of first pair of legs of family Chaerilidae showing expanded anteriorly (a). 39. Ventral view of coxae of first pair of legs of family Vaejovidae narrowed in front (b). 40. Mesosomal sternite of family Chaerilidae showing circular stigmata (a).

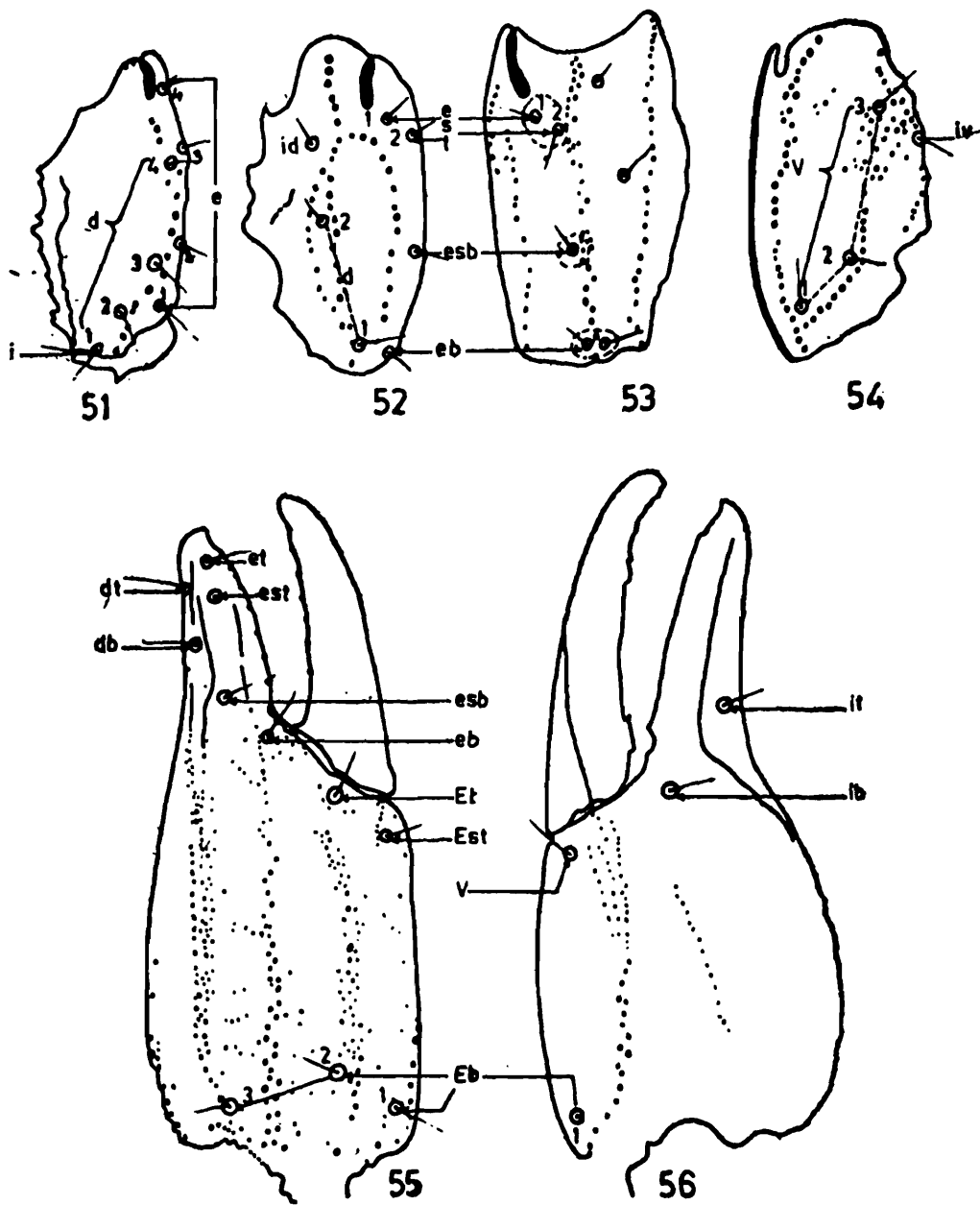


- 41. Mesosomal sternite of family Vaejovidae showing slit like stigmata (b).
- 42. Lateral view of Tarsomere II of leg of family Ischnuridae showing lateral edge not overlapping and forming right angle with base of claw (a).
- 43. Lateral view of Tarsomere II of leg of family Scorpionidae showing lateral edge overlapping and forming a very acute angle with base of claw (b).
- 44. Manus or hand of pedipalp flat in Ischnuridae.
- 45. Manus or hand of pedipalp not flat in Scorpionidae.

- Legs furnished with single pedal spur (Fig. 29b). Trichobothrial pattern on pedipalp always is C type (Figs. 57-62) (but number of trichobothria on patella differ). 4
2. Dorsal arm of movable finger of chelicerae furnished with four minute teeth on inner margin (Fig. 30a). Sternum generally triangular and narrowed in front (Fig. 32), III and IV pairs of legs generally provided with a tibial spur (Fig. 34). Trichobothrial pattern is A type (Figs. 46-50) **BUTHIDAE**
- Dorsal arm of movable finger of chelicera furnished with two or three minute teeth on inner margin (Fig. 31b). Sternum broad and pentagonal (Fig. 33), III and IV pairs, of legs without tibial spur (Fig. 35). Trichobothrial pattern is B or C type (Figs. 51-56 and 57-62).....3
3. Anterior margin of carapace straight (Fig. 36a) two pairs of lateral eyes furnished with an amber-coloured spot below (Fig. 36); Anterior border of the coxa of 1st pair of legs expanded anteriorly and truncated (Fig. 38a). Stigmata of book lungs circular (Fig. 40). Trichobothrial pattern is 'B' type (Fig. 51-56). **CHAERILIDAE**
- Anterior margin of carapace deeply notched in middle portion (Fig. 73b). Three or four pairs of lateral eyes without an amber-coloured spot below (Fig. 37). Anterior border of the coxa of I pair of legs narrow in front (Fig. 39b). Stigmata of book lungs elongated and slit like (Fig. 41). Trichobothrial pattern is C type (Figs. 57-62). **VAEJOVIDAE**

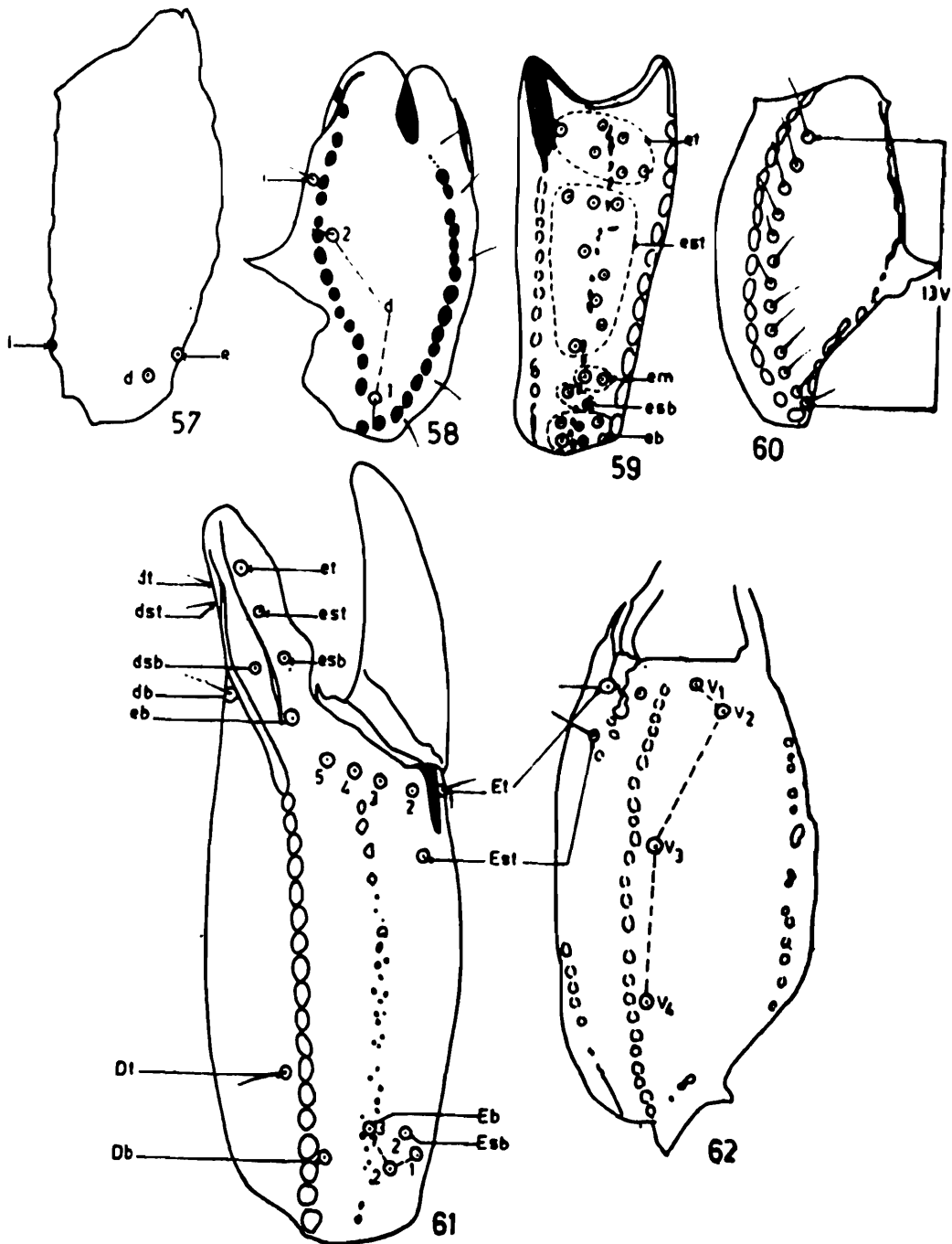


FIGS. 46-50. 46. Femur of 'A' type showing dorsal, inner and exterior trichobothria. 47. Patella of 'A' type showing dorsal and inner trichobothria. 48. Patella of "A" type showing exterior trichobothria. 49. Manus and immovable finger of "A" type showing different trichobothria. 50. Manus of 'A' type showing ventral trichobothria.



FIGS. 51-56.

51. Femur of "B" type showing different trichobothria.
52. Patella of 'B' type showing dorsal and inner trichobothria.
53. Patella of "B" type showing exterior trichobothria.
54. Patella of "B" type showing ventral trichobothria.
55. Manus and immovable finger of "B" type showing different trichobothria.
56. Manus of "B" type showing different trichobothria.



FIGS. 57-62.

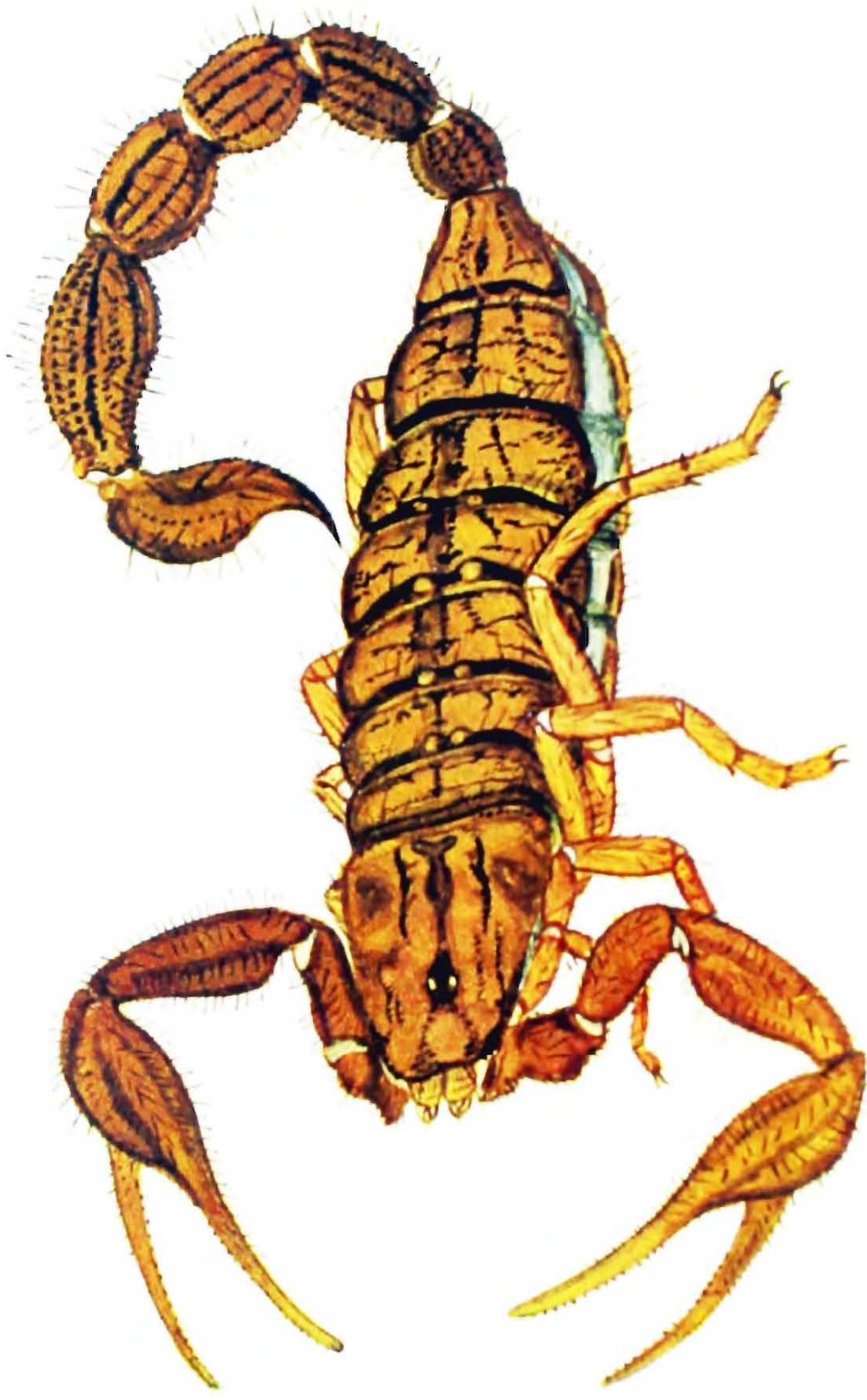
- 57. Femur of 'C' type showing different trichobothria.
- 58. Patella of 'C' type showing dorsal and inner trichobothria.
- 59. Patella of 'C' type showing exterior trichobothria.
- 60. Patella of 'C' type showing ventral trichobothria.
- 61. Manus and immovable finger of 'C' type showing different trichobothria.
- 62. Manus of 'C' type showing different trichobothria.

4. Hands of pedipalp flat (Fig. 44); tail weak and compressed. Distal lateral edge of tarsi of the legs not produced into a lobate prominence and overlapping the base of the claw but straight and forming a right angle with the claw-lobe (Fig. 42a). ISCHNURIDAE
- Hands of pedipalp not flat (Fig. 45); tail strong and not compressed. Distal lateral edge of the tarsi of legs produced into a rounded lobe, overlapping the base of claw and forming a very acute angle with base of the claw-lobe (Fig. 43b). SCORPIONIDAE

Family I. BUTHIDAE

1879. Buthidae Simon, *Les arachnides de France*, 7.
1881. Buthidae : Karsch, *Berl. ent. Z.*, 25 : 89-91.
1900. Buthidae : Pocock, *Fauna Brit. India, Arachn.*, : 5-99.
1910. Buthidae : Simon, *Bull. Soc. ent. Egypte*, : 57-87.
1943. Buthidae : Rower, *Senckenberg. biol.*, 26 (4) : 205-244.
1952. Buthidae : Vachon, *Etudes sur les scorpions*, : 1-482.
1955. Buthidae : Lawrence, *S. Afr. Anim. Life*, 1 : 152-262.
1969. Buthidae : Vachon, *Senckenberg. biol.*, 50(5-6) : 417-420.
1972. Buthidae : Stahnke, *Ent. News*, 83 : 121-133.
1973. Buthidae : Probst, *Acta trop.* 30 (4) : 213.
1973. Buthidae : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 3 ser zool 104(140) : 857-958.
1974. Buthidae : Stahnke, *Bio. Science*, 339.
1977. Buthidae : Francke, *Hom. Univ. Nae. Agraria*, 20(1) : 73-76.

Characters : The cephalothoracic sternum subtriangular. All legs are furnished with a pair of pedal spurs which sometimes have small lateral spurs. In many genera of this family the tibial spur is present on III and IV legs. Three to five pairs of lateral eyes, often provided with ocular tubercles. Inner margin of dorsal arm of movable finger of chelicera has four small denticles, second denticle generally the larger than the other and the proximal two



Family BUTHIDAE

Mesobuthus tamulus tamulus (Fabr.) ♀

are very small. Immobile finger of chelicera provided below with one or two small teeth. Pedipalps with slender hands and chelae comparatively narrow. Movable finger of chela provided with minute dentitions, sometimes imbricated. Femur of pedipalp provided with 11 trichobothria (4 interior, 5 dorsal and 2 exterior) as in text-fig. 23. Patella with 13 trichobothria (1 interior, 5 dorsal, 7 exterior) as in text-figs. 24 & 25. Manus or hand with 8 trichobothria and immobile finger with 7 trichobothria as in text-fig. 27. The ventral surface of patella of pedipalp is without trichobothria. Pectines generally long and provided with numerous teeth, polydont (Sreenivasa Reddy, 1959). Genital operculi divided into two but the sclerites almost fused in case of female. The eggs comparatively large and rich in the yolk content. Lamellae of book lungs reticulate. The poison glands are plicate. A hasty retreat is followed after a quick flick of the aculeus in defensive stinging behaviour. All scorpions of this family contain highly toxic venom. These scorpions are cryptophiles in nature i. e. they do not use their legs for digging.

Type genus : *Buthus* Leach.

Distribution : Temperate, Tropical and Neotropical regions of the world.

Key to the sub-families of the family Buthidae

1. III and IV pair of legs always furnished
with a tibial spur. *Buthinae*
III and IV pair of legs without tibial spur *Centruurinae*

Subfamily I. BUTHINAE

1896. *Buthinae* Pocock, *Ann. Mag. nat. Hist.*, 17(6) : 428.
1899. *Buthinae* : Kraepelin, *Tierr. Scorp etc.*, 1 6.
1900. *Buthinae* : Pocock, *Fauna Brit. India Arachn.*, : 12.

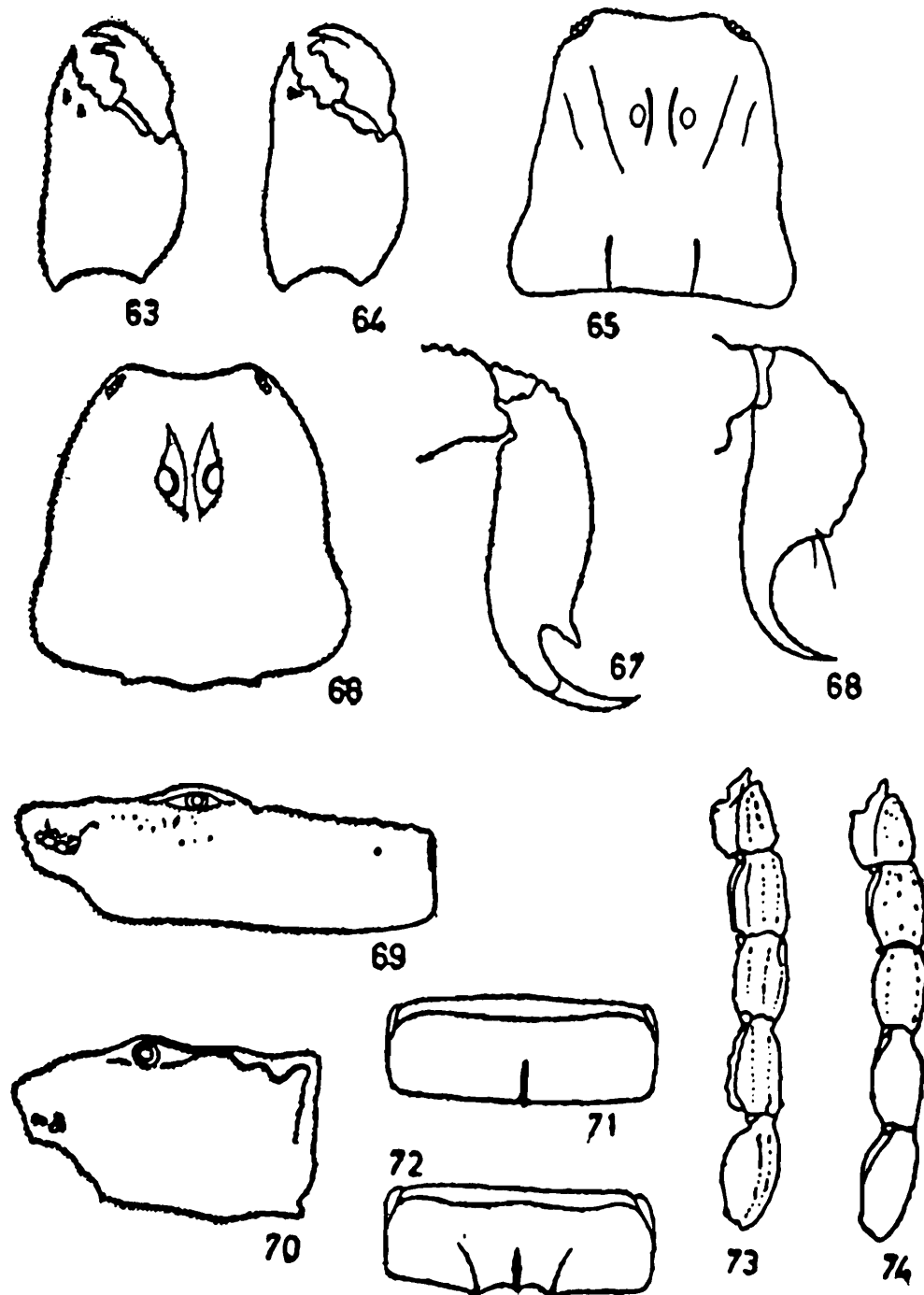
Characters: Same as family characters.

Distribution: Same as family distribution.

Key to the genera of the sub-family Buthinae

1. Immovable finger of chelicera furnished below with one minute tooth (Fig. 64). 2
 Immovable finger of chelicera always furnished below with two minute teeth (Fig. 63). 3
2. Carapace with posterior median or lateral carinae (Fig. 65). vesicle elongated and provided with strong triangular subaculear spine (Fig. 67). *Lychas*
 Carapace without carinae (Fig. 66) vesicle never provided with subaculear spine but a weak subaculear nodule (Fig. 68). *Hemibuthus*
3. Interocular area of carapace horizontal (Fig. 69). 4
 Interocular area of carapace sloping anteriorly (Fig. 70). *Orthochirus*
4. Mesosomal tergites monocarinated (Fig. 71), anterior caudal segments carinated on ventral surface but smooth without carinae on posterior segments (Fig. 74). Dentition on tarsus of pedipalp imbricated (Fig. 75). 5

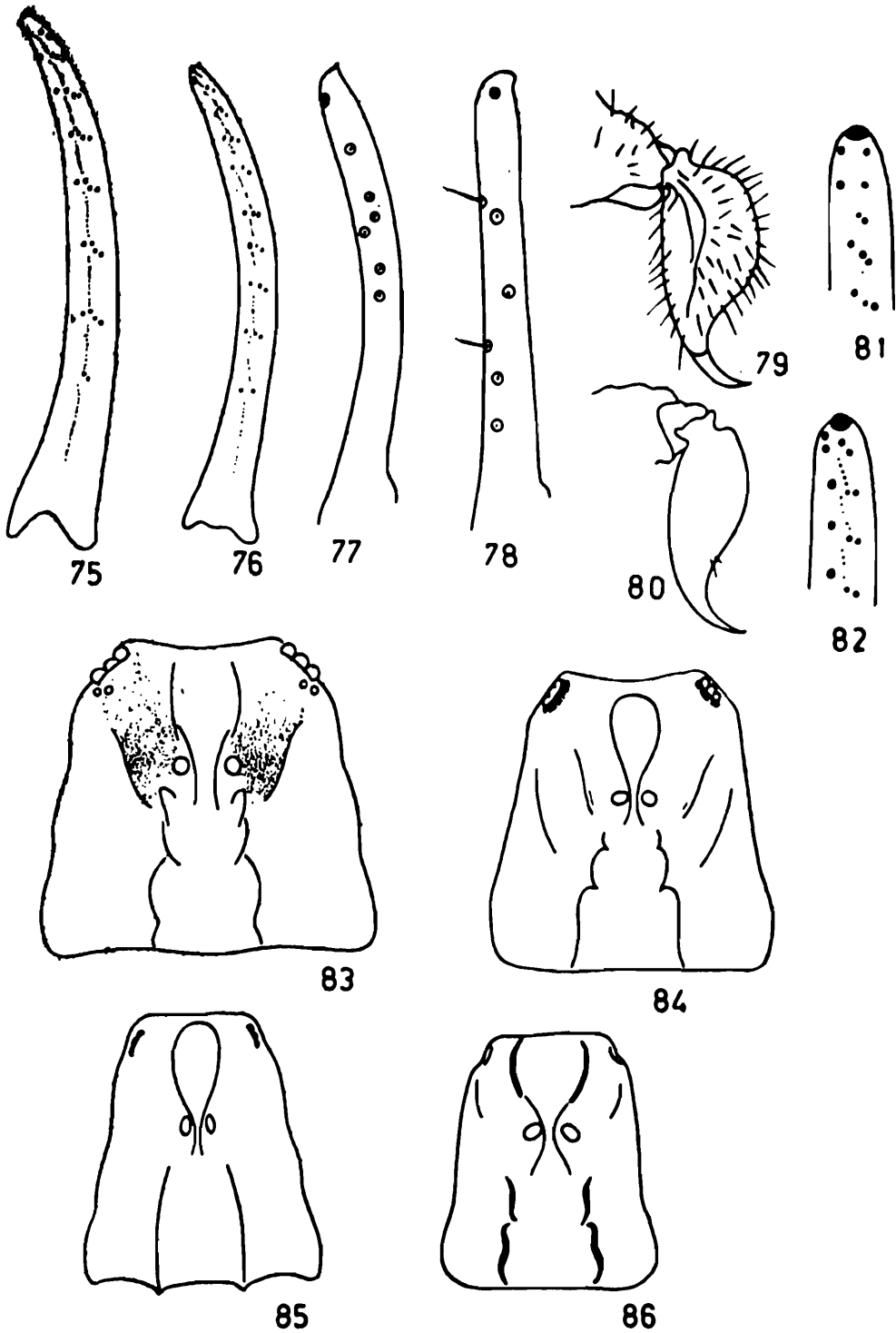
FIGS. 63-74. 63. Ventral view of chelicera showing two teeth on immovable finger. 64. Ventral view of chelicera showing one tooth on immovable finger. 65. Carapace of *Lychas*. 66. Carapace of *Hemibuthus*. 67. Lateral view of telson of *Lychas*. 68. Lateral view of telson of *Hemibuthus*. 69. Lateral view of carapace showing horizontal interocular area.



- 70 Lateral view of carapace of *Orthochirus* showing anteriorly sloping interocular areas.
71. Dorsal view of monocarinate mesosomal tergite.
72. Dorsal view of tricarinate mesosomal tergite.
73. Lateral view of metasoma (I-V) showing carinated segments.
74. Lateral view of metasoma (I-V) very weakly carinated on segments I-III and smooth on IV and V segments.

- Mesosomal tergites tricarinated
(Fig. 72), all caudal segments carinated
(Fig. 73). Dentition on tarsus of pedipalp
non-imbricated (Fig. 76). 6
5. Trichobothria *esb* and *eb* on pedipalp
tarsus placed on proximal portion from
its base (Fig. 77), vesicle of the telson
round with numerous hairs (Fig. 79) *Charmus*
- Trichobothria *esb* and *eb* on pedipalp
tarsus placed on distal portion from its
base (Fig. 78), vesicle of the telson
slightly elongated and not round
(Fig. 80). *Stenochirus*
6. Pedipalp tarsus provided always with
four linear distal granules just proximal
to terminal tooth (except in *Vachonus*
g. nov. (Fig. 81). 7
- Pedipalp tarsus provided with three or
four non-linear granules or a row of
distal granules just proximal to terminal
tooth (Fig. 82). 9

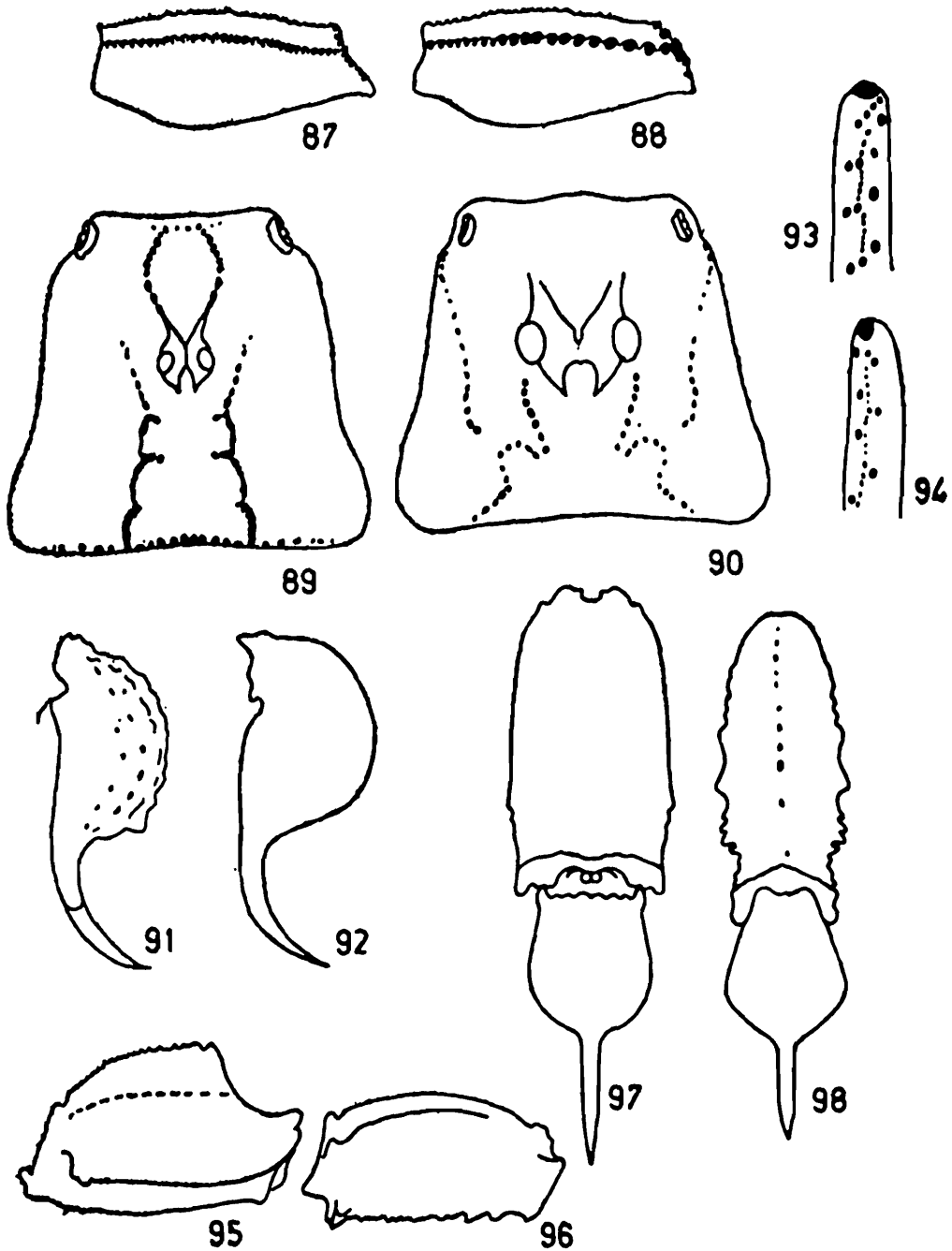
FIGS. 75-86. 75. Movable finger of pedipalp showing imbricated teeth.
76. Movable finger of pedipalp showing non-imbricated teeth.
77. Immovable finger of pedipalp of *Stenochirus* showing positions of
different trichobothria. 78. Immovable finger of pedipalp of *Charmus*
showing positions of different trichobothria. 79. Lateral view of telson
of *Charmus*. 80. Lateral view of telson of *Stenochirus*. 81. Tip of
movable finger of pedipalp showing linear dentition proximal to the apical
tooth. 82. Tip of movable finger of pedipalp showing non-linear dentition
proximal to the apical tooth. 83. Carapace of *Buthotus* showing lateral
eyes large and elevated lateral ocular tubercles.



- 84. Carapace showing lateral eyes smaller and non-elevated lateral ocular tubercles.
- 85. Carapace of *Compsobuthus* showing central median and posterior median carinae.
- 86. Carapace of *Vachonus* g. nov. showing central median and posterior median carinae.

7. Lateral eyes big, bulging and the lateral ocular tubercles elevated (Fig. 83). *Buthotus*
- Lateral eyes small, not bulging, the lateral ocular tubercles not elevated (Fig. 84). **■**
8. Posterior median carinae of carapace joining with central median carinae and forming a single straight carina, strongly spiniform posteriorly (Fig. 85). Inferior lateral carinae of V caudal segment evenly granular (Fig. 87)..... *Compsobuthus*
- Posterior median carinae of carapace joining with the central median carinae but neither straight nor spiniform posteriorly (Fig. 86). Inferior lateral carinae of V caudal segment unevenly granular (increasing in size posteriorly) (Fig. 88). *Vachonus*
9. Lateral carinae of carapace very weak sometimes not developed (Fig. 89); Posterior median and central median carinae forming lyre-form configuration,

FIGS. 87-98. 87. Lateral view of metasomal segment V of *Compsobuthus* showing inferior lateral carinae evenly granular. 88. Lateral view of metasomal segment V of *Vachonus* showing inferior lateral carinae unevenly granular and lobate on posterior portion. 89. Carapace of *Mesobuthus* showing lyre-form configuration of posterior and central median carinae. 90. Carapace showing nonlyre-form configuration of posterior and central median carinae. 91. Lateral view of Telson of *Mesobuthus*. 92. Lateral view of Telson showing smooth vesicle. 93. Tip of movable finger of pedipalp of *Androctonus* showing four non-linear teeth. 94. Tip of movable finger of pedipalp of *Odontobuthus* showing three non-linear teeth.



95. Lateral view of metasomal segment III of *Androctonus* showing inferior carinae without tuberculate granules.
96. Lateral view of metasomal segment III of *Odontobuthus* showing inferior carinae with tuberculate granules.
97. Ventral view of Telson and metasomal segment V of *Androctonus*.
98. Ventral view of telson and metasomal segment V of *Odontobuthus*.

- pedipalp tarsus always furnished with four non-linear granules just proximal to terminal tooth (Fig. 82); ventral surface of vesicle granular and always provided with a subaculear nodule (Fig. 91). *Mesobuthus*
- Lateral carinae of carapace granular, well developed, sometimes upto lateral ocular tubercles (Fig 90); pedipalp of tarsus furnished with a row of three to four granules just proximal to terminal tooth (Figs. 93, 94). Ventral surface of vesicle almost smooth and never provided with a subaculear nodule (Fig. 92).10
10. Width of vesicle always less than the width of posterior end of V caudal segment (Fig. 97). IV caudal segment with strong elevated dorsal carinae and without ventral denticular tubercles on anterior portion (Fig. 95).*Androctonus*
- Width of vesicle almost as wide as the posterior end of V caudal segment (Fig. 98). IV caudal segment without elevated dorsal carinae and with four ventral denticular tubercles on anterior portion (Fig. 96). *Odontobuthus*

Genus 1. *Lychas* C. Koch.

1845. *Lychas* Koch, *Arachn.*, 12 : 3.
 1891. *Archisometrus* : Kraepelin, *Jb. Hamb. wiss. Anst.*, 8 : 217
 1899. *Archisometrus* : Kraepelin, *Tierr. Scor. etc.*, : 41.
 1900. *Lychas* : Pocock, *Fauna Brit. India, Arachn.*, 35.
 1972. *Lychas* : Stahnke, *Ent. News.* 83 : 128.

Characters : Carapace with weak posterior and lateral carinae. Interocular area horizontal. Mesosomal tergites with two or three carinae. Cephalothoracic sternum triangular and longer than wide. Metasomal segments carinated and vesicle with a conspicuous,

strong, triangular subaculear spine below the vesicle. Inferior surface of cheliceral fixed finger with one tooth. Dentition on fingers of pedipalp non-imbricated (Fig. 105). Trichobothria *d1*, *d3* and *d4* on femur form β angle (Fig. 110).

Type species : *Lychas scutilus* Koch.

Distribution : INDIA, BURMA, MALAYA, PHILIPPINES, THAILAND, CHINA, AUSTRALIA; EAST, WEST AND SOUTH AFRICA.

Discussion : The revisionary studies of type specimens of the species under this genus have revealed that they belong to three subgeneric groups. This can be established on the studies of trichobothrial patterns on immovable finger of pedipalp. Special importance can be given to the different positions of *et* and *est* to *dt* and *db* on immovable fingers. The subgeneric names have been derived from the relative positions of above trichobothria. The subgenus *Distotrichus* has *db* and *dt* placed distal to *et* (Fig. 113). The subgenus *Alterotrichus* has an alternative positions of *est* and *db* to *et* and *dt* respectively (fig.152). The subgenus *Endotrichus* has *est* and *et* placed between *db* and *dt* (Fig. 200).

Key to the subgenera of the genus Lychas.

1. *db* is proximal to *et* or *est* (Fig. 152). 2
 db is distal to *et* (Fig. 113). *Distotrichus*
2. *db* is proximal to *et* only (Fig. 169) *Alterotrichus*
 db is proximal to *est* (Fig. 200). *Endotrichus*

Sub-genus i. *Distotrichus* sg. nov.

Characters : Trichobothria *dt* and *db* are place at the tip of immovable finger, distal to *et*.

Key to the species of sub-genus Distotrichus sg. nov.

1. Median eyes situated anteriorly in the ratio
 1:2. (Fig 100). Pectines 4.25 times as
 wide, Pectinal teeth 16-17 (Fig. 106). *nigristernis*

Median eyes situated anteriorly in the ratio 1: 2.5 (Fig. 115), pectines 3.5 times as wide; pectinal teeth 12-13 (Fig. 120). *gravelyi*

1. *Lychas (Distotrichus) nigristernis* (Pocock)
(Figs. 99-114)

1899. *Archisometrus nigristernis* Pocock, *J. Bombay nat Hist. Soc.*, 12 : 265.

1900. *Lychas nigristernis* : Pocock, *Fauna Brit. India, Arachn.*, : 38.

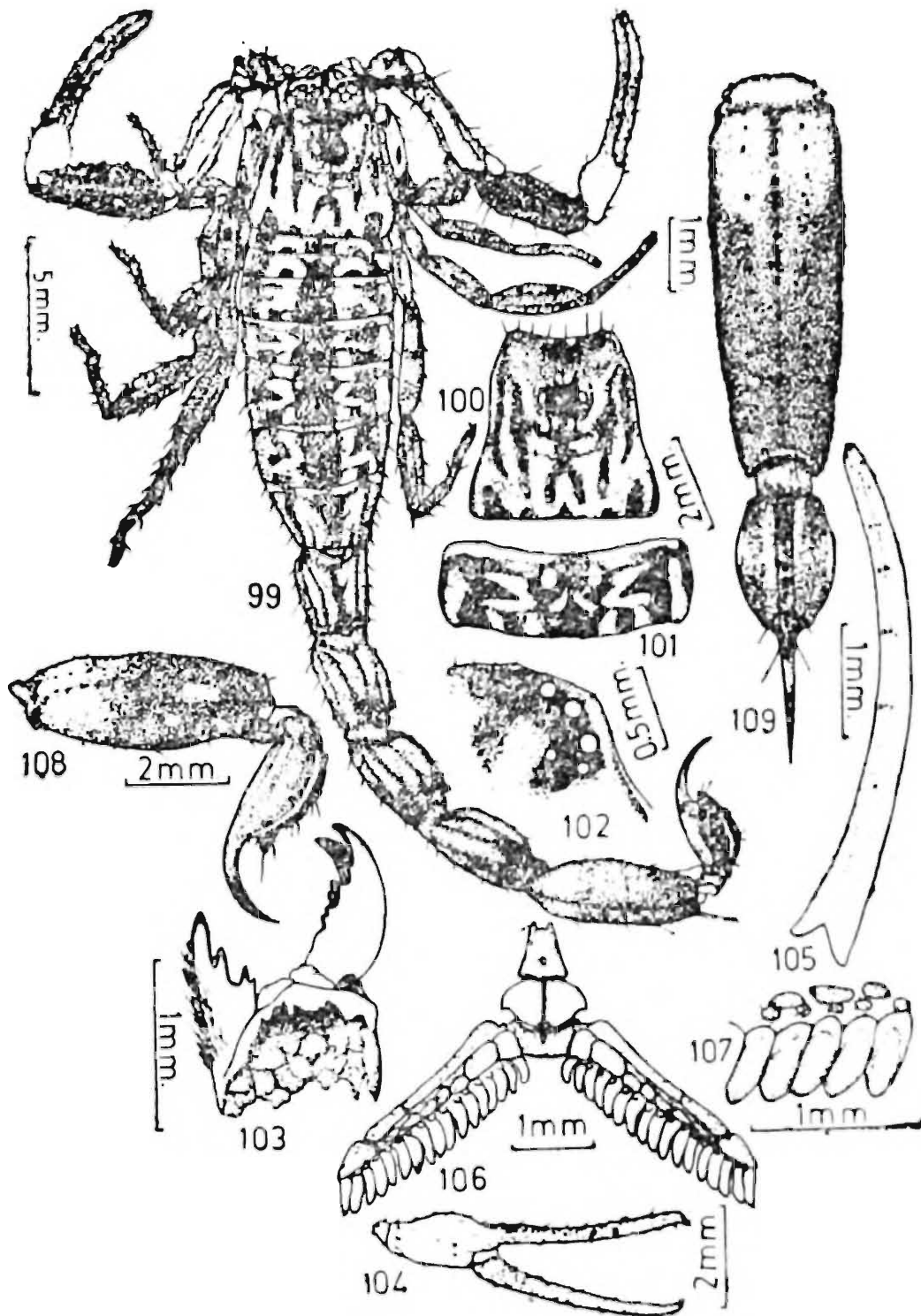
General : Female scorpion of medium body size and yellowish body colour with black spots. Ocular tubercles and interocular area black. Mesosomal tergites with six black and five yellowish spots, but the yellowish spots large and prominent. Metasomal segments with few black spots. Chelicera blackish, with dark brown fingers. Pedipalp with spotted femur, entirely black patella, hand yellow but fingers darker. Legs with all segments spotted with dark spots as in text-fig. 99. Sternites yellowish, except last sternite darker and provided with two pairs of granular carinae. Entire body surface finely and coarsely granular. Telson small with long, sharp aculeus and a strong subaculear spine. Dentition on movable finger of pedipalp non-imbricated. Pectines well developed.

Measurements : Total length 39.25 mm.; Carapace 4.25 mm. long; Mesosoma 11.50 mm. long; Metasoma 23.50 mm. long.

Carapace : Entire surface finely and also coarsely granular but smooth on few spots. Lateral ocular tubercles black and granu-

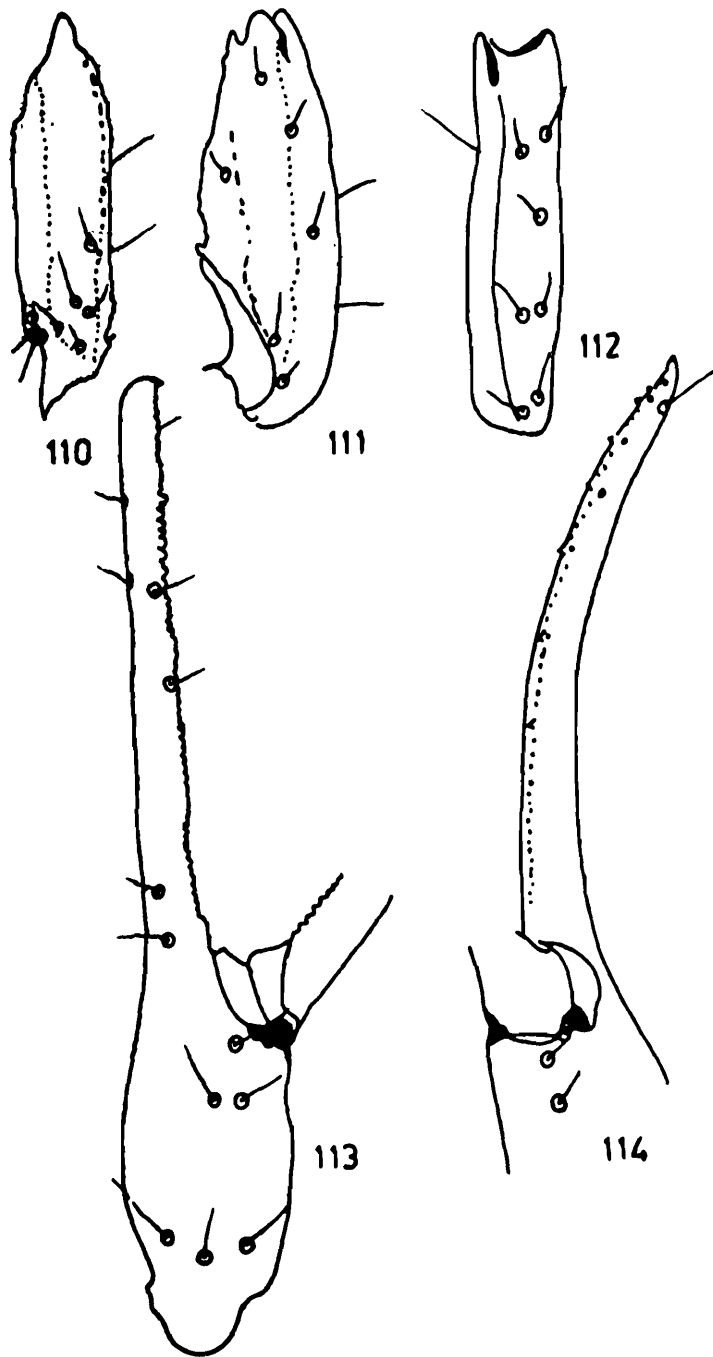
FIGS. 99-109. *Lychas (Distotrichus) nigristernis* (Pocock)

99. Dorsal view of female. 100. Carapace, dorsal view. 101. Lateral eyes, lateral view. 102. Tergite, dorsal view. 103. Chelicera, dorsal view. 104. Manus and fingers, exterior view. 105. Movable finger, dorsal view.



- 106. Pectines, genital operculum and cephalothoracic sternum, dorsal view.
- 107. Pectinal teeth and fulcra, ventral view.
- 108. Telson and metasomal segment V, lateral view.
- 109. Telson and metasomal segment V, ventral view.

lar, provided with five contiguous lateral eyes as in text-fig. 102. Median ocular tubercles smooth in middle portion but granular on posterior and anterior portions and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2 as in text-fig. 100. Interocular area blackish, remaining surface coloured with five brownish and four yellowish bands. Central median furrow shallow and bifid posteriorly. Posterior lateral furrow slightly prominent and continued upto lateral margins. Anterior margin smooth, slightly invaginated and provided with few setae as in text-fig. 100. Lateral margins very finely crenulated and provided with a sub-marginal granular ridge. Posterior margin sparsely granular. Chelicera with basal segment smooth and blackish on dorsal surface but more blackish on anterior portion. Ventral surface smooth and thickly clothed with short delicate white silky hairs, extending on fingers. Fingers slightly pale yellow but deep reddish brown on dentition. Dentition on fingers as characterised in family and genus. Dorsal and ventral distal teeth of movable finger equal in size as in text-fig. 103. Pedipalp with elongated segments, fingers slender and more longer. Femur slightly shorter than carapace, carinae more granular on proximal than on distal portion. Posterior or inner surface provided with evenly crenular carina, outer or exterior carina more crenulated. Intercarinal surface weakly granular. Patella longer than carapace and completely blackish brown provided with dorsal granular carinae, outer and ventral carinae almost smooth. Anterior or inner surface provided with granular carinae but three to four granules sub-denticulate. Hand smooth as in text-fig. 104, not much wide but more than as wide as femur and less than as wide as patella. Length of underband equal to half the length of femur. Fingers slender and more elongated. Movable finger longer than patella. Immobile finger as long as femur. Dentition on finger non-imbricated and outer row on movable finger consists of seven minute teeth as in text-fig. 105. Femur, patella, hand and fingers covered with microscopic delicate setae. Trichobothrial pattern on femur, patella, hand and immobile finger as in text-figs. 110—114. Legs yellowish variegated with few brownish black bands. Femur flat, carinated almost all carinae granular and intercarinal space granular. Patella flat and more wider than femur, carinated and except inner crenulated carina all carinae smooth. Intercarinal



FIGS. 110-114. *Lychas (Distotrichus) nigristernis* (Pocock)
 110. Femur, dorsal, exterior and interior views.
 111. Patella, dorsal view.
 112. Patella, exterior view.
 113. Manus and immovable finger, exterior view.
 114. Manus and immovable finger, ventral view,

space almost smooth. Tibia carinated but carinae smooth, intercarinal space smooth and provided with a short, weak tibial spur or III & IV pairs. Tarsomere I smooth, without carinae, provided below with a pair of small delicate pedal spur. Tarsomere II more yellowish, smooth provided below with a tuft of paired, long, delicate hairs. All segments sparsely and weakly covered with delicate microscopic hairs. Pectines well developed, 4.25 times longer than wide as in text-fig. 106. Middle lamellae subdivided into eight small digits. Fulcra well distinguished and round. Lamellae and fulcra covered sparsely with microscopic white setae. Pectinal teeth short, pointed as in text-fig. 107 and 17/17 in number as in text-fig. 106. Basal piece almost rectangular with a deep median notch in the middle of anterior margin. Genital operculum as long as wide, operculae smooth united throughout the length in middle, covered with few reddish setae. Cephalothoracic sternum triangular longer than wide with small triangular depression in the posterior middle portion as in text-fig. 106.

Mesosoma : All tergites finely as well as coarsely granular, a few granules still bigger in size. Tergites I-VI provided with a median granular carina as in text-fig. 101. Posterior margins of each tergite evenly granular. Lateral margins granular. Pretergal portion finely granular and more granular on lateral portion with finely and evenly granular posterior margin. Tergite VII more granular than preceding tergites; provided with a broad median carina, distinct only on anterior portion, two pairs of lateral granular carinae as in text-fig. 99. Lateral margins crenulated. Posterior margins granular. Pretergal portion granular but more granular on lateral portions. Sternites pale yellow but blackish on margins, last sternite blackish brown with slight yellowish tint. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Sternite I without presternal portion. Sternites II-IV with smooth presternal portion but finely granular on posterior margin. Sternite V granular but not evenly granular, provided with two pairs of granular carinae, lateral pair of carinae longer than median, lateral margins crenulated. Posterior margin smooth but granular submarginally.

Metasoma : Cauda slightly shorter than five times as long as carapace. Basal segment as long as wide. Segments I-IV provided with dorsal, dorso-lateral, inferior lateral and inferior carinae, all carinae granular but dorsal and dorso-lateral carinae more evenly granular and ending posteriorly into a sub-denticular tubercle but more spiniform on II & III segments. Lateral carinae present throughout the length on I segment and 1/3 posterior portion on II segment. Lateral carinae evenly granular if present. Intercarinal space weakly, sparsely and very irregularly granular but more granular on ventral portion. Anterior peduncle of each segment granular and more granular on ventral portion. Posterior margin of each segment evenly granular on ventral and lateral portions. Segment V longer than carapace or patella, provided with dorso-lateral, inferior lateral and single inferior median carinae as in text-figs. 108 & 109. All carinae evenly granular. Intercarinal space more granular than preceding segments. Anterior and posterior peduncles smooth on dorsal surface but finely granular on anterior ventral portion. Anal rim of this segment evenly granular. Telson slightly shorter than last caudal segment. Vesicle slightly shorter than II caudal segment and less than as wide or deep as last caudal segment as in text-fig. 108. Dorsal surface smooth but ventral and lateral surface covered with few big granules arranged in a row on either sides. Ventral median crest weakly developed and provided with few granules, ending posteriorly into a strong sub-aculear spine, provided with a single minute tooth on inner surface. Subaculear spine supported with a pair of long setae at the base as in text-fig. 108. Aculeus slightly shorter than vesicular length, sharp, not much curved, reddish brown on distal portion as in text-fig. 108.

Distribution : INDIA: Kinnour, Bilaspur, Sirmaur, Bhammary, Mandi, Baully, Dhakog, Himachal Pradesh; Chamoli, Tehri, Uttarkashi, Nainital, Almora, Uttar Pradesh.

Remarks : We have studied the female specimen received from B. M. (N. H.) London, Regd. No. 1924, 7.22.11. which is a identified specimen as it was collected in 1924 after the publication of *Fauna Brit. India Arachn.*, (1900). The label with the specimen is *Archisometrus nigristernis* Pocock which was originally kept under

the genus *Archisometrus* by Pocock, but in *Fauna Brit. India, Arachn.*, (pg. 38—39) Pocock himself has changed it to the genus *Lychas* and we have described it as *Lychas (Distotrichus) nigris-ternis* Pocock as we have subdivided this genus into three subgenera. Our description and illustrations are based on the same specimen. We have also studied many specimens identified by us. These specimens were received from Northern Regional Station, Dehra Dun and High Altitude Station, Solan, Z. S. I. Some of the identified specimens are kept in Western Regional Station, Z. S. I., Poona.

2. *Lychas (Distotrichus) gravelyi* Henderson

(Figs. 115-129)

1911. *Lychas gravelyi* Henderson, *Rec. Indian Mus.*, 16 (5) : 379-381.

General : Female of smaller body size. Body colour basically yellow but variegated with many black to brown patches. Carapace more darker. Metasoma yellowish. Metasoma dark brown to black but more darker on caudal segment V and telson. Chelicera yellowish, pedipalp dark brown to black with few yellow spots on femur and patella, clear yellow on manus but fingers dark as in text-fig. 117. Legs yellowish with few dark spots. Pectines yellow, well developed. Sternites yellowish with few dark patches. Last sternite more darker, with two pairs of weakly granulated carinae. Carapace and mesosomal tergites finely granular.

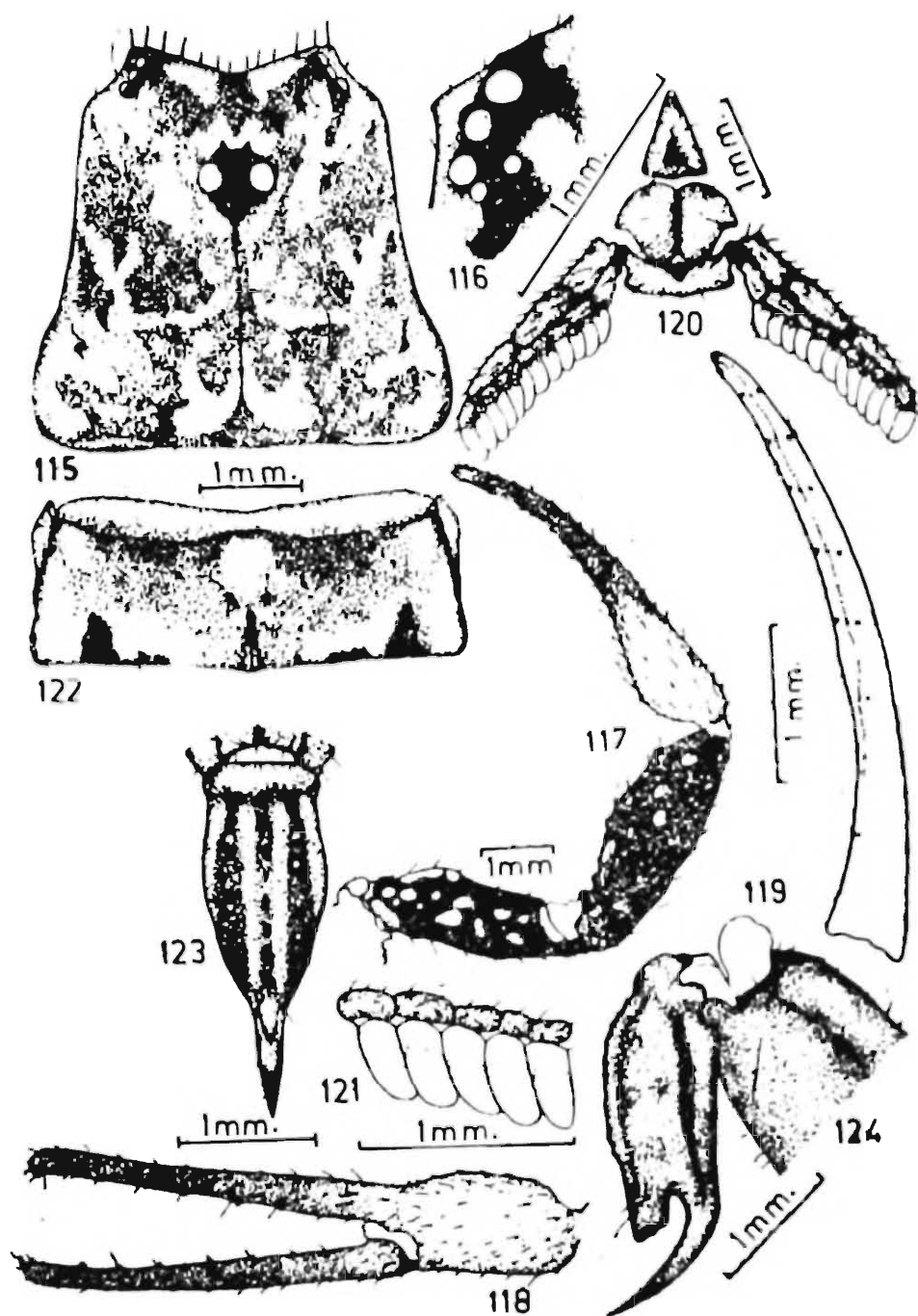
Measurements : Total length 30.75 mm; Carapace 3.5 mm. long; Mesosoma 11.00 mm. long; Metasoma 16.25 mm. long.

Carapace : Entire surface finely granular. Carinae very weakly developed and finely granular. Median depression shallow and more prominent on posterior portion. Interocular area small and

FIGS., 115-124. *Lychas (Distotrichus) gravelyi* Henderson

115. Dorsal view of carapace of female. 116. Lateral eyes, lateral view.

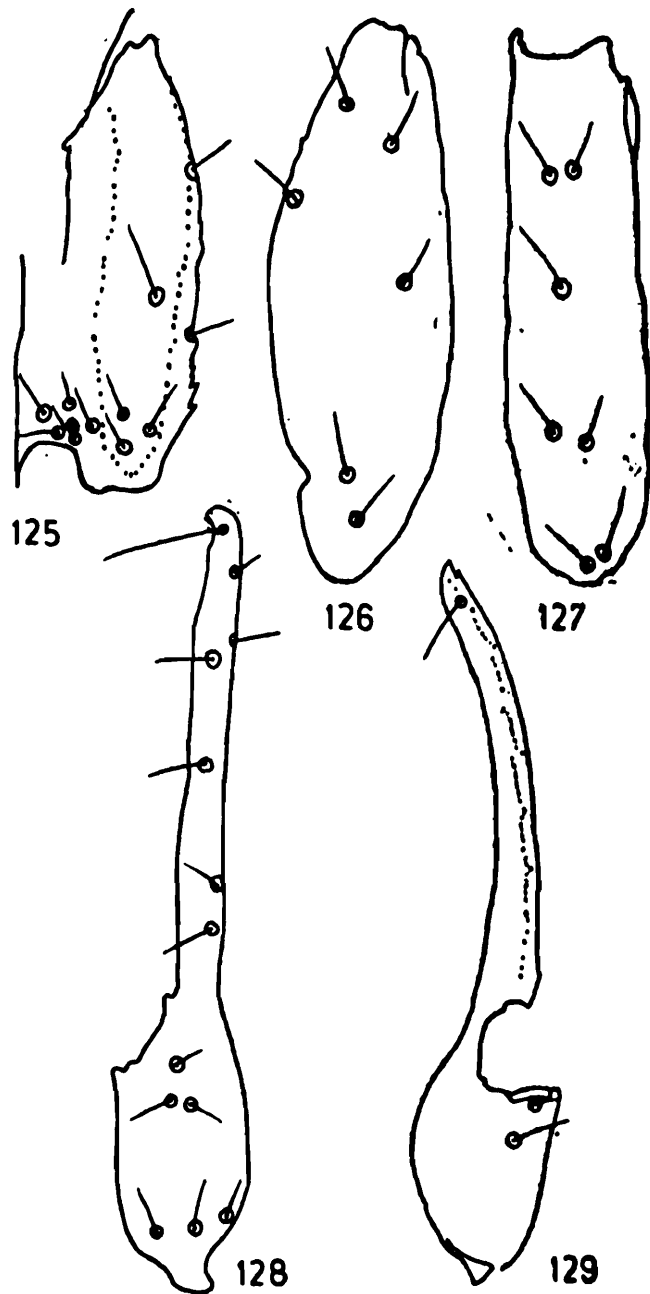
117. Pedipalp, dorsal view.



- 118. Manus and fingers, exterior view.
- 119. Movable finger, dorsal view.
- 120. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 121. Pectinal teeth, ventral view.
- 122. Tergite, dorsal view.
- 123. Telson, ventral view.
- 124. Telson, lateral view.

granular. Lateral ocular tubercles weakly developed and granular and provided with five contiguous lateral eyes as in text-fig. 116. A pair of median eyes situated anteriorly in the ratio 1 : 2.5 as in text-fig. 115. Ocular tubercles granular. Anterior margin slightly invaginated in the middle portion, smooth and provided with few setae. Lateral margins smooth. Chelicera with basal segment pigmented on dorsal surface but more darker on anterior portion. Ventral surface clothed with short, silky hairs. Fingers short, dark and dentition as characterised in the family and genus. Dorsal and ventral distal tooth of movable finger subequal in length. Pedipalp slightly strong. Femur black with a few yellow spots as in text-fig. 117, slightly shorter than carapace. Carinae granular but outer carinae slightly smooth. Patella black with few yellow spots as in text-fig. 117, as long as IV caudal segment. Inner carinae weakly granular but outer carinae smooth. Manus or hand yellow, smooth as in text-fig. 117, length of under hand short and as long as I caudal segment. Finger black, long and movable finger longer than carapace but as long as V caudal segment. Dentition on the finger non-imbricated and outer row comprises of seven teeth on movable finger as in text-fig. 119. Immobile finger as long as carapace. Trichobothrial pattern on femur, patella, manus and immobile fingers as in text-figs. 125-129. Legs yellow but outer portion with many black spots. Femur and patella finely granular and carinae finely crenulated. Tibia carinated but carinae smooth and provided with a short tibial spur on III and IV pairs. Tarsomere I carinated but smooth provided with a pair of pedal spurs. Tarsomere II with short hair below, claws delicate. Pectines well developed and 3.5 times longer than wide as in text-fig. 120. Middle lamellae subdivided into seven small digits. Fulcra very poorly distinguished. Lamellae and fulcra sparsely clothed with microscopic white setae. Pectinal teeth short and 12/12 in number. Basal piece well developed but poorly sclerotised. Anterior margin slightly notched in the middle. Genital operculum almost as wide as long but operculi weakly sclerotised and united in the middle. Cephalothoracic sternum triangular and provided with a depression on posterior portion as in text-fig. 120.

Mesosoma : All tergites finely granular. Tergites I-VI yellow but variegated with black spots as in text-fig. 122 and provided with a



FIGS. 125-129. *Lychas (Distotrichus) gravelyi* Henderson
 125. Femur, dorsal, interior and exterior views.
 126. Patella, dorsal view.
 127. Patella, exterior view.
 128. Manus and immovable finger, exterior view.
 129. Manus and immovable finger, ventral view.

weak, granular median carina. Pretergal portion finely granular. Posterior margin of each tergite finely granular. Tergite VII more darker and granular and provided with two pairs of lateral granu-

lar carinae. Pretergal portion finely granular. Posterior margin finely granular. Sternites I-IV smooth with few black patches and each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth. Sternite V smooth, more darker and provided with two pairs of finely granular carinae. Presternal portion smooth.

Metasoma : Cauda more than five times as long as carapace. Basal segment not as long as wide. Segments I-IV with finely granular carinae. All ten carinae developed on segments I & II. Lateral carinae granular and developed only on anterior portion on segment III and totally absent on segment IV. Inter carinal space finely granular. Segment V longer than carapace but always as long as patella. Dorsal carinae granular and weakly developed on anterior portion. Inferior lateral carinae well developed and granular. Inferior carinae granular and developed only on anterior portion. Single inferior median carinae evenly granular. Anal rim of this segment almost smooth as in text-fig. 123 & 124. Inter-carinal space granular. Telson always shorter than V caudal segment. Vesicle as long as caudal segment III but not as wide or deep as caudal segment V. Ventral median crest almost smooth and ending into a broad subtriangular spine, provided with three minute teeth on interior margin as in text-fig. 124. Ventral and lateral band yellowish brown. Aculeus short, less than as long as vesicle, sharp and curved as in text-figs. 123 & 124.

Distribution : Moulmeni, LOWER BURMA.

Remarks : We have studied, described and illustrated on the basis of female type specimen received from National Collection, ZSI, Calcutta, Regd. No. 1283/17 dated 16.11.1911. This species is included in Fauna because many species occurring in adjacent countries have been reported from India. Burma being one of the closely adjacent country to India, the occurrence of this species is quite possible in India.

Subgenus ii . *Alterotrichus* sg. nov.

Characters : Trichobothria *est*, *db*, *et* and *dt* are placed alternatively (Fig. 152).

Key to the species of subgenus Alterotrichus sg. nov.

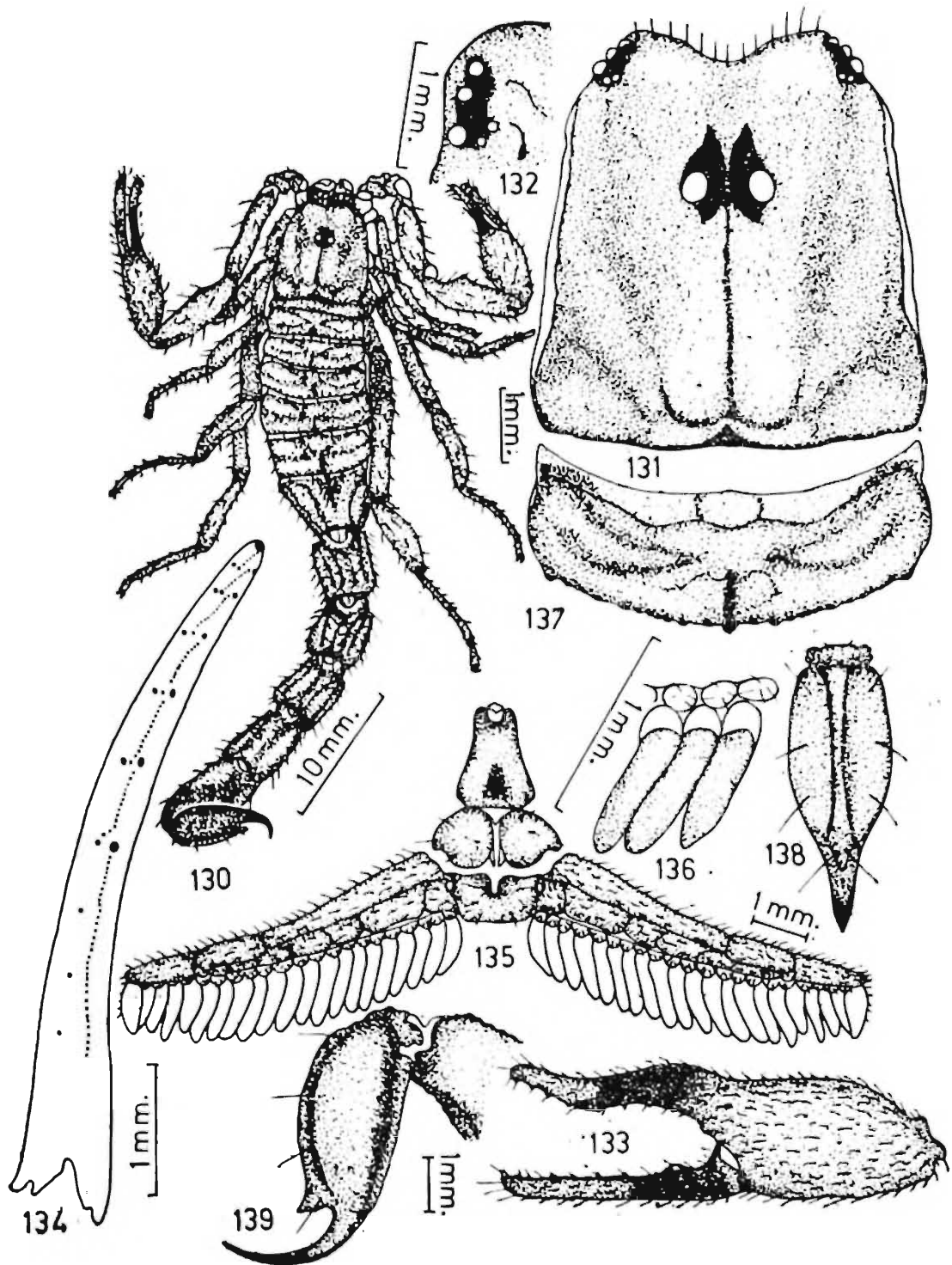
1. Body not more than 30 mm in length;
pectines not more than 5 times as wide
and pectinal teeth never above 20
in number (Fig. 159). Outer row of teeth
on movable finger of pedipalp do not
have un-paired teeth (Fig. 158). Immo-
vable finger never arched in male (fig. 151)2
- Body always more than 35 mm in length;
pectines 5 times as wide and pectinal
teeth more than 20-21 in number
(Fig. 155). Outer row of teeth on movable
finger of pedipalp has three unpaired
teeth (Fig. 134). Immobile finger arched
in male (Fig. 133). *mucronatus*
2. Body length about 25 mm. Pectines
2.75 times as wide and pectinal teeth
12-13 in number (Fig. 159) *rugosus*
- Body length more than 25 mm.
Pectines 4 times as wide and pectinal
teeth 17-18 in number (Fig. 175). *hendersoni*

3. *Lychas (Alterotrichus) mucronatus* (Fabricius)

(Figs. 130-153)

1798. *Scorpio mucronatus* Fabricius, *Ent. Syst. Suppl.*, : 294.
1845. *Tityus mucronatus* : C. Koch, *Arachn.*, 11 : 29.
1884. *Isometrus mucronatus* : Simon, *Ann. Mus. cur. Genova*, 20 : 363.
1889. *Isometrus mucronatus* : Thorell, *Ann. Mus. Civ. Genova*, 27 : 566.
1891. *Archisometrus mucronatus* : Kraepelin, *Jb. hamb. wiss. Anst.*, 8 : 223
1893. *Isometrus mucronatus* : Pocock, *Weber Reise Niederl. O. Ind.* 3 : 85.
1899. *Archisometrus mucronatus* : Kraepelin, *Tierr. Scorp. etc.*, : 46.
1900. *Lychas mucronatus* : Pocock, *Fauna Brit. India, Arachn.*, : 36.

General : Male and female scorpions of medium body size, almost orchiyellow except darker interocular area, and black ocular tubercles on carapace as in text-figs. 130 & 140. Posterior



FIGS. 130-139. *Lychas (Alterotrichus) mucronatus* (Fabricius)

130. Dorsal view of male. 131. Carapace, dorsal view. 132. Lateral eyes, lateral view. 133. Manus and fingers, exterior view. 134. Movable finger, dorsal view. 135. Pectines, genital operculum and cephalothoracic sternum, ventral view. 136. Pectinal teeth and fulcra, ventral view. 137. Tergite, dorsal view. 138. Telson, ventral view. 139. Telson and anal rim of metasomal segment V, lateral view.

segments of cauda and telson dark brown. Pedipalp slightly darker on patella and blackish at the base of fingers. Legs pale yellow but slightly darker on femur and patella. Sternites pale yellow. Last mesosomal sternite granular with two pairs of carinae. Entire dorsal body surface coarsely granular. Caudal segment carinated. Telson weakly granular and subaculear spine provided with a pair of minute teeth on inner margin. Tibial spurs on III and IV legs very short. Immovable finger of pedipalp arched in male as in text-fig. 133.

Measurements : Total length 48.00 mm; Carapace 6.50 mm. long; Mesosoma 15.00 mm, long; Metasoma 26.50 mm. long.

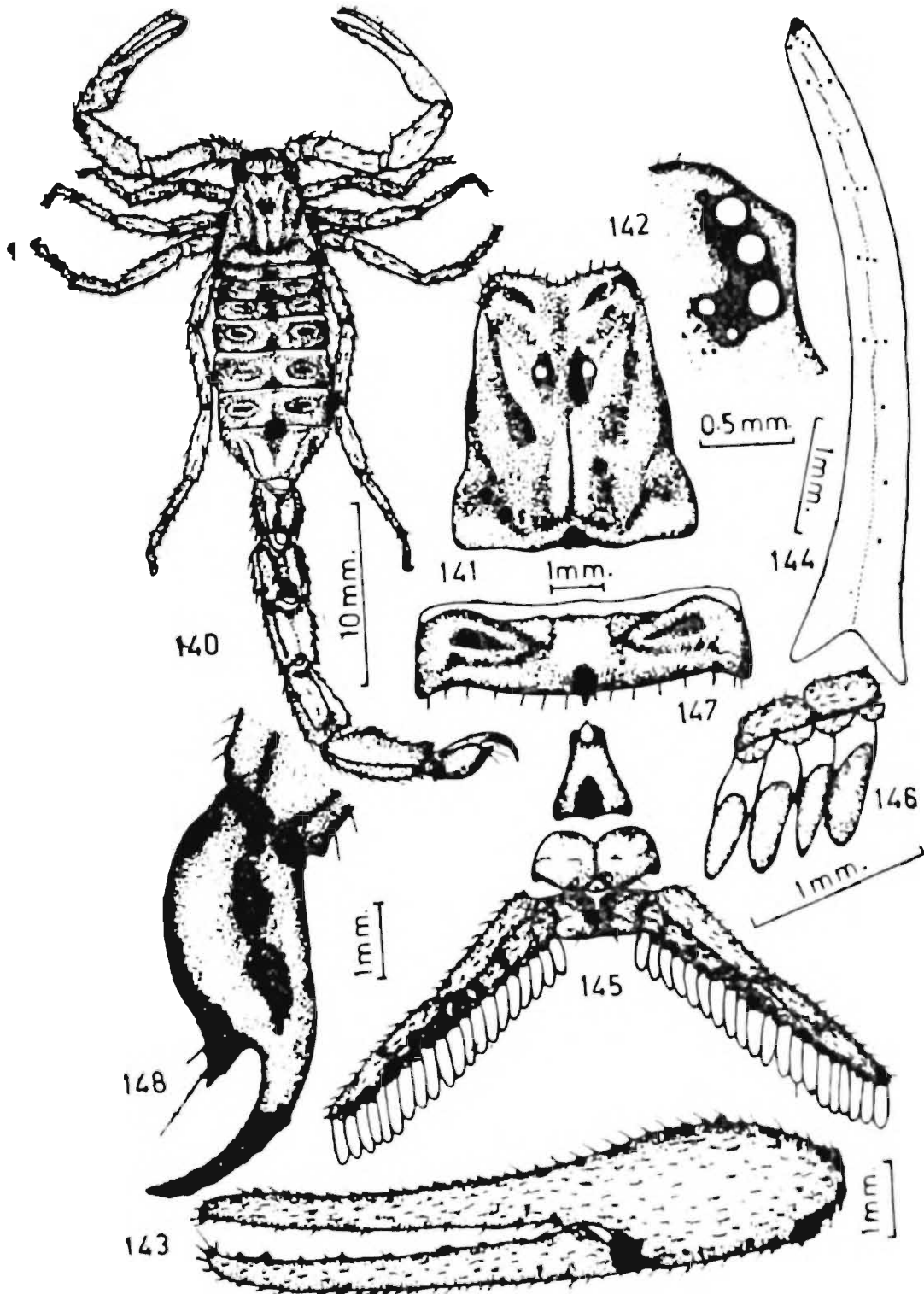
Carapace : Entire surface coarsely granular but granulation more fine in male. Interocular area dark brown. Ocular tubercles black and granular. Lateral ocular tubercle provided with five lateral eyes as in text-figs. 132 & 142. Median ocular tubercles granular, continued anteriorly but short; provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.1 in ♂, 1 : 2 in ♀ as in text-figs. 131 & 141. No carinae developed. Anterior margin almost smooth, invaginated in middle and provided with few setae. Lateral margins finely crenulated and supported with a submarginal ridge. Posterior margin granular above and almost straight. Chelicera with basal segment smooth and pigmented on dorsal surface but more darker on anterior portion. Ventral portion thickly covered with fine, whitish, silky hair, often extended on ventral surface of immovable finger. Fingers short and reddish brown on dentition. Dentition on fingers as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger almost subequal. Pedipalp with robust hand and arched immovable finger in male as in text-fig. 133. Femur always longer than carapace. Carinae weakly crenulated. Anterior or outer surface provided with many tubercles. Intercarinal space weakly and finely granular but more granular in female. Patella almost smooth, as long as femur. Carinae smooth except anterior or inner surface provided with granular carina with five or six triangular tubercles. Hand smooth, more robust in male as in text-fig. 133 and almost more than as wide as patella in male but less than as wide as patella in female. Length of under hand more than half

the length of femur or patella in male but less in female. Movable finger as long as femur or patella but immovable finger slightly shorter than movable. Dentition on the finger non-imbricated and outer row on movable finger comprises nine teeth as in text-figs. 134 & 144. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 149-153. Legs pale yellow with femur weakly granular in female and carinae granular, crenulated on inner surface. Patella very weakly granular in female and smooth in male. Carinae almost smooth except weakly crenulated anterior carina. Tibia carinated but smooth with short but stout tibial spurs on III and IV pairs. Tarsomere I carinated, but smooth, longer than tibia, provided with a pair of pedal spur. Tarsomere II smooth and provided below with a row of short, paired setae. All digits weakly covered with setae. A pair of claws, short, stout, sharp and dark brownish on tips. Pectines well developed and 5 times longer than wide as in text-figs. 135 and 145. Middle lamellae subdivided into eight small digits. Fulcra well distinguished and elongated. Lamellae and fulcra covered with microscopic whitish setae. Pectinal teeth well developed, less tapering as in text-fig. 135, slightly short and more tapering in female as in text-fig. 146 and 20 in number as in text-fig. 145. Basal piece sclerotised with anterior margin deeply notched in the middle in both male and female. Genital operculum provided with two sclerites united or fused in the middle in female as in text-fig. 145 but exposed in male, from under which a pair of small but conspicuous male genital papillae protruding out as in text-fig. 135. Sclerites covered sparsely with few microscopic setae. Cephalothoracic sternum triangular and provided with a posterior median notch as in text-figs. 135 and 145.

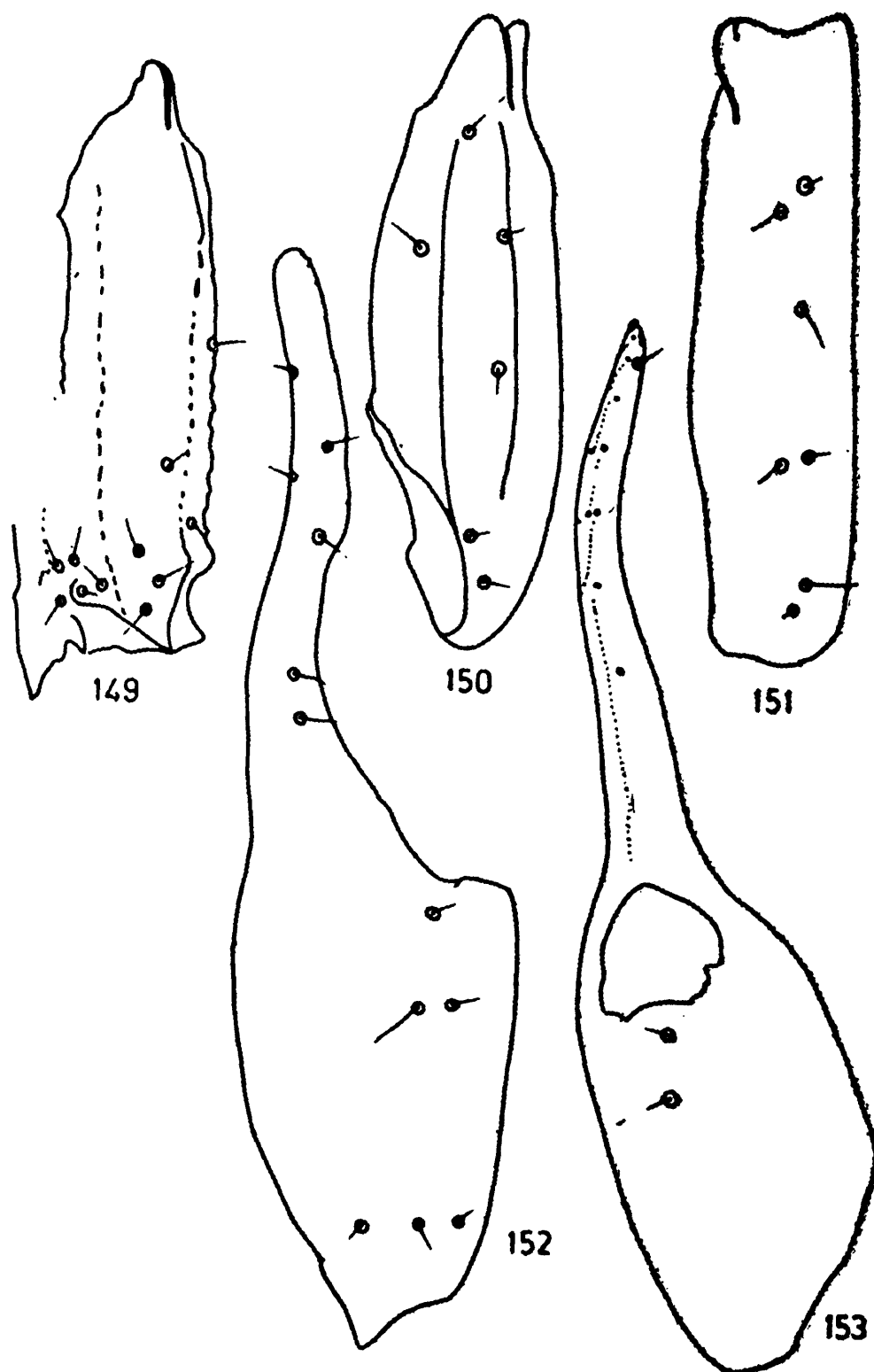
Mesosoma : All tergites granular but granules very fine in male and appear more smoother than in female. Tergites I-VI with a median granular carina developed on posterior half of each tergite

FIGS. 140-148. *Lychas (Alterotrichus) mucronatus* (Fabricius)

140. Dorsal view of female. 141. Carapace, dorsal view. 142. Lateral eyes, lateral view. 143. Manus and fingers, exterior view. 144. Movable finger, dorsal view. 145. Pectines, genital operculum and cephalothoracic sternum, ventral view.



- 146. Pectinal teeth and fulcra, ventral view.
- 147. Tergite, dorsal view.
- 148. Telson and anal rim of metasomal segment V, lateral view.



FIGS. 149-153. *Lychas (Alterotrichus) mucronatus* (Fabricius)

- 149. Femur, dorsal, interior and exterior views.
- 150. Patella, dorsal view.
- 151. Patella, exterior view.
- 152. Manus and movable finger, exterior view.
- 153. Manus and immovable finger, ventral view.

as in text-figs. 137 and 147. Posterior margin granular above. Pretergal portion smooth but posterior margin finely granular and invaginated in the middle. Tergite VII with two pairs of lateral granular carinae as in text-figs. 130 and 140. Posterior margin granular above. Lateral margins crenulated. Pretergal portion smooth with finely granular posterior margin, invaginated in middle. Sternites I-IV smooth, each provided with a pair of slit-like stigmata for book lungs. Lateral and posterior margin smooth, sparsely setose. Presternal portion smooth with smooth posterior margin, invaginated in middle. Sternite V weakly granular but more granular on lateral portions and provided with two pairs of carinae, lateral pair weak and developed only in the middle portion. Median carinae smooth, but well developed. Lateral margins crenulated but posterior margin smooth. Presternal portion smooth and invaginated in middle.

Metasoma : Cauda almost five times as long as carapace. Basal segment always wider than long. Segments I & II with ten carinae, dorsal and dorsolateral carinae ending posteriorly into a dentiform tubercles. Inferior lateral and inferior carinae smooth. Intercarinal space granular, but more granular in female. Anterior peduncle finely granular on dorsal portion. Posterior margin granular above. Segment III with dorsal and dorsolateral carinae crenulated ending posteriorly into broad, triangular tubercle. Inferior lateral and inferior carinae smooth. Intercarinal space very weakly granular. Anterior peduncle finely granular but more granular in female. Posterior margin granular. Segment IV with dorsal carinae weakly granular and not ending posteriorly into a triangular tubercle; dorso-lateral, inferior lateral and inferior carina smooth. Intercarinal space almost smooth or very weakly and finely granular. Anterior peduncle finely granular. Posterior margin smooth. Segment V always longer than carapace but as long as femur or patella. Dorsal surface convex, and smooth. Inferior lateral carinae granular. Single inferior median carina very weakly crenulated. Intercarinal space granular. Telson as long as V caudal segment. Vesicle as long as IV caudal segment in male and II caudal segment in female. Entire surface smooth. Ventral and lateral bands reddish brown. Ventral median crest weakly developed and ending posteriorly into a broad triangular, subaculear spine, pro-

vided on inner margin with a pair of minute teeth and a pair of stout long setae at the base as in text-figs. 138, 139 and 148. Aculeus pointed, sharp, not much curved as long as half the vesicular length in male and more than half the vesicular length in female. Setation on vesicle not clear and as in text-figs. 138, 139 and 148.

Distribution : INDIA: Darna hills, Dehra Dun, Uttar Pradesh.

Remarks : We have examined, illustrated and described on the basis of type specimens (one ♂, two ♀♀) received from B. M. (N. H.) London, Regd. No. 1889.3.29.9—11 and we have compared these with the identified specimens of National Museum, ZS I, Calcutta. We would like to mention here that the specimens from India are much bigger than the type specimens collected from Cambodia.

4. *Lychas (Alterotrichus) rugosus* Pocock

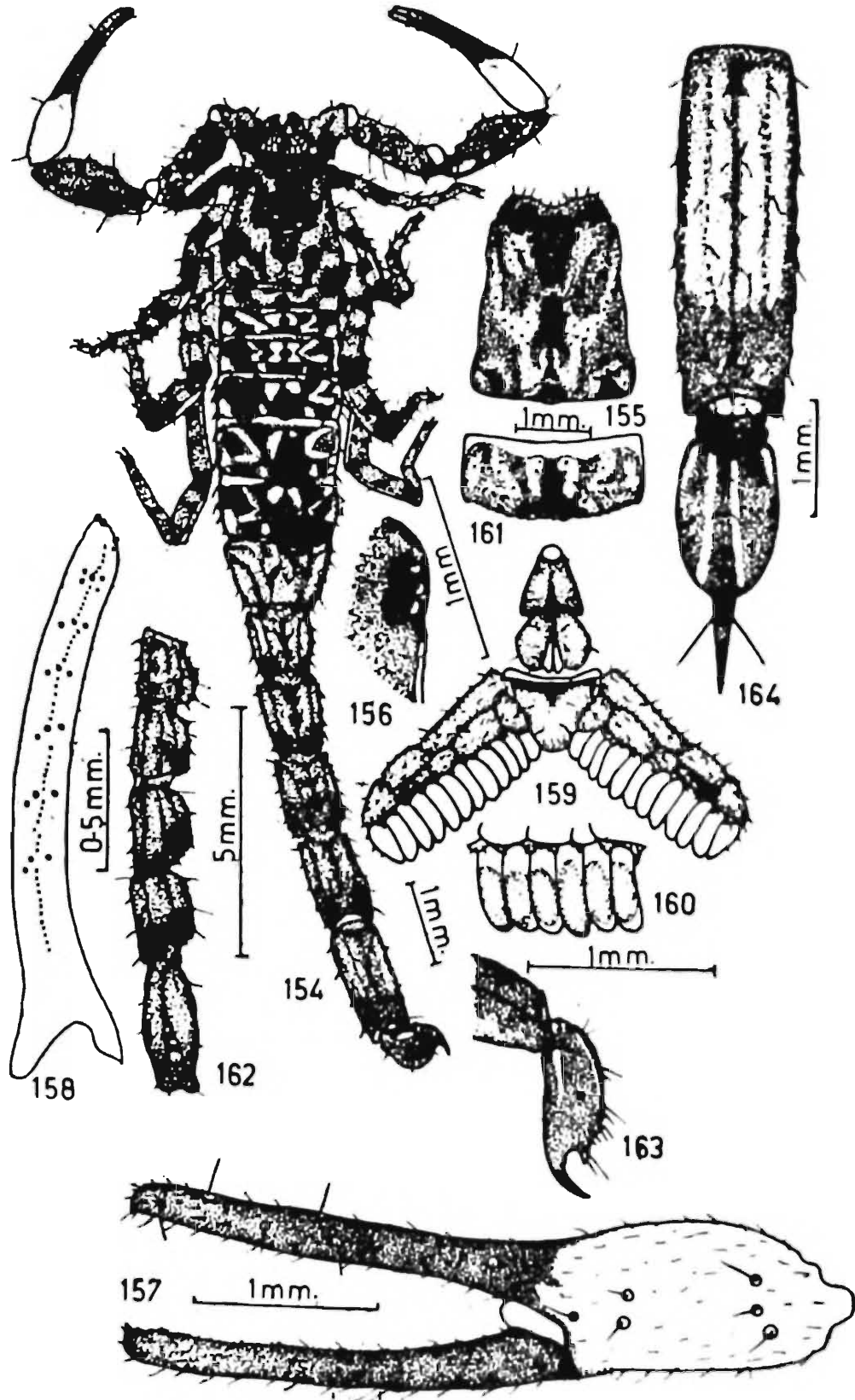
(Figs. 154-169)

1897. *Lychas rugosus* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 111.
 1899. *Archisometrus rugosus* : Kraepelin, *Tierr. Scorp. etc.*, : 48.
 1900. *Lychas rugosus* : Pocock, *Fauna Brit. India, Arachn.*, : 39.

General : Male scorpion of smaller body size. Entire body surface more coarsely granular and the granules bigger in size. All caudal carinae evenly granular. Entire surface of vesicle granular. Pedipalp carinated, granular. Sternites smooth except last granular sternite provided with four granular carinae. Pectines well developed.

FIGS. 154-164. *Lychas (Alterotrichus) rugosus* Pocock

154. Dorsal view of male. 155. Carapace, dorsal view. 156. Lateral eyes, lateral view. 157. Manus and fingers, exterior view. 158. Movable finger, dorsal view. 159. Pectines, genital operculum and cephalothoracic sternum, ventral view. 160. Pectinal teeth and fulcra, ventral view. 161. Tergite, dorsal view. 162. Metasomal segments I-V, lateral view. 163. Telson and anal rim of metasomal segment V, lateral view.

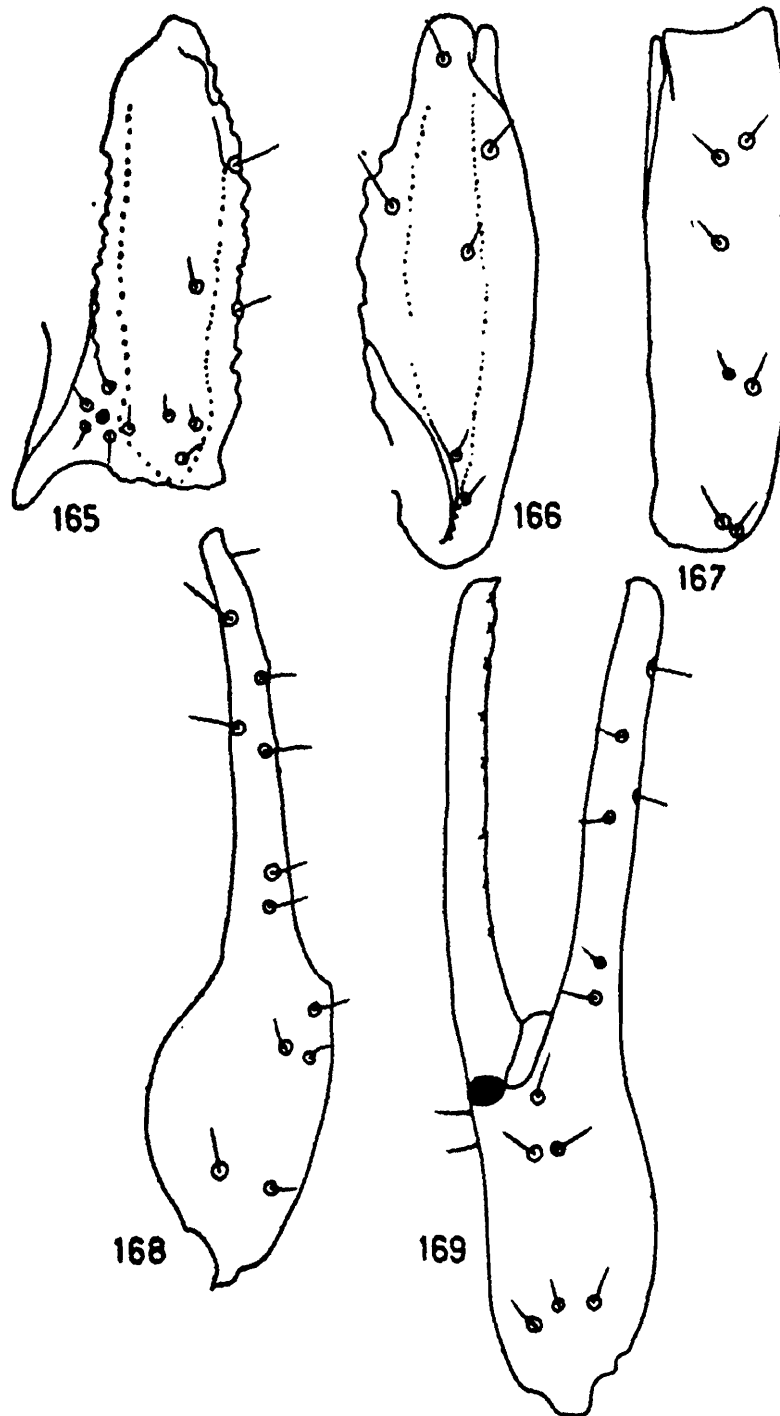


164. Telson and anal rim of metasomal segment V, ventral view.

Body colour pale due to poor preservation, but identified specimens have yellowish body colour varigated with black spots and stripes. Carapace almost black with few small yellowish spots and black ocular tubercles. Each mesosomal tergite with $> - <$ yellow patches on lateral sides, a pair of semicircular yellowish patches in the middle while posterior margin with submedian yellowish patches and submarginal yellow bands as in text-fig.154. Sternites II & III almost yellow, varigated with blackish patches on lateral portions. Sternites IV-V yellowish but entirely varigated with blackish patches. Each metasomal segment yellow varigated with black patches but more varigated on posterior portion. Vesicle blackish brown except ventral and lateral portion yellow. Aculeus dark brown on distal portion. Chelicera blackish on basal segments but pale yellow on ventral surface. Pedipalp with femur and patella blackish with few small yellow spots. Hand entirely pale yellow. Fingers darker but slightly pale on tips. Legs yellow with few darker bands as in text-fig. 154.

Measurements : Total length 21.75 mm; Carapace 2.50 mm. long, Mesosoma 7.25 mm. long, Metasoma 12.00 mm. long.

Carapace : Entire surface coarsely granular. Posterior median furrow more prominent, deep, weakly bifurcated posteriorly but anteriorly continued into lateral ocular furrow. Posterior lateral furrows slightly prominent than anterior lateral furrows. Only posterior median carinae granular. Lateral ocular tubercles granular and provided with five contiguous lateral eyes as in text-fig. 156. Median ocular tubercle provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.25 as in text-fig.155. Anterior margin invaginated, smooth but granular sub-marginally. Lateral margins finely and evenly granular and supported with a submarginal ridge. Posterior margin evenly granular and straight. Chelicera (missing in the type, but identified specimens have chelicera) with basal segment smooth and black mosaic pigmented on dorsal surface. Ventral surface smooth, thickly covered with short, silky hairs, extending on ventral surface of fingers. Fingers dark reddish brown but more darker on dentition. Dentition on fingers as characterised in the family and genus. Pedipalp delicate and femur as long as carapace, carinated and all carinae granular.



FIGS. 165-169. *Lychas (Alterotrichus) rugosus* Pocock
 165. Femur, dorsal, exterior and interior views.
 166. Patella, dorsal view.
 167. Patella exterior view.
 168. Manus and immovable finger, dorso-exterior view.
 169. Manus and immovable finger, exterior view.

Anterior or outer surface provided with crenulated carina but outer carina weakly crenulated. Intercarinal space finely granular. Patella slightly longer than carapace or femur carinated. All carinae finely granular. Anterior or inner surface provided with finely crenulated carinae. Intercarinal space very finely granular but more granular on inner portion. Hand smooth; length of under hand exactly half the length of femur or carapace and as wide as patella. Movable finger as long as carapace, immovable finger shorter than carapace. Dentition on the fingers non-imbricated and outer row on movable finger comprises eight minute teeth as in text-fig. 158. All segments clothed with microscopic whitish hairs. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 165-169. Legs yellow with few blackish bands on each segment. Femur finely granular and carinated, all carinae granular. Patella flat, wider than femur, finely granular and carinated. All carinae granular. Tibia carinated but smooth, provided with a short tibial spur on III and IV pairs. Tarsomere I slender and elongated, smooth, provided below with a row of long setae and a pair of small pedal spur. Tarsomere II smooth, provided below with a tuft of paired bristles. A pair of claws, minute, delicate and dark brown. Pectines well developed and 2.75 times longer than wide. Middle lamellae subdivided into six small digits as in text-fig. 159. Fulcra very poorly distinguished or sometimes not developed. Lamellae and fulcra covered sparsely with microscopic reddish hair. Pectinal teeth well developed tubular but not much tapering, as in text-fig. 160. Proximal teeth shorter in length, 12/12 in number as in text-fig. 159. Basal piece sclerotised with invaginated anterior margin and deeply notched in the middle as in text-fig. 159. Genital operculum as long as wide, a pair of sclerites completely exposed from which a pair of conspicuous male genital papillae seen as in text-fig. 159. Cephalothoracic sternum triangular and almost as wide as long as in text-fig. 159.

Mesosoma : All tergites coarsely granular but more closely granular in anterior and middle portion. Tergites I-VI provided with a median granular carina, developed only on posterior portion of each tergite as in text-fig. 161. Lateral margin of each tergite very sparsely granular. Pretergal portion very finely granular with

granular posterior margin, invaginated on sub-lateral portions on tergites III-IV. Tergite VII provided with a broad, granular median carina on anterior portion and two pairs of evenly granular lateral carinae as in the text-fig. 154. Lateral margins crenulated. Posterior margin smooth but granular above. Pretergal portion finely granular but more granular on lateral portions; finely granular posterior margin "W" shaped. Sternites I & II smooth, but II weakly and finely granular on lateral portion. Sternite I without presternal portion. Sternite II with presternal portion smooth on posterior margin. Lateral and posterior margins almost smooth. Sternites III & IV weakly granular on lateral portions but smooth in middle portion. Lateral and posterior margins almost smooth. Presternal portion smooth in middle portion but very finely granular on lateral portion, with almost smooth posterior margin. Sternites I-IV, each provided with a pair of slit like stigmata for book lungs. Sternite V almost finely and closely granular, provided with two pairs of granular carinae developed only on posterior portion. Lateral margins crenulated. Posterior margin smooth but finely granular below. Presternal portion smooth in middle but very finely granular on lateral portion with finely and evenly granular posterior margin.

Metasoma : Cauda about five times as long as carapace. Basal segment almost as wide as long. All carinae evenly granular. Segments I-IV provided with dorsal and dorsolateral carinae evenly granular and ending posteriorly into a sub-denticular tubercle. Lateral carinae evenly granular and well developed on segments I & II but very sparsely granular on segment III and represented by few bigger granules on segment IV. Inferior carinae weakly granular on I-III but comparatively more developed and evenly granular on segment IV as in text-fig. 162. Intercarinal space almost coarsely granular but granules bigger in size on dorsal portion. Anterior peduncle very finely and closely granular. Posterior margin evenly granular on lateral and ventral portions, dorsal portion almost smooth. Segment V longer than carapace but as long as patella, provided with dorso-lateral, inferior lateral and single inferior median carinae, all carinae evenly granular. Inferior carinae represented by few

bigger irregular granules on either sides of single inferior median carina. Intercarinal space coarsely granular than preceding segments. Anterior peduncle smooth on dorsal portion and ventral anal rim of this segment evenly granular as in text-fig. 163. Telson slightly shorter than last caudal segment but as long as carapace or femur of pedipalp. Vesicle as long as caudal segment III but always less than as wide or deep as caudal segment V. Surface of vesicle finely granular on dorsal and dorsolateral portion but smooth on ventral and ventrolateral portion. Ventral and lateral depressions prominent and darker. Ventral median crest smooth but well developed, ending posteriorly into a strong, triangular subaculear spine, provided with a pair of strong basal setae and a minute tooth on inner margin as in text-fig. 163. Aculeus less than as long as half the vesicular length, not much curved, sharp and dark brown on distal portion as in text-fig. 163.

Distribution : INDIA : Raipur, M.P.; Nasik, Aurangabad, Poona, Maharashtra.

Remarks : We have studied the male type specimen, deposited in the B.M. (N.H.) London, Regd. No. 1893.12.20.1. Present description and illustrations are based on the same type specimen received. We have also compared and identified some specimens from our collection. The identified specimens are deposited in Western Regional Station, ZSI, Poona.

5. *Lychas* (*Alterotrichus*) *hendersoni* Pocock (Figs. 170-184)

1897. *Lychas hendersoni* Pocock, *J. Bombay nat. Hist. Soc.*, 11 ; 111.

1899. *Archisometrus hendersoni* : Kraepelin, *Tierr. Scorp. etc.*, : 51.

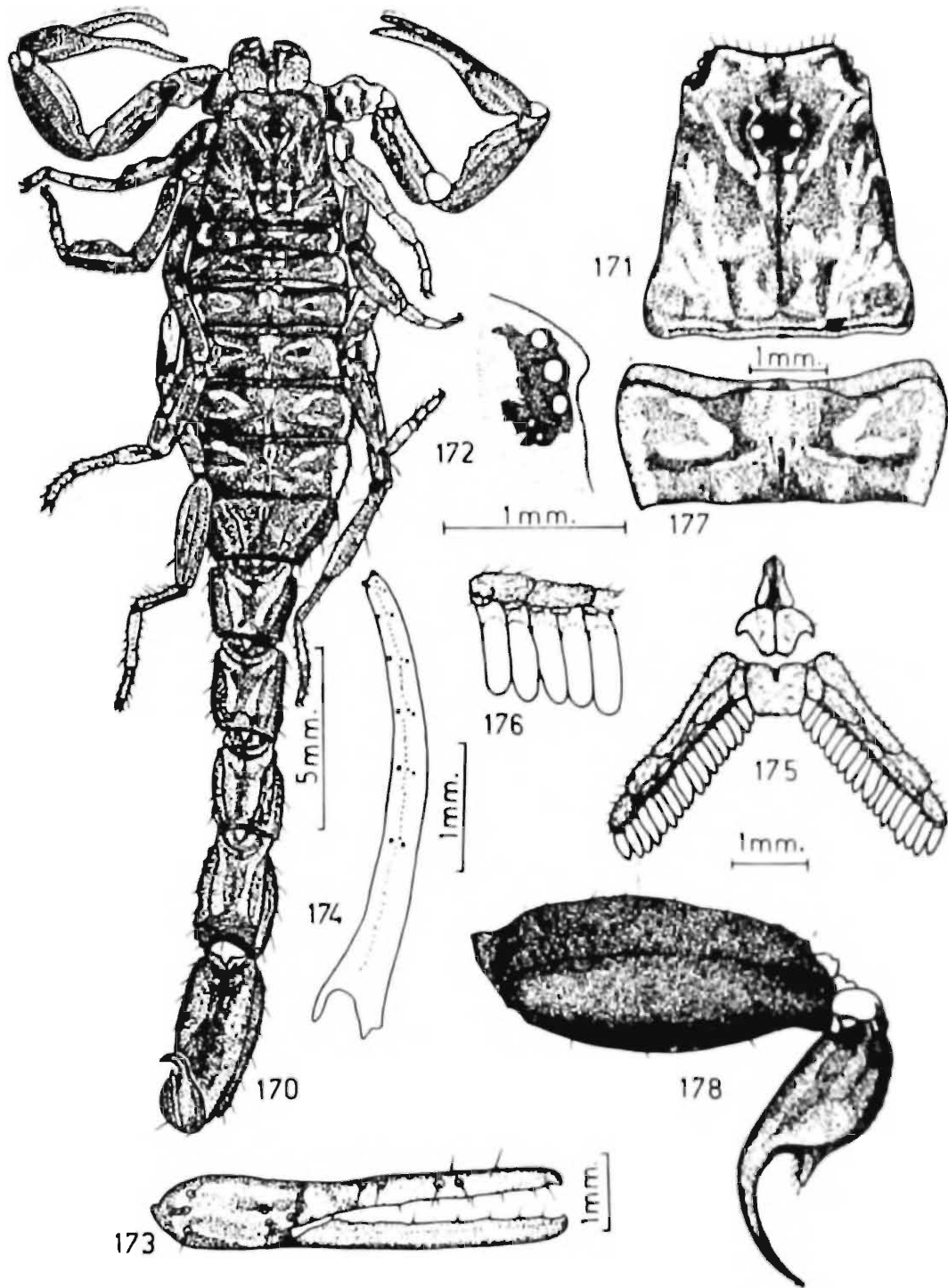
900. *Lychas hendersoni* : Pocock, *Fauna Brit. India, Arachn.*, : 40-41.

1

General : Female of medium body size, entire surface coarsely to finely granular but more granular on median portions of carapace and posterior portion of each mesosomal tergites as in

FIGS. 170-178. *Lychas* (*Alterotrichus*) *hendersoni* Pocock

170. Dorsal view of female. 171. Carapace, dorsal view. 172. Latreal eyes, lateral view. 173. Manus and fingers, exterior view. 174. Movable finger, dorsal view.



- 175. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 176. Pectinal teeth and fulcra, ventral view.
- 177. Tergite, dorsal view.
- 178. Telson and anal rim of metasomal segment V, lateral view.

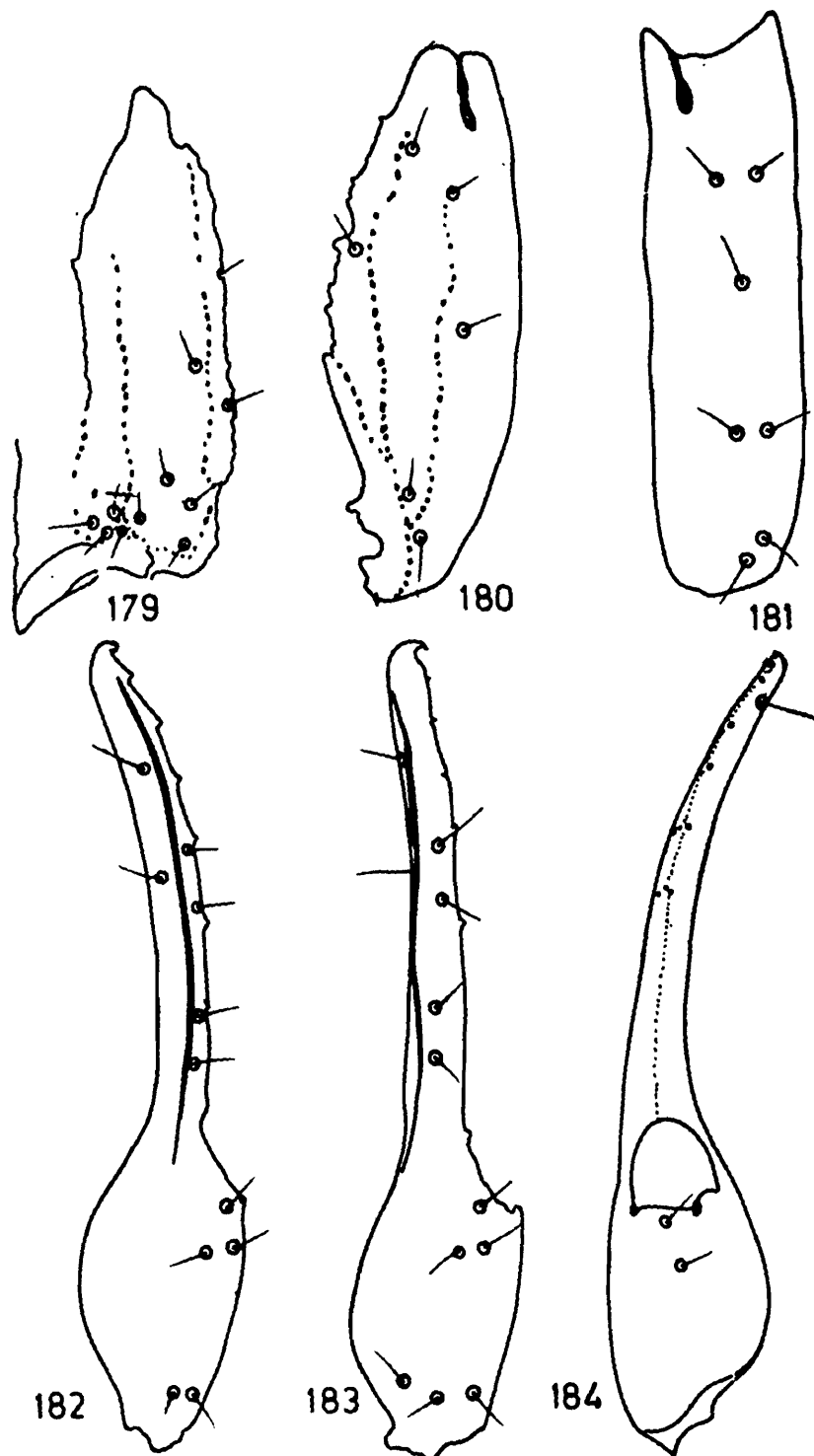
text-fig. 170. Tergites I-IV monocarinated. Sternite V granular with four granular carinae. Metasoma carinated and all carinae weakly granular. Telson with thin vesicle and long and sharp aculeus. Pedipalp normal. Legs thin and carinated on femur and patella. Pectines well developed. Body colour very dark brownish black to black.

Measurements : Total length 32.50 mm. Carapace 3.75 mm. long; Mesosoma 11.25 mm. long; Metasoma 17.50 mm. long.

Carapace : Entire surface coarsely granular but more granular on median portion. Posterior central or posterior median carinae very weakly developed, poorly granular and granules obsolete. Lateral ocular tubercles granular and provided with five lateral eyes as in text-fig. 172. Median ocular tubercle granular provided with a pair of median eyes, situated anteriorly in the ratio more than 1 : 2.75 as in text-fig. 171. Interocular area also coarsely granular. Furrows not prominent and posterior median furrow shallow bifid posteriorly. Lateral ocular furrow more prominent. Posterior margin granular and nearly straight as in text-fig. 171. Chelicera smooth on basal segment, dark pigmented on dorsal surface but pale yellow on ventral surface and thickly clothed with many short silky hair as in text-fig. 170. Fingers short, dark on dentition. Dentition on fingers as characterised in family and genus. Distal teeth subequal. Pedipalp slender and with longer fingers. Femur shorter than carapace, carinated and all carinae granular. Outer or anterior and inner or posterior carinae granular. Intercarinal space granular but more granular on dorsal surface. Patella longer than femur but shorter than carapace, carinated but only inner dorsal and dorsal median carinae granular. Inner or interior surface granular and some granules tuberculate. Outer or posterior surface smooth. Intercarinal space weakly granular but more granular on dorsal surface. Manus smooth, acarinated as in text-fig. 173. Length of under hand less than half the length of patella and also less than as wide as patella. Fingers longer and movable finger as long as carapace but immovable finger shorter than patella and provided with a strong, obsolete carina on outer side. Dentition on fingers non-imbricated and outer row on movable finger comprises of six to seven minute teeth as

in text-fig. 174. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 179-184. Legs carinated on femur, patella, and tibia but carinae granular on femur and patella. Intercarinal space granular but more granular on femur. Tibia also carinated but carinae smooth on I & II pairs while finely granular on III & IV pairs. Intercarinal space smooth. Tibia on III and IV pairs provided with a long tibial spur on distal margin. Tarsomere I smooth, clothed with many hair and bristles and provided with a pair of pedal spurs on distal margin. Tarsomere II smooth, cylindrical and clothed thickly on ventral surface with paired bristles and hair. Pectines well developed and 4 times longer than wide. Middle lamellae subdivided into seven small digits. Fulcra poorly distinguished, small, elongated as in text-fig. 175. Lamella and fulcra sparsely clothed with microscopic hairs and setae. Pectinal teeth tubular, not much tapering distally as in text-fig. 176 and 17/17 in number. Basal piece smooth on entire surface and anterior margin invaginated with a deep median notch. Genital operculum wider than long and a pair of sclerites fused in the middle portion. Cephalothoracic sternum small triangular with a median longitudinal depression as in text-fig. 175.

Mesosoma : All tergites coarsely granular but more granular on lateral, posterior and anterior middle portion of each tergite. Tergites I-VI monocarinated and a median carina granular on posterior portion as in text-fig. 177. Pretergal portion granular with finely granular posterior margin. Lateral and posterior margins granular. Tergite VII with two pairs of granular lateral carinae as in text-fig. 170. Lateral and posterior margin granular. Pretergal portion granular with granular posterior margin. Sternites I-IV smooth except weakly granular on lateral portions of sternite IV, each provided with a pair of slit like stigmata for book lungs. Presternal portion absent in segment I and smooth with finely granular posterior margin on sternites II-IV. Lateral and posterior margins smooth except crenulated lateral margins of sternite III. Sternite V entirely coarsely granular and provided with two pairs of granular carinae. Presternal portion finely granular with finely granular posterior margin. Lateral and posterior margins crenulated.



FIGS. 179-184. *Lychas (Alterotrichus) hendersoni* Pocock

- 179. Femur, dorsal, interior and exterior views.
- 180. Patella, dorsal view.
- 181. Patella, exterior view.
- 182. Manus and fingers, dorso-exterior view.
- 183. Manus and immovable finger, exterior view.
- 184. Manus and immovable finger, ventral view.

Metasoma : Cauda more than four and half times as long as carapace. Segments I-IV carinated and all carinae evenly granular. Lateral carinae well developed and evenly granular on segments I and II, but poorly developed and granular on posterior portion of segment III and absent on segment IV. Intercarinal space weakly and sparsely granular. Anterior peduncle finely and thickly granular. Posterior margin evenly granular. Segment V slightly longer than carapace and as wide and deep as preceding segment. Dorsolateral carinae distinct and granular but granulation become obsolete on posterior portion as in text-fig. 178. Inferior lateral and single inferior median carinae evenly granular. Inferior carinae poorly developed on anterior portion. Intercarinal space irregularly, coarsely and closely granular. Anterior peduncle finely and closely granular. Anal rim of this segment evenly granular as in text-fig. 178. Telson shorter than segment V and as long as carapace. Vesicle as long as caudal segment I, poorly granular and granules obsolete on ventral portion. Ventral median crest weakly crenulate, ending posteriorly into a triangular subaculear spine as in text-fig. 178. Ventral and lateral bands not prominent. Aculeus long, slightly shorter than vesicular length, not much curved, sharp and dark on distal portion as in text-fig. 178.

Distribution : INDIA : Yeracaud, Kerala.

Remarks : We have examined, illustrated and described on the basis of one of the female type specimen (syntype) received from B.M. (N.H.) London, Regd. No. 1984.10.24.38-41. The present illustrations and descriptions are based on the type specimen received.

Sub-genus iii *Endotrichus* sg.nov.

Characters : *Trichobothria et* and *est* are placed in between *dt* and *db*.

Key to the species of sub-genus Endotrichus sg. nov.

1. Mesosomal tergites II-VI with three carinae (Tricarinated) (Fig. 193) *eb* and *esb* placed closer to the base of immovable finger (Fig. 280). *em* on patella placed more distal but close to *est* and *et* (Fig. 198).2

Mesosomal tergites II-VI with one carina (Mono-carinated) (Fig. 224), *eb* and *esb* placed at distal from the base of immovable fingers (Fig. 238), (except in *Lychas scaber*), *em* on patella placed proximal and away from *est* and *et* (Fig. 236).3

2. Lateral carinae on mesosomal tergites granular and well developed on posterior portion (Fig. 193), *esb* 2 is slightly distal to *esb* 1 on patella (Fig. 298). *tricarinatus*

Lateral carinae on mesosomal tergites not well developed and represented by a single bigger granule on posterior margin (Fig. 209); *esb*2 is proximal to *esb* 1 on patella (Fig. 214). *laevifrons*

3. Fingers of chela longer, *dt* and *db* are away from each other, distance between *et* and *est* also more (Fig. 237); *d*5 and *e*1 are on same plane on femur (Fig. 234), *esb*2 distal to *esb*1 on patella (Fig. 236).*scaber*

Fingers of chela short, *dt* and *db* not much away from each other; *et* and *est* also very closer (Fig. 254), *e*1 proximal to *d*5 on femur (Fig. 250); *esb*1 and *esb*2 on same plane or *esb*1 slightly distal to *esb*2 (Fig. 252).4

4. *Et*, *Est*, and *Esb* placed very close to each other on manus (Fig. 264); *esb*2 always slightly proximal to *esb*1 on patella (Fig. 263). Manus not clear yellow (Fig. 259).5

Et placed away from *Est* and *Esb* on manus (Fig. 254); *esb1* and *esb2* on same plane on patella (Fig. 252); Manus clear yellowish in colour (Fig. 243).*albimanus*

5. Pectines 6 times longer than wide and pectinal teeth 24/24 in number (Fig. 261), *est* placed more distal to *db* on immovable finger (Fig. 269).*biharensis*

Pectines less than 5 times longer than wide and Pectinal teeth 20/20 in number (Fig. 276), *est* placed closer to *db* on immovable finger (Fig. 284).*kamshetensis*

6. *Lychas* (*Endotrichus*) *tricarinatus* Simon

(Figs. 185-201)

1884. *Lychas tricarinatus* Simon, *Ann. Mus. civ. Sto. na Genova*, 20 : 371.
 1890. *Isometrus tricarinatus* : Pocock, *J. Linn. Soc. (Zool.)*, 23 : 433.
 1891. *Lychas tricarinatus* : Kraepelin, *Jb. hamb. wiss. Anst.*, 8 : 227.
 1892. *Lychas tricarinatus* : Pocock, *J. Bombay nat. Hist. Soc.*, 7 : 301.
 1899. *Archisometrus tricarinatus* : Kraepelin, *Tierr. Scorp. etc.*, : 50.
 1900. *Lychas tricarinatus* : Pocock, *Fauna Brit. India, Arachn.*, : 40.

General : Female brownish yellow of medium to bigger body size as in text-fig. 185. Entire body granular. Interocular area yellow. Tergites III-IV tri-carinated. Caudal segment I almost as wide as long. Pretergal portion blackish. All carinae on caudal segment granular. Telson small granular on ventral surface, vesicle with strong subaculear spine. Appendages paler than body colour. Pectines well developed and pale yellow. Last sternite provided with four granular carinae.

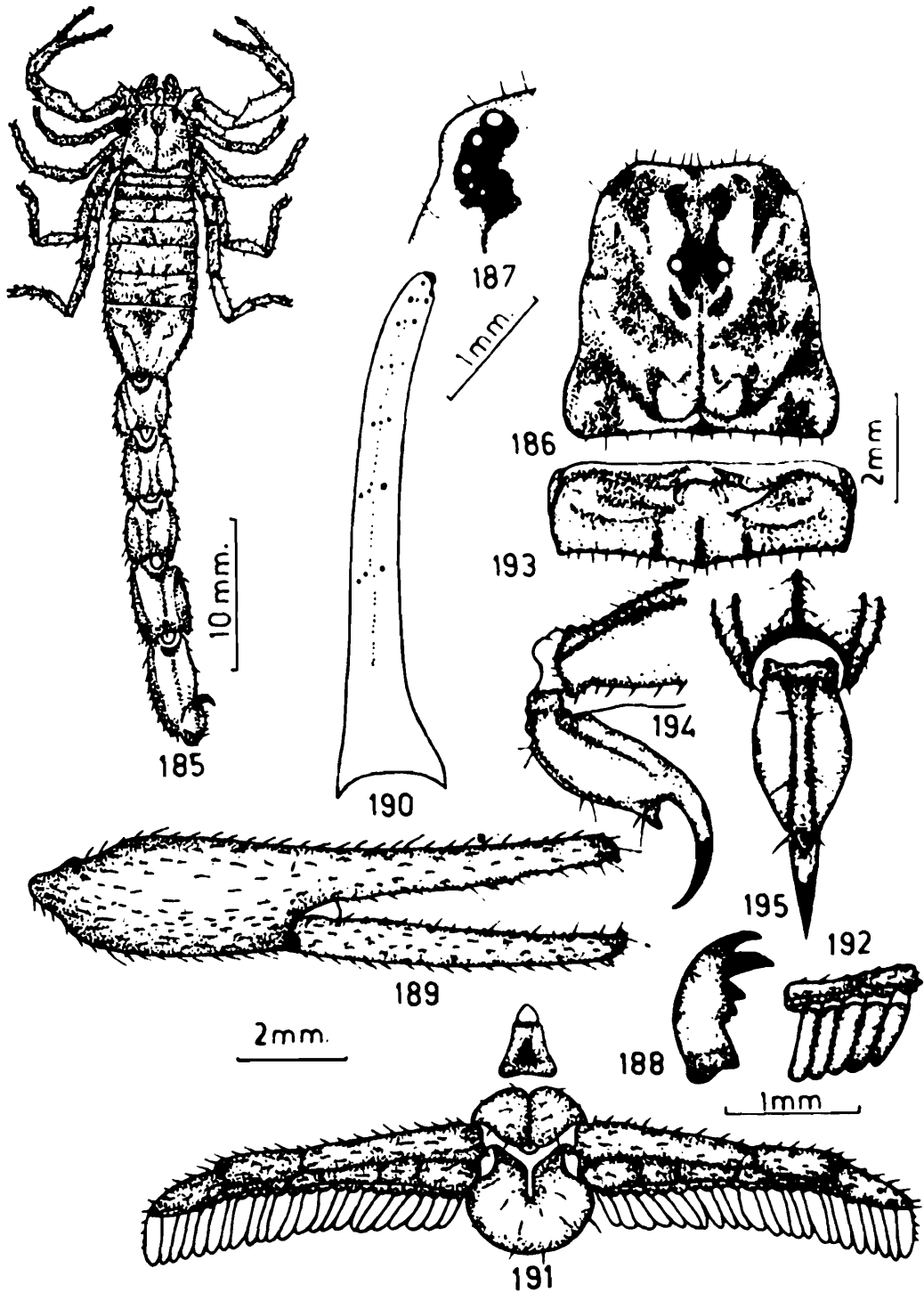
Measurements : Total length 47.50 mm. Carapace 5.25 mm. long; Mesosoma 16.00 mm long; Metasoma 26.25 mm. long.

Carapace : Entire surface coarsely granular. Interocular area yellowish except dark smooth middle portion. Lateral ocular tubercles black granular, provided with five lateral eyes as in text-fig. 187. Median ocular tubercles smooth

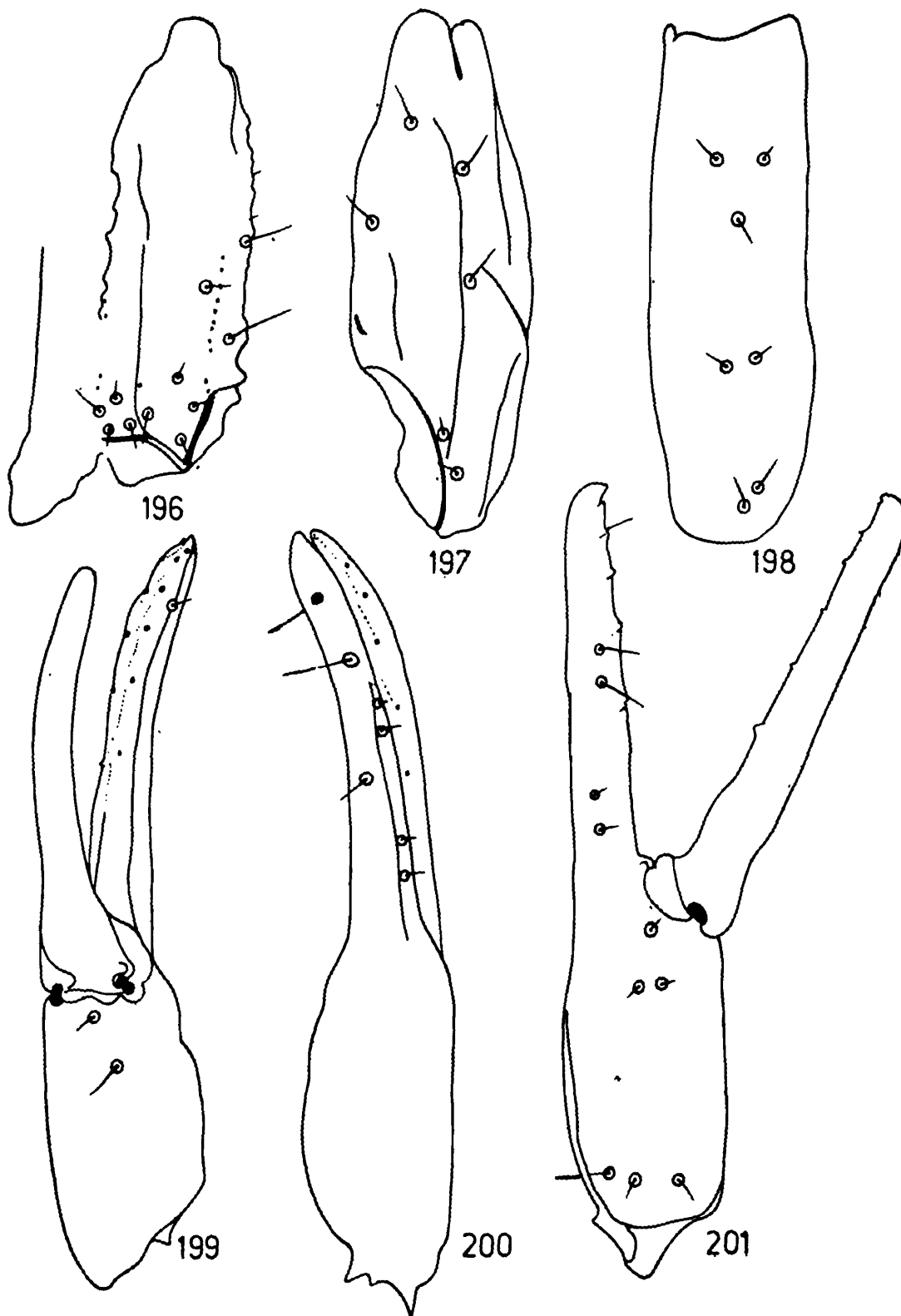
in middle, granular on posterior and anterior sides but anteriorly continued for a short distance, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.75 as in text-fig. 186. Anterior margin crenulated, very weakly invaginated in middle and provided with submarginal granular ridge. Posterior margin granular above and almost straight. Chelicera small, with basal segment pigmented on dorsal surface but more darker on anterior portion. Ventral surface thickly covered with short, silky hair, sometimes extending on ventral portion of finger as in text-fig. 188. Fingers short, dark on dentition. Dentition as characterised in genus and family. Dorsal and ventral distal teeth of movable finger subequal in length as in text-fig. 188. Pedipalps with short femur. Femur shorter than carapace and carinated. All carinae granular and intercarinal space sparsely granular. Outer or anterior surface provided with irregularly granular crest; three to four tubercles prominent. Patella shorter than carapace but longer than femur and carinated. Outer carinae smooth. Dorsal carinae very poorly granular but granules bigger in size. Inner or anterior surface provided with a granular crest on dorsal portion and few granules on ventral portion. Intercarinal space much sparsely and poorly granular. Hand smooth as in text-fig. 189 and less than as wide as patella. Length of under hand slightly longer than half the length of patella. Movable finger shorter than carapace but as long as femur. Dentition on the fingers non-imbricated and outer row of movable finger comprises six teeth as in text-fig. 190. Immovable finger shorter than femur. All segments sparsely setose. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 196-199 and 201. Legs darker on femur and patella and granular; carinae crenulated or serrated on femur but smooth on patella. Tibia carinated but carinae smooth; intercarinal space also smooth and provided with a long tibial spur on III and IV pairs. Tarsomere I carinated and provided below with two or three rows of

FIGS. 185-195. *Lychas (Endotrichus) tricarinatus* Simon

185. Dorsal view of female. 186. Carapace, dorsal view. 187. Lateral eyes, lateral view. 188. Movable finger of chelicera, dorsal view. 189. Manus and fingers, exterior view. 190. Movable finger, dorsal view. 191. Pectines, genital operculum and cephalothoracic sternum, ventral view.



- 192. Pectinal teeth and fulcra, ventral view.
- 193. Tergite, dorsal view.
- 194. Telson and anal rim of metasomal segment V, lateral view.
- 195. Telson and anal rim of metasomal segment V, ventral view.



FIGS. 196-201. *Lychas (Endotrichus) tricarinatus* Simon

196. Femur, dorsal, interior and exterior views. 197. Patella, dorsal view. 198. Patella, exterior view. 199. Manus and immovable finger, ventral view. 200. Manus and immovable finger, dorsal view. 201. Manus and immovable finger, exterior view.

long reddish setae and a pair of pedal spur. Tarsomere II smooth, pale yellow provided with a tuft of thick, short reddish setae. All segments clothed sparsely with reddish setae. Claws short, not much sharp, reddish brown on tips. Pectines well developed, pale yellow and 5 times longer than wide as in text-fig. 191. Middle lamellae divided into six or seven small digits. Fulcra elongated to round and well distinguished between adjacent teeth. Lamellae and fulcra covered with white and reddish microscopic setae. Pectinal teeth well developed, tubular as in text-fig. 192 and count 23/23 as in text-fig. 191. Basal piece weakly sclerotized and with a deep median notch on anterior margin. Genital operculum always wider than long, two sclerites pointed on latero-median portion, united in the middle. Cephalothoracic sternum small, triangular, with a deep, prominent depression in posterior median portion as in text-fig. 191.

Mesosoma: All tergites coarsely granular but median and anterior lateral portions of each tergite more coarsely granular and granules small in size. Granules on posterior lateral portion of each tergite bigger in size. Tergites I & II with only weakly granular median carina and lateral carinae represented by single bigger granule on posterior margin. Tergites III & IV with well developed granular median carina and a pair of sparsely granular lateral carinae as in text-figs. 185 and 193. Lateral margins of tergites I-III smooth, tergite IV weakly crenulated, tergites V & VI crenulated. Posterior margin of each tergite granular above. Pretergal portion dark, with finely and closely granular posterior margin, posterior margin invaginated on median lateral portions. Tergite VII with two pairs of granular lateral carinae and a weak median carina on median anterior portion as in text-fig. 185. Pretergal portion dark with coarsely granular posterior margin, invaginated on median lateral portion. Sternites I-IV smooth, sparsely setose, each provided with a pair of slit like stigmata for book lungs. Lateral margins smooth, except sternite IV, with weakly crenulated. Presternal portion not visible. Sternite V weakly granular but little more granular in middle portion, provided with four almost smooth carinae. Lateral margins serrated. Posterior margin smooth. Presternal portion not visible.

Metasoma : Cauda five times as long as carapace. Basal segment slightly wider than long. Segment I with dorsal, dorso-lateral, inferior lateral and inferior carinae. All carinae crenulated but dorsal and dorso-lateral carinae more elevated posteriorly and ending into a broad triangular tubercles. Segments II & III with dorsal carinae crenulated, elevated posteriorly and ending into a triangular tubercles. Lateral carinae developed on segment II and sparsely granular but represented on segment III with few granules on posterior portion. Inferior lateral and inferior carinae granular. Each carina sparsely setose on either sides. Segment V slightly longer than carapace, dorsal carinae granular, dorsal surface not elevated and finely granular. Dorso-lateral carinae very sparsely granulate and each granule supported with a pair of setae. Inferior lateral carinae granular. Inferior carinae granular and developed only on 1/3 anterior portion. Single inferior median carina evenly granular. Inter-carinal space granular and granules bigger in size. Anal rim of this segment evenly granular as in text-figs. 194 and 195. Telson shorter than last caudal segment or carapace but as long as patella. Vesicle as long as caudal segment I but always less than as wide or deep as last caudal segment. Dorsal surface of vesicle smooth but ventral and lateral surfaces granular and granules arranged in rows. Ventral median crest granular and ending into a large, triangular, pointed subaculear spine. Subaculear spine smooth and straight on inner margin, without tooth. Ventral and lateral depressions reddish brown. Aculeus slightly less than as long as half the length of vesicle, less curved, pointed, sharp and dark on distal portion. Setation on vesicle not clear as in text-figs. 194 and 195.

Distribution : INDIA : Bhopal, Madhya Pradesh; Belgaum, Mangalore, Kanara, Karnataka; Trivandrum, Kerala; Nellore, Andhra Pradesh; Tanjore, Yercaud in Shevaroy Hills, Nilgiri Hills in Tamil Nadu.

Remarks : We have examined the type specimens received from the B.M. (N.H.) London, (3 ♀ ♀) Regd. No. 1894.10.24. 38-41. We have described and illustrated this species on the basis of same type material.

7. *Lychas* (*Endotrichus*) *laevifrons* Pocock

(Figs. 202-216)

1897. *Lychas laevifrons* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 113.
1899. *Archisometrus shoplandi* : Kraepelin, *Tierr. Scorp. etc.*, : 50.
1900. *Lychas laevifrons* : Pocock, *Fauna Brit. India, Arachn.*, : 41.

General : Female of medium body size. Carapace, mesosoma entirely coarsely granular and mesosomal tergites II-VI tricarinated. Sternites smooth but last with two pairs of granular carinae. Metasoma comparatively long, equally wide on segments I-V, all segments carinated and all carinae evenly granular. Telson with elongated, thin vesicle provided ventrally with subaculear spine. Aculeus long, sharp, not much curved. Chelicera short, with sharp dentition on fingers. Pedipalp comparatively short, stout, carinated on femur and patella, manus smooth, elongated, fingers short, with non-imbricated dentition; outer row on movable finger comprises of five to six minute teeth. Legs granular and carinated on femur and patella. Pectines well developed with 22/22 teeth on each side.

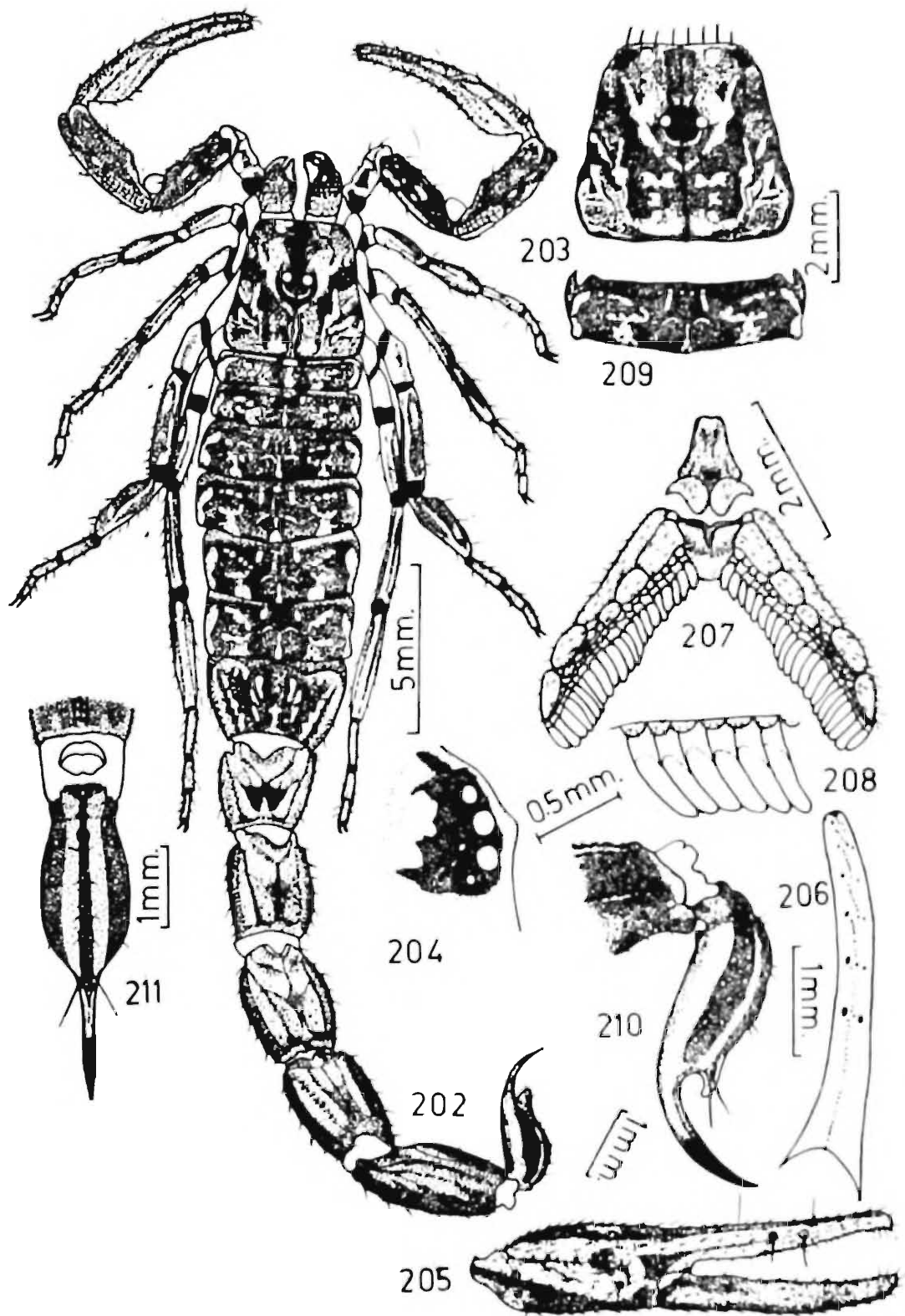
Body colour blackish brown variegated with many yellow patches. Carapace more blackish with few yellow spots. Interocular region black on middle portion but variegated with yellow on lateral median carina and with a pair of >> - << shaped yellow lateral patches joining to posterior margin of each tergite with short yellow strip as in text-fig. 202. Lateral margins of each tergite provided with a pair of sublateral yellow patches. Pretergal portion blackish on posterior portion as in text-fig. 209. Sternites yellow except IV, V variegated with black patches. Metasomal segments comparatively pale brown in colour but darker on ventral portion. Last segment and telson dark brown. Chelicera yellowish with darker pigmentation on dorsal surface of basal segment as in text-fig. 202 but yellow on ventral and dark brown on fingers. Pedipalp darker on femur and patella but brown on distal portions. Legs darker on femur and patella but pale on distal portions as in text-fig. 202.

Measurements : Total length 36.75 mm. Carapace 4.25 mm. long; Mesosoma 12.25 mm. long; Metasoma 20.25 mm. long.

Carapace : Entire surface coarsely and closely granular. Posterior and lateral granular carinae very weakly distinguished as the granules are of same size. Lateral ocular furrows inconspicuous and posterior median, posterior and posterior lateral furrows also shallow but conspicuous. Lateral ocular tubercles granular and provided with five lateral eyes in text-fig. 204. Median ocular tubercles prominent but obsolete on middle portions, weakly granular on posterior portion while granular on anterior portion, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.5 as in text-fig. 203. Anterior margin smooth and straight, provided with few reddish setae. Lateral margins finely crenulated and provided with a submarginal granular ridge. Posterior margin smooth but granular above and almost straight. Chelicera with bulbous basal segment, smooth on dorsal surface while ventral surface clothed thickly with many short silky hair, extending on fingers. Fingers short with normal dentition as characterised in family and genus. Pedipalps short and stout. Femur shorter than carapace, carinated; outer and inner carinae on dorsal surface evenly granular. Outer or anterior carina granular and few granules subdenticulate. Inner or posterior carina weakly developed and poorly granular. Ventral carinae not distinguished. Intercarinal space weakly granular but ventral surface more regularly granular and few granules coarse. Patella longer than femur but shorter than carapace, distinctly granular. Inner or anterior surface provided with a crenulated crest. Entire surface smooth. Manus as long as half the length of carapace, less than as wide but as deep as patella, acarinated and smooth as in text-fig. 205. Movable finger as long as femur. Immobile finger slightly longer than the length of under hand, carinated but carinae obsolete. Dentition on fingers non-imbricated and outer row on movable

Figs. 202-211. *Lychas (Endotrichus) laevifrons* Pocock

202. Dorsal view of female. 203. Carapace, dorsal view. 204. Lateral eyes, lateral view. 205. Manus and fingers, exterior view. 206. Movable finger, dorsal view. 207. Pectines, genital operculum and cephalothoracic sternum, ventral view. 208. Pectinal teeth and fulcra, ventral view. 209. Tergite, dorsal view. 210. Telson and anal rim of metasomal segment V, lateral view.



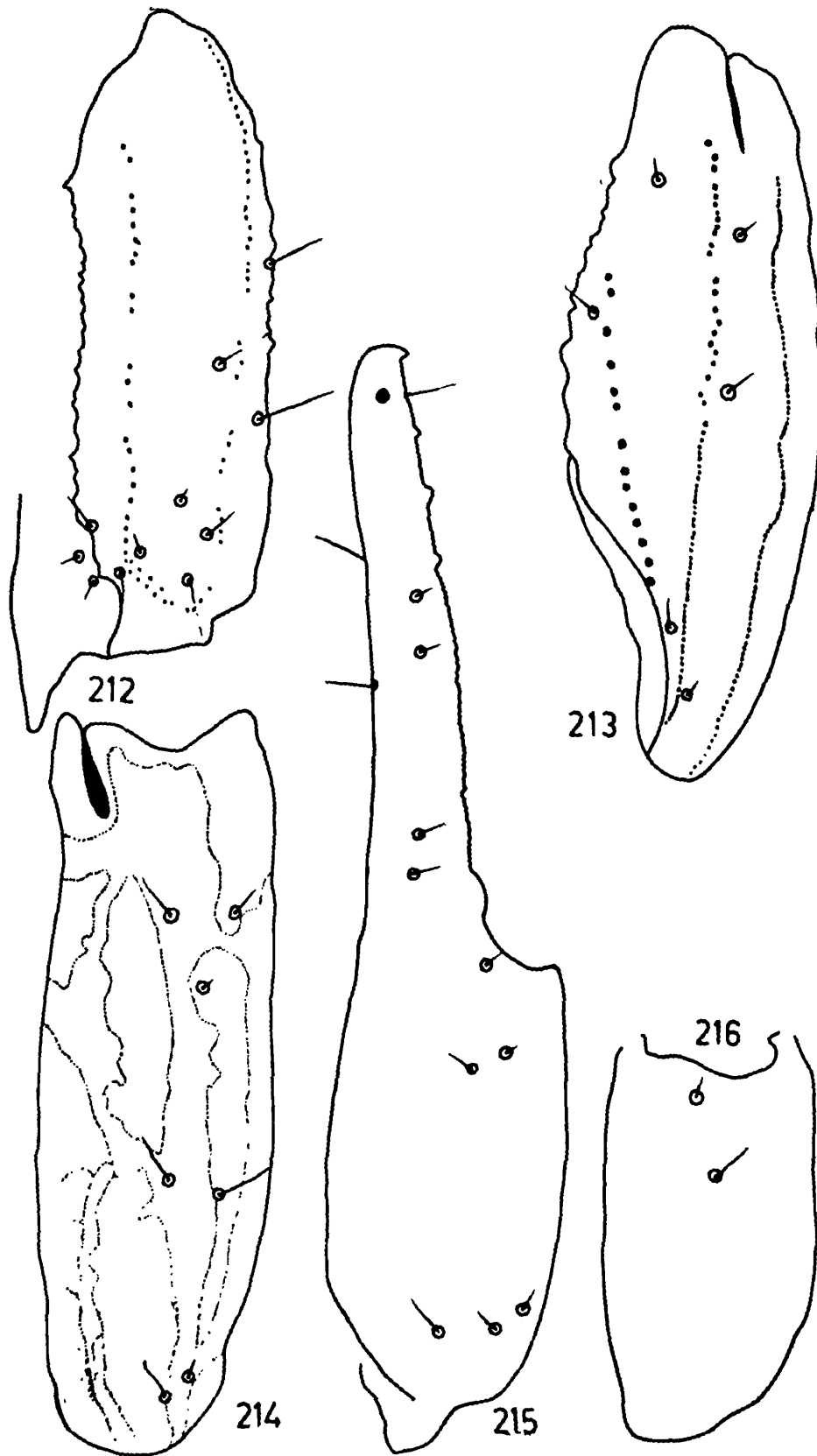
211. Telson and anal rim of metasomal segment V, ventral view.

finger comprises of five to six minute teeth as in text-fig. 206. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 212-216 and *esb* 2 on patella is more proximal than *esb* 1. Legs carinated and granular on femur and patella. All carinae granular only on femur, outer and lateral carinae on patella smooth but inner carinae crenulated. Intercarinal space more granular on femur than on patella. Tibia carinated, all carinae weakly granular and provided with a long tibial spur on III and IV pairs. Tarsomere I carinated, outer carinae smooth and inner carinae provided with long bristles, distal inner edge provided with a pair of pedal spur. Tarsomere II cylindrical, smooth and ventral surface fully covered with numerous short setae. Pectines well developed and 5.5 times longer than wide as in text-fig. 207. Middle lamellae subdivided into seven to eight small digits. Fulcra clearly distinguished and round to oval in shape. Lamellae and fulcra covered sparsely with microscopic white and reddish setae. Pectinal teeth elongated, tapering as in text-fig. 208 and 22/22 in number as in text-fig. 207. Basal piece sclerotised, narrowed on posterior portion, while anterior margin, invaginated and deeply notched in the middle as in text-fig. 207. Genital operculum wider than long, operculi united or fused in middle. Cephalothoracic sternum small, triangular with a deep median depression on posterior portion. Basal piece, genital operculi and sternum sparsely clothed with few reddish, microscopic setae.

Mesosoma : All tergites coarsely and regularly granular throughout. Tergite I with a very weak median carina. Tergites II-VI with granular median carina and a pair of short, granular lateral carinae as in text-fig. 209. Lateral margins of each tergite crenulated, posterior margin granular. Pretergal portion finely granular with granular posterior margin. Tergite VII with two pairs of granular lateral carinae developed only on 2/3 of posterior portion as in text-fig. 202. Lateral margin crenulated, posterior margin smooth but evenly granular on dorsal side. Pretergal

FIGS. 212-216. *Lychas (Endotrichus) laevifrons* Pocock

212. Femur, dorsal, interior and exterior views. 213. Patella, dorsal view
214. Patella, exterior view.



215. Manus and immovable finger, exterior view.
216. Manus, ventral view.

portion granular with granular posterior margin. Lateral margins of each sternite weakly crenulated but posterior margins smooth. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Sternite I without presternal portion. Sternites II-IV with smooth presternal portion with smooth posterior margin. Sternite V weakly granular, with two pairs of weakly granular carinae. Lateral margins crenulated, posterior margin smooth. Presternal portion smooth with posterior margin finely crenulated on lateral portion.

Metasoma : Cauda slightly less than five times as long as carapace. Basal segment slightly wider than long, segment II as long as wide. Segment V twice as long as wide. Segments I-IV with dorsal, dorsolateral, inferior lateral and inferior carinae distinct and except inferior carinae on segment I, all carinae evenly crenulated and dorsal carinae ending posteriorly into a subdenticular tubercle. Lateral carinae distinct and granular on segments I and II but weakly developed and sparsely granular on segment III. Intercarinal space sparsely granular and few granules coarse. Anterior peduncle of each segment finely but thickly granular. Posterior margin granular. Segment V slightly longer than carapace, as deep and wide as IV caudal segment, with dorsolateral carinae distinct only on 2/3 anterior portion. Inferior lateral carinae evenly granular. Inferior carinae represented by few, bigger and very sparsely arranged granules. Single inferior median carina evenly granular. Intercarinal portion granular. Anterior and posterior peduncles smooth on dorsal portion but finely granular on its anterior ventral margin while posterior ventral or anal rim of this segment weakly granular as in text-figs. 210 and 211. Telson shorter than carapace and vesicle as long as caudal segment I but less than as wide or deep as last caudal segment. Entire surface smooth, except five weakly and broadly granular ventral crests and a ventral median crest ending posteriorly into a strong triangular subaculear spine, provided with a pair of long basal setae. A pair of lateral and ventral bands clearly distinguished but not much deep. Aculeus not much curved, long and more than half the vesicular length, sharp pointed and reddish brown on distal portion as in text-figs. 210 & 211.

Distribution : INDIA : Calcutta, West Bengal and Gujarat.

Remarks : We have studied and identified two female specimens collected from Gujarat. The present illustrations and descriptions are based on the basis of above specimens. According to the correspondence with B.M.(N.H.) London, the type specimens of this species are not traceable. So these specimens are identified as per the description available in *Fauna Brit. India, Arachn.*, Pocock, 1900.

8. *Lychas (Endotrichus) scaber* Pocock

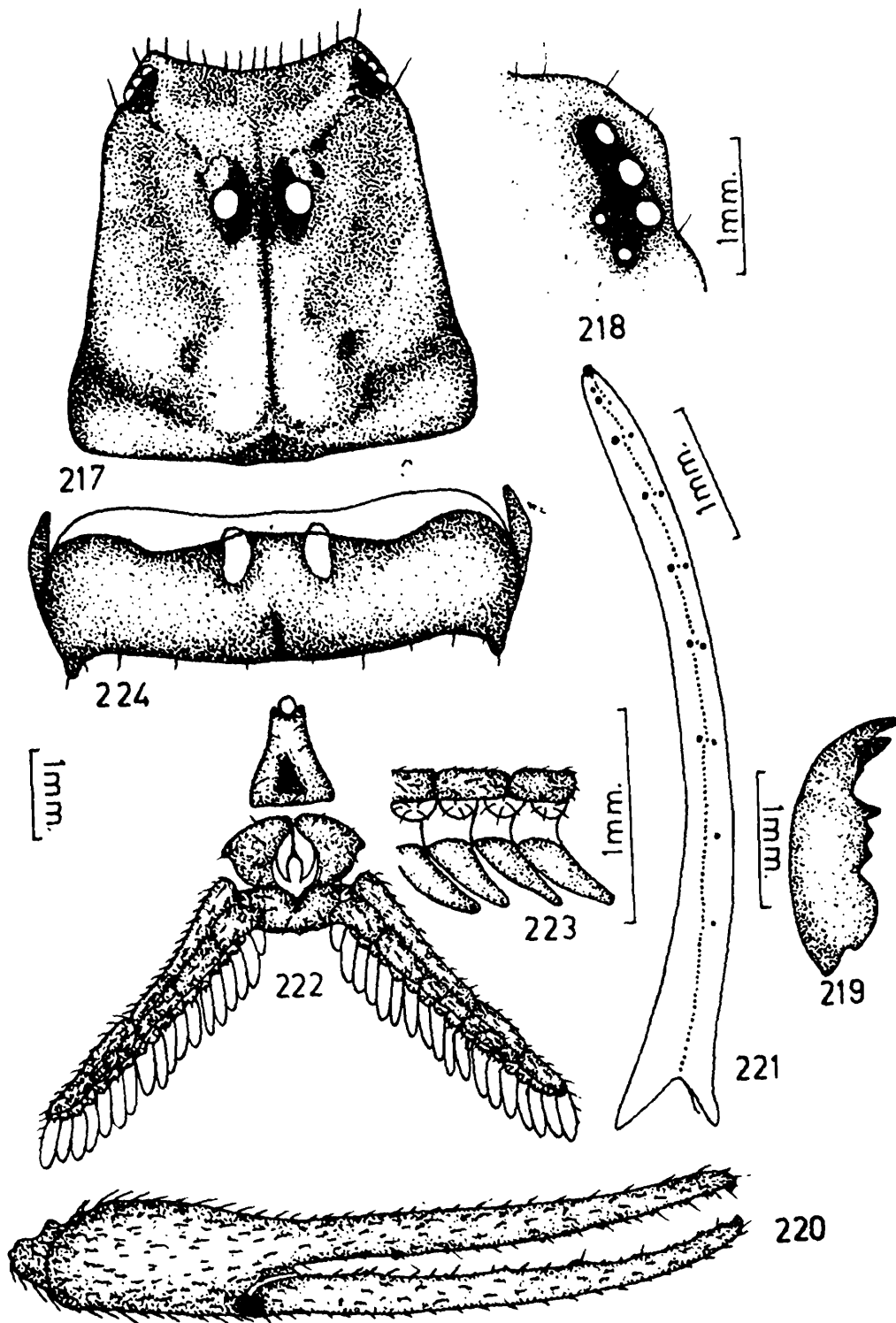
(Figs. 217-239)

1893. *Lychas scaber* Pocock, *J. Bombay nat. Hist. Soc.*, 7 : 300.
 1895. *Lychas scaber* : Kraepelin, *Jb. hamb. wiss. Anst.*, 12 : 86.
 1899. *Archisometrus scaber* : Kraepelin, *Tierr. Scorp. etc.*, : 51.
 1900. *Lychas scaber* : Pocock, *Fauna Brit. India, Arachn.*, : 38.

General : Male and female yellowish brown with medium body size. Male smaller and slender, elongated in body size (Body colour in case of male is changed, may be due to preservation) Entire body granular. Pedipalp slightly dark brown. Legs pale yellow. Last sternite granular but without any carinae. Pectines well developed and pale yellow.

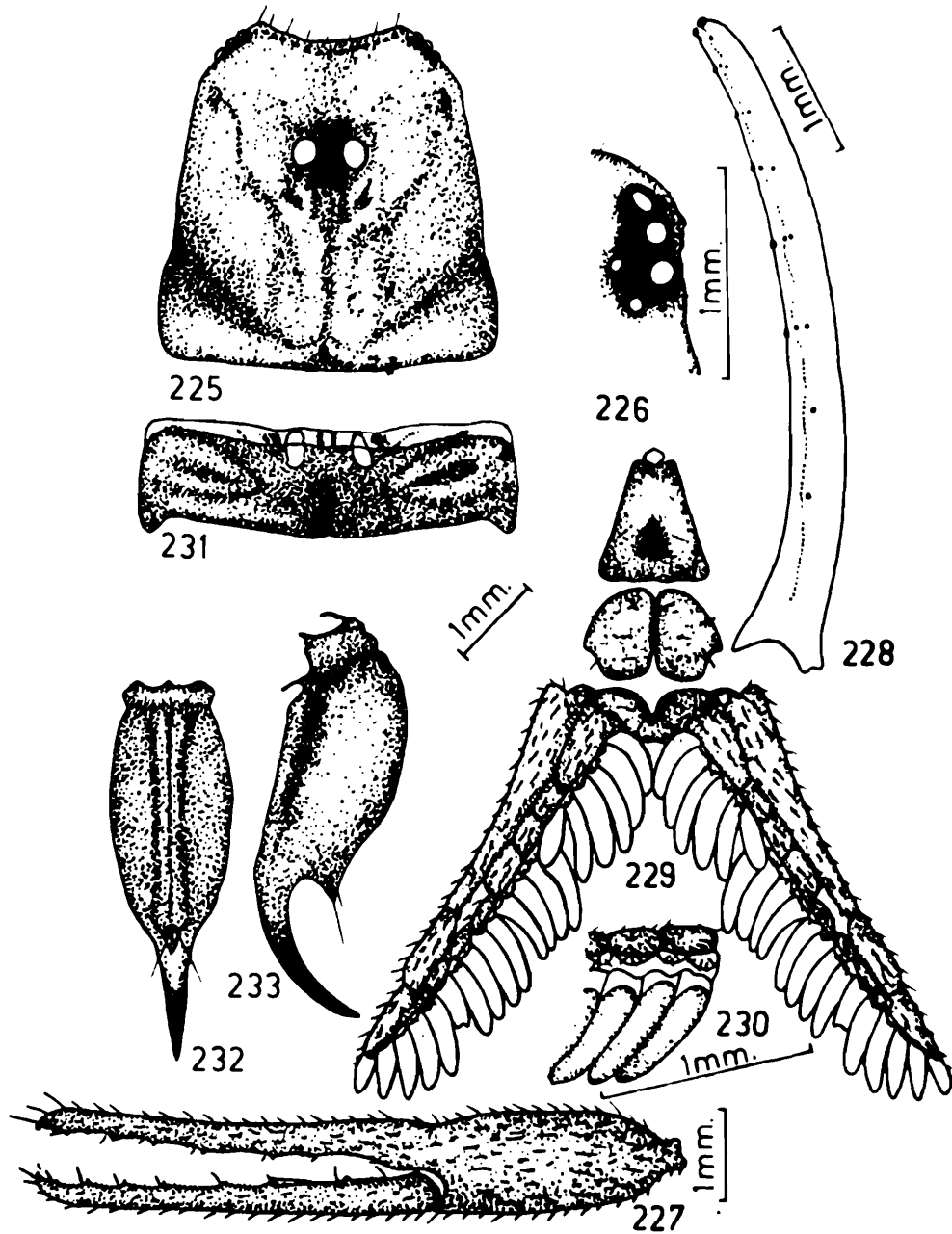
Measurements : Total length 39.25 mm. Carapace 3.75 mm. long; Mesosoma 9.50 mm. long; Metasoma 26.00 mm. long.

Carapace : Entire surface coarsely and finely granular but more coarsely granular on lateral and anterior portion. Interocular region more darker. Anterior lateral carinae weakly developed and granular. Central median, posterior, lateral furrows almost smooth and clear. Lateral ocular tubercles weakly granular and provided with five lateral eyes in text-figs. 218 & 226. Median ocular tubercles smooth in middle portion, finely granular on anterior and posterior portions, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2 as in text-figs. 217 & 225. Anterior margin invaginated in middle, smooth but granular above and provided with few setae. Lateral margins finely crenulated with submarginal granular ridge. Posterior margin granular above. Chelicera with basal segment pigmented



FIGS. 217-224. *Lychas (Endotrichus) scaber* Pocock

217. Dorsal view of carapace of male. 218. Lateral eyes, lateral view.
 219. Movable finger of chelicera, dorsal view. 220. Manus and fingers, exterior view. 221. Movable finger, dorsal view.
 222. Pectines, genital operculum and cephalothoracic sternum, ventral view. 223. Pectinal teeth and fulcra, ventral view,
 224. Tergite, dorsal view,



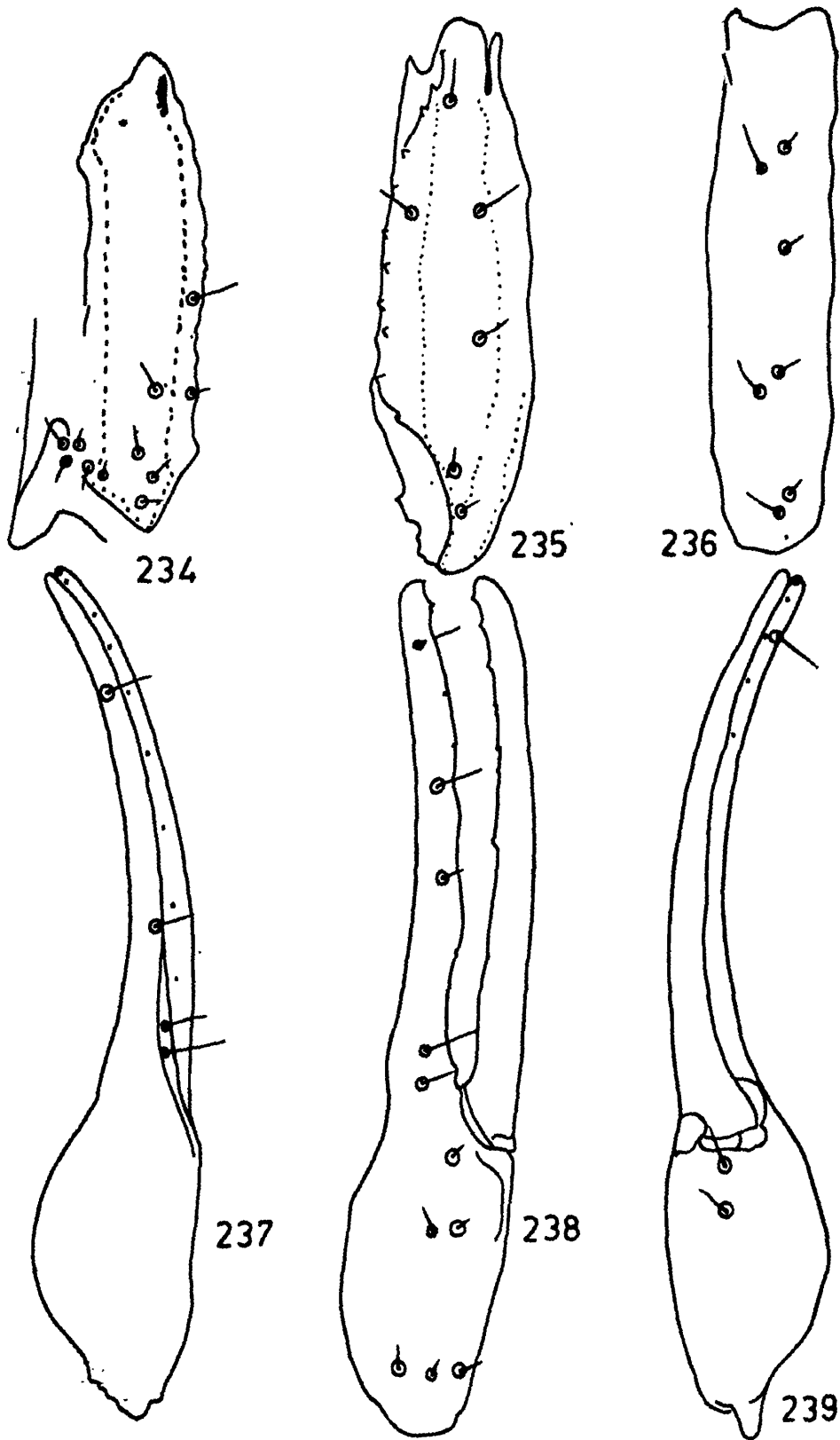
FIGS. 225-233. *Lychas (Endotrichus) scaber* Pocock

- 225. Dorsal view of carapace of female.
- 226. Lateral eyes, lateral view.
- 227. Manus and fingers, exterior view.
- 228. Movable finger, dorsal view.
- 229. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 230. Pectinal teeth, ventral view.
- 231. Tergite, dorsal view.
- 232. Telson, ventral view.
- 233. Telson, lateral view.

on dorsal surface but more darker on anterior portion. Ventral surface thickly covered with short, silky hairs. Fingers short, stout, dark brown but more reddish on dentition. Dentition as characterised in family and genus as in text-fig. 219. Dorsal and ventral distal teeth on movable finger almost subequal in length. Pedipalp slightly elongated but more stout in female. Femur longer than carapace in male and as long as in female. All carinae granular but outer carinae weakly granular than dorsal, ventral and inner carinae. Outer or anterior surface provided with well developed crenulated carinae. Intercarinal space weakly granular but more weaker granulation in male. Patella longer than femur but smoother and granulation very weak. Carinae weakly developed, outer carinae almost smooth. Inner carinae weakly granular. Intercarinal space more granular on inner side. Inner or anterior surface provided with crenulated carinae but four dentiform tubercles prominent in female and five to six in male. Hand almost smooth not as wide as patella and length of under hand more than half the length of patella. Movable finger longer than patella, immovable finger shorter than movable finger but longer than patella. Dentition on fingers non-imbricated and outer row of movable finger comprises eight teeth as in text-figs. 221 and 228. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 234-239. Legs pale yellow, femur and patella carinated. All carinae crenulated, intercarinal space granular. Tibia carinated but carinae smooth and provided with a short, very weak tibial spur on III and IV pairs. Tarsomere I carinated but carinae smooth, provided below with row of paired setae and pair of pedal spurs. Tarsomere II pale yellow, smooth provided below with a row of paired setae. Claws short, weak and dark reddish brown on tips. Pectines well developed and 4.75 times longer than wide as in text-figs. 222 and 229. Middle lamellae subdivided into seven to eight small digits. Fulcra well distinguished, round to elongate. Lamellae and fulcra sparsely covered with red microscopic setae. Teeth more tubular, well developed and 18/18 in number in male as in text-fig. 222

FIGS. 234-239. *Lychas (Endotrichus) scaber* Pocock

234. Femur, dorsal, interior and exterior views. 235. Patella, dorsal view.
236. Patella, exterior view. 237. Manus and immovable fingers, dorsal view.



238. Manus and immovable finger, exterior view.

239. Manus and immovable finger, ventral view.

and 20/20 in female as in text-fig. 229. Basal piece almost square and deeply notched in the middle of anterior margin. Genital operculum always wider than long, sclerites exposed in female; in male sclerites united and small but conspicuous male genital papillae visible as in text-fig. 222. Cephalothoracic sternum triangular with a shallow depression in the posterior median portion as in text-figs. 222 and 229.

Mesosoma : Tergites coarsely granular but more granular in male. Tergites I-VI provided with a median, granular carinal developed only on posterior margin as in text-fig. 224. Lateral margins crenulated, posterior margin granular above. Pretergal portion finely granular and invaginated in the middle of posterior margin. Tergites VII granular provided with two pairs of granular lateral carinae as in text-fig. 217. Lateral margins serrated, posterior margin granular above. Pretergal portion granular, with finely granular posterior margin. Sternites I-IV smooth, each provided with slit like stigmata for book lungs. Posterior margin smooth, lateral margins smooth except in sternites III & IV in male and IV in female. Presternal portion smooth, with very finely granular posterior margin, invaginated in middle. Sternite V granular but more granular on lateral portions and provided with two pairs of very weakly developed granular carinae. Posterior margins smooth. Lateral margins serrated. Presternal portion smooth with finely granular posterior margin, invaginated in middle portion.

Metasoma : Cauda seven and half times as long as carapace in male. Basal segment longer than wide, all ten carinae developed and carinated but inferior lateral and inferior carinae less crenulated. Segment II with dorsal carinae crenulated and weakly tuberculate posteriorly, dorsolateral carinae crenulated, laterals very weakly developed, granular and marked throughout the length. Inferior lateral and inferior carinae poorly crenulated. Segments III & IV without lateral carinae but dorsal and dorso-lateral carinae weakly and sparsely crenulated. Inferior lateral and inferior carinae weakly and poorly crenulated. Intercarinal space granular. Anterior peduncle finely granular on ventral portion. Posterior margin granular. Segment V longer than carapace

and surface more smoother than the preceding segments. Inferior lateral and single inferior median carina poorly developed and granular. Intercarinal space weakly granular. Anal rim of this segment poorly granular. Telson as long as carapace but shorter and not as wide or deep as fifth caudal segment. Vesicle longer than caudal segment I but shorter than caudal segment II. Entire surface smooth. Lateral and ventral depressions not prominent and dark brown. Ventral median crest smooth, weakly developed and ending into a triangular, pointed, subaculear spine supported with a pair of long setae at the base. Aculeus is almost as long as half the vesicular length, not much curved, sharp, dark reddish brown on distal portion. Setation on vesicle not clear as in text-figs. 232 and 233.

Distribution : INDIA : Secunderabad, Andhra Pradesh; Madras, Tamil Nadu.

Remarks : We have examined the type specimens (one ♂ one ♀) received from B.M.(N.H), London, Regd. No. 1893.3.16.7-8. Present description and illustrations are based on these types. Types received were accompanied with one extra pedipalp whereas the male type was with both the pedipalps detached from body. For examinations and further description the two similar pedipalps were chosen. The female type was lost its metasoma so the description of that portion is not given.

9. *Lychas (Endotrichus) albimanus* Henderson (Figs. 240-255)

1919. *Lychas albimanus* Henderson, *Rec. Indian Mus.*, 16(5) : 379-381.

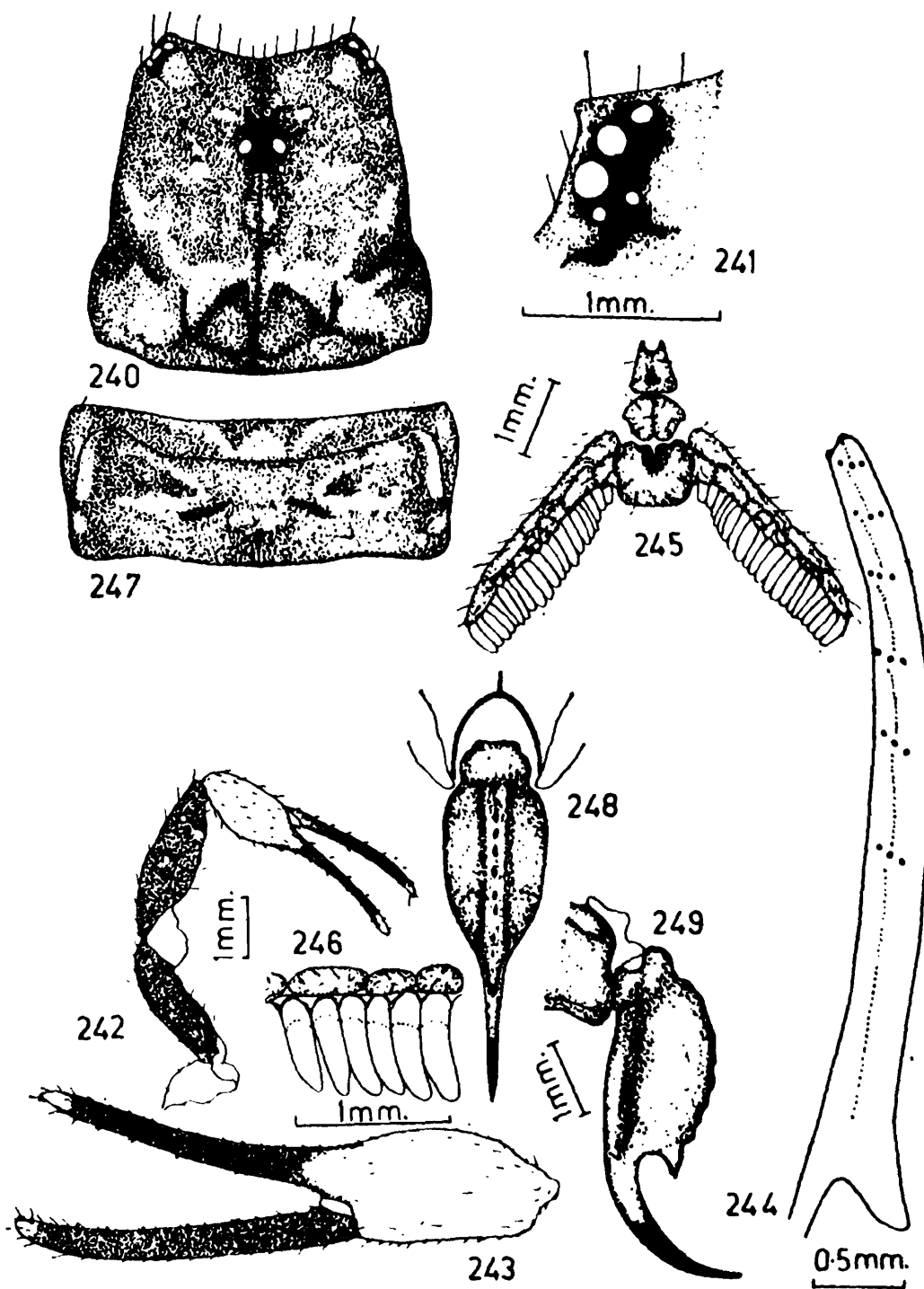
General : Female of medium body size and body colour brownish, varigated with yellow patches. Caudal region yellowish on posterior segments. Telson yellow. Chelicera blackish on anterior portion. Pedipalp dark except white manus as in text-fig. 242. Legs dark on femur and patella. Ventral portion of body pale yellow. Entire body weakly and poorly granular. Tergites with single median carina. Carinae on caudal segments granular. Telson with pointed subaculear spine. Pectines well developed. Last mesosomal sternite with two pairs of granular carinae.

Measurements : Total length 36.00 mm. Carapace 4.00 mm. long; Mesosoma 11.25 mm. long; Metasoma 20.75 mm. long.

Carapace : Entire surface sparsely and weakly granular but slightly more granular on interocular and posterior portions. No carinae developed. Central furrow deep in middle and posterior portion. Ocular tubercles granular and black. A pair of median eyes situated anteriorly in the ratio 1 : 2.5 as in text-fig. 240. Five contiguous lateral eyes as in text-fig. 241. Anterior margin smooth, slightly invaginated in the middle and provided with few, short white setae. Lateral margins almost smooth and provided with granular submarginal ridge. Posterior margin weakly granular. Chelicera with pigmented basal segment but more darker on anterior portion. Ventral surface clothed thickly with fine silky hair. Finger pigmented but reddish brown on dentition. Dentition on fingers as characterised in family and genus. Dorsal and ventral distal teeth of movable finger subequal in length. Pedipalp slender, blackish brown in colour except white manus as in text-fig. 242. Femur as long as carapace. Carinae weakly developed and granular. Intercarinal space very finely granular. Patella longer than carapace or femur. Outer carinae smooth, dorsal and inner carinae very finely granular. Intercarinal space almost smooth. Manus smooth, yellow and length of under hand equal to caudal segment II, as wide as patella. Finger blackish, movable finger as long as patella but immovable finger shorter than femur. Dentition on the finger non-imbricated and outer row comprises of six teeth on movable finger as in text-fig. 244. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 250-255. Legs darker on femur and patella, carinated but carinae smooth. Intercarinal space smooth. Tibia yellow, carinated, but carinae smooth with long tibial spur on III and IV pairs. Tarsomere I carinated, carinae smooth, fur-

FIGS. 240-249. *Lychas (Endotrichus) albimanus* Henderson

240. Dorsal view of carapace of female. 241. Lateral eyes, lateral view.
242. Pedipalp, dorsal view. 243. Manus and fingers, exterior view.
244. Movable finger, dorsal view. 245. Pectines, genital operculum and cephalothoracic sternum, ventral view.



- 246. Pectinal teeth and fulcra, ventral view.
- 247. Tergite, dorsal view.
- 248. Telson and anal rim of metasomal segment V , ventral view.
- 249. Telson and anal rim of metasomal segment V , lateral view.

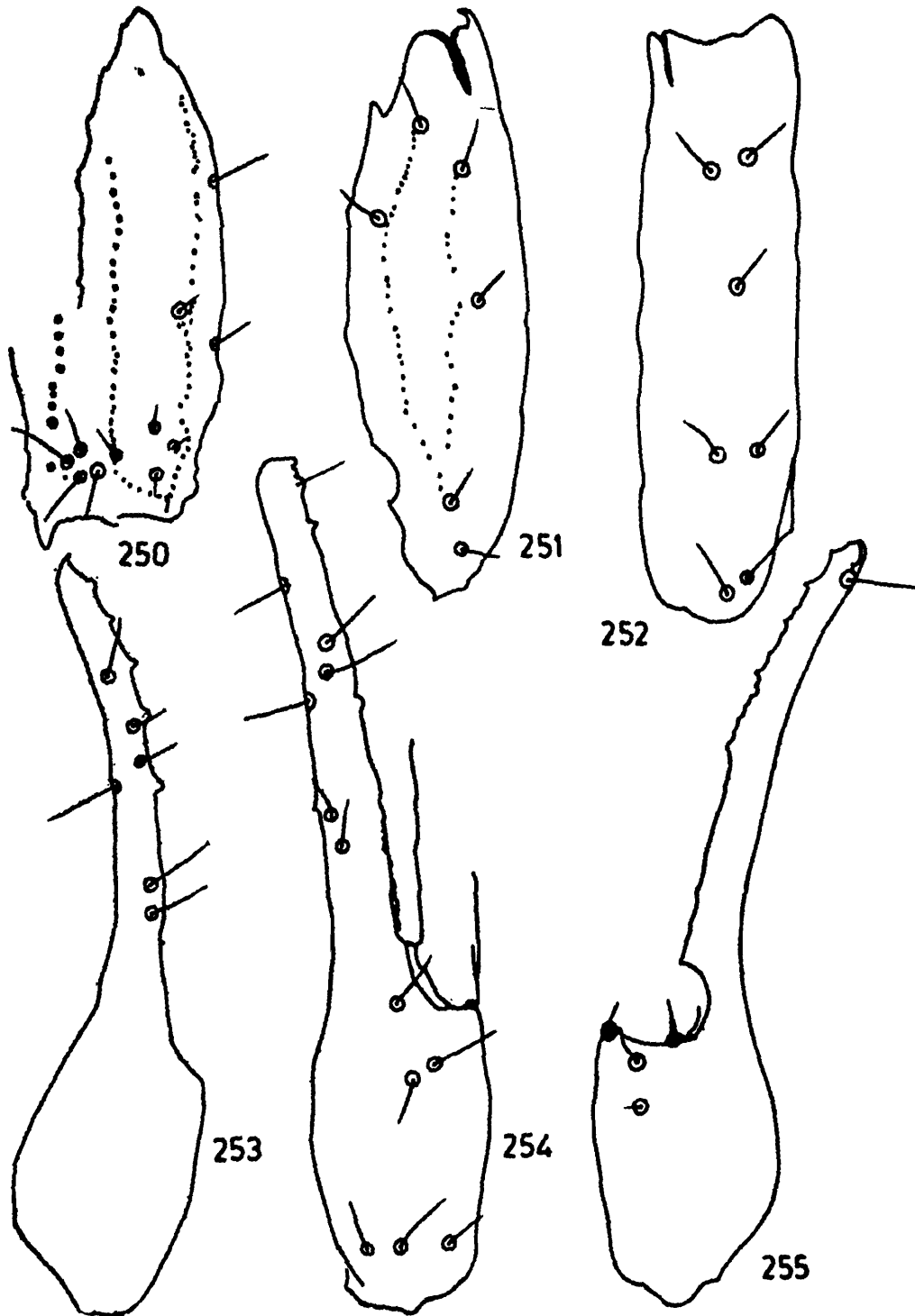
nished with a pair of pedal spur and row of short bristles. Tarsomere II smooth, furnished below with a row of paired short bristles. Pectines well developed and 4 times longer than wide as in text-fig. 245. Middle lamellae divided into six or seven small digits. Fulcra not distinguished. Lamellae and fulcra sparsely covered with short, white hairs. Pectinal teeth tubular, elongated as in text-fig. 246, and 21/21 in number as in text-fig. 245. Basal piece sclerotized and invaginated on anterior margin and provided with a deep median notch. Genital operculum always wider than long, sclerites weak and not well sclerotized, fused in the middle as in text-fig. 245. Cephalo-thoracic sternum triangular, dark brown on anterior portion and provided with a depression on posterior portion as in text-fig. 245.

Mesosoma : Each tergite finely and coarsely granular. Tergites I-VI yellowish brown with a pair of yellow elliptical spots in the middle portion; and >> - << shaped marks but posterior margin more darker as in text-fig. 247. Tergite I without carinae. Tergites II-IV with a median granular carina, developed only on posterior portion as in text-fig. 247. Posterior margin of each tergite granular. Pretergal portion almost smooth. Tergite VII provided with two pairs of weakly granular carinae. Posterior margin granular. Pretergal portion almost smooth. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Presternal portion for sternites II-IV smooth. Sternite V very weakly granular on posterior and lateral portions and provided with two pairs of weakly crenulated carinae. Presternal portion smooth.

Metasoma : Cauda more than five times as long as carapace. Basal segment slightly wider than long. Segments I-IV with weakly carinated. All carinae developed on segment I. Lateral carinae weakly developed and poorly crenulated on segment II. Lateral carinae absent on segments III & IV. Intercarinal space finely and sparsely granular. Segment V longer than carapace

FIGS. 250-255. *Lychas (Endotrichus) albimanus* Henderson

250. Femur, dorsal, interior and exterior views. 251. Patella, dorsal view.
252. Patella, exterior view. 253. Manus and immovable finger, dorsal view.
254. Manus and immovable finger, exterior view.



255. Manus and immovable finger, ventral view

or patella. Inferior lateral carinae weakly crenulated. Anal rim of this segment smooth as in text-figs. 248 & 249. Intercarinal space granular. Segments I-V slightly wider than deep. Telson slightly longer than carapace or patella but shorter than caudal segment V. Vesicle as long as caudal segment I but always less than as wide or deep as rest of the caudal segments. Ventral and lateral bands prominent and brown in colour. Ventral median crest well developed on distal portion and ending into a triangular, pointed subaculear spine. Subaculear spine furnished with a pair of minute teeth just near the apex as in text-figs. 248 and 249. Setation on the vesicle not clear but subaculear spine provided with a pair of long setae at the base. Aculeus not much curved, short, not as long as vesicle, sharp, dark brown to reddish on distal portion as in text-figs. 248 and 249.

Distribution : INDIA : Cochin, Kerala.

Remarks : We have studied, illustrated and described on the basis of the type specimen deposited in National Museum ZSI, Calcutta. Regd. No. 2159/18. (Metasoma of the type specimen is almost detached and broken, most of the legs are also broken)

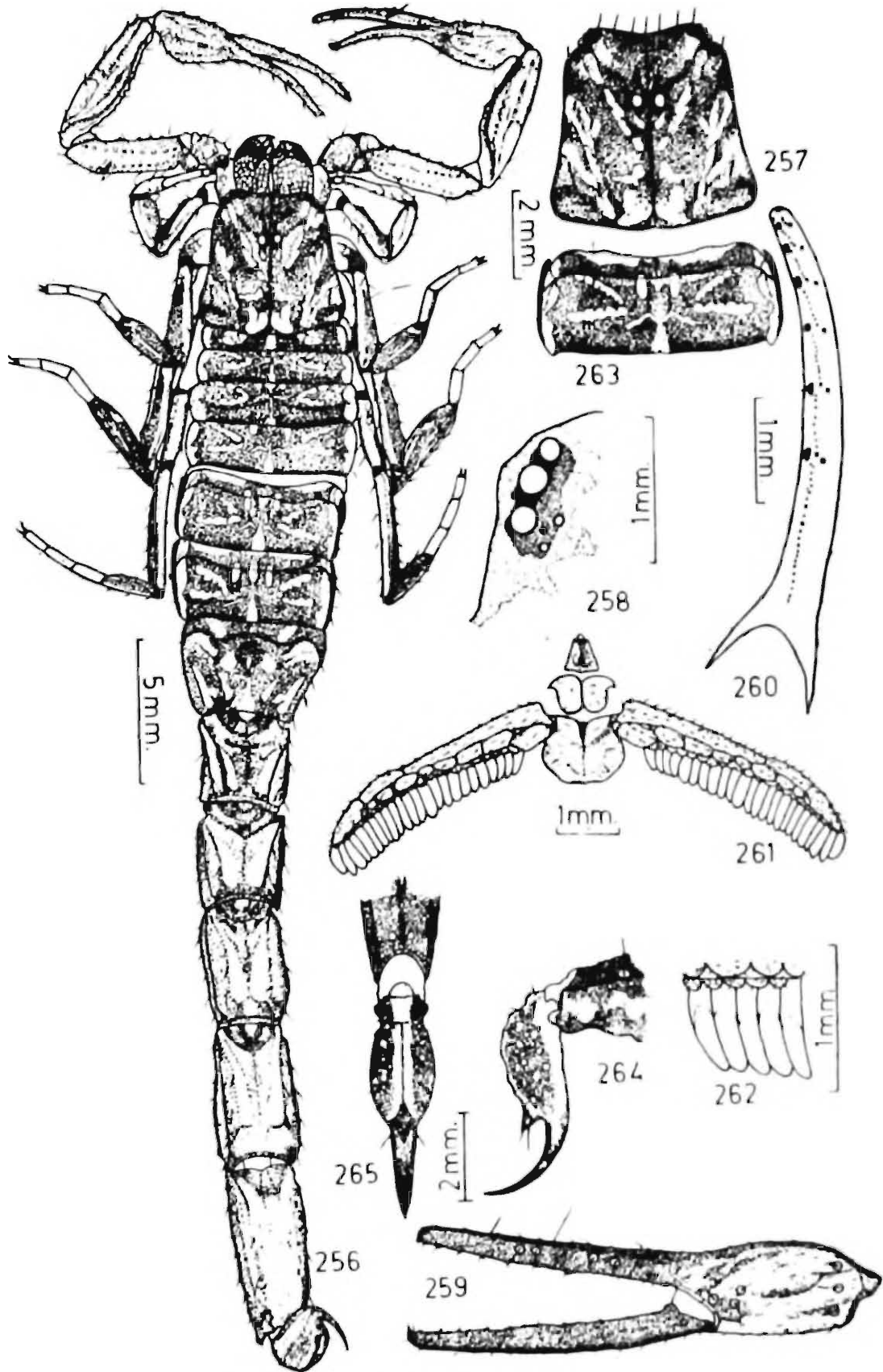
10. *Lychas (Endotrichus) biharensis* sp. nov.

(Figs. 256-270)

General : Female of medium size. Body surface fully covered with coarse granules. Carinae on carapace not much distinguished. Interocular area smooth. Chelicera normal with bulbous, smooth basal segment and short fingers. Pedipalp stout with long fingers. Dentition non-imbricated. Legs thin, carinated and granular on femur and patella. Legs III and IV

FIGS. 256-265. *Lychas (Endotrichus) biharensis* sp. nov.

256. Dorsal view of female. 257. Carapace, dorsal view. 258. Lateral eyes, lateral view. 259. Manus and fingers, exterior view. 260. Movable finger, dorsal view. 261. Pectines, genital operculum and cephalothoracic sternum, ventral view. 262. Pectinal teeth and fulcra, ventral view. 263. Tergite, dorsal view. 264. Telson and anal rim of metasomal segment V, lateral view.



265. Telson and anal rim of metasomal segment V, ventral view.

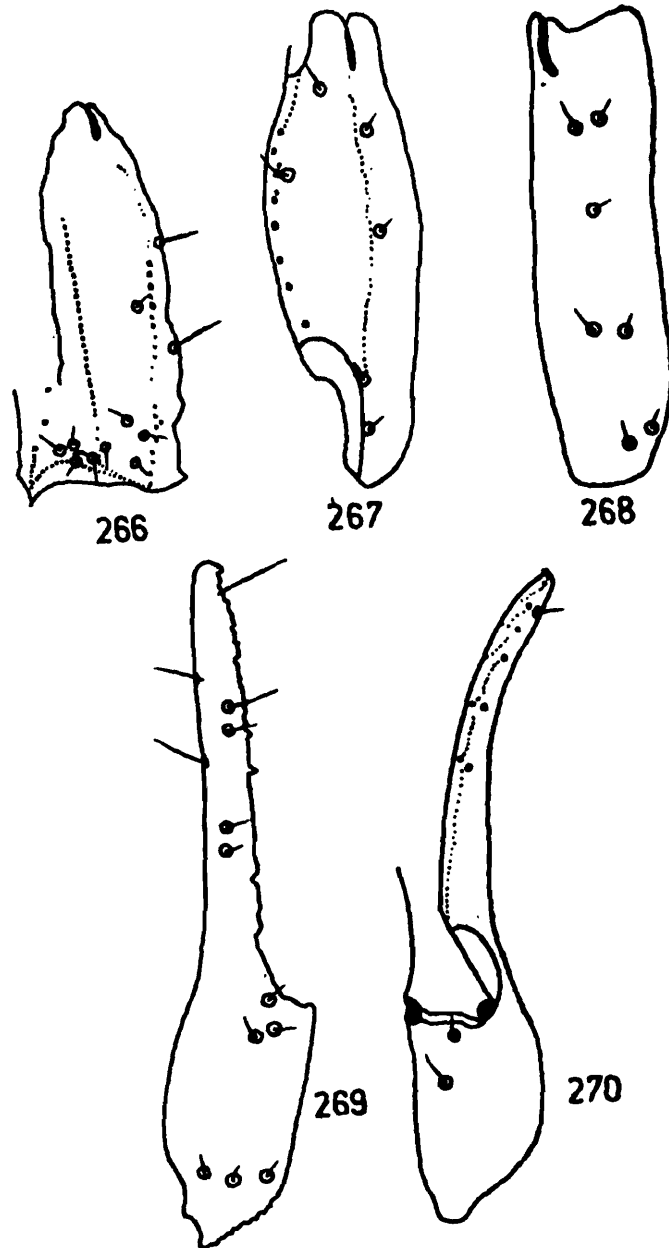
with long tibial spur. Mesosomal tergites monocarinated and coarsely granular. Pectines well developed. Genital operculum united. Cephalothoracic sternum small and triangular. Last sternite finely granular and provided with four granular carinae. Metasoma carinated on all segments and all carinae granular. Telson thin and vesicle provided with a strong, triangular, subaculear spine. Aculeus long, not much curved and pointed.

Body colour almost blackish brown with few yellowish patches on carapace. Mesosomal tergites I-VI with yellow >> - << markings. Tergite VII more yellow than blackish as in text-fig. 256. Sternites yellow but IV and V with few black strips. Metasoma yellowish with few brownish black spots and stripes on each segments but last or segment V darker on ventral portion. Telson dark brown with few darker spots. Aculeus dark reddish brown as in text-fig. 264.

Measurements : Total length 46.25 mm. Carapace 5.00 mm. long; Mesosoma 14.50 mm. long; Metasoma 26.75 mm. long.

Carapace : Entire surface coarsely and almost evenly granular except smooth portion of middle interocular area. Lateral carinae very weakly distinct. Lateral ocular tubercles granular and provided with five contiguous eyes as in text-fig. 258. Median ocular tubercles smooth, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2 as in text-fig. 257. Anterior lateral furrows slightly more prominent than lateral ocular furrows. Central median and posterior median furrows narrow, deep and bifid posteriorly. Posterior lateral furrows shallow and more distinct on inner portion. Anterior margin smooth and weakly invaginated, provided with few setae. Lateral margins finely crenulated and provided with a finely granular submarginal ridge. Posterior margin straight and granular as in text-fig. 257. Chelicera with elongated basal segment, smooth on entire surface, ventral surface clothed thickly with many short, silky hairs extending on fingers. Fingers short, with normal dentition as characterised in genus and family. Dorsal and ventral distal tooth of movable finger subequal. Pedipalp slightly more longer but stout. Femur shorter than carapace, carinated and all carinae granular. Inner or posterior surface

with few dentiform tubercles. Outer or anterior surface with crenulated carina. Intercarinal space finely and sparsely granular. Patella longer than carapace, carinated but only dorsal and ventral inner carinae distinct and granular. Anterior or inner



FIGS. 266-270. *Lychas (Endotrichus) biharensis* sp. nov.

- 266. Femur, dorsal, interior and exterior views.
- 267. Patella, dorsal view.
- 268. Patella, exterior view.
- 269. Manus and immovable finger, exterior view.
- 270. Manus and immovable finger, ventral view.

surface provided with a crest but few granules tuberculate. Posterior or outer surface smooth. Intercarinal space finely and weakly granular. Manus bulbous as in text-fig. 259 but as wide and deep as patella, smooth and length of under hand equal to half the length of carapace. Fingers long and movable finger twice the length of under hand or as long as carapace. Immobile finger shorter than carapace but almost as long as femur. Dentition of fingers non-imbricated and outer row on movable finger comprises six minute teeth as in text-fig. 260. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 266-270, but *esb* 1 and 2 on patella on equal distance from the base while *em* placed more proximal. Legs carinated on femur and patella and all carinae granular, intercarinal space finely but more closely granular on femur. Tibia carinated but carinae smooth; III and IV pairs provided with a long tibial spur. Tarsomere I carinated but carinae smooth. Tarsomere II cylindrical, smooth, acarinated, clothed on ventral surface with a tuft or pad of short setae. All segments sparsely covered with reddish hairs and bristles. A pair of claws normal. Pectines well developed and 6 times longer than wide. Middle lamellae subdivided into eight to nine digits. Fulcra poorly distinguished but triangular to round. Lamellae and fulcra covered with many minute setae. Pectinal teeth tubular, tapering as in text-fig. 262 and 24/24 in number as in text-fig. 261. Basal piece not well sclerotized, more wide on posterior portion, posterior margin round posteriorly and anterior margin slightly invaginated with a deep median notch. Genital operculum as wide as long, a pair of sclerites fused in the middle. Cephalothoracic sternum triangular, almost as long as wide, with a shallow depression in the middle portion. Basal piece, genital operculum and cephalothoracic sternum sparsely covered with few reddish setae as in text-fig. 261.

Mesosoma : All tergites coarsely and thickly granular but granulation more coarse on posterior portion. Tergites I-VI monocarinated and a median carina granular as in ext-fig. 263. Lateral and posterior margins of each tergites granular. Pretergal portion finely granular with granular posterior margin. Tergite VII with two pairs of lateral granular carinae, ending

abruptly on anterior margin as in text-fig. 256. Lateral and posterior margins granular. Pretergal portion finely granular with granular posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Sternite I without presternal portion. Sternites II-IV with smooth presternal portion with smooth posterior margin. Sternite V finely but thickly granular and provided with two pairs of granular carinae.

Metasoma : Cauda more than five times as long as carapace. Basal segment as long as wide but segment II longer than wide. Segment V twice as long as first caudal segment. Segments I-IV carinated, all carinae evenly granular but granules mostly obsolete. Lateral carinae on segment III clearly granular but granules sparse. Segment IV without lateral carinae. Intercarinal space weakly and finely granular. Anterior peduncle finely and thickly granular. Posterior margin granular. Segment V as wide but more than as deep as preceding segments, provided with inferior lateral and single inferior median granular carinae but all granules obsolete. Inferior carina distinct, sparsely granular and developed on anterior portion. Intercarinal space granular but more granular on ventral portion. Anal rim of this segment poorly granular on lateral portion and smooth as in text-figs. 264 and 265. Anterior peduncle smooth on dorsal portion but granular on ventral portion. Posterior peduncle smooth on dorsal portion. Telson longer than carapace but shorter than caudal segment V. Entire vesicular surface smooth but ventral surface provided with three obsolete crests. Ventral median crest more prominent and ending posteriorly into a triangular subaculear spine, provided with a pair of stout basal setae. Lateral and ventral bands prominent. Aculeus slightly shorter than vesicular length, not much curved, sharp, pointed and dark reddish brown as in text-figs. 264 and 265.

Type-specimen : *Holotype* female, paratype one female, in spirit, deposited at National Collection, ZSI, Calcutta, Regd. Nos. 5074/18 and 5075/18.

Type-locality : Chaurasi, Dist. Manbhum, Bihar, India, 26.ix.1948. Coll. *T. B. Sinha*.

Discussion : This species resembles to *Lychas (Endotrichus) albimanus* Henderson but it differs as follows : (i) Entire body surface much coarsely granular but in *albimanus* body surface not much granular. (ii) Trichobothria *Et*, *Est* and *Esb* on manus placed very close to each other but in *albimanus* they are placed away from each other. (iii) *Esb* 2 on patella is always proximal to *Esb* 1 but in *albimanus* *Esb* 1 and *Esb* 2 are on same plane. (iv) Manus of pedipalp not clear yellow, but in *albimanus* it is clear yellow.

Remarks : These specimens were identified as *Lychas hendersoni* Pocock and deposited in National Collection, ZSI, Calcutta. Regd. No. 2617/18. These specimens were wrongly identified as *L. hendersoni* Pocock, our studies reveal that these specimens belong to a new species as described here.

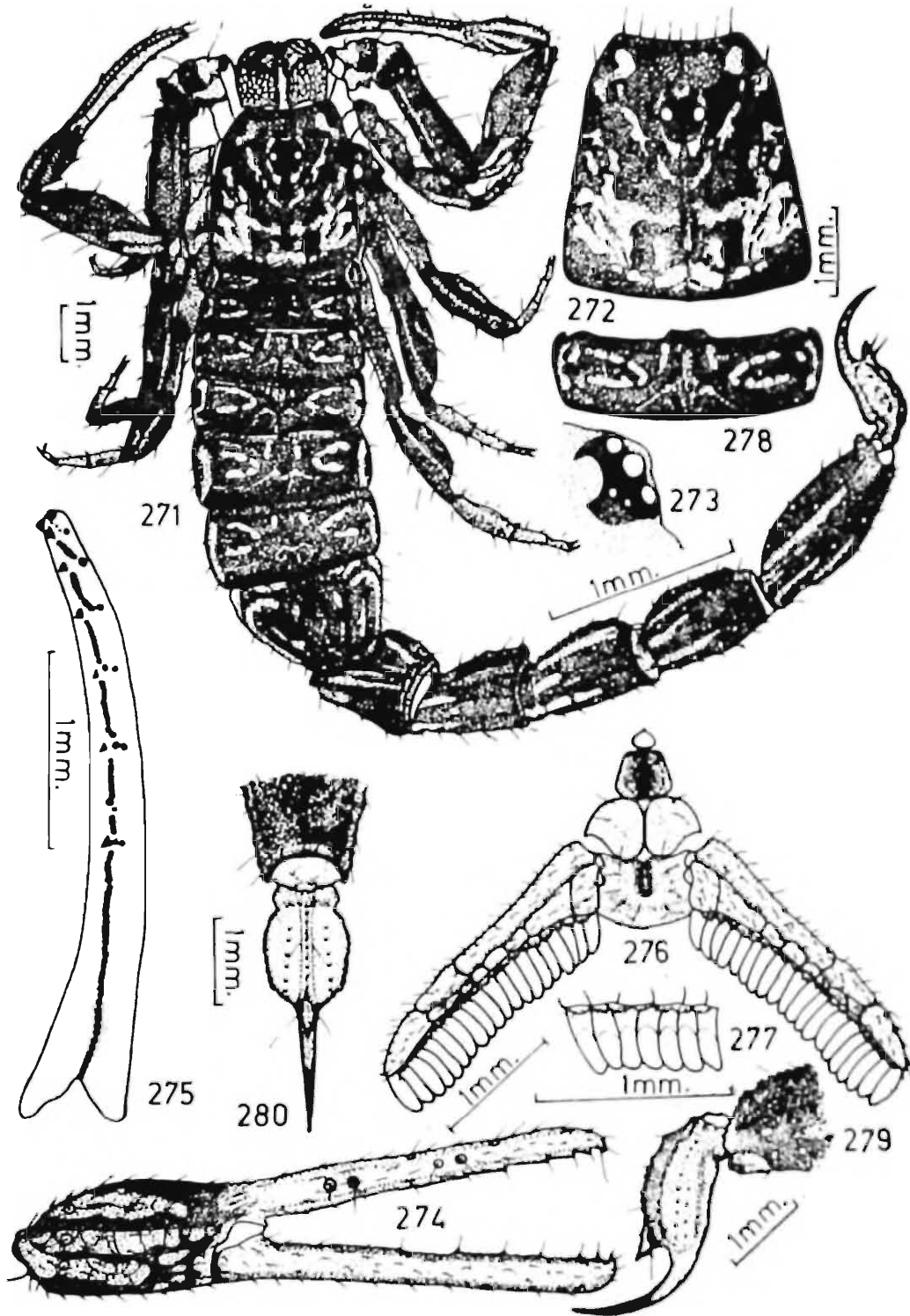
11. *Lychas (Endotrichus) kamshetensis* sp. nov.

(Figs. 271-285)

General : Female of small body size. Entire surface very weakly granular. Carapace weakly granular and posterior central carinae poorly distinct. Metasomal tergites mono-carinated. Last sternite granular and provided with two pairs of almost smooth carinae. Metasomal segments carinated and all carinae crenulated to serrated. Telson with small vesicle and long aculeus. Chelicera small with normal dentition. Pedipalp stout but slender on manus. Trichobothria *et* and *est* on immovable finger very close to each other and placed between *dt* and *bd*. Legs carinated. granular on femur and patella but smooth on tibia and tarsomeres; III and IV pairs with long tibial spur. Pectines well developed. Genital operculum united in middle. Cephalothoracic sternum triangular.

FIGS. 271-280. *Lychas (Endotrichus) kamshetensis* sp. nov.

271. Dorsal view of female. 272. Carapace, dorsal view. 273. Lateral eyes, lateral view. 274. Manus and fingers, exterior view. 275. Movable finger, dorsal view. 276. Pectines, genital operculum and cephalothoracic sternum, ventral view. 277. Pectinal teeth and fulcra, ventral view.



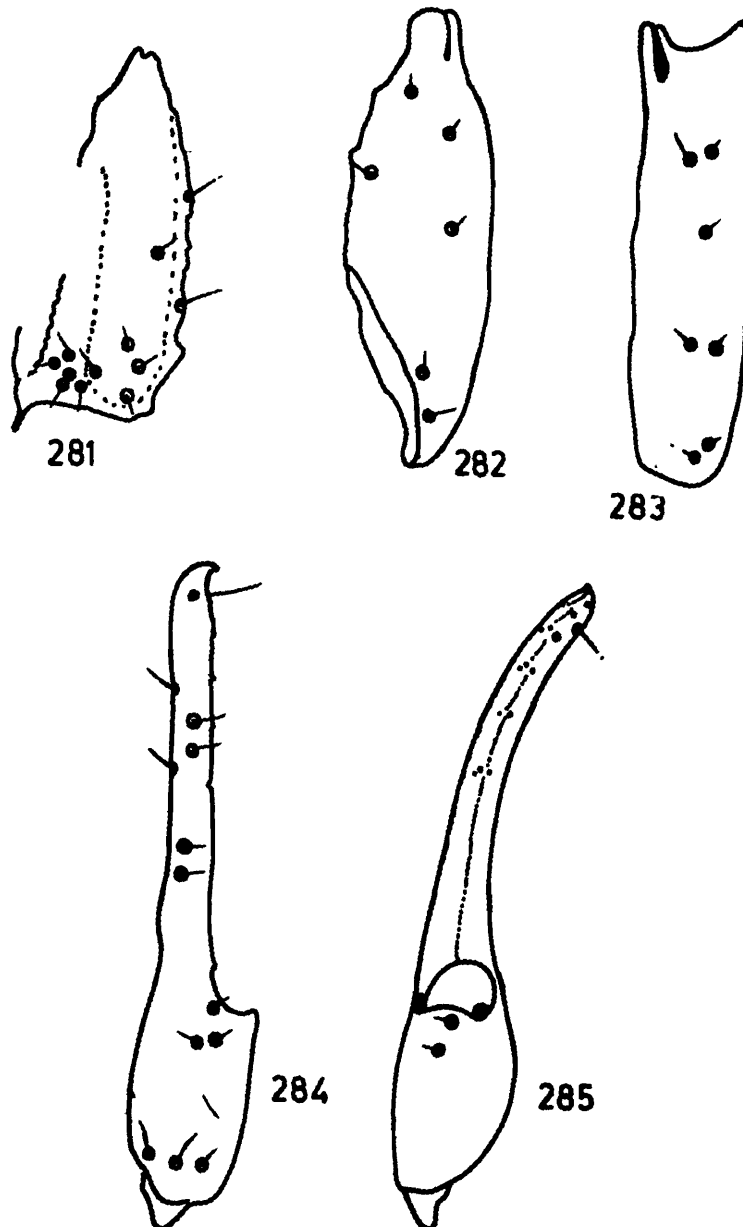
- 278. Tergite, dorsal view.
- 279. Telson and anal rim of metasomal segment V, lateral view.
- 280. Telson and anal rim of metasomal segment V, ventral view.

Colouration of entire body blackish brown, variegated with few yellowish brown spots and bands. Carapace variegated equally with blackish brown and yellowish brown colours. Tergites have >> - << shaped lateral yellowish marks, anterior submedian elliptical spots and submarginal yellow stripes as in text-fig. 278. Ventral portion yellow but weakly variegated on posterior sternites. Metasoma more brownish yellow on posterior portion as in text-fig. 271. Telson clear with dark yellow as in text-figs. 271, 279 and 280. Appendages dark brown with few yellowish brown bands. Chelicera deeply pigmented on dorsal surface of basal segment. Fingers of pedipalps clear yellow as in text-fig. 274. Legs pale brown to yellow on distal segments. Pectines clear pale yellow.

Measurements : Total length 27.75 mm. Carapace 3.50 mm. long; Mesosoma 8.50 mm. long; Metasoma 15.75 mm. long.

Carapace : Entire surface very finely and weakly granular. Interocular area also very weakly granular. Lateral ocular tubercles granular and provided with five lateral eyes as in the text-fig. 273. Median ocular tubercles smooth and obsolete, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.5 as in text-fig. 272. Posterior median carinae granular and very poorly distinct. Central median furrow narrow but not much deep and bifid posteriorly. Lateral ocular furrows distinct and prominent but posterior lateral furrows weakly distinguished. Anterior margin smooth and provided with six to eight microscopic setae. Lateral margins smooth and provided with smooth submarginal ridge. Posterior margin smooth but granular submarginally as in text-fig. 272. Chelicera more bulbous, smooth on basal segment and ventral surface clothed thickly with a tuft of short silky hairs, extending on fingers. Fingers short and delicate; dentition as characterised in family and genus. Dorsal and ventral distal teeth of movable finger equal. Pedipalp stout with narrow, slender manus. Femur shorter than carapace, carinated, dorsal carinae granular, ventral carinae smooth. Outer or anterior surface provided with smooth carinae. Inner or posterior surface also with smooth carinae. Intercarinal space very finely granular. Patella longer than femur but as long as carapace, acarinated, inner or anterior surface very finely granular and few granules tuberculate. Manus smooth, thin as in text-fig. 274 and less than

as wide as patella. Under hand as long as half the length of patella. Fingers stout, long and movable finger longer than patella. Immovable finger shorter than patella. Dentition on fingers non-imbricated and outer row on movable fingers comprises of six minute teeth as in text-fig. 275. Femur, patella,



FIGS. 281-285. *Lychas (Endotrichus) kamshetensis* sp. nov.

- 281. Femur, dorsal, interior and exterior views
- 282. Patella, dorsal view.
- 283. Patella, exterior view.
- 284. Manus and immovable finger, exterior view.
- 285. Manus and immovable finger, ventral view.

manus and fingers sparsely clothed with microscopic white setae. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 281-285. Legs carinated on femur, patella, and tibia, but granular only on femur and carinae on patella and tibia smooth. Tibia provided with a long tibial spur on III and IV pairs. Tarsomere I smooth and provided with long setae on ventral surface and a pair of pedal spurs on distal end. Tarsomere II smooth, clothed thickly with short, reddish setae on ventral surface. A pair of claws normal. Pectines well developed and more than 4 times longer than wide. Middle lamellae subdivided into eight small digits. Fulcra well defined and elongated. Lamellae and fulcra clothed sparsely with microscopic setae. Pectinal teeth short and not much tapering as in text-fig. 277 and 20/20 in number as in text-fig. 276. Genital operculum wider than long and a pair of sclerites united in the middle. Cephalothoracic sternum triangular but about as long as wide as in text-fig. 276.

Mesosoma : All tergites weakly granular but more granular on posterior and lateral portions. Tergites I-IV without carinae as in text-fig. 278. Lateral and posterior margins finely granular. Pretergal portion smooth in middle but finely granular on lateral portions with finely granular posterior margin. Tergite VII with a median carina, defined only on middle portion and two pairs of lateral carinae, granular and diverging on lateral sides as in text-fig. 271. Lateral and posterior margins granular. Sternites I-IV smooth, acarinated, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion smooth with smooth posterior margin for sternites II-IV. Sternite V finely granular but more closely granular on lateral portions and provided with two pairs of weakly granular to smooth carinae. Lateral margins crenulated. Posterior margin smooth but granular submarginally.

Metasoma : Cauda more than four times as long as carapace. Basal segment wider than long. Segments I-IV with dorsal, dorso-lateral carinae crenulated and slightly dentiform posteriorly. Lateral carinae crenulated on I and sparsely crenulated on segments II & III. Inferior lateral and inferior carinae poorly crenulated on segments I & II while weakly and irregularly granu-

lar. Anterior peduncle finely granular. Posterior margin smooth on dorsal portion but granular on ventral portion. Segment V slightly longer than carapace, dorsal surface globular and more elevated on anterior portion, inferior lateral carinae and single inferior median carina evenly granular and crenulated. Inferior carinae granular and developed only on $1/3$ anterior portion. Intercarinal space more granular on ventral portion. Anterior peduncle smooth on dorsal portion but finely granular on ventral of this segment evenly granular as in text-figs. 279 and 280. Telson shorter than segment V and vesicle provided with a median granular crest, ending into a strong, triangular subaculear spine and three pairs of lateral granular carinae. Ventral and lateral bands not much prominent. Aculeus not much curved, as long as vesicle, sharp and dark brown on distal portion. Setation on vesicle as in text-figs. 279 and 280.

Type-specimen : *Holotype* : Female in spirit, deposited at National Collection, ZSI, Calcutta, Regd. No. 5076/18.

Type-locality : Kamshet, Poona, Maharashtra; India. 15. vii. 1966. Coll. B. S. Lamba.

Distribution : INDIA : Poona, Maharashtra.

Discussion : This species closely resembles with *Lychas* (*Entotrichus*) *biharensis* sp. nov. but it differs as follows : (i) Mesosomal tergites less granular than in *biharensis*. (ii) Pectinal teeth 20/20 in number where as in *biharensis* the pectinal teeth 24/24 in number. (iii) trichobothria *est* placed closer to *db* on immovable finger where as in *biharensis* it is placed more distal.

Genus 2, *Hemibuthus* Pocock

1900. *Hemibuthus* Pocock, *Fauna Brit. India, Arachn.* : 34.

1960. *Hemibuthus* : Vachon, *Bull. Soc. zool. Fr.*, 85(2-3) : 241-245.

1972. *Hemibuthus* : Stahnke, *Ent. News*, 83 : 130.

Characters : Carapace without carinae. Inferior surface of cheliceral fixed finger with one tooth. Mesosomal tergites weakly but coarsely granular on posterior portion but with conspicuous lateral carinae. Cauda thick, weakly carinated and intercarinal

space sparsely granular, punctate. Vesicle smooth or sparsely granular, punctate and very small and weak subaculear nodule present below the aculeus. Pedipalp tarsus length about the same as of external surface manus or carapace. Manus much wider than patella. Dentition on finger non-imbricated. Superciliary crest may or may not be present. Trichobothria d_1 , d_3 and d_4 on femur from β angle (Fig. 296)

Type-species : *Hemibuthus crassimanus* (Pocock)

Distribution : INDIA and AFRICA.

12. *Hemibuthus crassimanus* (Pocock)

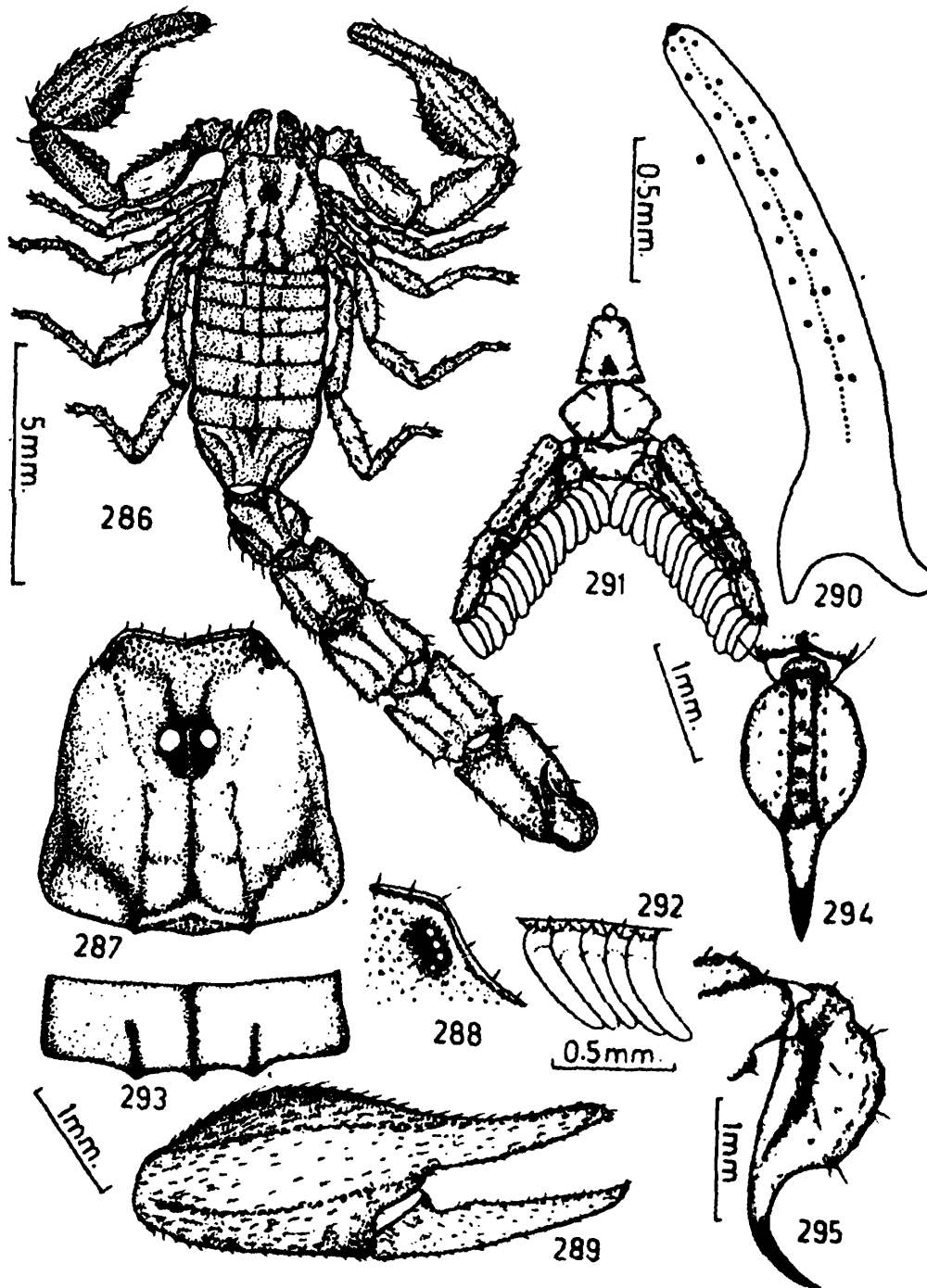
(Figs. 286-301)

1897. *Archisometrus crassimanus* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 110.
 1899. *Archisometrus crassimanus* : Kraepelin, *Tierr. Scorp. etc.*, : 44.
 1900. *Hemibuthus crassimanus* : Pocock, *Fauna Brit. India, Arachn.*, : 39.
 1960. *Hemibuthus crassimanus* : Vachon, *Bull. Soc. zool., Fr.* 85 (2-3) : 241-245.

General : Male and female of small body size. Body colour dark brown to black. Caudal region more blackish but telson dark brown. Chelicera pale on fingers. Pedipalp dark brown. Legs darker on femur but little brown to pale yellow on distal segments. Ventral surface brown but pectines yellow. Entire body surface finely and coarsely granular. Carapace without carinae. Mesosomal tergites tri-carinated. Caudal segments weakly carinated and punctured below. Telson granular on ventral surface and anterior lateral portion elevated. Pedipalp with much more robust manus. Dentition non-imbricated. Last mesosomal sternite granular on lateral portions and provided with two pairs of granular carinae.

FIGS. 286-295. *Hemibuthus crassimanus* (Pocock)

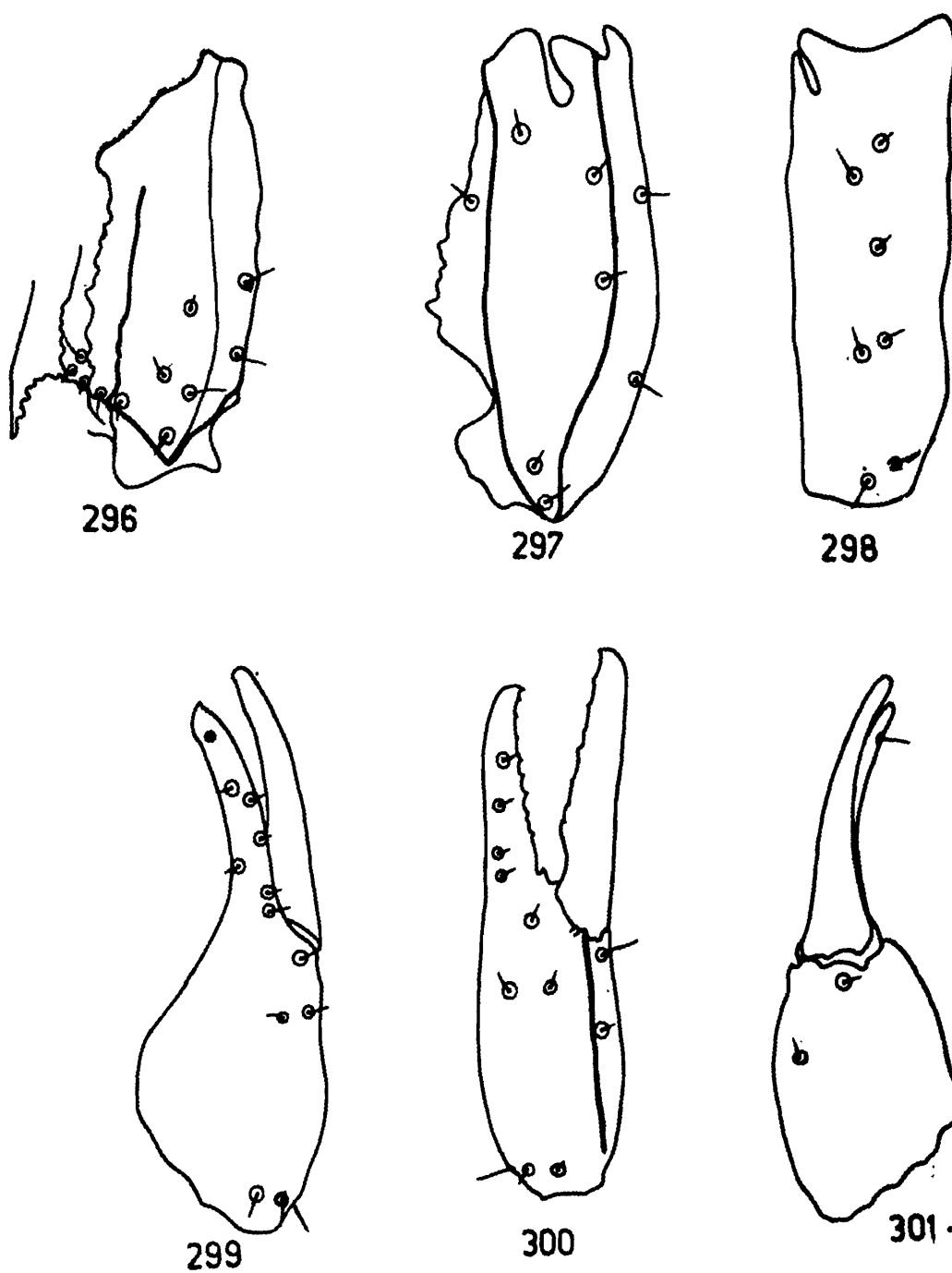
286. Dorsal view of female. 287. Carapace, dorsal view. 288. Lateral eyes, lateral view. 289. Manus and fingers, exterior view. 290. Movable fingers, exterior view.



- 291. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 292. Pectinal teeth and fulcra, ventral view.
- 293. Tergite, dorsal view
- 294. Telson and anal rim of metasomal segment V, ventral view.
- 295. Telson and anal rim of metasomal segment V, lateral view.

Measurements : Total length 19.50 mm. Carapace 2.50 mm. long; Mesosoma 5.50 mm. long; Metasoma 11.50 mm. long.

Carapace : Entire surface granular but the interocular area with coarse granules. Ocular tubercles granular; superciliary process weakly granular. Five lateral eyes as in text-fig. 288. A pair of median eyes situated anteriorly nearly in the ratio 1 : 2 as in text-fig. 287. Anterior margin smooth in front but granular on sub-marginal portion. Lateral margins finely granular. Posterior margin granular. Chelicera granular on anterior lateral portions of dorsal surface of basal segment. Fingers pale yellow but reddish on dentition. Dentition on fingers as characterised in family and genus. Distal teeth of dorsal and ventral arm of movable finger subequal. Ventral surface of basal segment and fingers clothed with few, long, silky hairs. Pedipalp strong. Femur shorter than carapace. All carinae granular. Outer or anterior surface provided with crenulated carinae and five to six strong tubercles. Intercarinal space weakly granular. Patella as long as carapace. Carinae on outer surface smooth, but inner carinae granular. Inner or anterior surface provided with granular crest but 3-4 granules tuberculate. Manus of the chela robust and more than as wide as patella as in text-figs. 286 and 289. Length of under hand almost equal to carapace or patella, weakly carinated and carinae very weakly granular. Inner surface with few granules. Movable finger as long as caudal segment IV or as long as carapace, immovable finger as long as caudal segment II. Dentition on the fingers non-imbricated and outer row comprises of eight teeth as in text-fig. 290. Trichobothrial patterns on femur, patella, manus and immovable finger as in text-figs. 296-301. Legs with femur and patella carinated, all carinae weakly granular. Intercarinal space granular. Tibia carinated but smooth and furnished with a very weak and short tibial spur on III & IV pairs. Tarsomere I carinated but intercarinal space smooth and each furnished with a row of paired hairs and pair of pedal spurs. Tarsomere II smooth, furnished below with a row of paired small spinules. Pectines well developed and almost 3.25 times longer than wide as in text-fig. 291. Middle lamellae subdivided into six small digits. Fulcra rounded and clearly distinguished. Lamellae and fulcra clothed sparsely with microscopic hairs. Pectinal teeth



FIGS. 296-301. *Hemibuthus crassimanus* (Pocock)

- 296. Femur, dorsal, interior and exterior views.
- 297. Patella, dorsal view.
- 298. Patella, exterior view.
- 299. Manus and fingers, dorsal view.
- 300. Manus and fingers, exterior view.
- 301. Manus and fingers, ventral view.

elongated but flat as in text-fig. 292 and 15/15 in number as in text-fig. 291. Basal piece weakly notched on anterior margin. Two sclerites of genital operculum always wider than long, united in the middle. Cephalothoracic sternum triangular with a depression on posterior median surface as in text-fig. 291.

Mesosoma : All tergites finely granular. Tergites I-IV tri-carinated, carinae weakly granular and lateral carinae developed only on posterior portion of each tergite. Posterior margin granular as in text-fig. 293. Pretergal portion not visible. Tergite VII with two pairs of granular carinae as in text-fig. 286. Posterior and lateral margin granular. Pretergal portion not visible. Sternites I-IV smooth, each provided with a pair of small, slit like stigmata for book lungs. Presternal portion not visible. Sternite V weakly granular on lateral portions and provided with two pairs of carinae. Outer pair of carinae weakly granular but the inner pair smooth and obsolete. Posterior margin smooth but the lateral margins finely crenulated.

Metasoma : Cauda more than five times as long as carapace. Basal segment as long as wide. Segments I & II with ten carinae. Dorsal, dorsolateral and lateral carinae weakly granular. Inferior lateral and inferior carinae almost smooth. Segment III & IV with dorsal, dorsolateral carinae almost smooth. Lateral carinae not developed. Inferior lateral and inferior carinae granular on segment III but almost smooth on segment IV. Intercarinal space smooth and punctured. Dorsal surface weakly granular in shallow median depression. Anterior peduncle finely granular. Segment V slightly shorter than carapace. Inferior lateral and single inferior median carina developed only on posterior portion and all carinae finely granular. Intercarinal space smooth and punctured. Dorsal surface smooth. Anterior peduncle finely granular. Anal rim of this segment evenly granular as in text-figs. 294 and 295. Telson as long as carapace and slightly longer than caudal segment V. Vesicle as long as caudal segment III but always less than as wide or deep as caudal segment I. Ventral surface of vesicle covered with granules. Ventral median crest very weakly developed and ending into a subaculear nodule. Setation on vesicle not clear. Aculeus not much curved, long but less than as long as vesicle as in text-figs. 294 and 295.

Distribution : INDIA : Panch Mahal, Gujarat.

Remarks : We have examined, illustrated and described on the basis of one male and female specimens received from B.M. (N.H.) London, Regd. No. 1896.9.26.5-6.

Genus 3. *Orthochirus* Karsch

1891. *Orthochirus* Karsch, *Berl. ent. Z.*, 36 : 306.
 1899. *Butheolus* : Kraepelin, *Tierr. Scorp. etc.* : 34.
 1900. *Butheolus* : Pocock, *Fauna Brit. India, Arachn.*, : 28.
 1958. *Orthochirus* : Vachon, *Vidensk. Meddr. dansk. naturh. Foren.*, 120 : 121-187.
 1972. *Orthochirus* : Stahnke, *Ent. News*, 83 : 129.

Characters : Carapace granular but without distinct carinae, interocular area sloping down anteriorly. Cephalothoracic sternum subpentagonal, wider than long, shorter than genital operculum. Cauda very powerful, posteriorly incrassate. Caudal segment V punctate and the vesicle very small, much narrower than the first caudal segment. Fixed finger of chelicera provided on ventral surface with two minute teeth. Dentition on fingers of pedipalp non-imbricated. Trichobothria *d1*, *d3* and *d4* on femur form β angle (Fig. 313).

Type-species : *Orthochirus melanurus* (Kessler)

Distribution : ASIA: INDIA, PAKISTAN, ARABIA, BUKHARA, PERSIA, AFGHANISTAN, SOCOTRA ISLAND, SYRIA, IRAN, ISRAEL; AFRICA: NUTRIA, LIBYA, ALGERIA, EGYPT, SOMALIA, ETHIOPIA; EUROPE: SICILY.

Key to the species of the genus Orthochirus

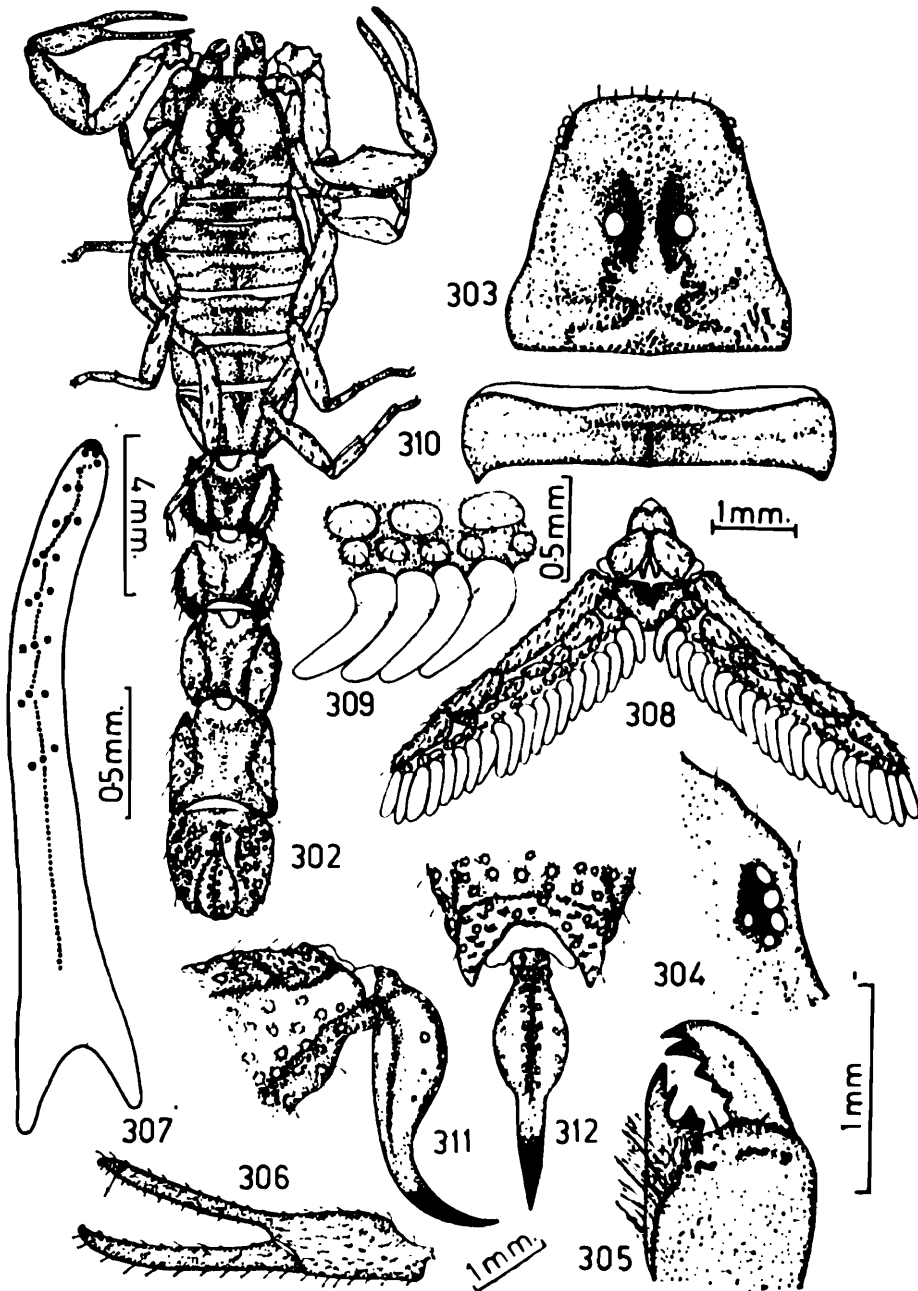
1. Mesosoma entirely brown or yellowish in colour, tergites with a median carina (Fig. 310). Trichobothria *Est* placed away from *Esb* (Fig. 316.)2
- Mesosoma entirely black, tergites with three carinae (Fig. 342). Trichobothria *Est* placed close to *Esb* (Except in *krishnai*) (Fig. 349).3.

2. Carapace and mesosomal tergites sparsely but coarsely granular. Metasomal segment III, smooth without any carinae. Pectinal teeth 21/21 (Fig. 308).*flavescens*
- Carapace and mesosomal tergites very weakly granular or smooth. Metasomal segment III with dorsal, dorso-lateral, and inferior lateral crenulated carinae. Pectinal teeth 16/16 (Fig. 324).*pallidus*
3. Metasoma entirely black (Fig. 351); Pectinal teeth 20/20 or more (Fig. 356); Lateral carinae on mesosomal tergites II-VI poorly developed (Fig. 358).4
- Metasoma yellowish on segments I to III and blackish blue on IV and V segments (Fig. 335). Pectinal teeth 18/18 (Fig. 340). Lateral carinae on mesosomal tergites II-IV distinct (Fig. 340).*bicolor*
4. Pectines 6 times longer than wide. (Fig. 356). Telson with much elongate vesicle (Fig. 359). Lateral ocular tubercle with small yellow patch on ventral side (Fig. 353); Sternite III with a conspicuous triangular yellow spot on middle portion of posterior margin. Pedipalp light yellow on tibia, tarsomere I and II (Fig. 351).*krishnai*
- Pectines 4.75 times longer than wide (Fig. 372). Telson with less elongated and globular vesicle (Fig. 375). Lateral ocular tubercle without ventral yellow patch (Fig. 369). Sternite III without triangular yellow spot on middle portion of posterior margin. Pedipalp and legs yellow on all digits (Fig. 367).*melanurus*

13. **Orthochirus flavescens** (Pocock)

(Figs. 302-317)

1897. *Butheolus flavescens* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 110.
 1900. *Butheolus flavescens* : Pocock, *Fauna Brit. India, Arachn.*, : 30-31

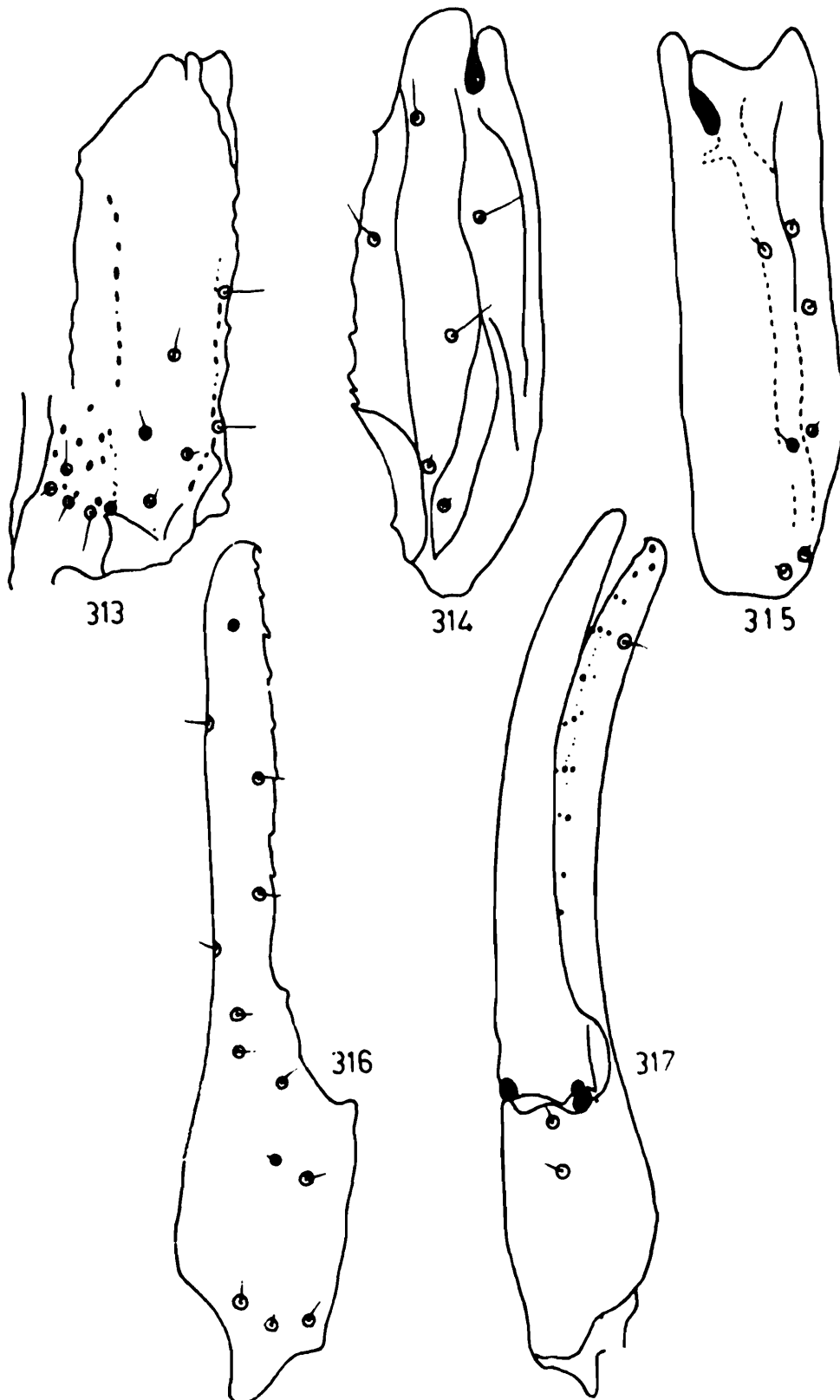


FIGS. 302-312. *Orthochirus flavescens* (Pocock).
 302. Dorsal view of male. 303. Carapace, dorsal view.
 304. Lateral eyes, lateral view.
 305. Chelicera, dorsal view.
 306. Manus and fingers, exterior view.
 307. Movable finger, dorsal view.
 308. Pectines, genital operculum and cephalothoracic sternum, ventral view. 309. Pectinal teeth and fulcra, ventral view.
 310. Tergite, dorsal view.
 311. Telson and anal rim of metasomal segment V, lateral view.
 312. Telson and anal rim of metasomal segment V, ventral view.

General : Male small in body size and body colour brick reddish, darker on posterior segments of metasoma. Pedipalp and chelicera slightly pale and yellowish. Legs yellowish. Ventral portion of the body yellowish brown. Carapace and mesosoma coarsely granular. Metasoma thick, posterior segments wider than long, pitted and almost all segments without carinae. Last mesosomal sternite granular but without carinae. Pectines well developed.

Measurements : Total length 27.75 mm. Carapace 3.50 mm. long; Mesosoma 8.00 mm. long; Metasoma 16.25 mm. long.

Carapace : Evenly granular throughout, no carinae developed but the granular elevation in middle portion, form a peculiar structure as in text-fig. 303. Interocular area slopping down anteriorly. Lateral ocular tubercles granular but median ocular tubercles smooth. Five lateral eyes as in text-fig. 304. A pair of median eyes situated anteriorly in the ratio 1 : 1 as in text-fig. 303. Anterior margin nearly smooth provided with a few reddish setae. Lateral margins smooth. Posterior margin granular and straight. Chelicera yellowish, fingers black. Basal segment smooth and ventrally covered with short silky hair. Dentition on fingers as characterised in family and genus as in text-fig. 305. Pedipalp yellow and delicate. Femur slightly shorter than carapace. Anterior carinae crenulated, posterior carinae almost smooth. Intercarinal space sparsely granular. Anterior surface provided with crenulated crest but few granules denticulate. Patella longer than femur but as long as carapace; all carinae almost smooth except anterior surface provided with a crenulated crest. Hand (or manus) smooth as in text-fig. 306, length of under hand as wide as patella. Movable finger longer than femur but shorter than patella. Immovable fingers slightly shorter than patella but as long as femur. Dentition on fingers non-imbricated. Outer row comprises of eight teeth on movable finger as in text-fig. 307. Trichobothrial patterns of femur, patella, manus and immovable finger as in text-figs. 313-317. Legs pale yellow, femur with inner carinae finely crenulated but outer carinae smooth. Intercarinal space sparsely granular. Patella smooth but inner carinae finely crenulated. Tibia carinated but smooth, with a tibial spur on III and IV pairs. Tarsomere I carinated but smooth and ventral surface



FIGS. 313-317. *Orthochirus flavescens* (Pocock.)

313. Femur, dorsal, interior and exterior views. 314. Patella, dorsal view.
 315. Patella, exterior view. 316. Manus and immovable finger, exterior
 view. 317. Manus and immovable finger, ventral view.

provided with a row of paired spinules and a pair of pedal spurs. Tarsomere II smooth and armed below with a row of paired small reddish spinules. Pectines well developed and 4.75 times longer than wide as in text-fig. 308. Middle lamellae divided into eight small digits. Fulcra small, circular and well distinguished. Lamellae and fulcra covered with microscopic reddish setae as in text-fig. 308. Pectinal teeth long, tubular as in text-fig. 309 and 21/21 in number as in text-fig. 308. Basal piece sclerotized and provided with a deep median notch on anterior margin. Genital operculum wider than long, the sclerites weakly sclerotized, sparsely covered with setae and not fused on posterior portion. A pair of conspicuous male genital papillae protruding out from posterior margin of sclerites as in text-fig. 308. Cephalothoracic sternum small, triangular to sub-pentagonal and wider than long.

Mesosoma : All tergites granular on posterior and median portion of each tergite. Tergites I-III without carinae. Tergites IV-VI provided with weak granular median carina but distinct only on posterior portion of each tergite. A median carina ending anteriorly into thickly granular, short, transverse lines and form a "T" shape structure as in text-fig. 310. Posterior margin of each tergite evenly granular. Pretergal portion smooth. Tergite VII not much granular provided with two pairs of crenulated carinae and posterior margin evenly granular as in text-fig. 302. Pretergal portion smooth. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Posterior margin smooth. Presternal portion also smooth. Sternite V scarcely granular on lateral portion, middle portion with two pairs of sutures indicating carinae and entire surface punctate. Lateral margins weakly granular. Posterior margin smooth. Presternal portion smooth.

Metasoma : Cauda five times as long as carapace. Basal segment always wider than long. Segment IV as wide as long. All segments equally deep. Segment I with dorsolateral and lateral carinae, both weakly crenulated and developed only on posterior portion. Intercarinal space weakly granular. Posterior margin weakly granular. Segment II with weak dorsolateral keel, developed

only on posterior portion. Intercarinal portion poorly granular and punctate but more punctate on ventral portion. Segments III & IV smooth without carinae, fully covered with pits but less punctate on dorsal portion. Last segment less than as long as carapace, provided with only inferior lateral carinae crenulated. Anal rim of this segment almost smooth as in text-figs. 311 and 312. Telson as long as carapace. Vesicle pyriform as long as proximal caudal segment, smooth on entire surface and punctate only on ventral surface. Ventral median crest smooth. Lateral and ventral bands light coloured. Aculeus not much curved, pointed and dark brown as in text-figs. 311 & 312.

Distribution : INDIA : Karagora in Kathiawar, Gujarat; Khandesh, Maharashtra.

Remarks : We have examined the lectotype, one male received from B. M. (N. H.), London, Regd. No. 1896.7.3.70. The present illustrations and description are based on the basis of the said specimen.

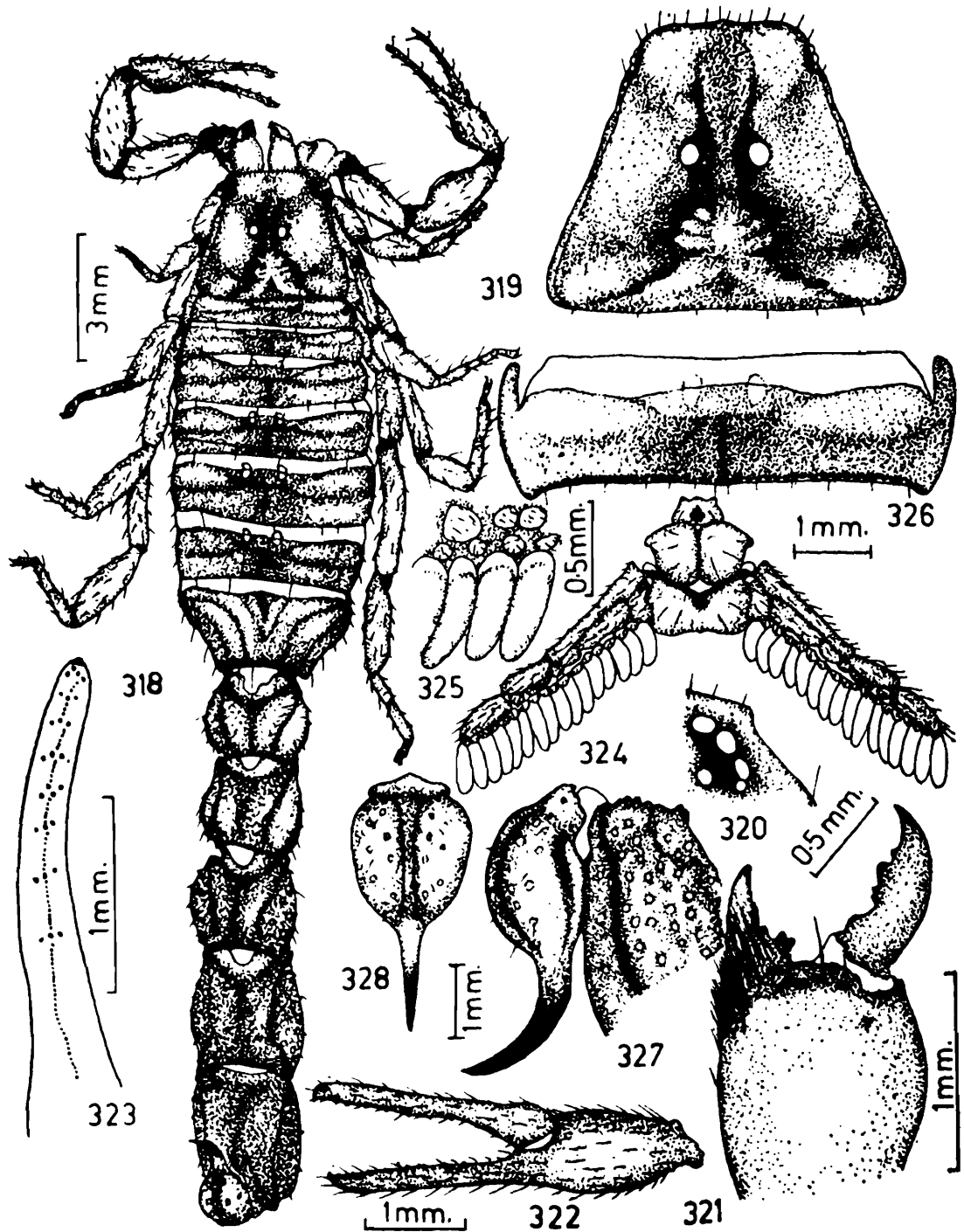
14. *Orthochirus pallidus* (Pocock)

(Figs. 318-334)

1897. *Butheolus pallidus* Pocock, *J. Bombay nat. Hist. Soc.*, **11** : 109.
 1899. *Butheolus pallidus* : Краэпelin, *Tierr. Scorp. etc.*, : 36.
 1900. *Butheolus pallidus* : Pocock, *Fauna Brit. India, Arachn.*, : 30.

General : Female of smaller size, yellowish in colour but darker on metasomal segments. Carapace and mesosoma finely granular but carapace smooth on lateral portion of interocular region. No carinae on carapace, mesosomal tergites with only median carina. Metasomal segments weakly granular, carinated and posterior segments covered with many pits. Telson pyriform, provided with few pits. Appendages yellow, coxa of the appendages smooth. Pectines well developed. Last mesosomal sternite provided with two pairs of weakly granular carinae.

Measurements : Total length 34.00 mm. Carapace 4.00 mm. long; Mesosoma 11.50 mm. long; Metasoma 18.50 mm. long.



FIGS. 318-328. *Orthochirus pallidus* (Pocock).

318. Dorsal view of female. 319. Carapace, dorsal view.
 320. Lateral eyes, latera view. 321. Chelicera, dorsal view.
 322. Manus and fingers, exterior view. 323. Movable finger, dorsal view.
 324. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 325. Pectinal teeth and fulcra, ventral view. 326. Tergite, dorsal view.
 327. Telson and posterior portion of metasomal segment V, ventral view.
 328. Telson, ventral view.

Carapace : Surface finely and unevenly granular. Interocular region smooth on lateral portion but granular in the middle. Lateral ocular tubercles granular and provided with five lateral eyes as in text-fig. 320. Median ocular tubercles smooth and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.25 as in text-fig. 319. Anterior margin finely crenulated and provided with few microscopic red setae. Lateral margins finely crenulated and supported with a crenulated submarginal ridge. Posterior margin granular above. Chelicera pale yellow, basal segment smooth, thickly clothed with fine silky hairs on ventral surface. Fingers darker on dentition. Dentition as characterised in the family and genus as in text-fig. 321. Pedipalp slightly darker than other appendages. Femur always shorter than carapace. Carinae almost smooth, outer surface provided with a crenulated carina. Intercarinal space granular only on inner surface. Patella always longer than femur but shorter than carapace, carinae smooth. Inner or anterior surface provided with smooth carina except a small tubercle on proximal end. Intercarinal space smooth except a few granules on inner surface. Manus not as wide as patella as in text-fig. 322 and length of under hand less than femoral length. Movable finger as long as femur but immovable finger shorter than femur. Dentition on the fingers non-imbricated and the outer row on movable finger comprises of eight teeth as in text-fig. 323. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 329-334. Legs yellowish, femur weakly granular, inner carinae crenulated; outer carinae almost smooth. Patella almost smooth, inner carinae weakly crenulated. Tibia smooth, carinated and provided with a weak tibial spur on III and IV pairs. Tarsomere I smooth, carinated and provided with a pair of pedal spurs on the under surface. Tarsomere II pale yellow, smooth and under surface provided with a row of paired spinnules. Claws reddish. Pectines well developed and 4 times longer than wide. Middle lamellae divided into six small digits. Fulcra well distinguished and round. Lamellae and fulcra clothed with microscopic reddish setae as in text-fig. 324. Pectinal teeth tubular, long as in text-fig. 325 and 16/16 in number as in text-fig. 324. Basal segment broad, sclerotised and anterior margin deeply notched in the middle. Genital

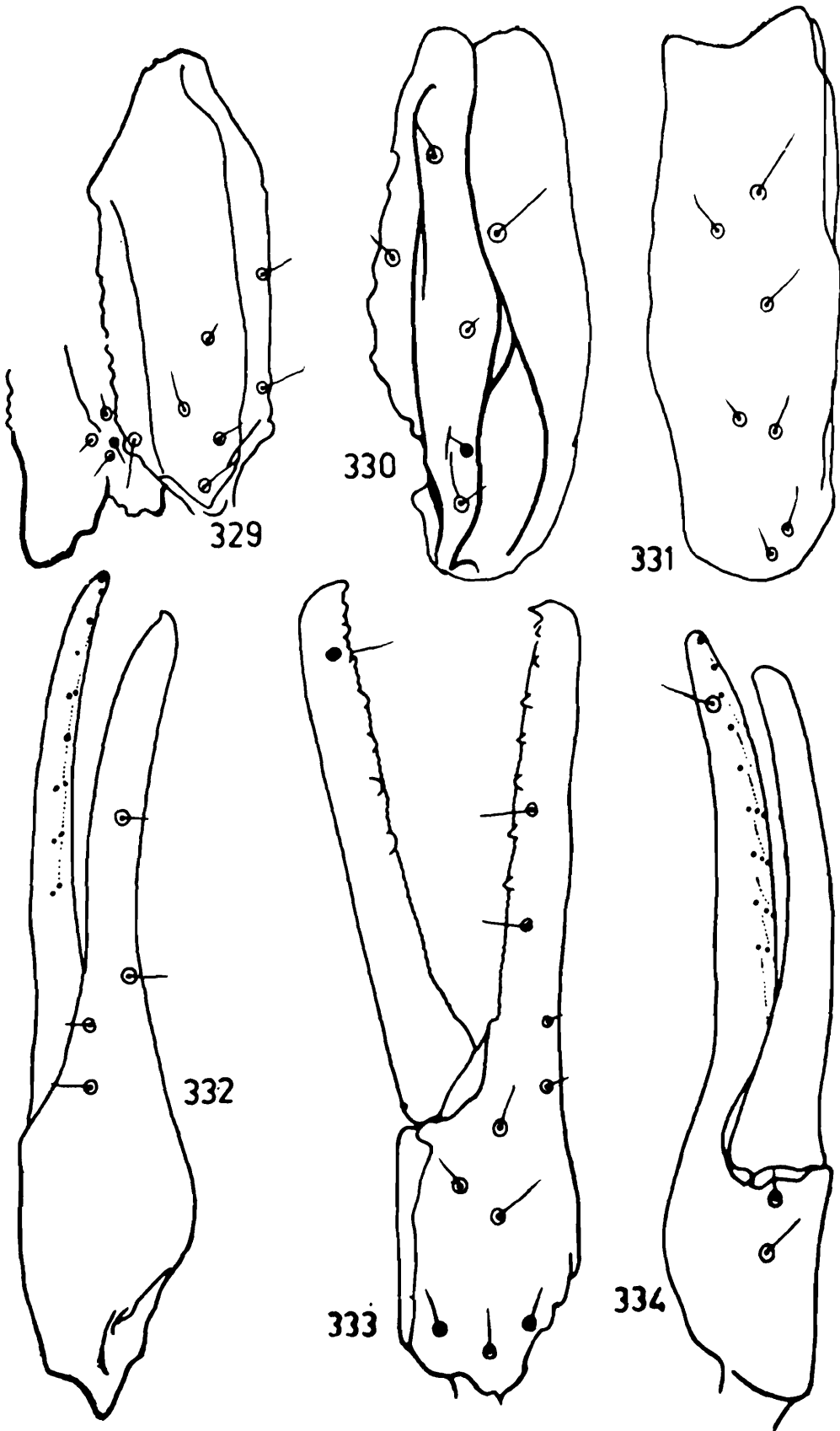
operculum almost as long as wide. A pair of sclerites heavily sclerotised, fully fused in the middle and covered with few microscopic setae. Cephalothoracic sternum very small, sub-pentagonal, more wide, posterior side provided with a deep depression as in text-fig. 324.

Mesosoma : All tergites finely granular and granules same as body colour. Tergite I without carinae. Tergites II-VI provided with a weakly developed granular median carina, ending anteriorly into a short, thickly granular, transverse line so as to form "T" structure as in text-fig. 326. Posterior margin smooth but granular above. Pretergal portion smooth with posterior margin finely granular. Tergite VII granular provided with two pairs of crenulated carinae diverging on lateral sides as in text-fig. 318. Lateral margins crenulated. Posterior margin smooth, pretergal portion with posterior margin finely granular. Sternites I-IV almost smooth but finely granular on submedian and anterior lateral portions, each sternite provided with a pair of slit like stigmata for book lungs. Posterior margin finely crenulated. Presternal portion smooth with finely granular on posterior margin. Sternite V granular but more granular on lateral portion and provided with two pairs of weakly granular carinae. Lateral margins crenulated. Posterior margin poorly crenulated. Presternal portion smooth with very finely granular posterior margin.

Metasoma : Cauda nearly four and half times as long as carapace. Basal segment always wider than long. Segments I & II with dorsal, dorso-lateral, lateral, inferior lateral and inferior carinae. Carinae finely crenulated. Intercarinal surface granular except dorsal surface. Anterior peduncle finely granular. Posterior margin granular. Segment III with dorsal, dorsolateral, lateral and inferior lateral carinae weakly crenulated. Inferior carinae more crenulated. Intercarinal space granular except dorsal surface. Anterior peduncle finely granular. Posterior

FIGS. 329-334. *Orthochirus pallidus* (Pocock).

329. Femur, dorsal, interior and exterior views. 330. Patella, dorsal view. 331. Patella, exterior view. 332. Manus and fingers, dorsal view. 333. Manus and fingers, exterior view. 334. Manus and fingers, ventral view.



margin granular. Segment IV almost smooth, covered with many pits. Anterior peduncle very finely granular. Posterior margin smooth. Segment V slightly shorter than carapace. Inferior lateral carinae well developed and crenulated as in text-fig. 327. Single inferior median carina weakly developed and finely crenulated. Intercarinal space granular on ventral side and also covered with many pits. Dorsal surface smooth. Anterior peduncle poorly developed and smooth. Anal rim of this segment crenulated as in text-fig. 327. Telson as long as carapace. Vesicle pyriform and not as wide as last segment. Ventral median crest smooth, poorly developed, no subaculear nodule. Ventral and lateral bands dark brown. Aculeus as long as vesicular length, dark brown, not much curved but as in text-figs. 327 and 328.

Distribution : INDIA : Rajasthan.

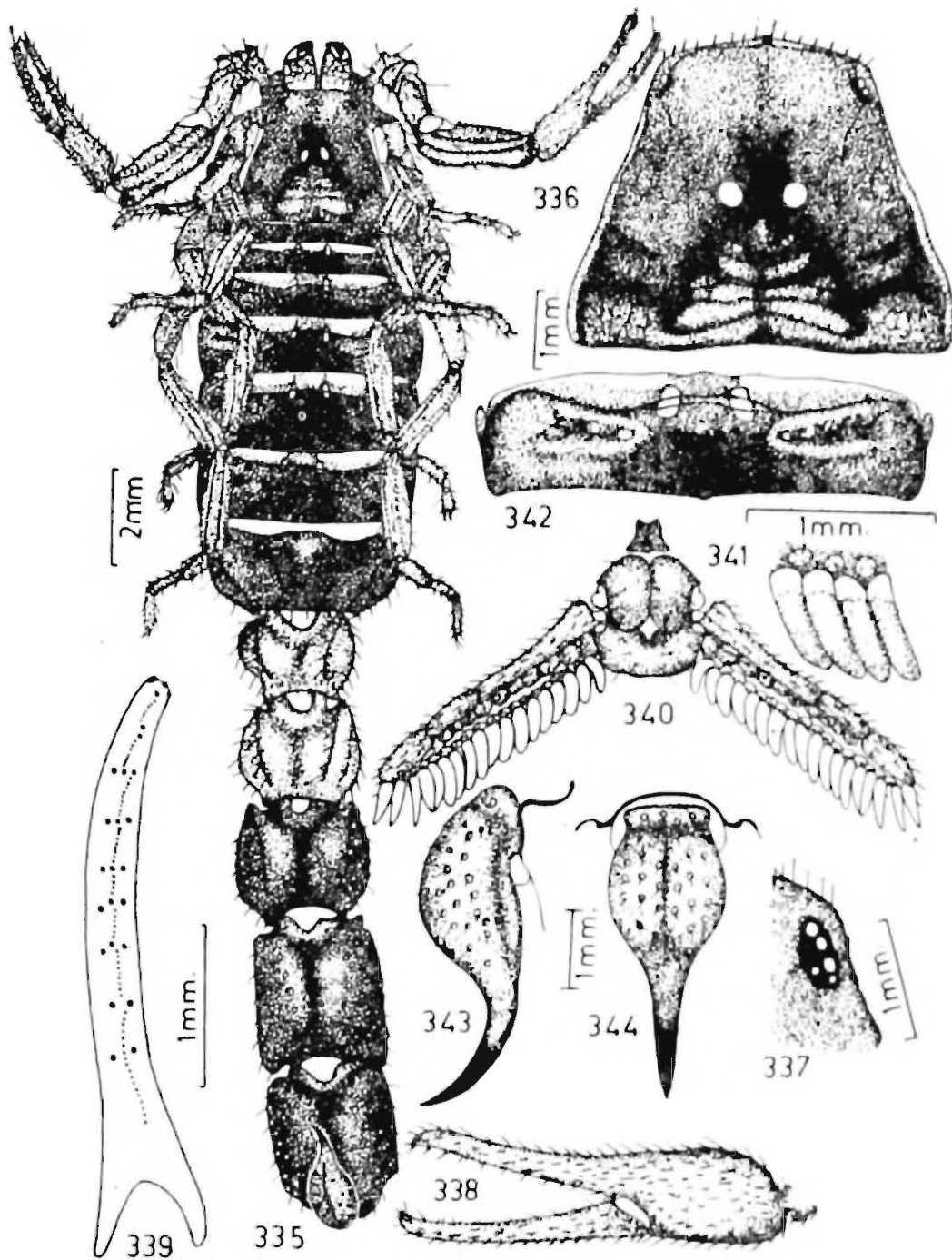
Remarks : We have examined, described and illustrated on the basis of the type specimens received from the B. M. (N. H.), London, Regd. No. 1896.10.20.24. This specimen is already examined by Dr. H. L. Stahnke, and included under the genus *Orthochirus*. We have included this species in our fauna as it has been recorded from Rajasthan, India.

15. *Orthochirus bicolor* (Pocock)

(Figs. 335-350)

1897. *Butheolus bicolor* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 108.
 1890. *Butheolus bicolor* : Kraepelin, *Tierr. Scorp. etc.*, : 36.
 1900. *Butheolus bicolor* : Pocock, *Fauna Brit. India. Arachn.*, : 31.

General : Female of medium size, blackish yellow, thick metasoma and posterior three segments black. Carapace and mesosomal tergites evenly and coarsely granular. Carapace without carinae, mesosomal tergites provided with weakly developed carinae. Last mesosomal sternite with two pairs of smooth carinae. Metasomal carinae weakly developed, intercarinal space granular on dorsal portion and punctate on ventral surface. Telson pyriform. Pectines well developed. Appen-



FIGS. 335-344. *Orthochirus bicolor* (Pocock).

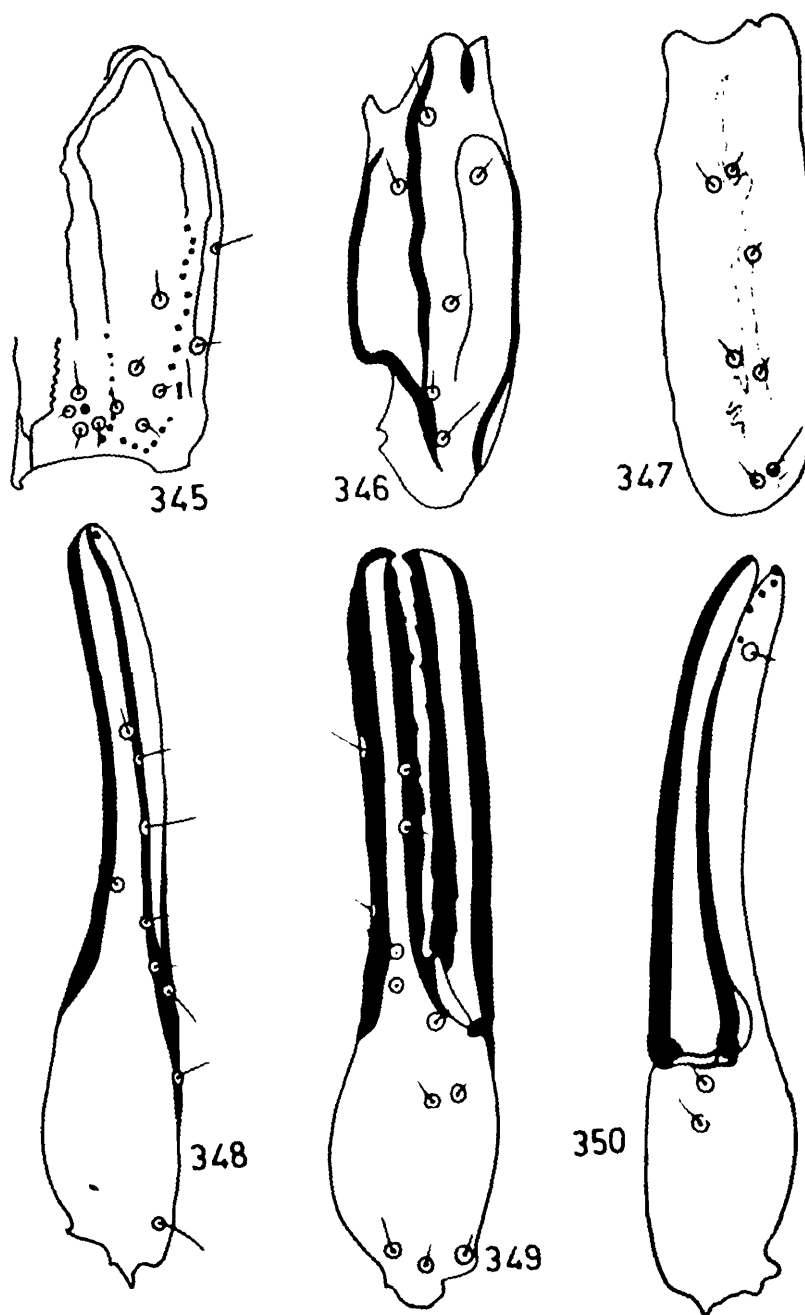
335. Dorsal view of female. 336. Carapace, dorsal view.
 337. Lateral eyes, lateral view. 338. Manus and fingers, exterior view.
 339. Movable finger, dorsal view. 340. Pectines, genital operculum and cephalothoracic sternum, ventral view. 341. Pectinal teeth and fulcra, ventral view. 342. Tergite, dorsal view. 343. Telson and anal rim of metasomal segment V, lateral view. 344. Telson and anal rim of metasomal segment V, ventral view

dages yellowish on dorsal portion, coxal portions of all appendages almost smooth.

Measurements : Total length 36.75 mm. Carapace 4.50 mm. long; Mesosoma 12.75 mm. long; Metasoma 19.50 mm. long.

Carapace : Entire surface almost coarsely and evenly granular. Interocular region slopping anteriorly and granules fused to form a mosaic structure. Carinae not developed properly but posterior median carinae forming granular configuration as in text-fig. 336. Lateral ocular tubercle provided with five lateral eyes as in text-fig. 337. One pair of median eyes situated anteriorly in the ratio 1 : 1 as in text-fig. 336. Lateral ocular tubercles granular but median ocular tubercles smooth and abruptly ending anteriorly and also posteriorly. Anterior margin finely crenulated and provided with submarginal ridge. Posterior margin finely crenulated and thickly granular on dorsal portion as in text-fig. 336. Chelicera normal. Pedipalp darker on femur and patella but brownish on chela. Femur shorter than carapace, inner carinae finely granular, outer carinae scarcely granular. Intercarinal space finely and evenly granular. Patella longer than femur but shorter than carapace; all carinae smooth. Inner surface provided with very weakly and finely crenulated carina. Intercarinal space smooth. Manus (or hand) pale and smooth as in text-fig. 338. Length of under hand slightly more than the width of patella. Hand always less than as wide as patella. Immobile finger shorter than femur. Dentition on the fingers non-imbricated, outer row on movable finger comprises of nine or ten teeth as in text-fig. 339. Trichobothrial pattern of femur, patella, manus and immobile finger as in text-figs. 345-350. Legs darker on femur but light yellow on distal portion. Femur carinated, inner carinae finely granular, outer carinae smooth. Intercarinal space granular. Patella carinated, inner carinae weakly and finely crenulated, outer carinae smooth. Intercarinal space smooth. Tibia carinated, intercarinal space smooth and provided with a short tibial spur on III and IV pairs. Tarsomere I carinated, smooth, provided with a pair of pedal spurs and a row of short reddish spinules. Tarsomere II smooth and provided below with a paired row of small, reddish spinules. Pectines well developed and 4.5 times longer than wide. Middle

lamellae divided into eight small digits. Fulcra well distinguished and round. Lamellae and fulcra weakly and sparsely clothed with microscopic reddish setae as in text-fig. 340. Pectinal teeth



FIGS. 345-350. *Orthochirus bicolor* (Pocock).

- 345. Femur, dorsal, interior and exterior views.
- 346. Patella, dorsal view.
- 347. Patella, exterior view.
- 348. Manus and fingers, dorsal view.
- 349. Manus and fingers, exterior view.
- 350. Manus and fingers, ventral view.

elongated, flat as in text-fig. 341 and 18/18 in number as in text-fig. 340. Basal piece weakly granular, anterior margin poorly notched in the middle. Genital operculum almost as wide as long, sclerites heavily sclerotised and completely fused in the middle. Cephalothoracic sternum short, subpentagonal, broad on posterior margin and with a deep depression in the above as in text-fig. 340.

Mesosoma : All tergites coarsely granular but more thickly and closely granular in the middle portion of each tergite as in text-fig. 342. Tergite I without carinae but tergite II with a weak median granular carina. Tergites III-VI with a granular median carina and a pair of short lateral carinae. Median carina ending anteriorly into a short, thick, transverse granular row and form a "T" shaped structure. Lateral carinae developed only on posterior portion of each tergite and those end anteriorly into a lateral mosaic structure as in text-fig. 342. Posterior margin of each tergite granular. Pretergal portion of each tergite scarcely granular with finely granular posterior margin. Tergite VII provided with two pairs of granular carinae as in text-fig. 335. Lateral margins and posterior margin granular. Pretergal portion weakly granular with less granular posterior margin. Sternites I-IV weakly granular but granulation only in submedian depressions and latero-anterior portions of each sternite, other portions smooth with a pair of slit like stigmata for book lungs. Lateral and posterior margins of each sternite very finely crenulated. Presternal portion smooth with finely granular posterior margin. Sternite V granular throughout but more granular on lateral portion. Lateral margin crenulated but posterior margin smooth. Presternal portion smooth with granular posterior margin.

Metasoma : Cauda thicker on posterior segments and five times as long as carapace. Basal segment always wider than long. Carinae poorly developed and dorsal carinae granular but dorso-lateral, lateral and inferior lateral carinae smooth. Inferior carinae weakly or poorly crenulated. Intercarinal space granular but more granular on dorsal portion. Anterior peduncle finely and evenly granular. Posterior margin granular above. Segments II & III with granular dorsal carinae, deve-

loped only on anterior portion. Inferior lateral carinae almost smooth. Inferior carinae well developed and crenulated. Inter-carinal space evenly granular on dorsal portion and lateral and ventral portions covered with many pits. Anterior peduncles finely and evenly granular. Posterior margin granular above. Segment IV almost smooth except finely and evenly granular dorsal median portion and anterior peduncle, smooth portion fully covered with many pits. Posterior margin granular above. Segment V almost as long as carapace, smooth except weakly granular dorsal median surface. Inferior lateral carinae developed only on posterior portion and the crenulation is broad; rest of the surface smooth and fully covered with pits. Anal rim of this segment almost smooth as in text-figs. 434 and 344. Telson slightly shorter than last caudal segment. Vesicle pyriform, small, covered with many pits on lateral and ventral surfaces. Ventral median crest not developed. Ventral and lateral bands not distinguished. Aculeus short, not as long as vesicular length, broad at the base and not much sharp. Setation on vesicle not clear and as in text-figs. 343 and 344.

Distribution : INDIA : Sangli, Satara, Sholapur, Ahmednagar, Poona, Aurangabad, Nasik and Dhule districts in Maharashtra.

Remarks : We have examined the type material (one female) received from the B. M. (N. H.) London, Regd. No. 1896.9.26.10. The present illustrations and descriptions are based on the type-specimen. The label with type indicates it is a male specimen but our observations reveal it is a female specimen. We have also studied many specimens identified by us. These identified specimens are deposited in the Western Regional Station, ZSI, Poona.

16. *Orthochirus krishnai* sp. nov.
(Figs. 351-366)

General : Female blackish, medium size, thickly granular on carapace and mesosoma, caudal region thick, incrassate and all segments covered with pits, telson reddish and pyriform. Appendages dark on femur and patella white, clear yellow on tibia and tarsomeres. Pectines well developed. Mesosomal ster-

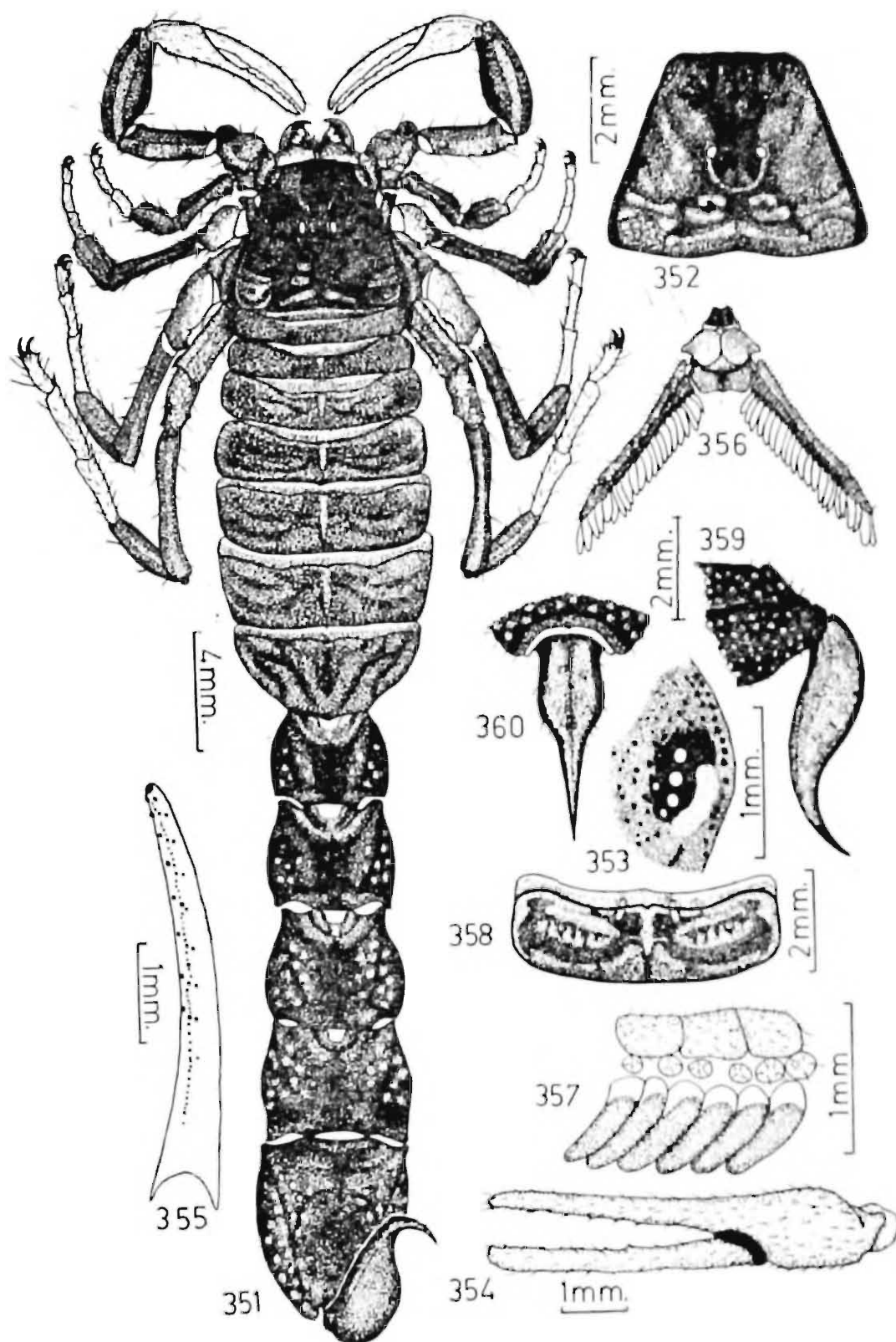
nite III with yellow triangular spot on posterior margin. Last mesosomal sternite provided with two pairs of smooth carinae.

Measurements : Total length 44.25 mm. Carapace 5.00 mm. long; Mesosoma 14.75 mm. long; Metasoma 24.50 mm. long.

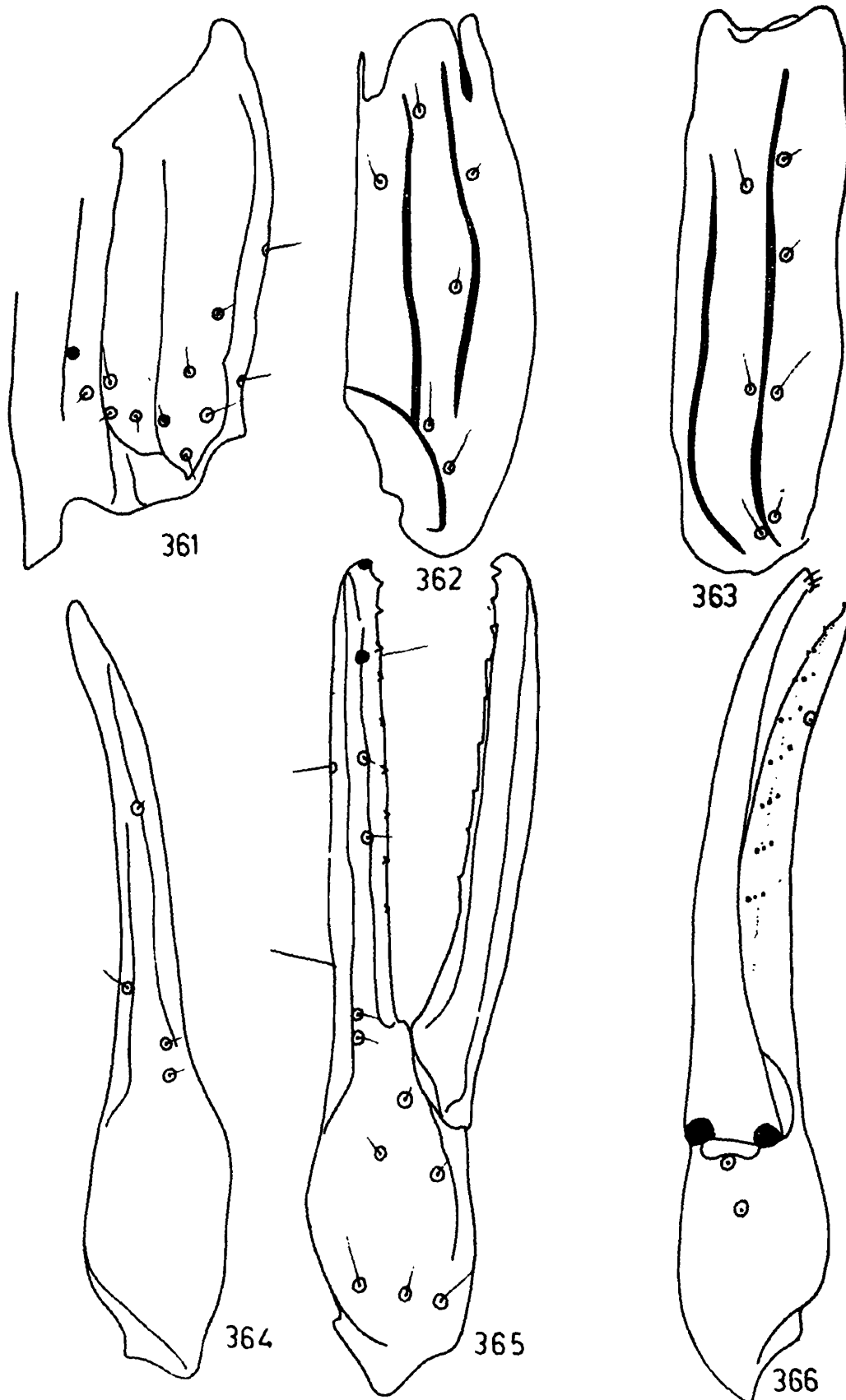
Carapace : Entirely deep blackish blue, surface coarsely and evenly granular, without any prominent carinae. Median ocular tubercles smooth, lateral ocular tubercles granular. Anterior margin granular, nearly straight and provided with ten to twelve short setae. Lateral margins finely crenulated and provided with a sub-marginal smooth ridge. Posterior margin granular. Lateral tubercle provided with five contiguous lateral eyes, situated on yellow depression as in text-fig. 353. The anterior pair of lateral eyes bigger. A pair of median eyes situated anteriorly in the ratio 1 : 1 as in text-fig. 352. Chelicera strong, basal segment black pigmented on dorsal surface but more darker on anterior portion. Ventral side pale, clothed with a tuft of short silky hairs, extending on dorsal side of immovable finger. Fingers dark and reddish on dentition. Dentition as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger subsequential in length. Femur of pedipalp black and shorter than carapace. Femoral carinae finely crenulated on inner and dorsal sides, carinae on outer side smooth. Intercarinal space granular. Patella light in colour and as long as carapace. All carinae on patella smooth and dark. Intercarinal space not much granular. Manus smooth, dark yellow with blackish tint as in text-fig. 354 and length of under hand not as long as femur but as wide as patella. Fingers uniformly yellow. Movable finger as long as carapace or patella. Dentition of fingers non-imbricated and movable finger armed with nine teeth on outer row as in text-fig. 355. Trichobothrial patterns on femur, patella, manus and immovable finger as in text-figs.

Figs. 351-360. *Orthochirus krishnai* sp. nov.

351. Dorsal view of female. 352. Carapace, dorsal view. 353. Lateral eyes, lateral view. 354. Manus and fingers, exterior view. 355. Movable finger, dorsal view. 356. Pectines, genital operculum and cephalothoracic sternum, ventral view. 357. Pectinal teeth and fulcra, ventral view. 358. Tergite, dorsal view.



359. Telson and anal rim of metasomal segment V, lateral view.
 360. Telson and anal rim of metasomal segment V, ventral view.



FIGS. 361-366. *Orthochirus krishnai* sp. nov.

361. Femur, dorsal, interior and exterior views. 362. Patella, dorsal view.

363. Patella, exterior view. 364. Manus and fingers, dorsal view.

365. Manus and fingers, exterior view. 366. Manus and fingers, ventral view.

361-366. Legs with coxa, trochanter, femur and patella finely granular and black in colour. Carinae on femur and patella finely crenulated. Tibia yellow with slight black tint and finely crenulated carinae with strong and long tibial spur on III and IV pairs. Tarsomeres I & II clear yellow, smooth and not regularly clothed with setae; two rows of black spinules below. Pectines well developed and almost six times longer than wide. Middle lamellae poorly separated into eight to nine digits and round to elongated fulcra well distinguished. Lamellae and fulcra thickly clothed with reddish microscopic setae as in text-fig. 356. Pectinal teeth 22/22 in number, broad and well developed as in text-fig. 357. Basal piece sclerotized, granular and strongly sclerotized sclerites granular on outer margins and fused in middle as in text-fig. 356.

Mesosoma : All tergites coarsely and evenly granular but more granular on median and posterior portions. Tergite I without prominent carinae, tergites II-VI with prominent median carinae and three fourth of anterior portion of median carina yellowish as in text-fig. 358. Lateral carinae poorly developed, finely granular and continued anteriorly in finely mosaic structure. Pretergal portion very finely granular, yellow on anterior portion, posterior margin finely granular. Tergite VII with two pairs of strongly crenulated carinae as in text-fig. 351. Intercarinal space weakly granular. Pretergal portion same as in preceding tergites. Sternites I-IV yellowish brown, granular but more on lateral sides and each with a pair of slit like stigmata for book lungs. Sternite III with a conspicuous yellow triangular mark on posterior margin. Sternites II-IV with a pair of smooth lateral carinae on inner margin of book lung. Presternal portion yellow, smooth and finely granular on posterior margin. Sternite V entirely black and weakly granular with two pairs of smooth carinae. Presternal portion darker than in preceding segments and finely granular. Lateral margins very weakly and finely crenulated. Posterior margin of presternal portion finely granular and black in colour.

Metasoma : Cauda thick, incrassate and almost five times as long as carapace. Basal segment twice as wide as long and with all ten carinae. All carinae finely crenulated. Intercarinal space

finely granular and provided with few pits. Segments II and III crenulated on dorsal and inferior carinae. Intercarinal space finely granular but less granular on posterior portion and ventral surface provided with more number of pits. Segment IV almost entirely smooth, entire surface covered with pits. Only dorsal and inferior carinae very weakly developed. Segment V reddish and as long as carapace, entire surface smooth with inferior lateral carinae posteriorly crenulated. Entire surface covered with pits. Anal rim of this segment smooth as in text-figs. 359 & 360. Telson almost as long as caudal segment V. Vesicle pyriform, much elongated and slender, more reddish than caudal segment V and ventral surface covered with few pits, entire surface smooth. Vesicle without setae. Aculeus short, not much curved, pointed and dark on distal portion as in text-figs. 359 and 360.

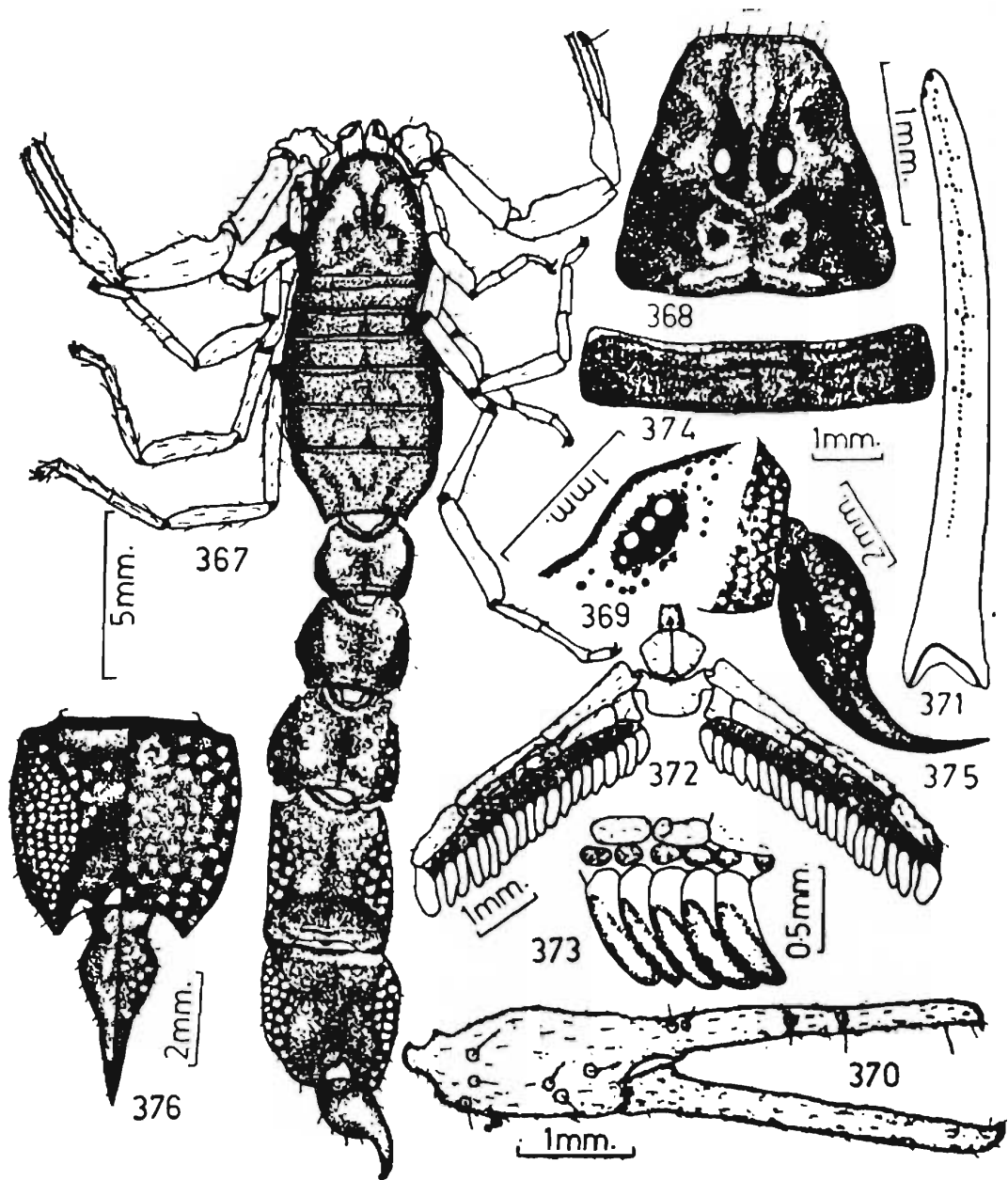
Type-specimen: *Holotype* female, *paratype* one female in spirit, deposited at National Collection, ZSI, Calcutta; Regd. No. 5077/18 and 5078/18.

Type-locality: Mogara vill. on Pali Road, 23 km from Jodhpur, Rajasthan, India; 3.ix.1972. Coll. R. C. Sharma. *Paratype* Collected from Tinumi Tank, 40 kms. NW of Jodhpur, Rajasthan; 12.xii.1962. Coll. Mr. Motilal.

Discussion: This species closely resembles with *Orthochirus melanurus* (Kessler), but can be separated from it as follows: (i) Third mesosomal sternite with a conspicuous yellow triangular spot on posterior margin but in *O. melanurus* third mesosomal sternite without any spots on posterior margin. (ii) Femur, patella of pedipalp and legs dark and granular but in *O. melanurus* femur and patella of pedipalp and legs clear yellow. (iii) Ventral side of caudal segments I and II with few pits but in *O. melanurus* ventral side of caudal segments I and II without any pits.

17. *Orthochirus melanurus* (Kessler) (Figs. 367-381)

1876. *Androctonus melanurus* Kessler, *Trudni Russ Kago Ent.*, 8 : 16.
1890. *Androctonus melanurus* : Pocock, *Proc. zool. Soc. London*, : 121.
1898. *Orthochirus melanurus* : Birula, *Ann. Mus. st. Petersb.*, : 281.
1899. *Butheolus melanurus* : Kraepelin, *Tierr. Scorp. etc.*, : 35.
1900. *Butheolus melanurus* : Pocock, *Fauna Brit. India, Arachn.*, : 28.



FIGS. 367-376. *Orthochirus melanurus* (Kessler).

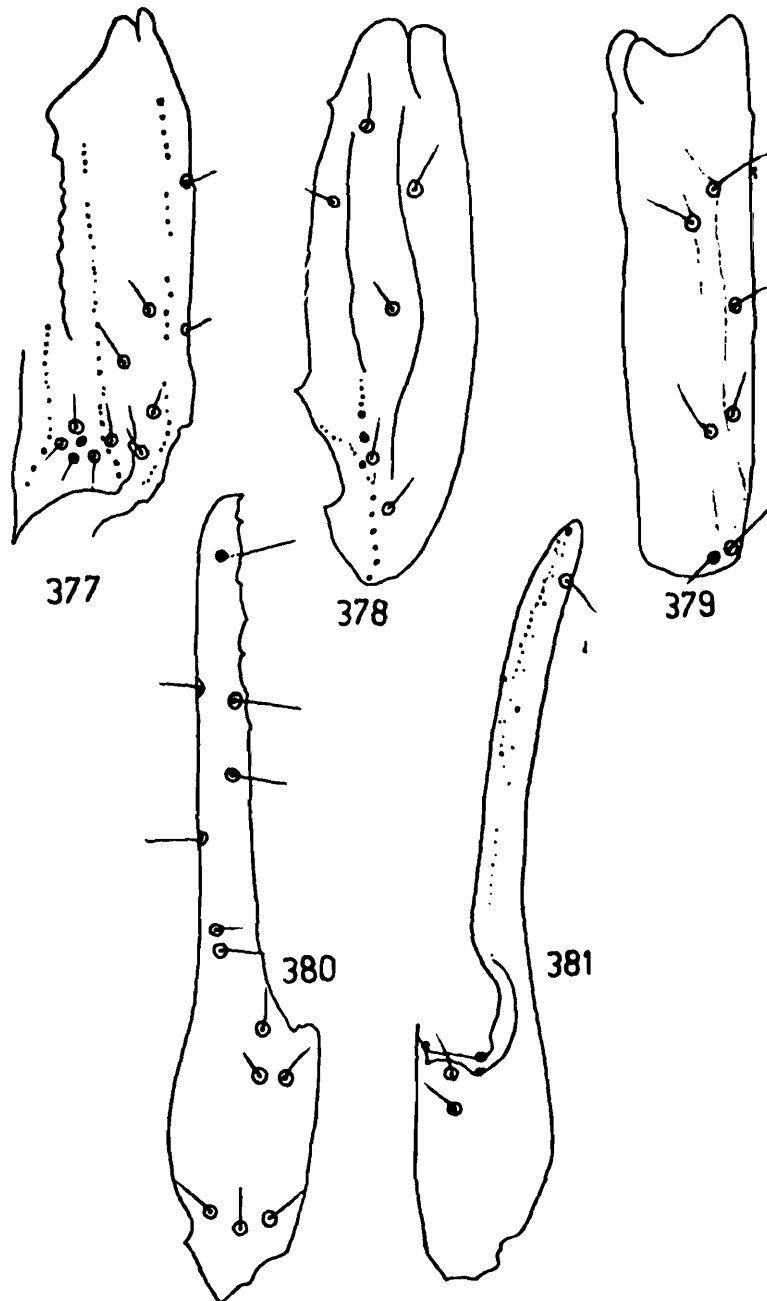
367. Dorsal view of female. 368. Carapace, dorsal view.
 369. Lateral eyes, lateral view. 370. Manus and fingers, exterior view. 371. Movable finger, dorsal view.
 372. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 373. Pectinal teeth and fulcra, ventral view.
 374. Tergite, dorsal view.
 375. Telson and anal rim of metasomal segment V, lateral view.
 376. Telson and anal rim of metasomal segment V, ventral view.

General: Male of medium body size, distal caudal segments more wide but telson much smaller. Body colour entirely black except yellowish appendages. Ventral portion yellowish, tinged with blackish brown. Carapace and mesosomal tergites coarsely and evenly granular. Carapace without prominent carinae. Tergites with a median carinae and very weak lateral carinae, last sternite with four granular carinae. Coxae granular. Pectines well developed. Appendages more thinner and delicate as compared to body size. Metasomal segments almost smooth but distal three segments entirely covered with minute pits. Telson small, surface covered with pits.

Measurements: Total length 33.25 mm. Carapace 3.75 mm. long; Mesosoma 8.75 mm. long; Metasoma 20.75 mm. long.

Carapace: Entire surface evenly and coarsely granular except few spots in furrows. Median portion much more elevated and interocular area slopping anteriorly. Lateral ocular tubercles granular and provided with five contiguous eyes as in text-fig. 369. Median ocular tubercles smooth and continued anteriorly for a short distance, provided with a pair of median eyes, situated anteriorly in the ratio 1:1 as in text-fig. 368. Almost no carinae developed but posterior median area slightly elevated and granular as in text-fig. 368. Posterior and anterior lateral furrows shallow. Anterior median furrow prominent on posterior portion. Anterior margin smooth but very finely and weakly crenulated, supported with an evenly granular submarginal ridge. Lateral margin finely crenulated and supported with an unevenly granular submarginal ridge. Posterior margin finely and evenly granular. Pedipalp slender and elongated, with carinated femur, slightly shorter than carapace; dorsal carinae finely and evenly granular. Inner or posterior margin provided with a crenulated carina but outer carina smooth. Intercarinal space finely and weakly granular. Patella longer than carapace, carinated but all carinae smooth. Intercarinal space smooth. Manus smooth as in text-fig. 370 and length of under hand almost half the length of femur but as wide as patella. Fingers elongated, movable finger as long as carapace but immovable finger shorter than movable finger. Dentition on fingers non-imbricated and outer row on movable finger

comprises of nine minute teeth as in text-fig. 371. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 377-381. Legs flat on femur and patella, femur longer than patella. Both femur and patella carinated, inner



FIGS. 377-381. *Orthochirus melanurus* (Kessler).

- 377. Femur, dorsal, interior and exterior views.
- 378. Patella, dorsal view.
- 379. Patella, exterior view.
- 380. Manus and immovable finger, exterior view.
- 381. Manus and immovable finger, ventral view.

carinae crenulated while outer smooth. Intercarinal space finely granular on femur but smooth on patella. Tibia carinated but all carinae smooth. Intercarinal space smooth, with a delicate, short, tibial spur on III and IV pairs. Tarsomere I carinated but smooth and provided below with a row of reddish, brown elongated spicules and a pair of pedal spur; anterior spurs double. Tarsomere II pale, smooth, provided with a row of small, reddish brown, spicules on the under surface. All segments sparsely covered with short reddish spicules as well as microscopic white hair. A pair of claws strong, curved, pointed and reddish brown on tips. Margins of all coxae granular, intermarginal space also weakly granular. Pectines well developed and 4.75 times longer than wide. Middle lamellae subdivided into eight digits. Shape of the fulcra triangular to round and well distinguished. Lamellae and fulcra covered with microscopic reddish hair as in text-fig. 372. Pectinal teeth laterally compressed as in text-fig. 373 and 20/20 in number. Basal piece strongly sclerotized and provided with a shallow depression on anterior portion. Genital operculum always wider than long, sclerites slightly separated from which a pair of small male genital papillae visible. Lateral margins of sclerites granular. Cephalothoracic sternum very small, nearly pentagonal, finely granular and provided with a small depression on posterior portion as in text-fig. 372.

Mesosoma: All tergites coarsely and evenly granular but median and lateral regions provided with more prominent lines. Tergites I without carinae. Tergites II-VI with granular median carina, developed upto median transverse granular line, forming a "T" shaped structure. Tergites V and VI provided with a pair of short, granular lateral carinae as in text-fig. 374. Lateral margins of each tergite finely crenulated. Posterior margin of each tergite evenly granular above. Pretergal portion almost smooth with finely and evenly granular posterior margins. Tergites VII provided with four granular carinae, originating abruptly from a short distance of posterior margin and evenly granular as in text-fig. 367. Lateral margins finely crenulated. Pretergal portion almost smooth with finely and evenly granular posterior margin. Sternite I-IV weakly

granular in submedian depressions otherwise smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins finely granular. Presternal portion smooth with finely granular posterior margin. Sternite III with a pair of smooth lateral carinae. Sternite IV also granular on lateral portions and provided with a pair of smooth median carinae and a pair of finely granular lateral carinae. Sternite V almost entirely granular, except few intercarinal space provided with two pairs of granular, carinae, median pair developed on $\frac{2}{3}$ posterior portion while lateral carinae developed in the middle portion. Lateral margins finely crenulated. Posterior margin finely granular below. Presternal portion smooth with very finely and evenly granular posterior margin.

Metasoma : Cauda five and half times as long as carapace. All segments longer than wide. Segment I with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae. All carinae granular and delicately crenulated. Segment II with dorsal, dorsolateral, inferior lateral and inferior carinae, weakly granular and delicately crenulated. Lateral carinae granular and developed only on $\frac{1}{3}$ posterior portion. Segment III with dorsal carinae very weakly granular. Inferior carinae granular and poorly crenulated. Segment IV with poorly granular dorsal carinae. Segments I and II with intercarinal space weakly and very sparsely granular. Segment III very poorly granular on dorsal portion and entire surface covered with pits. Dorsal surface very smooth in middle portion but anterior peduncle of each segment very finely and evenly granular and posterior margin granular. Segment V longer than carapace or patella, smooth and dorsal carinae sparsely granular. Inferior lateral carinae developed on $\frac{1}{3}$ posterior portion and broadly crenulated. Entire surface smooth and covered with numerous pits. Anterior peduncle smooth. Anal rim of this segment smooth as in text-figs. 375 and 376. Telson as long as last caudal segment but vesicle as long as caudal segment II, $2\frac{1}{2}$ times as wide and $\frac{1}{2}$ times as deep as last caudal segments. Entire vesicular surface smooth and covered with few pits on ventral surface. Lateral and ventral bands not prominent. Ventral median crest not prominent but very small, rudimentary, subaculear nodule present and supported by a pair of short and

weak basal setae. Aculeus stout, not much curved, pointed; darker on distal portion and nearly as long as vesicular length or slightly shorter as in text-figs. 375 & 376.

Distribution : INDIA : Punjab; Eastern Mediterranean Region.

Remarks : We have studied the authentically identified male specimen received from B.M. (N.H.) London, Regd. No. 1887-51 in good condition except missing chelicerae and broken legs. Present description and illustrations are based on the above specimen only. We have also studied two authentically identified male and female specimens received from National Collections, ZSI, Calcutta.

Genus 4. *Charmus* Karsch

1879. *Charmus* Karsch, *Mitt., munch. ent. Ges.*, 3 : 104.
 1891. *Charmus* : Karsch, *Berl. ent., Z.*, 36 : 306.
 1892. *Heterocharmus* : Pocock, *Ann. Mag. nat. Hist.*, 6(9) : 47.
 1899. *Charmus* : Kraepelin, *Tierr. Scorp. etc.*, : 39.
 1900. *Charmus* : Pocock, *Fauna Brit. India, Arachn.*, : 31.
 1915. *Charmus* : Hirst, *Ann. Mag. nat. Hist.*, 15 (8) : 224.
 1966. *Charmus* : Sreenivasa Reddy, *Bull. Mus. natl. Hist. nat., Paris.*, 2e Ser., 383 : 247-256.
 1970. *Charmus* : Sreenivasa Reddy, *J. Nat. Hist.*, 4 : 17.
 1972. *Charmus* : Stahnke, *Ent. News*, 83 : 130.

Characters : Carapace not carinated, interocular area horizontal. Mesosomal tergites monocarinated. Cephalothoracic sternum small, pentagonal, wider than long, about equal in length to the genital operculum. Caudal segments weakly carinated. Caudal segments IV and V punctured below. Vesicle small, round. Cheliceral fixed fingers provided below with two minute teeth. Granular rows of pedipalp fingers imbricated. Trichobothria *d1*, *d3* and *d4* form α angle (Fig. 391)

Type-species : *Charmus laneus*, Karsch

Distribution : INDIA AND SRI LANKA.

Key to the species of the genus Charmus

- Entire surface of carapace and mesosomal tergites weakly but less sparsely

granular on laterel portion; metasomal-segment IV short (Fig. 382).

Anal rim smooth (Figs. 389 & 390).....*indicus*

2. Entire surface of carapace and mesosomal tergites more granular and sparsely arranged; metasomal segment IV longer (Fig. 397). Anal rim evenly granulated (Figs. 409 & 410). *sinhagadensis*

18. *Charmus indicus* Hirst

(Figs. 382-396)

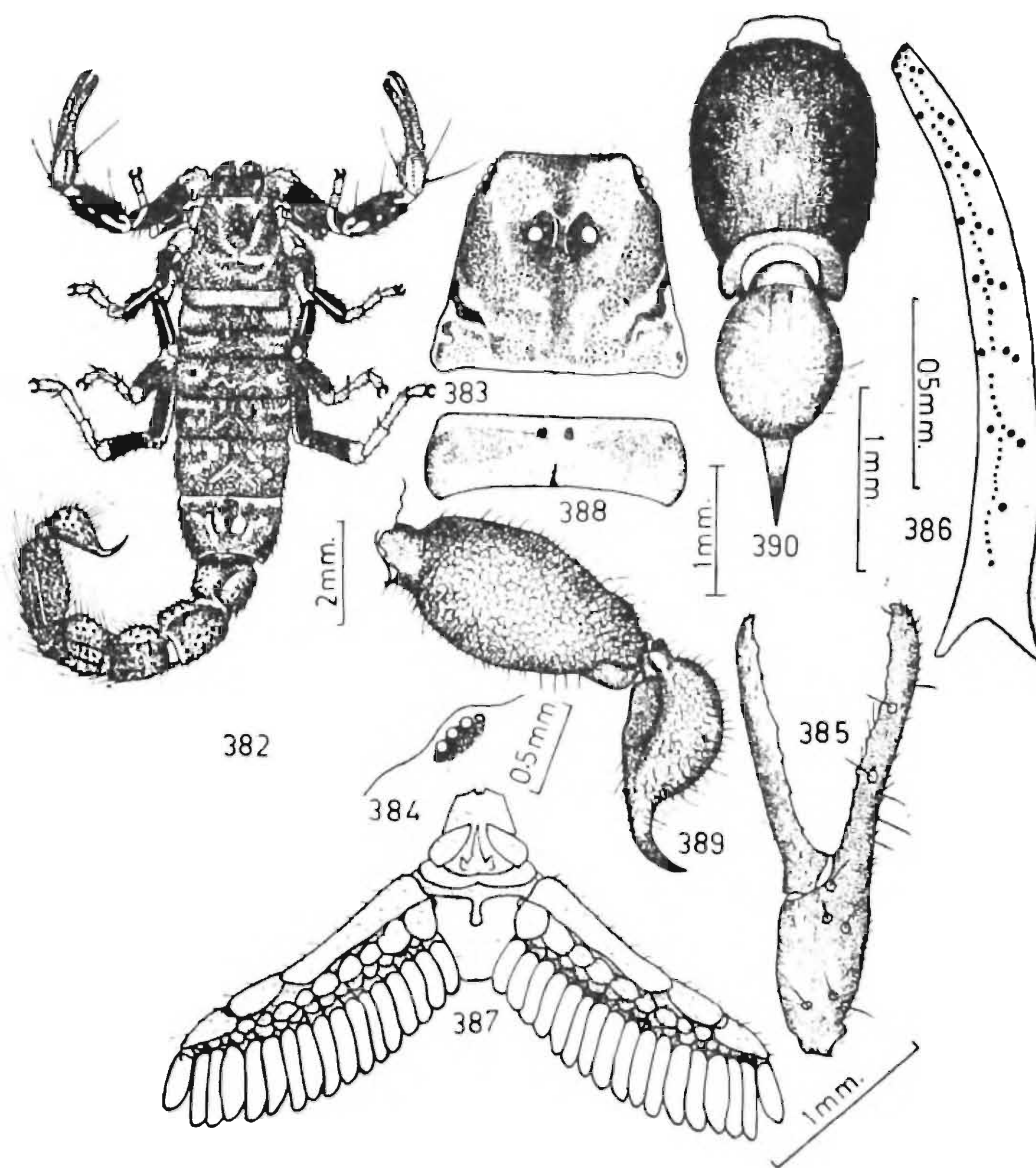
1915. *Charmus indicus* Hirst, *Ann. Mag. nat. Hist.*, 15(8) : 224-225.
 1966. *Charmus indicus* : Sreenivasa Reddy, *Bull. Mus. natl. Hist. nat.*, Paris, 38(3), 2e Ser : 247-256.

General : Male very small in size and body surface very finely granular. Body colour dark black but variegated with few yellowish spots. Tergites I-VI with a pair of conspicuous >> - << shaped yellow marks. Ventral surface cloudy black, sternites smooth but last sternite finely granular, without carinae and microscopically punctured. Metasoma carinated on segments I and II, otherwise smooth; heavily punctate and full of black hairs. Appendages black with few yellowish spots. Pectines well developed, cephalothoracic sternum pentagonal.

Measurements : Total length 13.50 mm. Carapace 1.75 mm. long; Mesosoma 3.75 mm. long; Metasoma 8.00 mm. long.

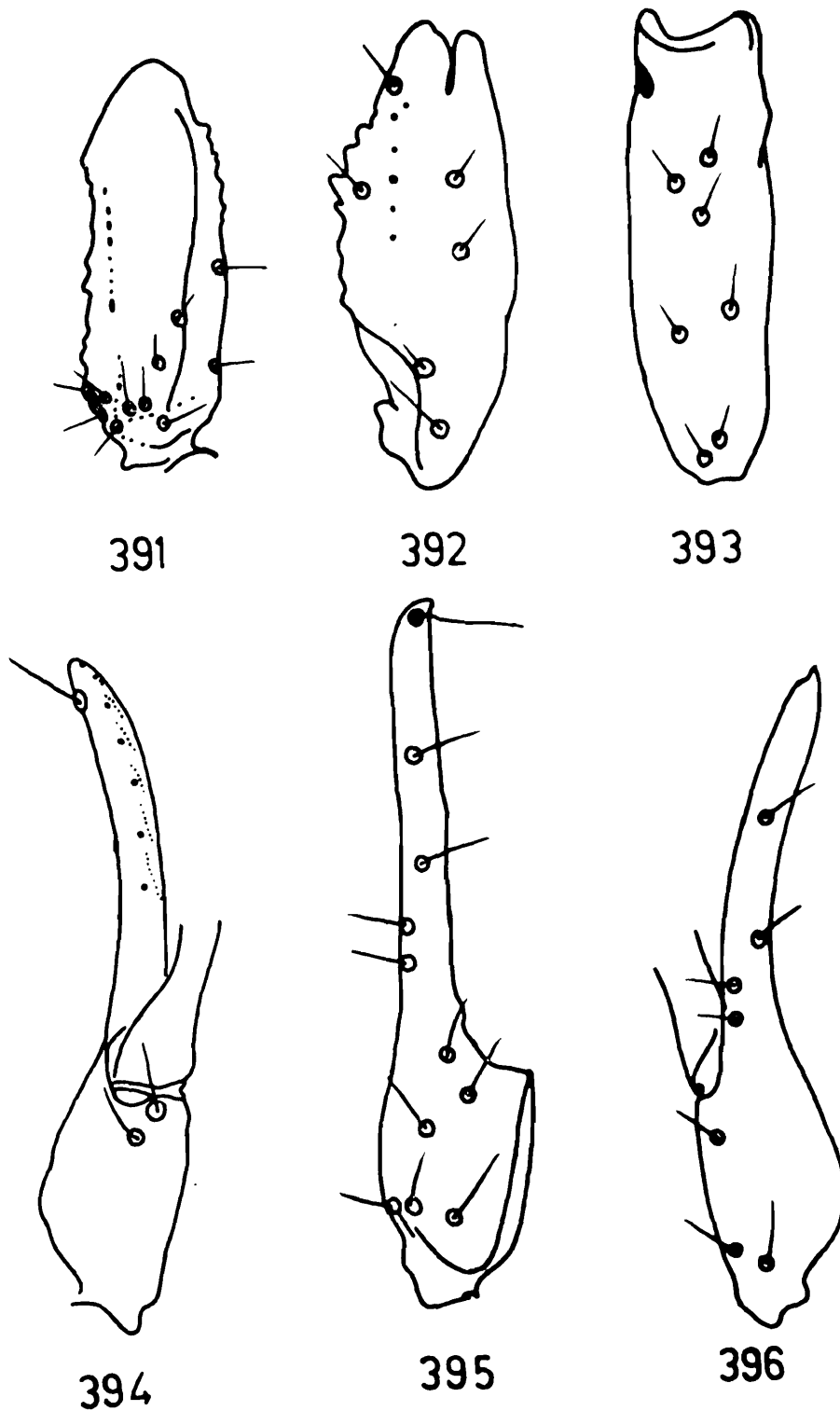
Carapace : Entire surface finely granular, granulation almost same size but the granulation in interocular area slightly bigger in size. Carinae not developed. Posterior median furrow prominent but shallow. Posterior lateral furrows slightly prominent at ocular portion. Ocular tubercles granular and lateral ocular tubercle provided with four contiguous lateral eyes as in text-fig. 384. Median ocular tubercles granular provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.9 as in text-fig. 383. Anterior margin straight and almost smooth. Lateral margins finely crenulated and provided with a fine granular mar-

ginal ridge. Posterior margin finely and evenly granular. Pedipalps comparatively stout and segments round. Femur always shorter than carapace, carinated, dorsal and ventral carinae finely but weakly granular. Outer or anterior surface provided with finely crenulated carina with three to four bigger granules.



FIGS. 382-390. *Charmus indicus* Hirst.

382. Dorsal view of male. 383. Carapace, dorsal view.
 384. Lateral eyes, lateral view.
 385. Manus and fingers, exterior view.
 386. Movable finger, dorsal view.
 387. Pectines, genital operculum and cephalothoracic sternum, ventral view. 388. Tergite, dorsal view.
 389. Telson and metasomal segment V, lateral view.
 390. Telson and metasomal segment V, ventral view.



FIGS. 391-396. *Charmus indicus* Hirst.

391. Femur, dorsal, interior and exterior views.
 392. Patella, dorsal view. 393. Patella, exterior view.
 394. Manus and immovable finger, ventral view.
 395. Manus and immovable finger, exterior view.
 396. Manus and immovable finger, dorso-exterior view.

Inner or posterior carina almost smooth. Intercarinal space granular but more granular on dorsal and anterior surface. Patella longer than femur but shorter than carapace, without carinae except weakly crenulated carina present on anterior or inner surface. Anterior surface finely but sparsely granular. Hand smooth as in text-fig. 385 but not as wide as patella, length of under hand equal to half the length of patella. Fingers long and almost as long as carapace. Movable finger longer than immovable finger. Dentition on finger imbricated and outer row comprises eight minute teeth on movable finger as in text-fig. 386. All segments covered thickly with very minute blackish brown microscopic setae. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 391-396. Legs yellow, very delicate, femur and patella laterally flat, finely granular and carinae finely crenulated on inner margin. Tibia smooth and provided with very delicate, long tibial spur on III and IV pairs. Tarsomere I elongated, slender, provided on ventral surface with a row of long microscopic setae and a pair of pedal spur, anterior spur sometimes double. Tarsomere II smooth, provided ventrally with a row of long, microscopic setae. A pair of claws, minute, delicated, not much curved, pointed and darker on tips. All segments, sparsely covered with whitish microscopic hairs. Pectines very well developed, four times longer than wide. Middle lamellae subdivided into eight to nine small digits. Fulcra well distinguished and almost round. Lamellae and fulcra sparsely covered with very minute microscopic white setae. Pectinal teeth elongated, tubular, laterally flat; proximal teeth shorter than distal and 17/17 in number as in text-fig. 387. Basal pieces well sclerotized and anterior margin slightly invaginated with a deep median notch. Genital operculum wider than long, sclerites exposed apart and a pair of very minute male genital papillae visible. Cephalothoracic sternum pentagonal and very small with a deep median depression on posterior portion as in text-fig. 387.

Mesosoma : All tergites very finely granular. Tergites II-VI provided with a weak, median granular carinae as in text-fig. 388. Lateral margins finely crenulated. Posterior margins finely and evenly granular. Pretergal portion smooth with very finely and

evenly granular posterior margin. Tergites VII sparsely granular and granules slightly bigger in size. Median carina represented by weak elevation, covered with few granules. Two pairs of lateral granular carinae and inner pair not much prominent than outer but outer carinae developed only on middle portion as in text-fig. 382. Lateral margins finely crenulated. Posterior margin smooth but provided with a finely granular submarginal ridge. Pretergal portion smooth, with finely granular and centrally invaginated posterior margin. Sternites I-IV smooth, punctured but more punctured in median portion of each sternite and each provided with a pair of slit like stigmata for book lungs. Lateral margins very finely crenulated. Posterior margin smooth. Pre-sternal portion smooth with smooth posterior margin. Last sternite sparsely granular but without carinae. Lateral margins crenulated. Posterior margin smooth but granular below. Pre-sternal portion smooth with smooth posterior margin.

Metasoma : Cauda slightly less than five times as long as carapace. Basal segment always wider than long. Segment I with weak dorsal, dorsolateral, inferior lateral and inferior carinae, all carinae sparsely granular. Intercarinal space granular. Lateral carinae very weakly granular. Segment II without lateral carinae and other carinae weakly and sparsely granular. Intercarinal space weakly granular and punctate. Segment III with dorsal carinae represented by few granules on posterior portion. Inferior lateral carinae weakly and sparsely granular. Inferior carinae more strong and sparsely crenulated. Intercarinal space weakly granular on ventral portion but lateral and dorsolateral portions smooth with numerous microscopic pits. Dorsal portion smooth and without pits. Segment IV entirely smooth and fully covered with pits, from each pit arises a microscopic brown hair. Segment V longer than carapace, entire surface smooth and fully covered with pits and from each pit arises a microscopic short hair. Anterior and posterior peduncle of each segment smooth. Anal rim of this segment smooth as in text-figs. 389 & 390. Telson longer than carapace but shorter than last caudal segment. Vesicle longer than caudal segment III but shorter than caudal segment IV. Entire surface smooth, covered with microscopic pits, from each pit arises

a microscopic short brownish hair. Lateral depressions more deep and prominent than ventral median depression. Ventral median crest poorly represented by smooth carina and ending posteriorly into aculeus. Aculeus $1/3$ of vesicular length, not much curved, pointed and dark reddish brown on distal portion as in text-figs. 389 and 390.

Distribution : INDIA : Udayagiri, Kerala; Coimbatore, Tamil Nadu; Pondicherry; Tirupati, Andhra Pradesh.

Remarks : We have studied the *holotype* received from B.M. (N.H.) London, Regd. No. 1915.10.16.1. This species has been redescribed by Sreenivasa Reddy in 1966. He has collected few specimens of this species from Coimbatore, Pondicherry; Udayagiri and Tirupati. He has studied total six specimens and these specimens he has deposited in M.H.N.N., Paris. Our study of movable finger of pedipalp shows that it consists eight minute teeth in the outer row instead of nine and the *holotype* is also a matured male and it has a pair of small but conspicuous male genital papillae.

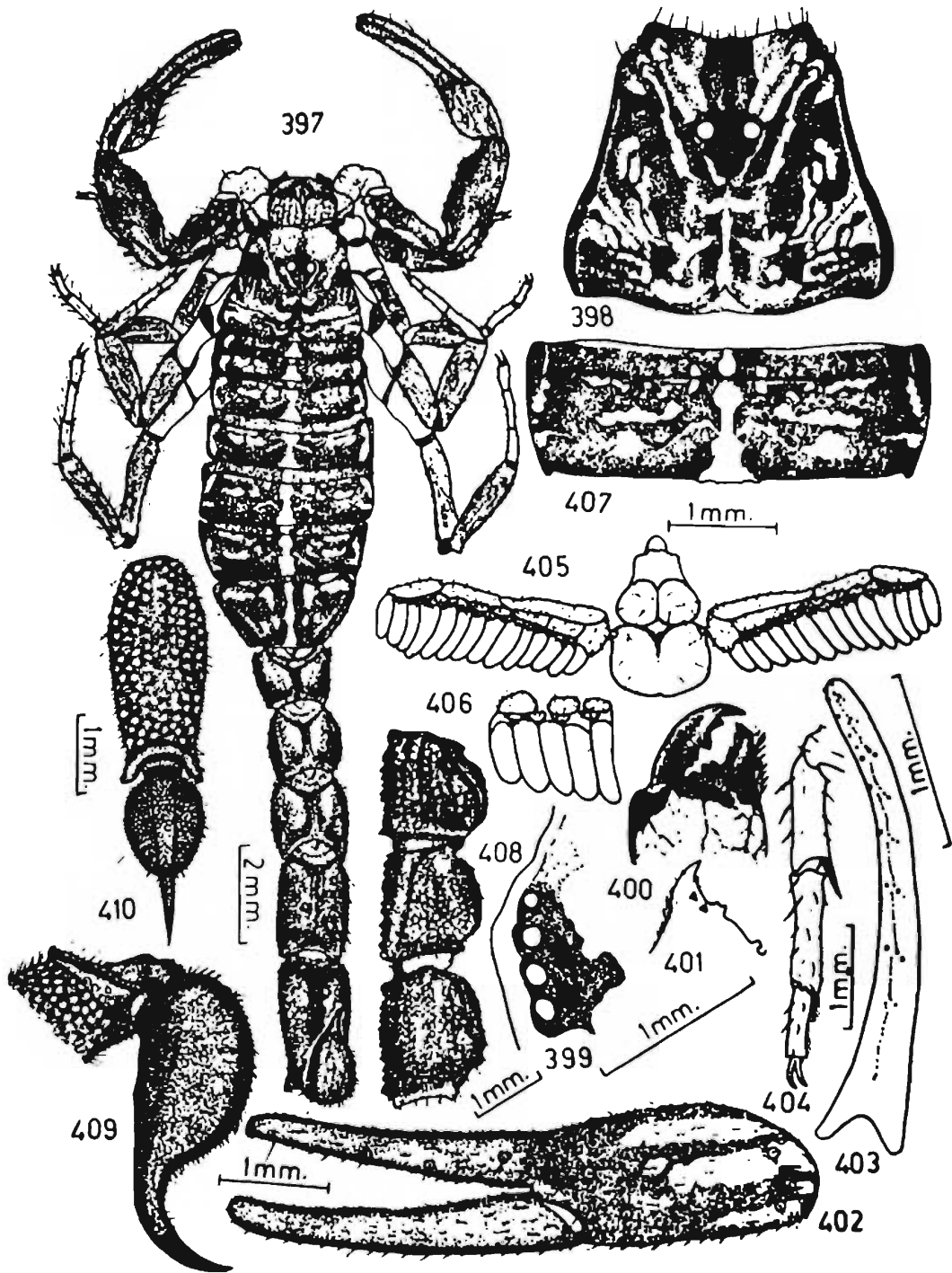
19. *Charmus sinhagadensis* sp. nov.

(Figs. 397-416)

General : Female of smaller body size. Entire body surface appears to be smooth but finely granular, granules very small, sparsely scattered and very weak. Last sternite very weakly granular and provided with two pairs of weakly and sparsely granular carinae. Cauda with first two segments carinated and carinae granular. Segment III carinated only on ventral surface. Segments IV and V smooth with numerous microscopic pits. Telson punctate with hairy vesicle, smooth on entire surface.

FIGS. 397-410. *Charmus sinhagadensis* sp. nov.

397. Dorsal view of female. 398. Carapace, dorsal view. 399. Lateral eyes, lateral view. 400. Chelicera, dorsal view. 401. Immobile finger of chelicera, ventral view. 402. Manus and fingers, exterior view. 403. Movable finger, dorsal view. 404. III leg, exterior view. 405. Pectines, genital operculum and cephalothoracic sternum, ventral view.



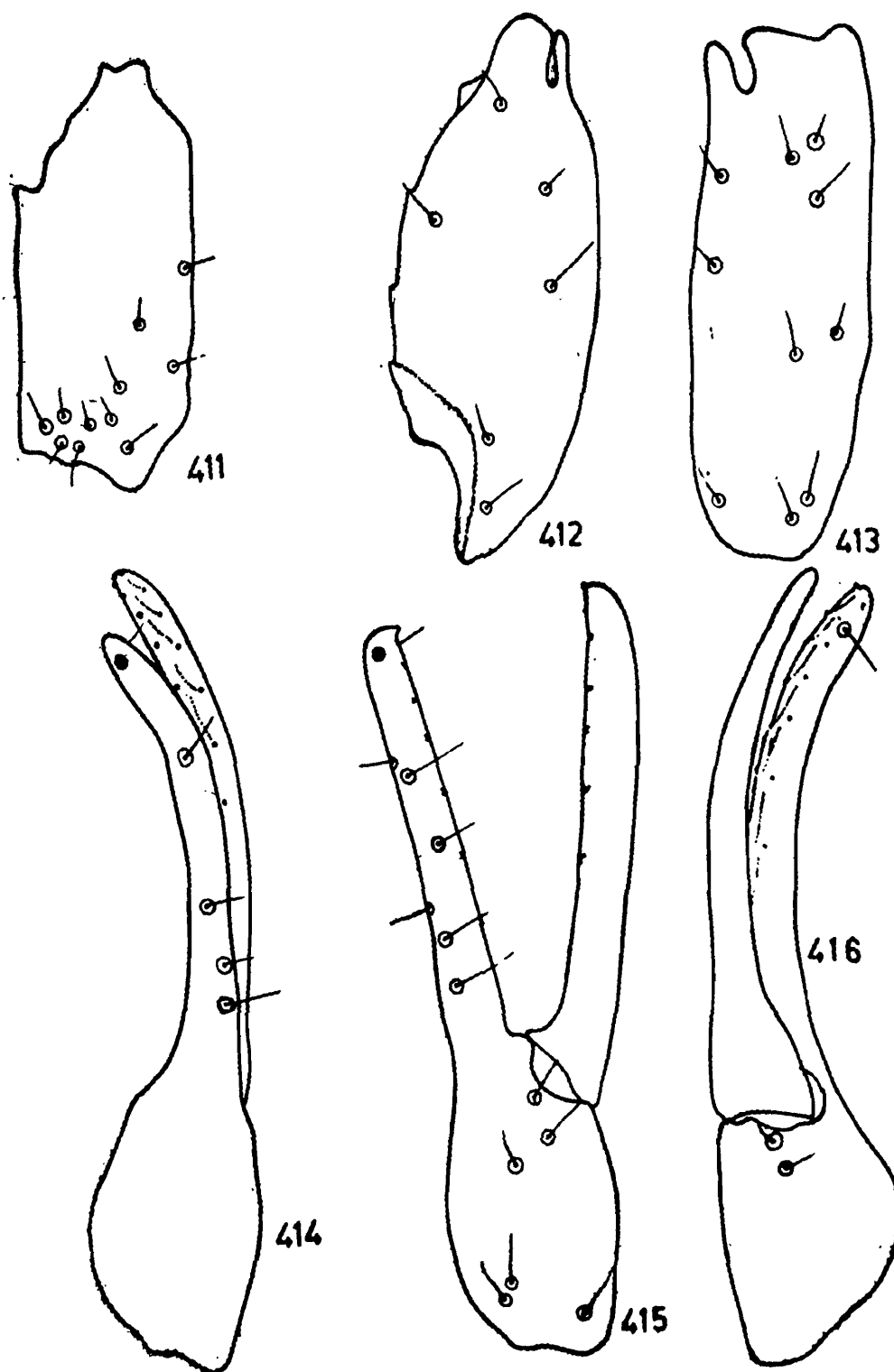
- 406. Pectinal teeth and fulcra, ventral view.
- 407. Tergite, dorsal view.
- 408. Metasomal segments I-III, lateral view.
- 409. Telson and anal rim of metasomal segment V, lateral view.
- 410. Telson and anal rim of metasomal segment V, ventral view.

Aculeus sharp. Chelicera darker and smooth. Pedipalp comparatively strong, globular and smooth. Legs carinated and finely granular on femur and patella. Pectines well developed.

Colouration of body dark brick red to blackish with regular yellowish brown variegation as in text-fig. 397. Tergites with median yellow longitudinal patch. Lateral portion provided with >> << shaped yellow patches except tergite VII. Lateral margins provided with small longitudinal yellow patches. Ventral portion pale yellow on anterior sternite but darker on lateral margins. Last sternite dark brown. Cauda dark brown on I and II segments, dark brownish black on segments III—V and telson. Chelicera dark, pigmented on basal segment but more darker on anterior portion and dentition. Pedipalp slightly paler with few yellowish brown bands but femur more darker. Fingers paler and with brownish tint. Legs darker on femur and patella but tibia and tarsomere I with brownish tint. Tarsomere II yellowish as in text-fig. 397. A pair of claws brownish.

Measurements : Total length 22.00 mm. Carapace 2.50 mm. long; Mesosoma 6.75 mm. long; Metasoma 12.75 mm. long.

Carapace : Surface smooth but few fine granules scattered irregularly and granulation slightly more closer in posterior median furrow. Interocular area small, almost brown and smooth. Ocular tubercles smooth, dark black. Lateral ocular tubercles provided with four contiguous lateral eyes as in text-fig. 399. Median ocular tubercle smooth, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2 as in text-fig. 398. Anterior margin smooth almost straight and provided with few reddish brown microscopic setae. Lateral margins smooth and provided with a smooth submarginal ridge. Posterior margin finely and almost evenly granular above and straight as in text-fig. 398. Posterior lateral furrows not prominent. Furrows, lateral to median eyes slightly prominent and median furrows deep and posteriorly bifurcated just anterior to posterior margin as in text-fig. 398. Chelicera with smooth basal segment, pigmented on dorsal surface but more darker on anterior portion as in text-fig. 400. Ventral surface pale and thickly covered with short silky hairs, extending on ventral surface of fingers. Fingers dark red-



FIGS. 411-416. *Charmus sinlagadensis* sp. nov.

- 411. Femur, dorsal, interior and exterior views.
- 412. Patella, dorsal view. 413. Patella, exterior view.
- 414. Manus and finger, dorsal view.
- 415. Manus and fingers, exterior view.
- 416. Manus and fingers, ventral view.

dish brown. Dentition on fingers as characterised in family and genus as in text-figs. 400 and 401. Pedipalp slightly paler and globular on segments. Femur darker and shorter than carapace, no carinae developed but few granules present on dorsal and dorso-anterior portion. Patella pale brown with few yellow spots on external surface, entirely smooth, without carinae. Anterior or inner surface provided with few tuberculate granules. Manus or hands smooth, as in text-fig. 402, but not as wide as patella. Length of under hand half the length of patella or carapace. Movable finger as long as carapace, dentition on finger imbricated and provided with eight rows of teeth as in text-fig. 403. Immovable finger slightly shorter than movable finger. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 411-416. Legs black, smooth but acarinated on femur and patella. Tibia brownish, carinated but smooth with short tibial spurs on III and IV pairs as in text-fig. 404. Tarsomere I smooth, provided with long setae on inner surface and a pair of pedal spurs. Tarsomere II cylindrical, smooth, provided below with a paired row of long setae. Claws delicate, curved, darker on tips. Pectines well developed and five times longer than wide. Middle lamellae subdivided into seven small digits. Fulcra round and distinguished. Lamellae and fulcra covered with microscopic setae as in text-fig. 405. Pectinal teeth tubular, proximal teeth shorter, 14/14 in number as in text-figs. 405 & 406. Basal piece delicate and deeply notched in the middle portion of anterior margin. Genital operculum wider than long, operculi united in the middle and covered sparsely with microscopic setae as in text-fig. 405.

Mesosoma: Tergites I-VI very finely, weakly and sparsely granular and slightly more granular on posterior portion of each tergite, provided with a median carina developed only on posterior portion as in text-fig. 407. Presternal portion smooth. Posterior margin finely and sparsely granular. Tergite VII more granular than preceding segments and provided with weak, broad median carina and two pairs of lateral granular carinae as in text-fig. 397. Pretergal portion smooth with smooth posterior margin. Lateral and posterior margins smooth. Sternites I-IV smooth, each provided with a pair of small slit like stigmata for

book lungs. Lateral and posterior margins smooth. Presternal portion smooth. Sternite V unevenly and sparsely granular but granules bigger and closer on posterior lateral portions, less setose than preceding sternites, provided with two pairs of short, granular carinae, developed only on posterior portion. Lateral margins weakly granular. Posterior margin evenly granular.

Metasoma : Cauda more than five times as long as carapace. Basal segment wider than long. Segments I-III granular as well as punctate and carinated. Segment I provided with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae. Dorsal carinae obsolete on anterior portion and granular on posterior 1/3 portion. Dorsolateral, lateral, inferior lateral carinae evenly but slightly sparsely granular. Inferior carinae, granular, though sparsely but more crenulated. Intercarinal space sparsely granular but more granular on posterior portion as in text-fig. 408. Segment II provided with dorsal, dorsolateral, lateral carinae, obsolete on 3/4 anterior portion but granular on 1/4 posterior portion. Inferior lateral carinae irregularly granular. Inferior carinae evenly granular and crenulated. Intercarinal space smooth on anterior portion while weakly and very sparsely granular on posterior portion as in text-fig. 408. Segment III provided with obsolete dorsal and dorsolateral carinae, ending into a weak subdenticular tubercle. Lateral carinae completely absent. Inferior lateral carinae smooth on anterior portion but granular on posterior portion. Inferior carinae evenly granular and crenulated. Inferior carinae evenly granular and more crenulated as in text-fig. 408. Intercarinal space smooth. Anterior peduncle of each segment smooth but posterior margin granular. Segment IV acarinated, smooth but fully covered with microscopic pits and hairs. Anterior peduncle and posterior margin smooth. Segment V longer than carapace, acarinated, surface fully covered with small pits and thickly clothed with microscopic hairs. Anal rim of this segment evenly granular and crenulated as in text-figs. 409 and 410. Telson as long as carapace but not as wide or deep as caudal segment V. Vesicle as long as caudal segment III, entire surface smooth, covered fully with minute pits and microscopic hairs as in text-

figs. 409 and 410. Ventral and lateral bands not prominent. Ventral median crest smooth and without subaculear nodule. Aculeus sharp, slightly curved, shorter than vesicular length, covered with few setae at the base and dark reddish on tip as in text-figs. 409 and 410.

Type-specimen : *Holotype* Female, *paratype* one female in spirit, deposited at National collection ZSI, Calcutta, Regd. No. 5079/18 and 5080/18.

Type-locality : Sinhagad, 13 kms. SW from Poona, Dist. Poona, Maharashtra, India; 7. viii.1978. Coll. D. B. Bastawade.

Distribution : Known only from type locality.

Remarks : This species closely resembles to *Charmus indicus* Hirst, but it differs from *C. indicus* as follows: (i) Length of IV caudal segment more than in *indicus*. (ii) Ratio of median eyes with anterior margin and posterior margin of carapace is more than in *indicus*. (iii) Entire surface of carapace and mesosomal tergites less and very sparsely granular than in *indicus*. (iv) Anal rim of V segment granular and evenly crenulated where as smooth in *indicus*. (v) Last mesosomal sternite provided with two pairs of short granular carinae whereas there are no carinae in *indicus*.

Genus 5. *Stenochirus* Karsch

1891. *Stenochirus* : Karsch, *Berl. ent. Z.*, 36 : 306
 1899. *Stenochirus* : Kraepelin, *Tierr. Scorp. etc.*, : 30.
 1900. *Stenochirus* : Pocock, *Fauna Brit. India, Arachn.*, : 32.
 1961. *Stenochirus* : Vachon, *Bull. Soc., zool. Fr.*, 86(6) : 786.
 1972. *Stenochirus* : Stahnke, *Ent. News.*, 83 : 130.

Characters : Carapace without carinae but weakly granular. Inferior surface of cheliceral fixed with two teeth. Mesosomal tergites monocarinated, smooth but finely granular at the sides and in the dorsal submedian impressions. Cephalothoracic ster-

num triangular, longer than wide and as long as genital operculum. Cauda robust, not carinated below, vesicle small, pyriform and no sub-aculear spine. Granular rows on fingers of pedipalp imbricated. Trichobothria *d1*, *d3* and *d4* on femur form ∞ angle (Fig. 426)

Type-species : *Stenochirus sarasinorum* Karsch.

Distribution : INDIA AND SRI LANKA.

Key to the species of the genus Stenochirus

1. Interocular portion of carapace smooth.
Mesosomal tergites finely granular in median and lateral portions. Patella weakly crested anteriorly. *politus*
- Interocular portion of carapace finely granular; Mesosomal tergites smooth. Patella smooth and rounded anteriorly. *sarasinorum*.

20. *Stenochirus politus* Pocock

(Figs. 417-429)

1899. *Stenochirus politus* Pocock, *J. Bombay nat. Hist. Soc.*, **12** : 262.
1900. *Stenochirus politus* : Pocock, *Fauna. Brit. India, Arachn.*, : 33.
1961. *Stenochirus politus* : Vachon, *Bull. Soc., zool. Fr.*, **86** (6) : 786-796.

General : Female of small size with body colour very dark brown but infested with dark black. Caudal segments blackish, telson dark brownish to black. Appendages dark to dull brownish but pale yellow on tibia and tarsomere I and II. Ventral body surface dark brown. Last mesosomal sternite black. Pectines yellow but dark on basal piece. Body surface very finely granular but the granulation is very irregular. Carapace without carinae, mesosomal tergites monocarinated as in text-fig. 417. Caudal segments without carinae, smooth on ventral surface and finely punctured. Last mesosomal sternite smooth, without

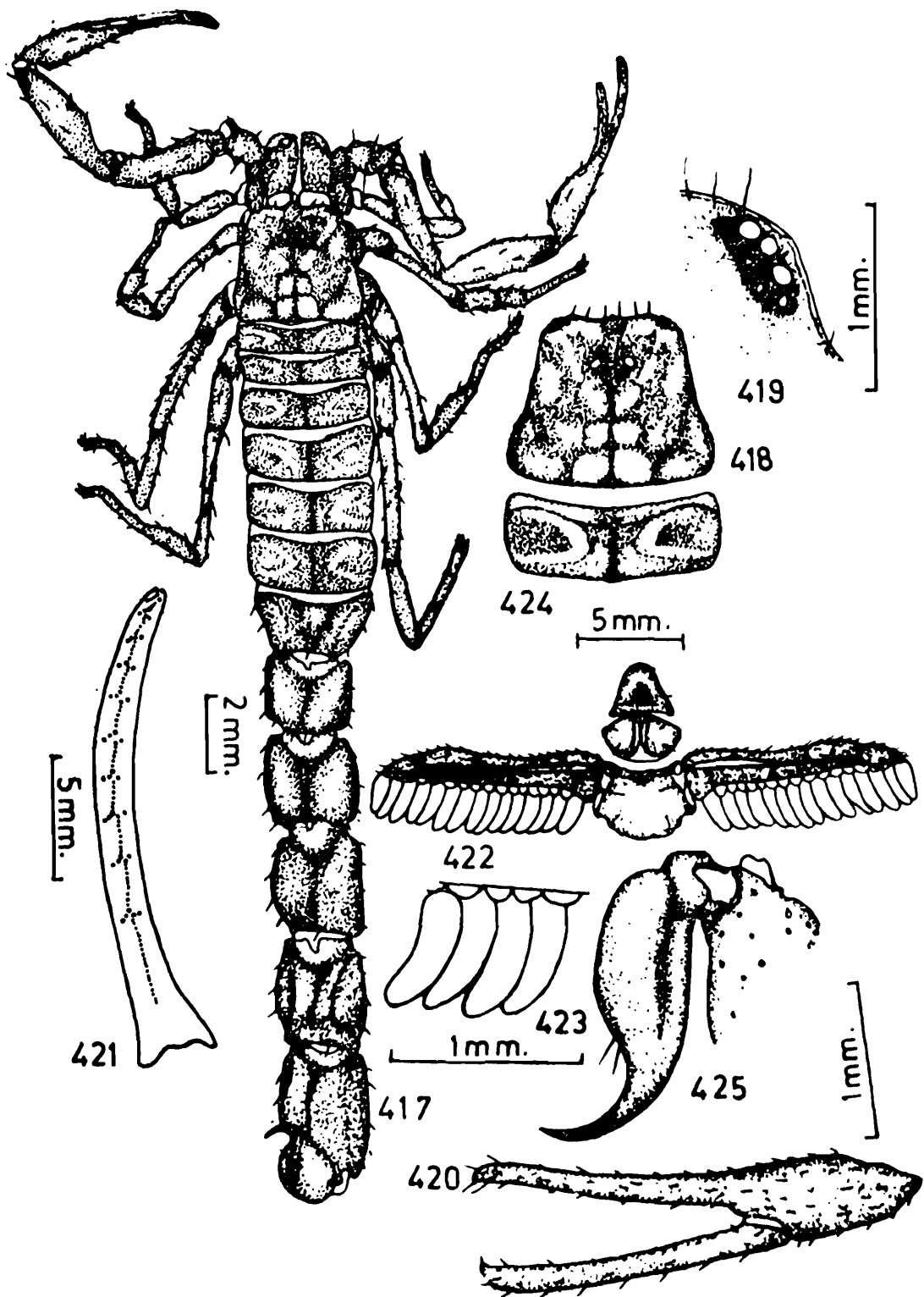
carinae. Pectines well developed. Pedipalp slender and elongate.

Measurements : Total length 27.00 mm. Carapace 3.25 mm. long; Mesosoma 10.00 mm. long; Metasoma 13.75 mm. long.

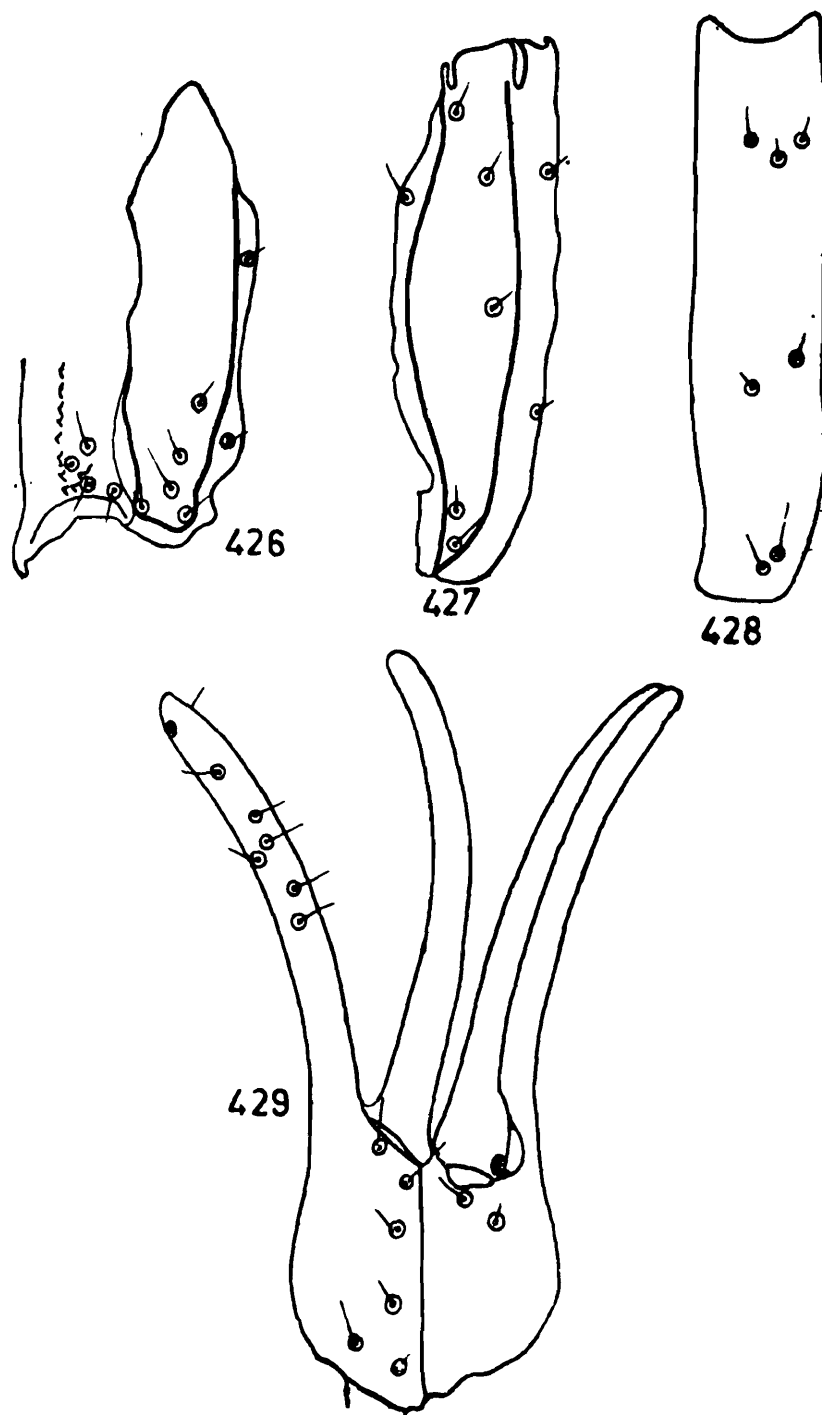
Carapace : Surface almost smooth except finely granular in median depression and on lateral portions. Interocular portion very narrow and smooth. Ocular tubercles smooth. Superciliary process smooth. Five lateral eyes as in text-fig. 419. A pair of median eyes anteriorly situated in the ratio 1 : 1.9 as in text-fig. 418. Anterior, lateral and posterior margins smooth. Anterior margin provided with few setae. Chelicera slightly pale but pigmented, basal segment more darker on anterior portion. Fingers dark but more darker on dentition. Dentition on the fingers as characterised in the family and genus. Distal teeth of dorsal and ventral arms of movable finger subequal. Ventral surface of basal segment and immovable finger thickly clothed with short fine silky hairs. Pedipalp slender and elongated as in text-fig. 417. Femur as long as carapace. Carinae poorly developed and weakly granular. Intercarinal space weakly granular on proximal portion. Patella longer than carapace or femur. Entire surface almost smooth, without any carinae or crest. Manus or hand of chela slender, smooth as in text-fig. 420, length of under hand equal to caudal segment III and less than as wide as patella. Movable finger as long as patella and immovable finger slightly longer than femur. Dentition on the finger imbricated and outer row comprises of ten teeth as in text-fig. 421. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 426-429. Legs with femur and patella darker, very finely granular and carinae almost smooth. Tibia slightly paler than preceding segments, smooth and furnished with a strong tibial spur on III-IV pairs. Tarsomere I pale yellow, smooth, furnished with a pair of pedal

Figs. 417-425. *Stenochirus politus* Pocock.

417. Dorsal view of female. 418. Carapace, dorsal view. 419. Lateral eyes, lateral view. 420. Manus and fingers, exterior view. 421. Movable finger, dorsal view. 422. Pectines, genital operculum and cephalothoracic sternum, ventral view.



- 423. Pectinal teeth and fulcra, ventral view.
- 424. Tergite, dorsal view.
- 425. Telson and anal rim of metasomal segment V, lateral view.



FIGS. 426-429. *Stenochirus politus* Pocock.

426. Femur, dorsal, interior and exterior views.

427. Patella, dorsal view. 428. Patella, exterior view.

429. Manus and fingers, exterior and ventral view.

spurs, anterior spur always double and a ventral row of paired microscopic hairs. Tarsomere II also pale yellow, smooth, elongated and furnished below with a row of paired small reddish spinules. Claws normal and dark red on tips. Pectines well

developed and five times longer than wide. Middle lamellae divided into six small digits. Fulcra round but elongated at the base and tubular in front. Lamellae and fulcra covered sparsely with microscopic white hairs. Pectinal teeth tubular, elongate as in text-fig. 423 and 15/15 in number. Basal piece dark, sclerotised narrowed behind and provided with a moderate median notch on anterior margin. Genital operculum slightly wider than long, sclerites divided in the middle. Cephalothoracic sternum pentagonal as in text-fig. 422.

Mesosoma : All tergites almost smooth but very finely and closely granular in the middle portion, in depression on either sides of median carina and on lateral portions of each tergite. Tergites I-VI monocarinated and a median carina smooth as in text-fig. 424. Posterior margin of each tergite very finely granular. Pretergal portion smooth. Tergite VII more granular than preceding tergites but granular only on posterior portion. Posterior margin granular. Pretergal portion smooth. Sternites I-IV smooth and each provided with a pair of small, slit like stigmata for book lungs. Presternal portion smooth. Last sternite smooth, more darker, without carinae.

Metasoma : Cauda slightly more than four times as long as carapace. Basal segment wider than long. Segments I-IV smooth, without carinae but the dorsal surface finely granular in the dorsal median portion. Anterior peduncle of each segment finely granular. Ventral surface of each segment finely punctured. Segment V slightly longer than carapace, smooth, without carinae but finely granular in the median depression on dorsal surface and punctate. Telson more than as long as carapace or caudal segment V. Vesicle pyriform, smooth, punctured and always less than as wide or deep as caudal segment V, subaculear node very weak and supported with a pair of short setae. Aculeus thick at the base, not much curved, short and also not much sharp as in text-fig. 425.

Distribution : INDIA : Kanara, Karnataka, Mandla National Park, Madhya Pradesh.

Remarks : We have examined, described and illustrated on the basis of 1 ♀ specimen received from B.M. (N.H.), London,

Regd. No. 1897.11.5.1. We presume that the specimen received is the type specimen originally described by Pocock in *J. Bombay nat. Hist. Soc.* 12 : 262 as the label tallies with that is mentioned in Pocock's description and the date of collection is also earlier to 1899 in which this species has been described for the first time by Pocock.

21. *Stenochirus sarasinorum* Karsch

(Figs. 430-452)

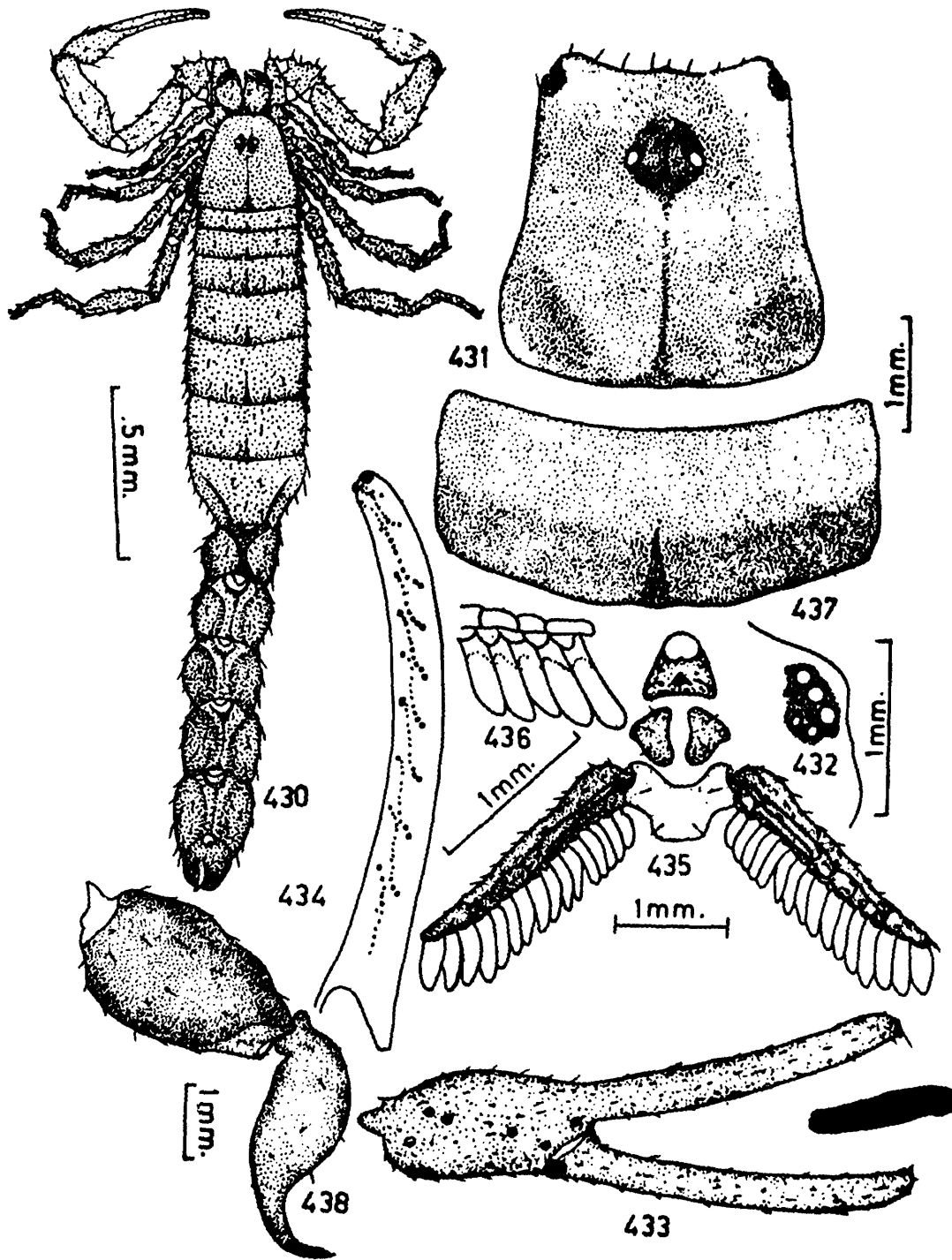
1892. *Stenochirus sarasinorum* Karsch, *Berl. ent. Z.*, 36 : 306.
 1899. *Stenochirus sarasinorum* : Kraepelin, *Tierr. Scorp. etc.*: 39.
 1900. *Stenochirus sarasinorum* : Pocock, *Fauna Brit. India, Arachn.*, : 33

General : Male and female both of medium to small size but male smaller and slender than female. Carapace smooth except granular in posterior median furrow. Chelicera delicate. Pedipalp stout and more round on patella. Legs smooth on femur and patella. Pectines well developed with 15/15 teeth. Genital papillae visible in male. Cephalothoracic sternum triangular. Mesosomal tergites monocarinated, granular but smooth on sternites. Last sternite smooth, acarinated and very finely punctured. Metasoma weakly carinated on anterior segments but smooth and finely punctate on posterior segments. Telson with pyriform vesicle but more globular and finely punctate. Aculeus short and dark on distal portion. Carapace and mesosoma pale yellow. Appendages also pale yellow. Metasoma dark yellowish brown on anterior segments but posterior segments and telson pale brown.

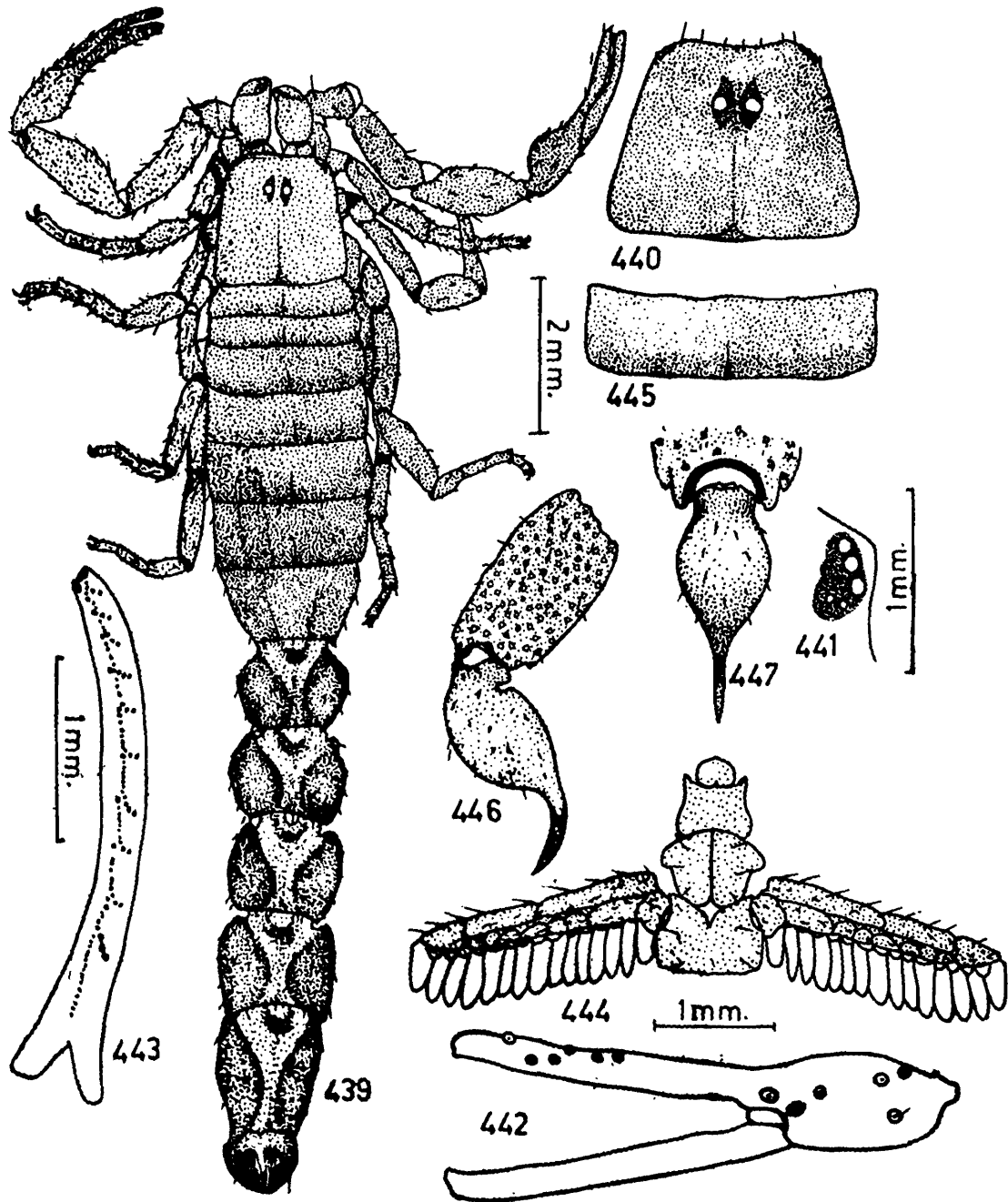
Measurements : Male total length 22.00 mm. Carapace 2.50 mm. long; Mesosoma 7.50 mm. long; Metasoma 12.00 mm. long.

FIGS. 430-438. *Stenochirus sarasinorum* Pocock.

430. Dorsal view of male. 431. Carapace, dorsal view. 432. Lateral eyes, lateral view. 433. Manus and fingers, exterior view. 434. Movable finger, dorsal view.



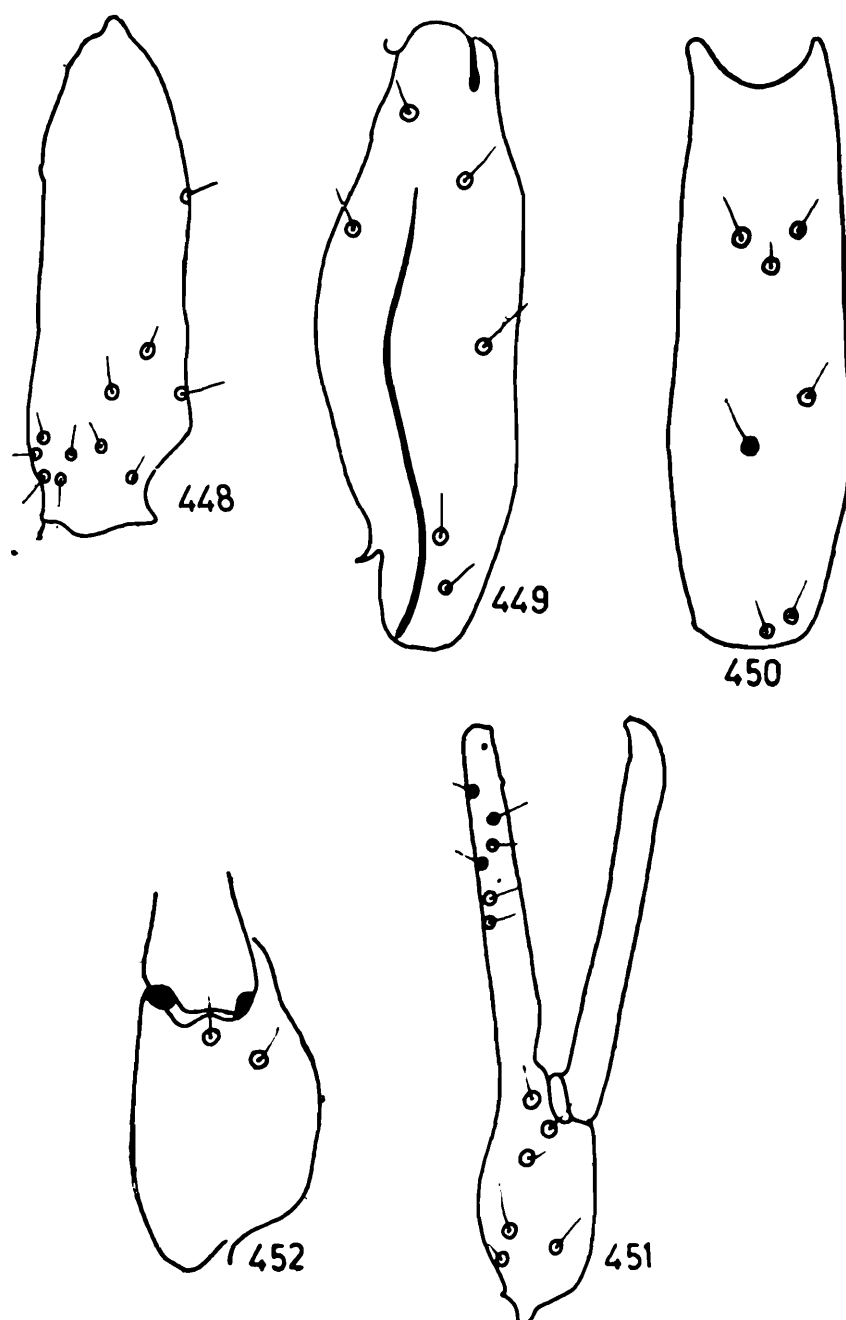
- 435. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 436. Pectinal teeth and fulcra, ventral view.
- 437. Tergite, dorsal view.
- 438. Telson and metasomal segment V, lateral view.



FIGS. 439-447. *Stenochirus sarasinorum* Pocock.

439. Dorsal view of female. 440. Carapace, dorsal view.
 441. Lateral eyes, lateral view.
 442. Manus and fingers, exterior view.
 443. Movable finger, dorsal view.
 444. Pectines, genital operculum and cephalothoracic sternum, ventral view. 445. Tergite, dorsal view.
 446. Telson and metasomal segment V, lateral view.
 447. Telson and anal rim of metasomal segment V, ventral view.

Female total length 27.25 mm. Carapace 3.00 mm. long; Mesosoma 9.50 mm. long; Metasoma 14.75 mm. long.



Figs. 448-452. *Stenochirus sarasinorum* Pocock.

- 448. Femur, dorsal, interior and exterior views.
- 449. Patella, dorsal view.
- 450. Patella, exterior view.
- 451. Manus and fingers, dorsal view.
- 452. Manus, ventral view.

Carapace : Surface almost smooth but finely granular on interocular area, posterior lateral portion and posterior median furrows. Furrows not distinct. Lateral ocular tubercles smooth and provided with five lateral eyes as in text-figs. 432 and 441. Median ocular tubercles smooth, not much distinct and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.5 in male as in text-fig. 431 and 1 : 2.1 in female as in text-fig. 440. Anterior, lateral and posterior margins smooth. Chelicera smooth on basal segment, ventral surface clothed with many short, silky hairs. Fingers short with dentition as characterised in the family and genus. Pedipalp stout, with smooth, round patella as in text-figs. 430 and 439. Femur shorter than carapace. Carinated but carinae smooth and obsolete, intercarinal space also smooth. Outer or anterior surface provided with few weak granules. Patella longer than carapace, acarinated, round, smooth on entire surface. Manus acarinated, smooth as in text-figs. 433 and 442 and length of under hand slightly less than half the length of patella. Fingers long and movable fingers longer than carapace but immovable fingers as long as femur. Dentition on fingers imbricated and outer rows on movable finger comprises of nine minute teeth as in text-figs. 434 and 443. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 448-452. Legs delicate, carinated on femur and patella but all carinae obsolete, intercarinal space smooth. Tibia smooth and carinated on inner surface, provided with long tibial spur on III and IV pairs. Tarsomere I smooth, provided below with a row of long setae and a pair of pedal spurs. Tarsomere II smooth, ventral surface provided with a row of long paired setae. A normal pair of claws. Pectines well developed and 4.2 times longer than wide in female as in text-fig. 444 and 5.5 times longer than wide in male as in text-fig. 435. Middle lamellae subdivided into six to seven small digits. Fulcra clearly distinguished and elongate. Lamellae and fulcra covered with microscopic white setae. Teeth tubular but not much tapering on distal portion as in text-fig. 436 and 15/15 in number in both male and female. Genital operculum as long as wide, sclerites united in middle portion in female but a pair of conspicuous genital

papillae visible in male. Cephalothoracic sternum triangular but about as long as wide, as in text-figs. 435 and 444.

Mesosoma : Tergites smooth. Tergites I-VI monocarinated and a median carina smooth, very poorly developed and obsolete as in text-figs. 437 and 445. Lateral and posterior margins smooth. Pretergal portion smooth with smooth posterior margin. Tergite VII very finely granular, provided with two pairs of obsolete lateral carinae. Lateral portion smooth with smooth posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Except sternites I, all with a smooth presternal portion and smooth posterior margin. Sternite V very finely granular, punctate and provided with two pairs of obsolete, smooth lateral carinae. Lateral and posterior margins smooth.

Metasoma : Cauda slightly shorter than five times as long as carapace. Segments I-III wider than long; segment IV as long as wide, segment V longer than wide. Segments I and II provided with only dorsal and dorsolateral smooth carinae but very poorly developed on posterior portion. Segments III & IV entirely smooth and ventral surface covered with many pits. Anterior peduncle and dorsal furrow finely to coarsely granular. Posterior margin smooth. Anal rim of last segment smooth. Telson longer than carapace or caudal segment V as in text-figs. 438, 446 and 447. Vesicle pyriform; not as wide or deep as last caudal segment; entire surface smooth and punctate on ventral surface. Ventral median crest obsolete. Ventral and lateral bands also not prominent. Aculeus not much curved, half as long as vesicular length; not much sharp and dark on distal portion as in text-figs. 438 and 447.

Distribution : INDIA : Calcutta, West Bengal.

Remarks : We have examined, described and illustrated on the basis of authentically identified one male and one female specimens, deposited in National Collection, ZSI, Calcutta. Regd. No. 1856/17.

Genus 6. *Buthotus* Vachon

1949. *Buthotus* Vachon, *Archs. Inst. Pasteur Alger.*, **27(2)** : 134.
 1958. *Buthotus* : Vachon, *Vidensk. Meddr. dansk naturh. Foren.*, **120** : 121.
 1972. *Buthotus* : Stahnke, *Ent. New.*, **83** : 131.

Characters : Trichobothria *d1*, *d3* and *d4* on femur form β angle (Vachon 1975) Trichobothria *est* distal to *db* on immovable finger. Fixed finger of chelicera provided on under surface with two minute teeth. Four distal granules just proximal to terminal tooth of pedipalp tarsus (movable finger) Width of caudal segments not increasing posteriorly. Tarsomere II of legs I, II and III without dorsal comb. Tarsomere II soles with spines. Caudal segments IV and V without ten complete carinae. Lateral ocular tubercles more elevated, eyes bulging and large in size (Fig. 455) Cephalothoracic sternum triangular. Mesosomal tergites tricarinated.

Type species: *Buthotus judaicus* Simon.

Distribution : ASIA : INDIA, PAKISTAN, AFGANISTAN, BUKHARA, S. PERSIA, N. ARABIA, MESOPOTAMIA AND PALESTINE; AFRICA : S. ALGERIA, MOROCCO.

22, *Buthotus alticola punjabensis* (Birula)

(Figs. 453-462)

1897. *Buthus alticola punjabensis* Birula, *Ann. Mus. st. Petersb.*, **2** : 282.
 1900. *Buthus alticola punjabensis* : Роџџџ, *Fauna Brit. India, Arachn.*, : 22.
 1950. *Buthotus alticola punjabensis* : Vachon, *Bull. Mus. natn. Hist nat.*, *Paris*, **22(2)** 215-218.

General : Male bigger in size with dull yellowish in colour, carapace blackish, ocular tubercles black. All carinae blackish and granular. Mesosomal tergites slightly greenish. Pedipalp not much strong, fingers blackish in the middle portion. Metasoma yellowish, telson slightly pale. Legs pale yellow. Pectines

well developed. Last mesosomal sternite provided with four crenulated carinae.

Measurements : Total length 50.00 mm. Carapace 6.00 mm. long; Mesosoma 14.50 mm. long; Metasoma 29.50 mm. long.

Carapace : Entire surface weakly granular but more granular on anterior lateral portions. All carinae granular as in text-fig. 454. Anterior margin smooth and provided with few setae. Lateral margins very finely crenulated. Posterior margin sparsely granular. Interocular area granular. Lateral ocular tubercles prominent, more elevated as in text-fig. 455. A pair of median eyes situated anteriorly in the ratio 1 : 1.5 as in text-fig. 454. Chelicera with dark basal segment and pigmented on dorsal surface, ventral surface pale and thickly covered with fine silky hairs. Fingers dark brown to black but more dark on silky hairs. Fingers dark brown to black but more darker on dentition. Dentition as characterised in the family and genus. Ventral and dorsal distal tooth on movable finger subequal. Pedipalp slender but strong as in text-fig. 456. Femur as long as carapace and carinated. Dorsal and ventral carinae granular. Posterior carinae weakly crenulated. Inner surface provided with sub-denticular crest and 5-6 prominent denticles. Patella longer than femur, with inner dorsal and ventral carinae granular. Outer carinae smooth. Inner or anterior surface provided with sub-denticular crest. Manus or hand smooth and bulbous as in text-fig. 456. Movable finger longer than patella. Dentition on the fingers non-imbricated and outer row on movable finger comprises of 13 teeth as in text-fig. 457. Legs with inner carinae serrated on femur and patella. Outer carinae smooth. Tibia carinated with weak tibial spurs on III and IV pairs and flanked below with a row of reddish spines. Tarsomere I sub-carinated, with a pair of pedal spurs, anterior spurs double. Tarsomere II smooth and flanked below with a row of paired brown setae. Femur and patella clothed with stout bristles on inner sides and tibia and tarsomere clothed with hairs. A pair of brownish claws for each leg, normal. Pectines well developed and 4.5 times longer than wide. Middle lamellae divided into 11 small digits. Fulcra well developed. Lamellae and fulcra clothed with brownish microscopic setae. Pectinal teeth elon-

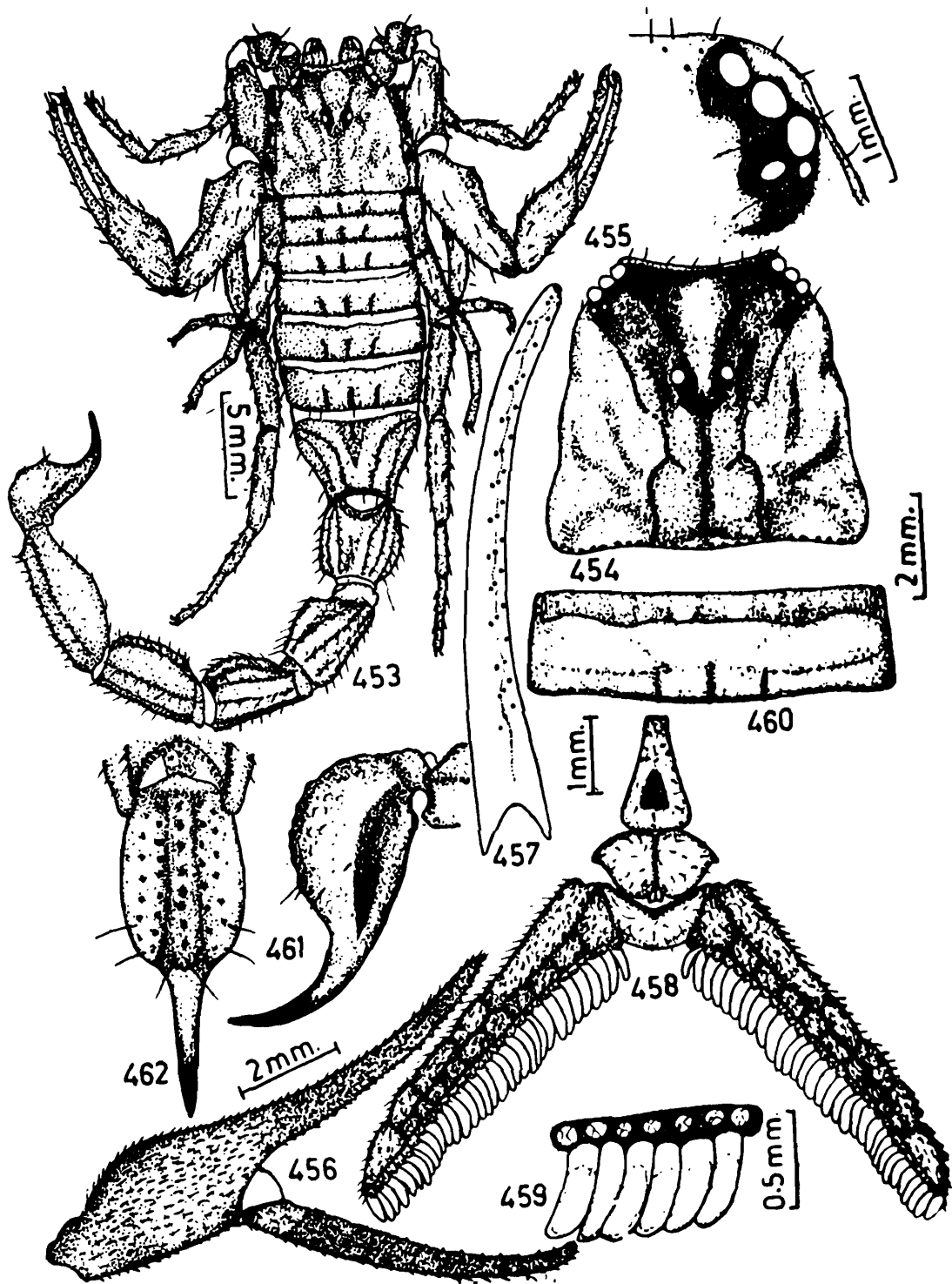
gated, flat on ventral portion and 32/32 in number as in text-fig. 459. Basal piece slightly notched on anterior margin. Genital operculum with a pair of sclerites, weakly clothed with brownish microscopic setae. Cephalothoracic sternum triangular and longer than wide as in text-fig. 458.

Mesosoma : Tergites I-VI weakly granular but little more granular on posterior and lateral portions of each tergite. A median and two lateral carinae granular, weakly spiniform on posterior margin but developed only on posterior portion of each tergite as in text-fig. 460. Pretergal portion smooth. Tergite VII weakly granular, two pairs of lateral carinae weakly granular as in text-fig. 453. Pretergal portion smooth. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth. Sternite V weakly granular on lateral portion and provided with two pairs of granular carinae. Presternal portion smooth.

Metasoma : Cauda nearly five times as long as carapace. Basal segment wider than long. Segments I-IV with dorsal carinae crenulated and weakly denticulate posteriorly. Dorsolateral carinae crenulated on segments I-III and very weakly developed on segment IV. Lateral carinae crenulated on segment I, almost smooth on segments II-IV. Inferior carinae crenulated on segments I and II, weakly and delicately serrated on segments III and IV as in text-fig. 453. Intercarinal space almost smooth. Segment V little longer than carapace, granular on dorsal surface. Inferior lateral carinae evenly granular. Single inferior median carina poorly serrated as in text-figs. 453. Anal rim of this segment granular as in text-figs. 461 and 462. Intercarinal

Figs. 453-462. *Buthotus alticola punjabensis* (Pocock)

- 453. Dorsal view of male.
- 454. Carapace, dorsal view.
- 455. Lateral eyes, lateral view.
- 456. Manus and fingers, exterior view.
- 457. Movable finger, dorsal view.
- 458. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 459. Pectinal teeth and fulcra, ventral view.



- 460. Tergite, dorsal view.
- 461. Telson and anal rim of metasomal segment V, lateral view.
- 462. Telson and anal rim of metasomal segment V, ventral view.

space very weakly granular. Telson more than as long as carapace or patella. Vesicle not as wide or deep as caudal segment V. Lateral and ventral bands not much prominent. Aculeus sharp, curved, dark on distal portion and not as long as vesicle. Setation on the vesicle not clear as in text-figs. 461 and 462.

Distribution : INDIA : Punjab.

Remarks : We have studied, illustrated and described on the basis of two male specimens received from B.M. (N.H.) London, Regd. No. 1900.8.12. 1-4, in spirit (in good condition) The label inserted with indicates the name as *Buthus alticola* (Pocock), *Punjabensis* (Birula) These specimens have been examined by Vachon in 1951 and kept under new genus *Buthotus*. The original type was described by Birula as new species in 1897 in the *Ann.Mus.st.Peters*. So these specimens we consider as the named specimens collected later in 1900.

Genus 7. *Compsobuthus* Vachon

1950. *Compsobuthus* Vachon, *Archs. Inst. Pasteur Alger.*, 28(2) : 152.
1972. *Compsobuthus* : Stahnke, *Ent. News.* 83 : 131.

Characters : *Trichobothria* $d1$, $d3$ and $d4$ from β angle (Fig. 472); *trichobothria est* distal to db on immovable finger (Fig. 475) Posterior median carinae of carapace distinct; strongly spiniform posteriorly and anteriorly joining with central median carinae. Mesosomal tergites tricarinated and the carinae strongly spiniform posteriorly. Tarsus (movable fingers) of the pedipalp with four distal granules on just proximal to terminal tooth. Tarsomere II soles with spines. Inferior lateral carinae of V segment evenly and finely granular. Vesicle granular on ventral surface and provided with a subaculear nodule. Cephalothoracic sternum triangular.

Type-species : *Compsobuthus acutecarinatus* (Simon)

Distribution ; ASIA : INDIA, PAKISTAN, AFGHANISTAN, ISRAEL.

23. Compsobuthus acutecarinatus rugosulus (Pocock)

(Figs. 463-475)

1900. *Buthus acutecarinatus rugosulus* Pocock, *Fauna Brit. India, Arachn.*, : 20-21.

General : Females of small to medium size and of ochre-yellow in colour but sometimes darker on carinae as in text-fig. 463. Appendages pale yellow. Pedipalp with carinated manus and long fingers. Entire surface covered with granules and all granules of ochre-yellow in colour. Pectines well developed. Ventral side smooth, pale yellow in colour. Last mesosomal sternite provided with four granular carinae.

Measurements : Total length 34.00 mm. Carapace 4.00 mm. long; Mesosoma 10.00 mm. long; Metasoma 20.00 mm. long.

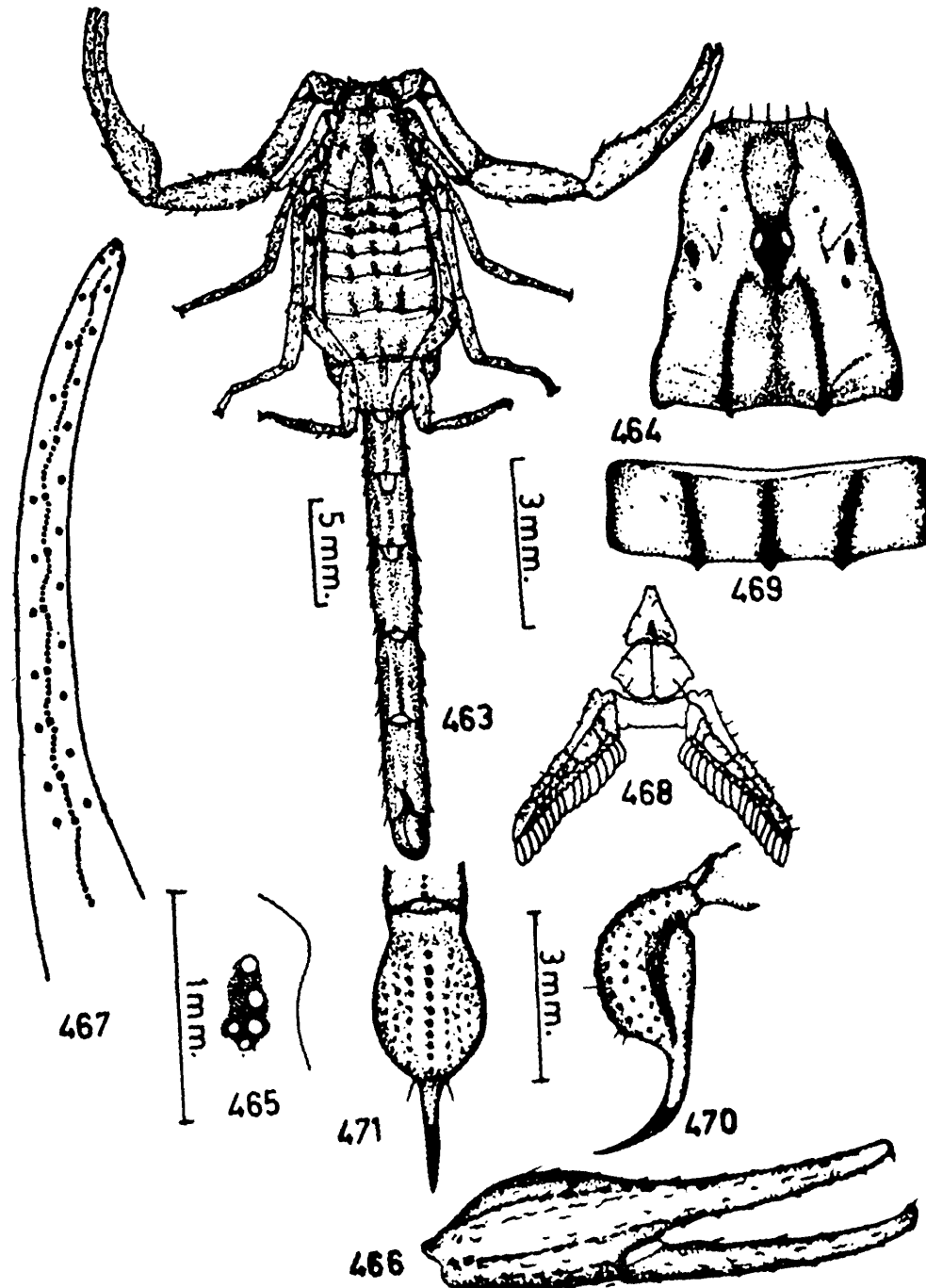
Carapace : Entire surface covered with coarse and fine granules. All carinae granular. Anterior carinae apparently continue into a dark ring, lateral carinae continued upto lateral eyes. Posterior median carinae joining with central median carinae to form a continuous carinae, spiniform posteriorly. Anterior margin smooth and armed with 6-8 short, stout, reddish setae. Posterior margin smooth but spiniform at carinae. Lateral margins finely crenulated with granular submarginal ridge. The interocular region narrowed. Except anterior median furrows all furrows less distinct. Median ocular tubercles granular provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.5 as in text-fig. 464. Lateral ocular tubercles black, granular and each provided with five contiguous lateral eyes, as in text-fig. 465. Chelicera with basal segment pale yellow, smooth on dorsal side. Ventral side weakly covered with a tuft of silky hairs, extending on dorsal surface of fingers. Dentition as characterised in the family and genus. Ventral distal tooth on movable finger longer than the dorsal distal tooth. Pedipalp with femur shorter than carapace. Femoral carinae crenulated to serrated. Outer or anterior surface with evenly crenulated to serrated carina. Intercarinal space essentially granular. Patella longer than femur. Carinae on patella crenulated. Inner or anterior

surface with two crenulated to serrated crests, each ending posteriorly into a subdenticular tubercles. Hand of pedipalp somewhat globular with granular carinae, intercarinal space granular as in text-fig. 466. Fingers smooth, movable finger longer than patella and the immovable finger shorter than movable finger. Dentition on fingers non-imbricated and outer row on movable finger furnished with 11 teeth as in text-fig. 467. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 472-475. Legs with inner femoral carinae serrated and outer carinae weakly crenulated. Patella also carinated as in femur. Intercarinal space granular. Tibia smooth and with short tibial spurs on III and IV pairs. Tarsomere I with two rows of long, reddish spinules below. Tarsomere II with two rows of short reddish spinules below. Pectines three times longer than wide. Middle lamellae and fulcra well distinguished. Middle lamellae subdivided into six to seven small digits. Triangular fulcra more prominent. Lamellae and fulcra covered with reddish microscopic setae. Pectinal teeth 16/16 in female. Basal piece strong with a poor median notch on anterior margin. Genital operculum wider than long, fused on middle. Cephalothoracic sternum triangular and provided with a small depression in the posterior median portion as in text-fig. 468.

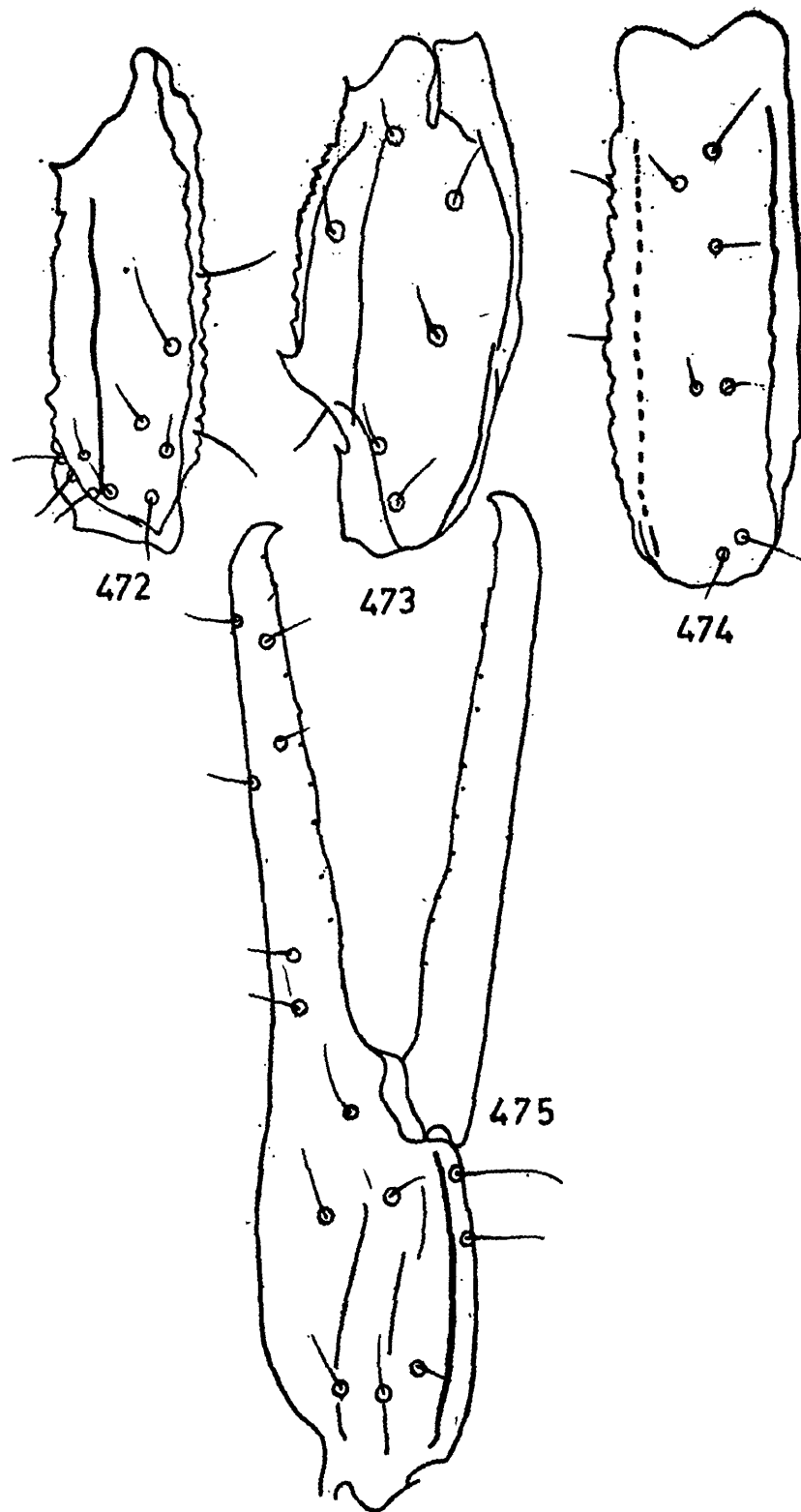
Mesosoma : Tergites I-VI essentially granular and provided with dark, posteriorly spiniform sub-parallel carinae. Lateral carinae more spiniform. All tergites carinated but carinae developed on posterior portion of each tergite as in text-fig. 469. Tergites more granular on lateral sides. Lateral margin of each tergite finely crenulated. Pretergal portion finely granular on lateral sides with finely granular posterior margin. Tergite VII more granular, two pairs of crenulated lateral carinae as in text-fig. 463, lateral margins finely crenulated. Pretergal portion as

Figs. 463-471. *Compsobuthus acutecarinatus rugosulus* (Pocock).

- 463. Dorsal view of female.
- 464. Carapace, dorsal view.
- 465. Lateral eyes, lateral view.
- 466. Manus and fingers, exterior view.
- 467. Movable finger, dorsal view.



- 468. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 469. Tergite, dorsal view.
- 470. Telson and anal rim of metasomal segment V, lateral view.
- 471. Telson and anal rim of metasomal segment V, ventral view.



FIGS. 472-475. *Compsobuthus acutecarinatus rugosulus* (Pocock).
472. Femur, dorsal, interior and exterior views.
473. Patella, dorsal view.
474. Patella, exterior view.
475. Manus and fingers, exterior view.

in preceding tergites. Sternite I smooth with finely crenulated posterior margin. Sternites II and III smooth, except weakly developed lateral carinae ending into slit like stigmata for book lungs. Sternite IV with four crenulated carinae. Sternite V with four serrated carinae, lateral carinae distinct on three fourth of anterior portion. Presternal portion smooth and pale, with finely granular, posterior margin.

Metasoma : Cauda nearly four and half times long as carapace. Basal segment longer than wide. Segments I-IV with dorsal, dorsolateral, lateral and inferior lateral crenulated carinae. Dorsal carinae more crenulated on posterior portion of each segment. Inferior carinae crenulated on segment I and more crenulated on segments II-IV. Intercarinal space always granular. Segment V with inferior lateral carinae finely granular throughout. Inferior carinae evenly granular as in text-fig. 471. Single inferior median carina crenulated more towards posterior side. Intercarinal space more granular on ventral side. Anal rim of this segment granular. Telson with pale surface, smooth, ventral surface covered with granules. Ventral median bands prominent. Median granular crest ending into a weak subaculear nodule but not as high as wide and supported with a pair of long projecting setae at the base. Aculeus not much curved, long, sharp, pointed and reddish distally as in text-figs. 470 and 471.

Distribution : INDIA : Rajasthan, Gujarat, Madhya Pradesh.

Remarks : We have studied 4 ♀ type specimens (syntype) received from B.M. (N.H.) London, Regd. No. 1896.12.15. 14-17 in spirit. The present illustrations and descriptions are based on these type specimens only. Besides these type specimens we have identified and examined many specimens from unnamed material received from Desert Regional Station, ZSI, Jodhpur; some identified specimens have been deposited in Western Regional Station, ZSI, Poona.

Genus 8. *Vachonus* g. nov.

Characters : Posterior median carinae of carapace distinct but neither straight anteriorly nor spiniform posteriorly (Fig.

477) Mesosomal tergites tricarinated but carinae not spiniform posteriorly (Fig. 484) Metasomal segment II with very weak or rudimentary lateral carinae. Inferior lateral carinae of segment V unevenly granular and lobate on posterior portion (Fig. 486). Vesicle granular on ventral surface and provided with a subaculear nodule (Fig. 485) Cheliceral fixed finger provided with two minute teeth on ventral surface. Tarsus (movable finger) of the pedipalp with 2-4 distal granules, just proximal to apical tooth and lateral granules sometimes smaller than median and inner granules (Fig. 480). Tarsomere II soles with spines. Cephalothoracic sternum triangular (Fig. 482) Trichobothria *d1*, *d3* and *d4* on femur form β angle (Fig. 487), trichobothria *est* distal to *db* on immovable finger (Fig. 490)

Type species : *Vachonus rajasthanicus* sp. nov.

Distribution : INDIA : Rajasthan.

Discussion : This genus closely resembles with *Compsobuthus* but it differs as follows. (i) Central median and posterior median carinae not joining to form a straight line. (ii) Inferior lateral carinae of metasomal segment V lobate posteriorly. (iii) Lateral carinae on metasomal segment II poorly developed whereas in *Compsobuthus*, well developed lateral carinae present on metasomal segment II.

Key to the species of the genus Vachonus g.nov.

1. Movable finger provided with 10-11 very minute lateral (exterior) granules; Pectinal teeth 22 in number in female and 28 in male; Aculeus more than as long as vesicular length. *rajasthanicus*
- Movable finger of pedipal provided with 12 lateral teeth of equal size to median teeth; Pectinal teeth 26 in number in female and 20 in male; Aculeus as long as vesicular length. *atrostriatus*

24. *Vachonus rajasthanicus* sp. nov.

(Figs. 476-490)

General : Female of smaller size. Body surface finely and less granular. Carapace carinated. Anterior margin provided with a coarsely granular submarginal line. Ocular tubercles black and granular. Mesosomal tergites tricarinated as in text-fig. 484. Sternites smooth but last with four granular carinae. Metasoma carinated, segment II with rudimentary lateral carinae and segment V with inferior lateral carinae lobate posteriorly. Telson with carinated vesicle. Chelicera small, smooth on entire surface, with normal dentition as characterised in family and genus. Pedipalp delicate, short, not much stout but with long fingers. Legs delicate and with finely crenulated carinae. Pectines well developed with 22/22 teeth.

Body colour entirely yellow with slightly dark yellow on metasoma. Ocular tubercles black. Telson with long aculeus, dark brown on distal portion.

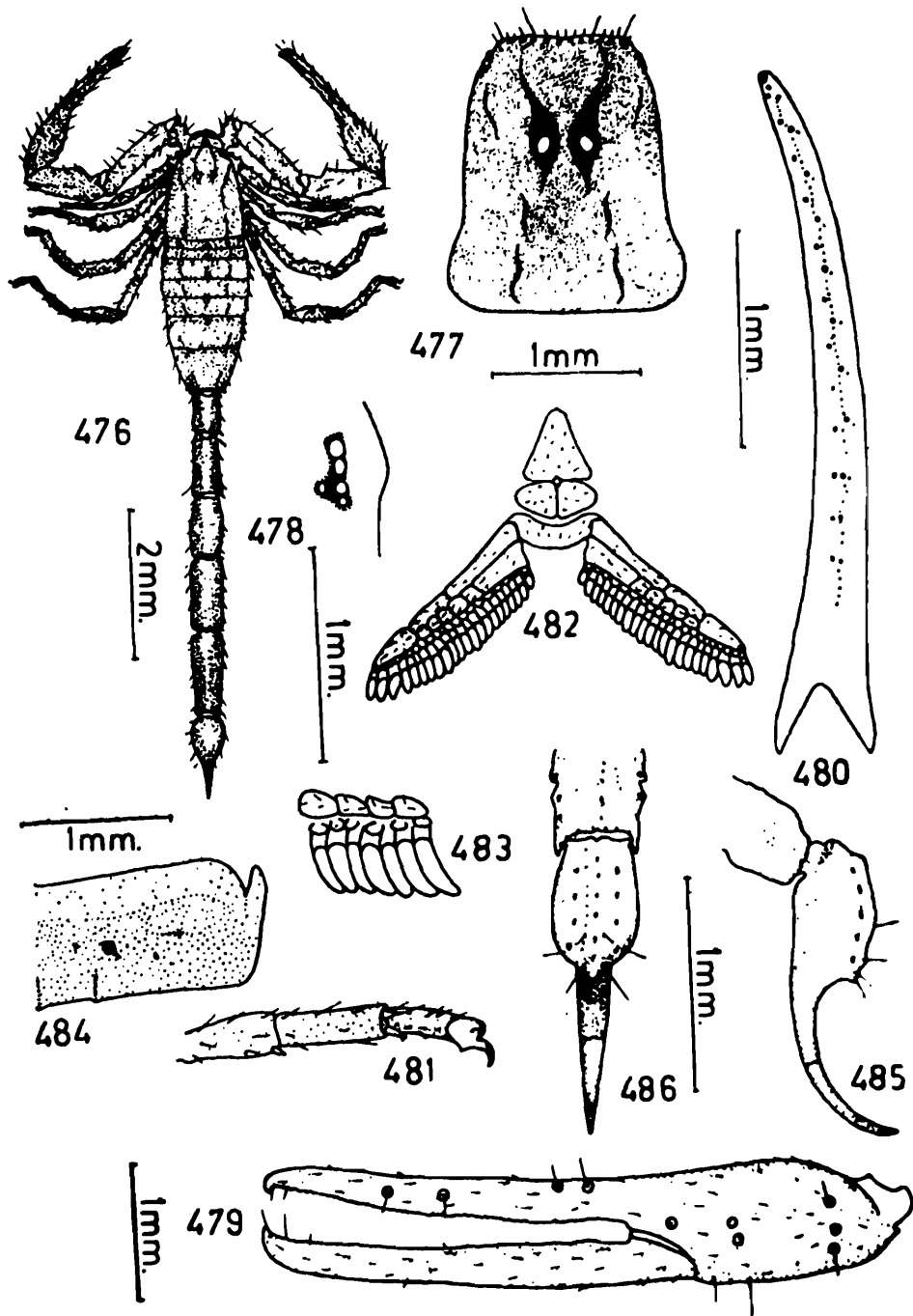
Measurements : Total length 22.50 mm. Carapace 2.75 mm. long; Mesosoma 6.75 mm. long; Metasoma 13.00 mm. long.

Carapace : Entire surface very weakly granular. Carinae very weakly distinguished, ventral median and posterior median carinae joining but not forming "Lyre form" configuration as in text-fig. 477. Ocular tubercles granular and median ocular tubercles continued anteriorly as anterior median granular carinae, forming anterior median ring. Interocular area poorly granular and few granules prominent on anterior lateral portion. Furrows not prominent. Anterior margin smooth provided with few setae and a granular submarginal line. Lateral margins smooth with submarginal ridge. Posterior margin smooth. Lateral ocular tubercles provided with five contiguous eyes as in text-fig. 478. Median ocular tubercles granular and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.7 as in text-fig. 477. Chelicera small, smooth on dorsal surface and ventral surface clothed with many silky hairs. Fingers short, with normal dentition as characterised in family and genus. Dorsal and

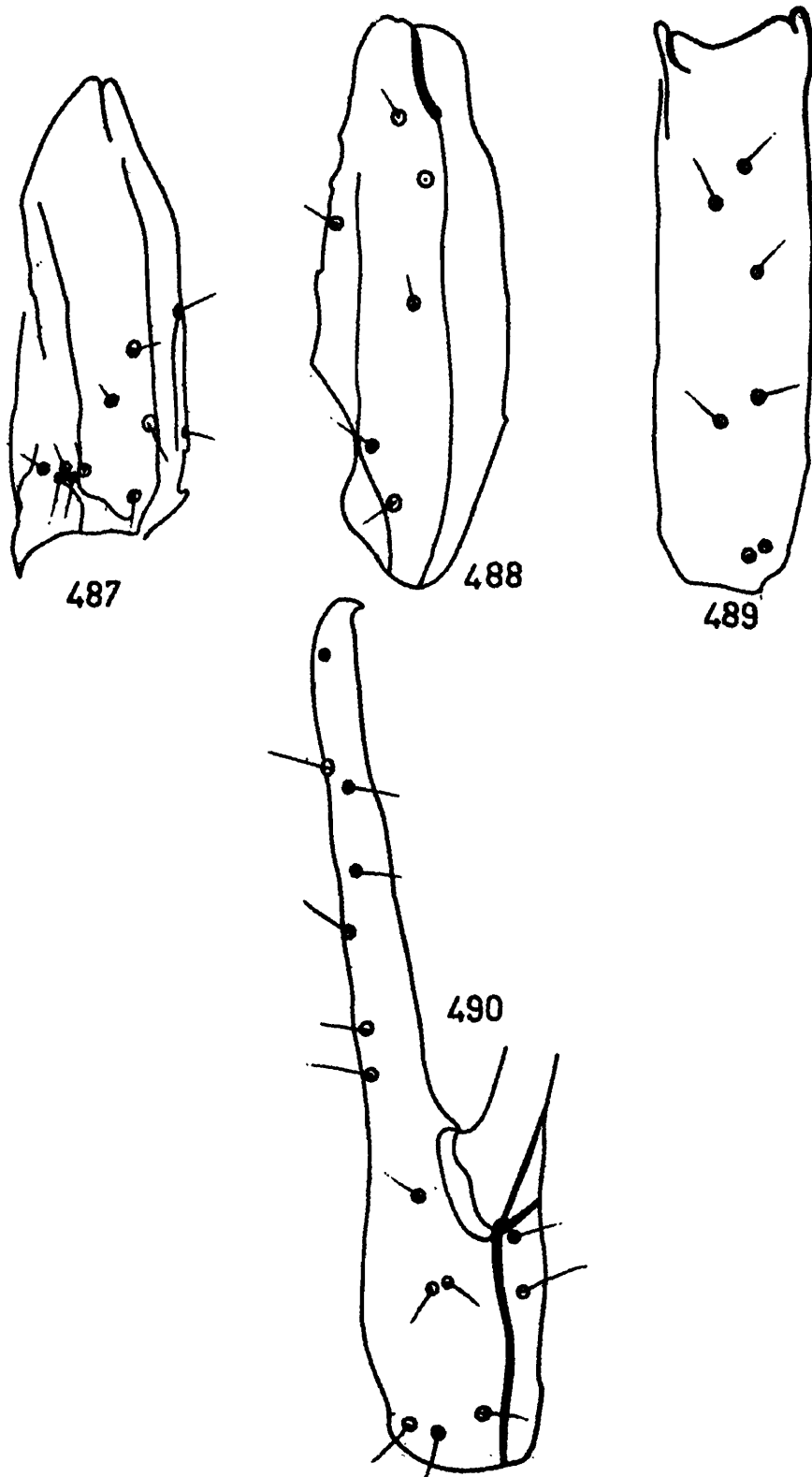
ventral distal teeth of movable finger subequal. Pedipalp also short, delicate with long fingers. Femur shorter than carapace, carinated, except posterior ventral carinae, all carinae granular. Outer or anterior surface provided with a crenulated carina and 5-6 tuberculate granules. Inner or posterior surface with weakly to poorly crenulated carina. Intercarinal space almost smooth. Patella longer than femur but as long as carapace, carinated and only outer carina smooth, distinct and obsolete. Inner or anterior surface provided with a dorsal and ventral crests and four granular tubercles. Intercarinal space smooth. Manus narrow, not robust less than as wide as patella, acarinated and length of under hand half as long as patella. Fingers very thin and long, movable finger twice as long as under hand. Dentition on fingers non-imbricated and movable finger comprises 10-11 very minute lateral teeth in outer row. Lateral granules very fine than middle and inner granules. Tip of the movable finger provided with 2-3 teeth just proximal to distal tooth as in text-fig. 480. Immobile finger acarinated and shorter than movable finger. Trichobothrial pattern on femur, patella, manus and immobile finger as in text-figs. 487-490. Legs delicate, femur and patella finely granular, carinated, all carinae granular on femur, almost smooth on patella. Tibia carinated but smooth and provided with a short tibial spur on III and IV pair as in text-fig. 481. Tarsomere I carinated but smooth and provided with a pair of stout pedal spurs. Tarsomere II smooth, acarinated and clothed sparsely on ventral surface with few reddish bristles. A pair of claws normal. Pectines well developed and 4 times longer than wide. Middle lamellae sub-divided into seven small digits. Fulcra distinct and triangular. Lamellae and fulcra clothed sparsely with

FIGS. 476-486. *Vachonus rajastanicus* g. and sp. nov.

- 476. Dorsal view of female.
- 477. Carapace, dorsal view.
- 478. Lateral eyes, lateral view.
- 479. Manus and fingers, exterior view.
- 480. Movable finger, dorsal view.
- 481. Tibia, tarsomere I and tarsomere II of 3rd leg, ventral view.



482. Pectines, genital operculum and cephalothoracic sternum, ventral view.
483. Pectinal teeth and fulcra, ventral view.
484. Tergite, dorsal view.
485. Telson and anal rim of metasomal segment V, lateral view.
486. Telson and anal rim of metasomal segment V, ventral view.



FIGS. 487-490. *Vachonus rajasthanicus* g. and sp. nov.

487. Femur, dorsal, interior and exterior views.

488. Patella, dorsal view.

489. Patella, exterior view.

490. Manus and immovable finger, exterior view.

reddish setae. Teeth tubular but short, tapering as in text-fig. 483 and 22/22 in number as in text-fig. 482. Basal piece smooth, anterior margin with a weak median notch. Genital operculum always wider than long and a pair of sclerites fused in the middle. Cephalothoracic sternum triangular and longer than wide, surface provided with a weak depression in the middle of posterior portion as in text-fig. 482.

Mesosoma : Tergites weakly granular but more granular on posterior lateral portion of each tergite. Tergite I with only weak median carina. Tergites II-VI tricarinated and carinae distinct only on posterior portion as in text-fig. 484. Lateral margins smooth, posterior margin smooth but granular submarginally. Pretergal portion smooth with smooth posterior margin. Tergite VII almost smooth and provided with four lateral crenulated carinae as in text-fig. 476. Lateral margin crenulated. Posterior margins smooth. Pretergal portion smooth with smooth posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs and stigmata situated more posteriorly. Lateral and posterior margins smooth. Presternal portion smooth with smooth posterior margin. Sternite V finely granular and provided with two pairs of crenulated carinae. Lateral and posterior margins finely crenulated. Presternal portion smooth with finely crenulated posterior margin.

Metasoma : Cauda slightly shorter than five times as long as carapace. All segments longer than wide. Segment I as long as wide or deep, segment V twice as wide but less than as deep as preceding segments. Segment I with all eight carinae, crenulated. Segments II-IV with dorsal, dorsolateral, inferior lateral and inferior carinae crenulated to serrated on posterior portion of each segment. Lateral carinae very small, rudimentary only on posterior portion of segment II. Intercarinal space smooth. Anterior peduncle and posterior margin for each segment smooth. Segment V shorter than carapace and as wide as but not as deep as preceding segment. Inferior lateral carinae distinct, crenulated on anterior portion but crenulation becomes lobate on posterior portion. Inferior carinae represented by few granules on anterior portion. Single inferior median carina

crenulated to serrated. Intercarinal space smooth on dorsal and lateral portions but weakly and finely granular on ventral portion. Anal rim of this segment crenulated on ventral portion but round and lobate on lateral portions as in text-figs. 485 and 486. Anterior peduncle smooth. Telson longer than caudal segment V but as long as carapace. Vesicle small, shorter than segment I but as long as the length of under hand and less than as wide or deep as last segment. Ventral surface weakly and finely granular and provided with three granular crest, median ventral crest ending distally into a small subaculear nodule, supported with a pair of long setae at the base. Ventral and lateral bands not much prominent. Dorsal surface smooth. Aculeus long, more than as long as vesicle, not much curved, sharp, dark reddish brown on distal portion as in text-figs. 485 and 486.

Type-specimen : *Holotype* female, *allotype* one male in spirit, deposited in National Collections, ZSI, Calcutta, Regd. Nos. 5081/18 and 5082/18.

Type locality : Nearda vill. i.e. 9 kms. south of Satnala vill. Jodhpur, Rajasthan, India, 2.iv.1965. Coll. V C. Agarwal, *allotype*, CAZRI farm, Kudofoon, Jaisalmer, Western Rajasthan, India, 19. vii. 1978. Coll. N. S. Rathore.

Discussion : This is the type species of new genus *Vachonus* and it closely resembles with *Vachonus atrostriatus* (Pocock) but it differs as follows : (i) Lateral granules on movable finger of pedipalp very small but in *atrostriatus* the lateral granules are same in size as medium granules. (ii) Movable finger of pedipalp provided with 2-3 granules just proximal to terminal tooth but in *atrostriatus* movable finger of pedipalp always provided with 4 granules just proximal to terminal tooth. (iii) Pectinal teeth also differs in both sexes of these two species.

Remarks : The illustrations for *Allotype* are not given separately because it does not show much differences to *Holotype*.

25. *Vachonus atrostriatus* (Pocock)

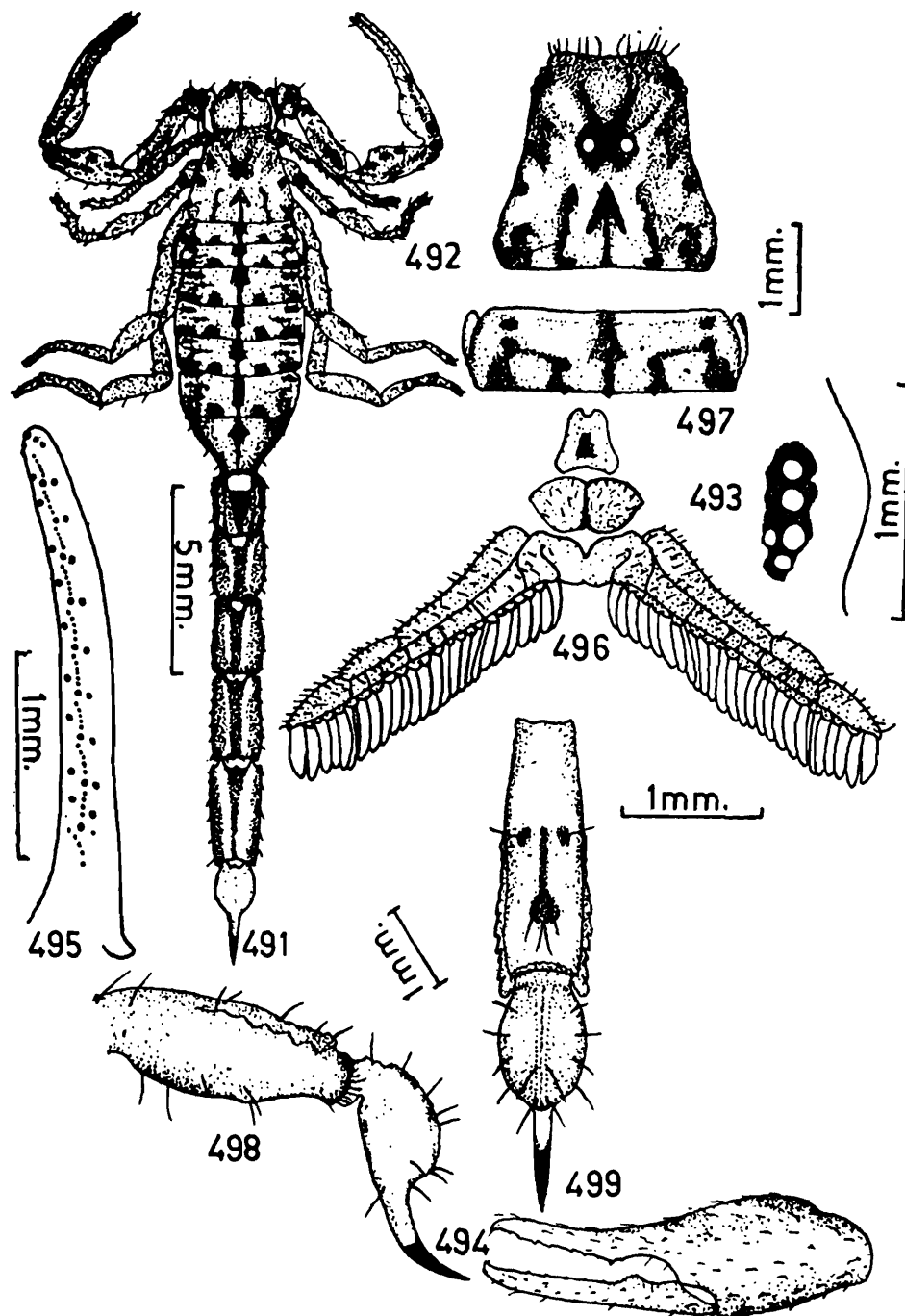
(Figs. 491-503)

1897. *Buthus atrostriatus* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 105.1900. *Buthus atrostriatus* : Pocock, *Fauna Brit. India, Arachn.*, : 20.

General : Male smaller in size but female of medium size with entire body dark yellowish brown, variegated with black bands as in text-fig. 491. Carinae on carapace, mesosoma and metasoma black. Last caudal segment more darker. Telson light yellowish brown. Ventral side of body pale yellow. Appendages brownish yellow. Pedipalp with more bulbous hand in male. Male smaller than female. Pectines well developed. Last mesosomal sternite provided with four weak granular carinae.

Measurements : Male total length 19.25 mm. Carapace 2.75 mm. long; Mesosoma 6.50 mm. long; Metasoma 10.00 mm. long. Female total length 33.50 mm. Carapace 4.50 mm. long; Mesosoma 13.00 mm. long; Metasoma 16.00 mm. long.

Carapace : Surface not evenly granular. All carinae granular and pigmented. Anterior carinae extending on anterior portion, lateral carinae extend upto lateral ocular tubercles, posterior carinae not much prominent and provided with pigmented arrow mark between the carinae. Posterior median carinae and central median carinae neither joining and forming a 'Lyre-form' configuration nor straight. Ocular tubercles black and granular. Anterior margin smooth in female and weakly crenulated in male, straight and provided with few setae. Lateral margins finely crenulated with granular to smooth submarginal ridge. Posterior margin weakly granular and straight. Lateral ocular tubercles with five lateral eyes as in text-fig. 493. A pair of median eyes situated anteriorly in the ratio 1 : 1.5 as in text-fig. 492. Chelicera paler than body colour and dorsal surface of basal segment covered with fine granules. Ventral surface covered with a tuft of fine silky hairs, extending on fingers. Dentition on fingers as characterised in the family and genus. Dorsal and

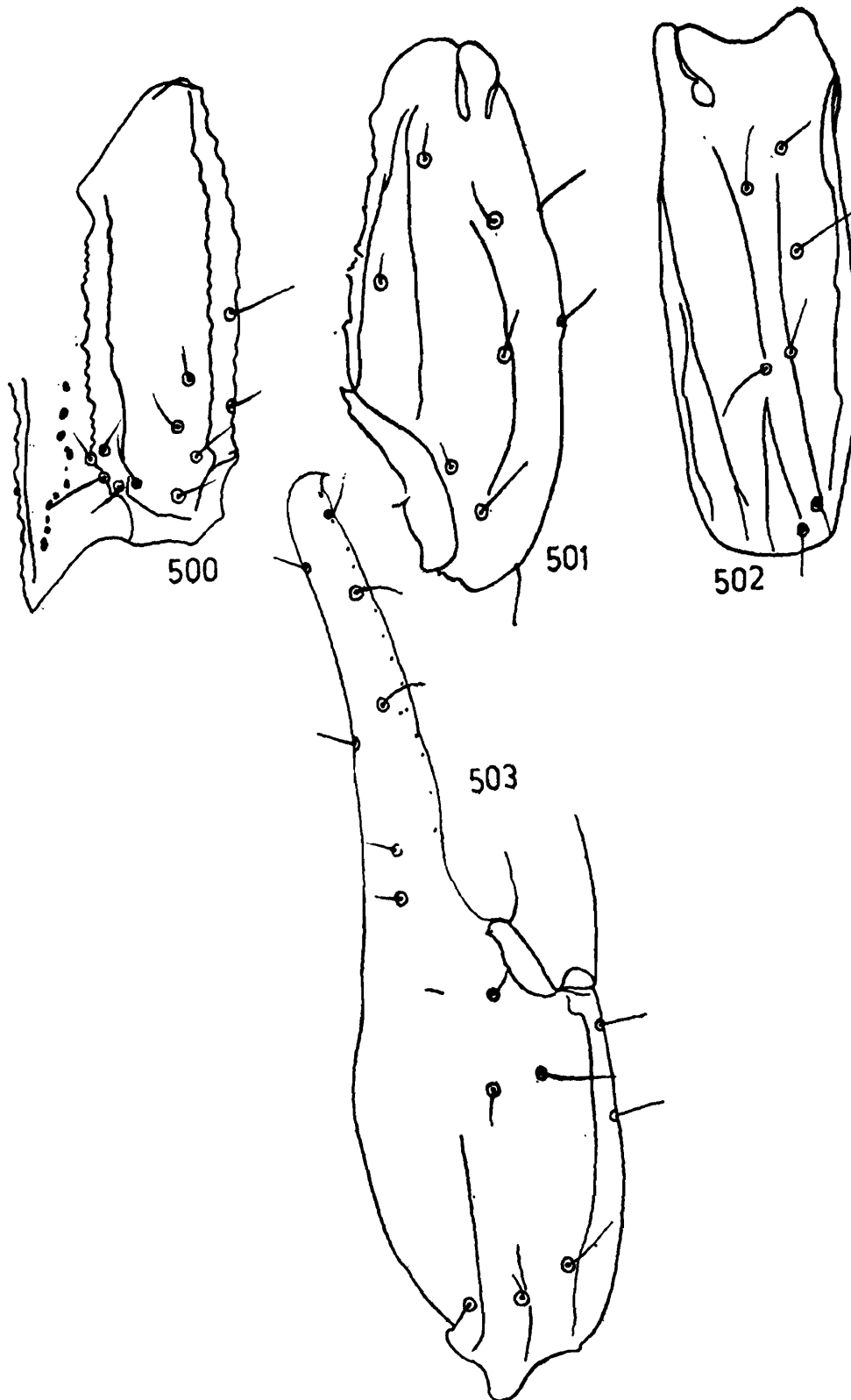


Figs. 491-499. *Vachonus atrostriatus* (Pocock).

- 491. Dorsal view of female.
- 492. Carapace, dorsal view.
- 493. Lateral eyes, lateral view.
- 494. Manus and fingers, exterior view.
- 495. Movable finger, dorsal view.
- 496. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 497. Tergite, dorsal view.
- 498. Telson and anal rim of metasomal segment V, lateral view.
- 499. Telson and anal rim of metasomal segment V, ventral view.

ventral distal teeth of movable finger equal. Pedipalp stronger in female. Femur shorter than carapace. All carinae crenulated. Outer or anterior surface provided with crenulated carinae and only a few sub-denticular tubercles prominent. Patella as long as carapace. Carina on outer side smooth, carinae on inner side weakly crenulated. Manus or hand smooth, globular in male as in text-fig. 494 and length of under hand more than half the length of carapace. Dentition on the fingers non-imbricated and weakly scalloped at the base in female and strongly scalloped at the base in male. Movable finger armed with 12 teeth in outer row as in text-fig. 495. Trichobothrial patterns on femur, patella, manus and immovable finger as in text-figs. 500-503. Legs slightly pale in colour and the carinae on femur and patella weakly crenulated on outer surface and crenulated on inner surface. Tibia carinated but smooth with a weak tibial spur on III and IV pairs. Tarsomere I flanked below with two rows of long, stout bristles. Tarsomere II flanked below with two rows of small black spinules. Pectines well developed and almost four and a half times longer than wide. Middle lamellae divided into 7-8 small digits. Fulcra well distinguished and almost triangular. Lamellae and fulcra clothed with microscopic, short, reddish setae. Pectinal teeth 26/26 in female as in text-fig. 496. Basal piece small and anterior margin deeply notched on middle portion in male and slightly notched in female. Genital operculum always wider than long. Sclerites slightly divided on posterior side in male and a pair of small genital papillae protruding from below.

Mesosoma: Tergites I-VI granular and coloured with five black and six yellow bands as in text-fig. 491. A median carina smooth on anterior portion, weakly granular on posterior portion and spiniform posteriorly. Lateral carinae granular, slightly diverging outwards on anterior portion and spiniform posteriorly. Pretergal portion smooth as in text-fig. 497. Tergite VII granular and provided with a broad median carina and two lateral crenulated carinae as in text-fig. 491; pretergal portion smooth. Sternites I-IV smooth, pale and each provided with a pair of slit like stigmata for book lungs; presternal portion smooth. Sternite V weakly granular and two pairs of



FIGS. 500-503. *Vachonus atrostriatus* (Pocock).
500. Femur, dorsal, interior and exterior views.
501. Patella, dorsal view.
502. Patella, exterior view.
503. Manus and immovable finger, exterior view.

well developed granular carinae but the lateral carinae developed only on middle portion; presternal portion smooth.

Metasoma : Cauda nearly four and a half times as long as carapace. Basal segment longer than wide. Segments I-IV with dorsal and dorsolateral crenulated carinae. Lateral carinae crenulated on segment I, developed only on posterior portion of segment II, one fourth posterior portion of segment III and totally absent on segment IV. Inferior lateral carinae crenulated on segments I-IV. Inferior carinae crenulated on segment I, crenulated on anterior portion and serrated on segment IV. Segment V with inferior lateral carinae serrated on anterior portion and lobate, dentiform on posterior portion. Single inferior median carina evenly serrated on anterior portion and more dentiform on posterior portion. Anal rim of this segment crenulated on ventral portion but lobate on lateral portion as in text-figs. 498 and 499. Telson not as long as caudal segment V. Vesicle slightly pale and longer than caudal segment I but as wide as caudal segment I. Dorsal surface smooth, ventral surface covered with granules and a ventral median crest crenulated ending into a weak subaculear nodule. Lateral and ventral median bands light brown in colour. Aculeus not much curved, as long as or slightly shorter than vesicular length, sharp and dark on distal portion. Setation on the vesicle as in text-figs. 498 and 499.

Distribution : INDIA : Jodhpur, Jaisalmer, Bikaner, Barmer, Rajasthan.

Remarks : We have received the part of syntypes (1 ♀, 1 ♂) from B.M. (N.H.), London, Regd. No. 1896.10.22.18-22. We have compared these type specimens with the specimens collected from Jodhpur. We have described and illustrated on the basis of identified specimens. This was done particularly because the colour of the types was lost due to the prolonged preservation in spirit. Moreover Pocock has not designated any *Holotype* etc. Pocock has described this species under *Buthus* but we have included it under the genus *Vachonus* g. nov. We have also examined some specimens identified by us and are housed in Western Regional Station, ZSI, Poona.

Genus 9. *Mesobuthus* Vachon

1950. *Mesobuthus* Vachon, *Archs. Inst. Pasteur Alger.*, 28(2) : 252.

1952. *Mesobuthus* : Vachon, *Archs. Inst. Pasteur Alger.*, : 324-325.

Characters : Central median carinae of carapace distinct and joining with posterior median carinae forming a 'Lyre-form' configuration. Fixed finger of chelicera provided with two minute teeth on ventral surface. Proximal margins of caudal segments III and IV without any transverse row of large granules. Trichobothria *d1*, *d3* and *d4* on femur form β angle (Fig. 522); trichobothria *est* proximal to *db* on immovable finger (Fig. 525) Pedipalp tarsus usually with four non-linear distal granules just proximal to terminal tooth or if with three non-linear distal granules, then without exterior accessory granule on granular row of pedipalp tarsus (movable finger) Ventral surface of vesicle granular and always provided with a sub-aculear nodule. Cephalothoracic sternum triangular.

Type species : *Mesobuthus eupeus* (C. Koch)

Distribution : ASIA : INDIA, TURKESTAN, AFGHANISTA, PERSIA, CAUCASIA, TRANSCAUCASA, BALUCHISTAN, MALACCA, MONGOLIA, BUKHARA.

Key to the species of the genus Mesobuthus

1. Metasoma thinner and segments II and III distinctly longer than wide; average length of adult from 50 mm to 80 mm.; Pectinal teeth between 26-38; Trichobothria *db* from *est* and *dt* from *et* on immovable finger are placed at much distal portion.*tamulus*

- Metasoma thick and segments II and III as long as wide; Average length of adult from 38 mm to 50 mm, Pectinal teeth between 20-25; Trichobothria *db* from *est* and *dt* from *et* on immovable finger are placed close or in the same plane.2

2. Metasoma not much thick; Average length of adult 45 mm. to 50 mm. Trichobothria *dt* and *db* distal to *et* and *est* respectively but distance between *dt* and *et* more than the distance between *db* and *est* on immovable finger.*hendersoni*

Metasoma short and much thick; Average length of adult not more than 45 mm., Trichobothria *db* distal to *est* and *dt* distal to *et* and distance between the respective pores same.3

3. Body colour yellowish with very light brown tint; Body surface less granular. Pectinal teeth between 20-21; Trichobothria *dt-et* and *db-est* placed on same plane, *d1* and *d2* on patella close; *est* more proximal to *et* on patella.*rugiscutis*

Body colour dark chocolate brown to blackish brown. Body surface thickly granular, Pectinal teeth 23-24; Trichobothria *dt* distal to *et* and *db* distal to *est* on immovable finger, *d2* placed more away from *d1* and *est* not much proximal to *et* on patella.*packyurus*

Key to the sub-species of the species tamulus

1. Last mesosomal sternite with granular carinae.3
 Last mesosomal sternite with smooth carinae.2
2. Inferior lateral and inferior carinae smooth on metasomal segments I-IV.*concanensis*
 Inferior lateral and inferior carinae smooth on metasomal segments I and II, weakly and moderately granular on III and IV.*sindicus*

3. Sternites III and IV without carinae.*gujaratensis*
 Sternites III and IV with carinae.4
4. Sternites III and IV with smooth lateral
 carinae; body colour yellowish red. *gangeticus*
 Sternite IV only with smooth lateral
 carinae; body colour yellowish to light
 yellowish brown. *tamulus*

26. *Mesobuthus tamulus concanensis* (Pocock)

(Figs. 504-525)

1900. *Buthus tamulus indicus* Pocock, *Fauna Brit. India, Arachn.*, : 25.

General: Male and female bigger in body size and reddish brown to yellowish brown in colour. Male slender than female. Entire body surface less granular. Mesosomal tergites black or greenish brown. All carinae well developed but almost smooth, obsolete and shining. Inferior carinae on I, II and III caudal segments smooth. Telson darker. Chelicera dark pigmented on dorsal surface. Pedipalp more stronger and with bulbous hand in male. Ventral side of body pale yellow. Legs light yellow in colour. Pectines well developed. Last mesosomal sternite provided with two pairs of smooth carinae.

Measurements: Male total length 65.00 mm. Carapace 7.50 mm. long; Mesosoma 22.00 mm. long; Metasoma 35.50 mm. long.

Female total length 73.50 mm. Carapace 8.50 mm. long; Mesosoma 23.00 mm. long; Metasoma 42.00 mm. long.

Carapace: Entire surface granular but weakly granular in middle portion and more granular on lateral portions. Interocular region granular and provided with a pair of granular carinae. Superciliary crest weakly granular and provided with few setae. All carinae well developed but weakly granular or smooth. Posterior median carinae not isolated but forming a Lyre-form configuration with central medians as in text-fig. 505. Lateral carinae not continuous. Anterior margin smooth and

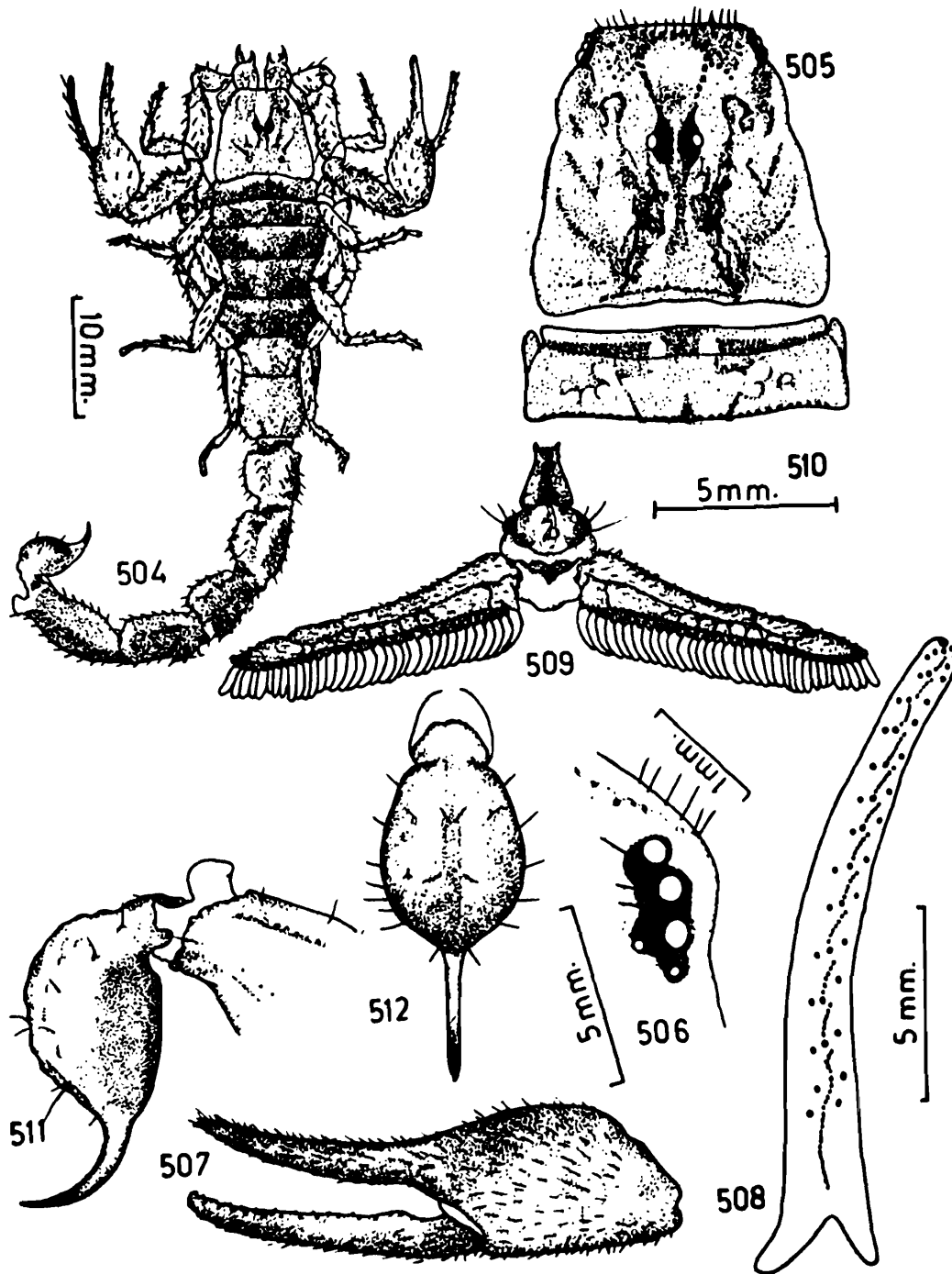
flanked with many red setae. Lateral margins finely crenulated with finely granular submarginal ridge and provided with few setae on anterior portion. Posterior margin smooth, granular above and nearly straight as in text-fig. 505. Lateral ocular tubercles black, weakly granular and provided with five contiguous eyes as in text-fig. 506. Median tubercles smooth, black provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.5 as in text-fig. 505. Chelicera with basal segment pigmented on dorsal surface and weakly granular on anterior portion. Ventral surface clothed thickly with fine silky hair. Fingers dark brownish to red on dentition. Dentition as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger equal in length. Pedipalp with more bulbous and robust hand in male as in text-fig. 504. Femur as long as carapace in male and always shorter than carapace in female. Carinae on posterior surface weakly granular; dorsal carina granular. Outer or anterior surface provided with a weakly crenulated carina but seven to eight sub-denticular tubercles prominent. Intercarinal space weakly granular. Patella longer than carapace in male but almost as long as carapace in female. Entire surface almost smooth except a sub-denticular crest on anterior surface. Intercarinal space almost smooth. Hand or manus more bulbous, robust and more than as wide as patella in male as in text-fig. 507. Length of under hand more than half the length of carapace in male and almost half the length of carapace in female. Immobile finger always as long as carapace. Movable finger longer than immobile finger. Dentition on the fingers non-imbricated and weakly scalloped at the base in male as in text-fig. 507, fifteen teeth in male and fourteen teeth in female comprises the outer row on movable fingers as in text-figs. 508 and 517. All segments clothed with microscopic hairs. Trichobothrial pattern on femur, patella, manus and immobile finger as in text-figs. 522-525. Legs slightly stout in female. Femur with inner carinae serrated and outer carinae granular. Intercarinal space weakly granular. Patella with inner carinae very poorly crenulated and outer carinae almost smooth. Tibia carinated but smooth, provided with a stout tibial spur on III and IV pairs. Tarsomere

I smooth, flanked below with a row of paired bristles or one row of bristles and other row of spines, provided with a pair of pedal spurs. Tarsomere II smooth, pale yellow and flanked below with a row of paired red spinules. A pair of claws of normal size. Pectines well developed and five times longer than wide. Middle lamellae divided into twelve small digits in male and nine in female. Fulcra almost round. Lamellae and fulcra clothed with microscopic red setae. Pectinal teeth well developed in male and 34/35 in number and 29/30 in female as in text-figs. 509 and 518. Basal piece smooth and anterior margin notched in the middle but more deep in male. Genital operculum provided with two sclerites completely divided in male and a pair of conspicuous male genital papillae exposed as in text-fig. 509. The sclerites completely united in female as in text-fig. 518. Cephalothoracic sternum triangular and a deep depression in the posterior middle portion.

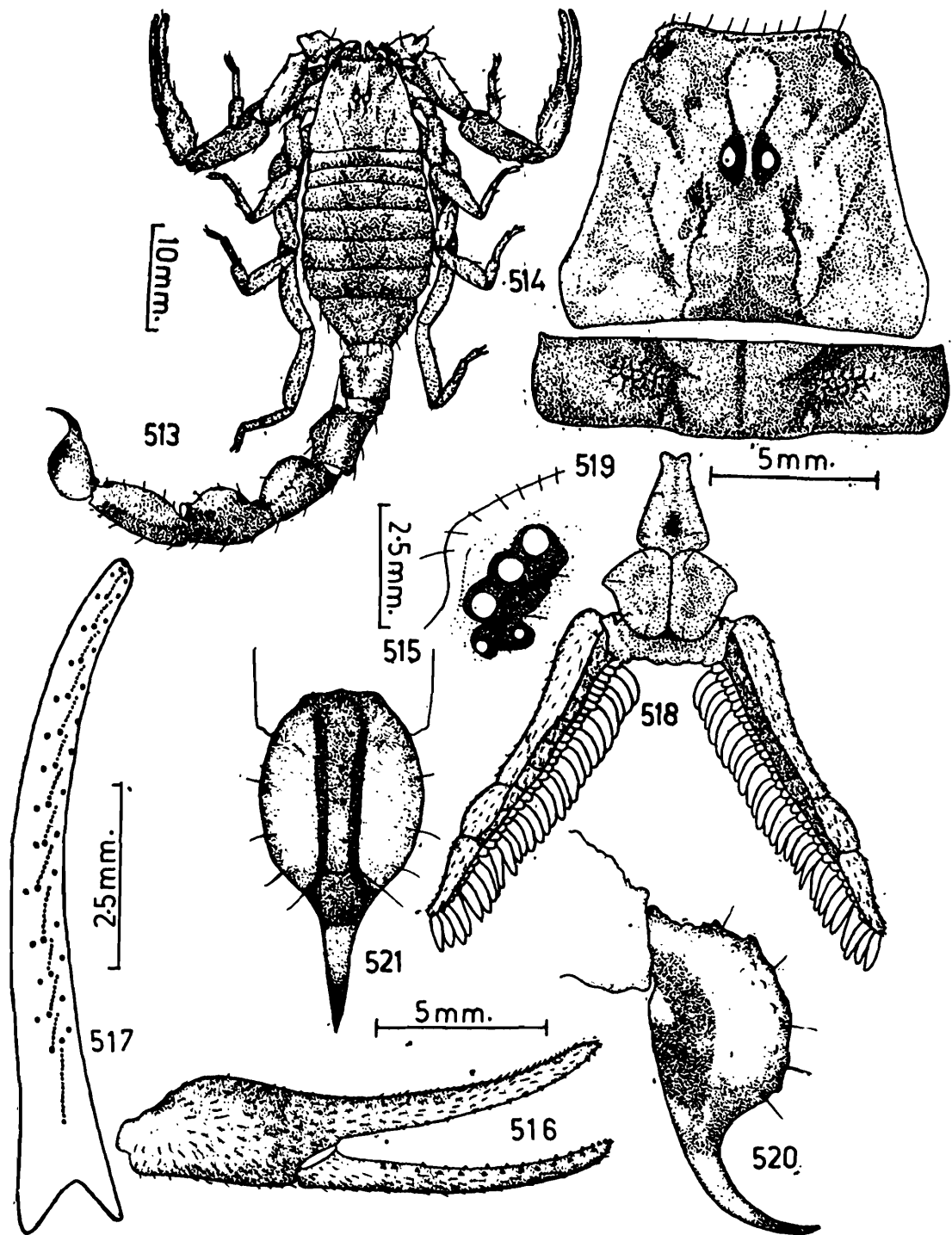
Mesosoma : All tergites very weakly granular in the middle portion but somewhat coarsely granular on lateral portions. Tergites I-VI provided with a median carina and two lateral carinae; all carinae smooth and developed only on posterior portion of each tergite. Lateral carinae turning outward as in text-figs. 510 and 519. Posterior margin of each tergite very sparsely granular. Pretergal portion black on posterior portion with a pair of round yellow spots in the middle and very finely granular on lateral portions. Tergite VII with weakly developed median carina and two pairs of almost smooth lateral carinae. Pretergal portion smooth but finely crenulated on posterior margin as in text-figs. 504 and 513. Sternites I-IV smooth, each with a pair of slit like stigmata for book lungs. Posterior margin of each sternite very finely crenulated. Presternal portion smooth. Sternite V almost smooth with two pairs of smooth carinae. Posterior and lateral margins smooth. Presternal portion smooth.

FIGS. 504-512. *Mesobuthus tamulus concanensis* (Pocock).

- 504. Dorsal view of male.
- 505. Carapace, dorsal view.
- 506. Lateral eyes, lateral view.
- 507. Manus and fingers, exterior view.



- 508. Movable finger, dorsal view.
- 509. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 510. Tergite, dorsal view.
- 511. Telson and anal rim of metasomal segment V, lateral view.
- 512. Telson, ventral view.



FIGS. 513-521. *Mesobuthus tamulus concanensis* (Pocock).

513. Dorsal view of female.

514. Carapace, dorsal view.

515. Lateral eyes, lateral view.

516. Manus and fingers, exterior view. 517. Movable finger, dorsal view.

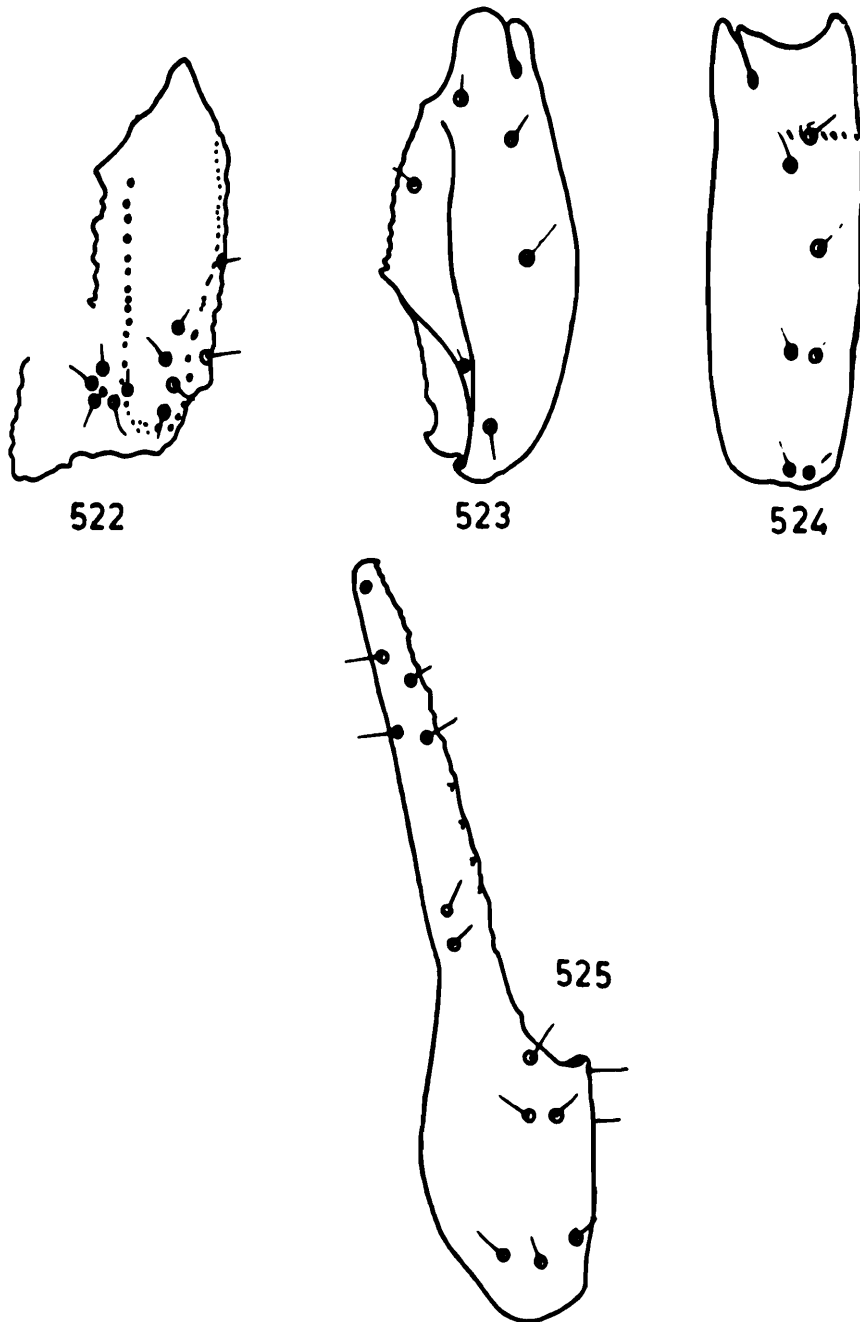
518. Pectines, genital operculum and cephalothoracic sternum, ventral view.

519. Tergite, dorsal view.

520. Telson and anal rim of metasomal segment V, lateral view.

521. Telson, ventral view.

Metasoma : Cauda almost five times as long as carapace. Basal segment always wider than long. Segments I-IV with dorsal, dorsolateral carinae weakly crenulated. Lateral carinae



FIGS. 522-525. *Mesobuthus tamulus concanensis* (Pocock)
 522. Femur, dorsal, interior and exterior views.
 523. Patella, dorsal view.
 524. Patella, exterior view.
 525. Manus and immovable finger, exterior view.

almost smooth on segments I & II; weakly developed and sparsely granular on segment III. Inferior laterals and inferior carinae almost smooth on segments I-IV. Intercarinal space smooth but anterior peduncle of each segment finely and closely granular. Each carina flanked with many hairs on both sides. Segment V more than as long as carapace. Dorsolateral carinae weakly developed and granular in male. Inferior lateral carinae granular. Inferior carinae granular and developed only on anterior portion. Single inferior median carina weakly granular. Intercarinal space weakly granular. Anterior peduncle granular. Anal rim of this segment granular as in text-figs. 511 and 520. Telson longer than but vesicle not as wide or deep as fifth caudal segment. Ventral surface weakly granular. Ventral median crest weakly developed and ending into a weak subaculear nodule. Ventral and lateral bands not much clear. Aculeus sharp, curved, dark on distal portion but not as long as vesicle. Setation on the vesicle not clear and as in text-figs. 511, 512, 520 and 521.

Distribution : INDIA : Ratnagiri, Kolaba, Western Maharashtra.

Remarks : We have described and illustrated on the basis of syntypes (5 ♂ 7 ♀) received from B.M. (N.H.), London, Regd. No. 1896.7.30.6-16. The label with specimens tallies with the information given in *Fauna Brit. India, Arachn.*, (p. 25) We presume that the specimens received are type specimens. We have also examined some specimens, identified by us. These identified specimens are kept in Western Regional Station, ZSI, Poona.

27. *Mesobuthus tamulus indicus* (Pocock)

(Figs 526-550)

1900. *Buthus tamulus indicus* Pocock, *Fauna Brit. India, Arachn.*, : 25.

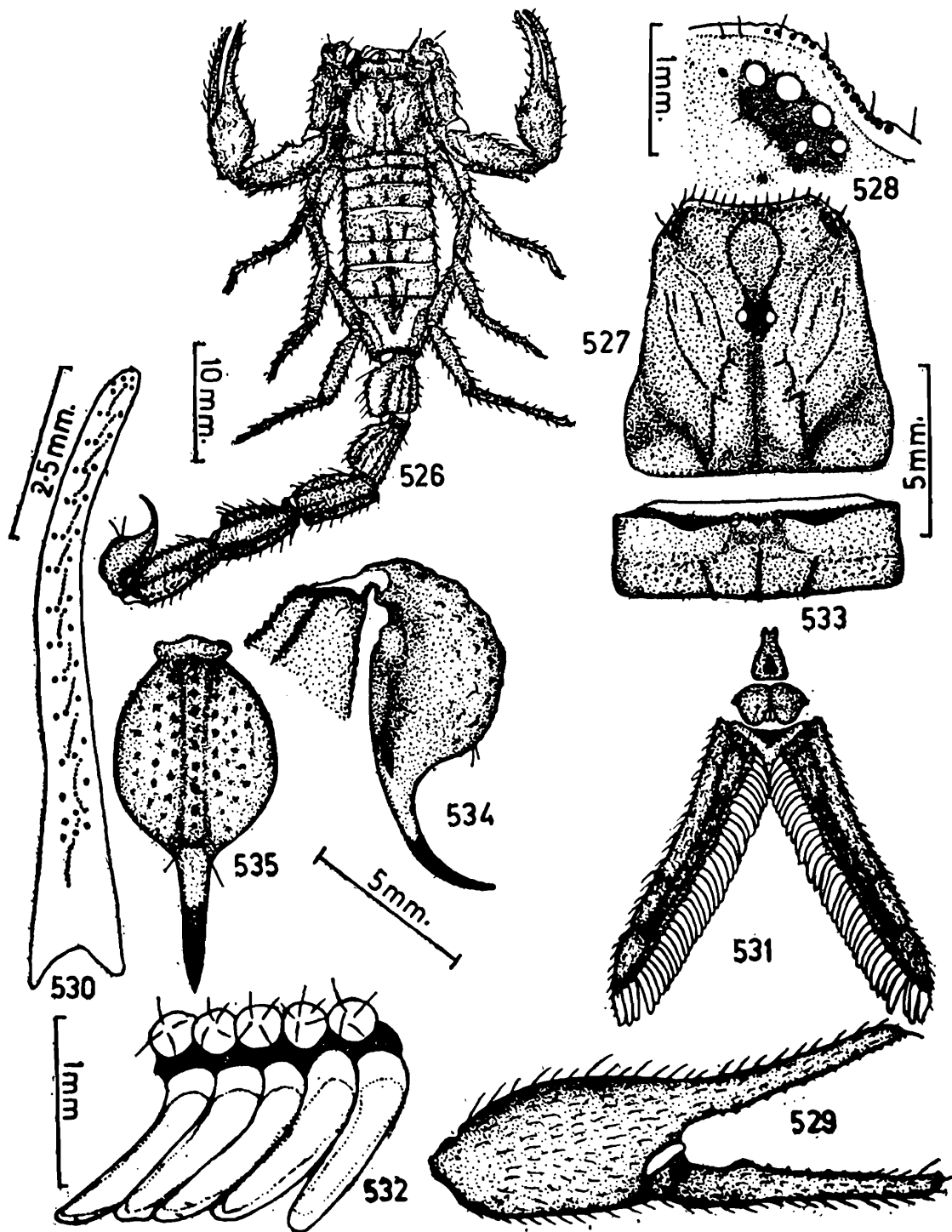
General : Male and female bigger in body size and pale yellowish to brown in colour. All carinae on the body reddish

brown to black. Legs slightly pale. Female bigger and more darker than male. Entire body surface coarsely granular. Almost all carinae granular. Chelicera yellowish. Pedipalp more bulbous and robust in male. Telson brownish with prominent brown lateral bands. Pectines well developed. Last mesosomal sternite with four smooth carinae.

Measurements : Male total length 71.00 mm. Carapace 8.00 mm. long; Mesosoma 20.50 mm. long; Metasoma 42.50 mm. long.

Female total length 79.00 mm. Carapace 9.00 mm. long; Mesosoma 25.50 mm. long; Metasoma 44.50 mm. long.

Carapace : Entire surface coarsely granular but weakly granular in the middle portion. Interocular region granular on anterior portion and provided with two anterior granular carinae originating from median ocular tubercles as in text-figs. 527 and 537. Superciliary crest granular and supported with many reddish setae. All carinae granular. Posterior median carinae weakly isolated but forming a 'Lyre-form' configuration with central median carinae as in text-figs. 527 and 537. Lateral carinae granular but broken. Anterior margin almost smooth and flanked above with many setae. Lateral margins finely crenulated with granular submarginal ridge and provided with few setae on anterior portion. Posterior margin granular and straight as in text-figs. 527 and 537. Lateral ocular tubercles black, granular and provided with five lateral eyes as in text-figs. 528 and 538. A pair of smooth and black median ocular tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.5 in male and 1 : 1.25 in female as in text-figs. 527 and 537. Chelicera with yellowish basal segment weakly granular on anterior portion of dorsal surface. Ventral surface smooth and thickly clothed with fine silky hairs. Fingers dark brown on dentition; immovable finger covered with silky hairs. Dentition on the fingers as characterised in the family and genus. Distal teeth of dorsal and ventral arms of movable finger equal in length. Pedipalp with manus more bulbous and robust in male as in text-fig. 529. Femur as long as carapace in male but shorter than carapace in female. Posterior carinae very weakly granular. Anterior dorsal carina more granular.

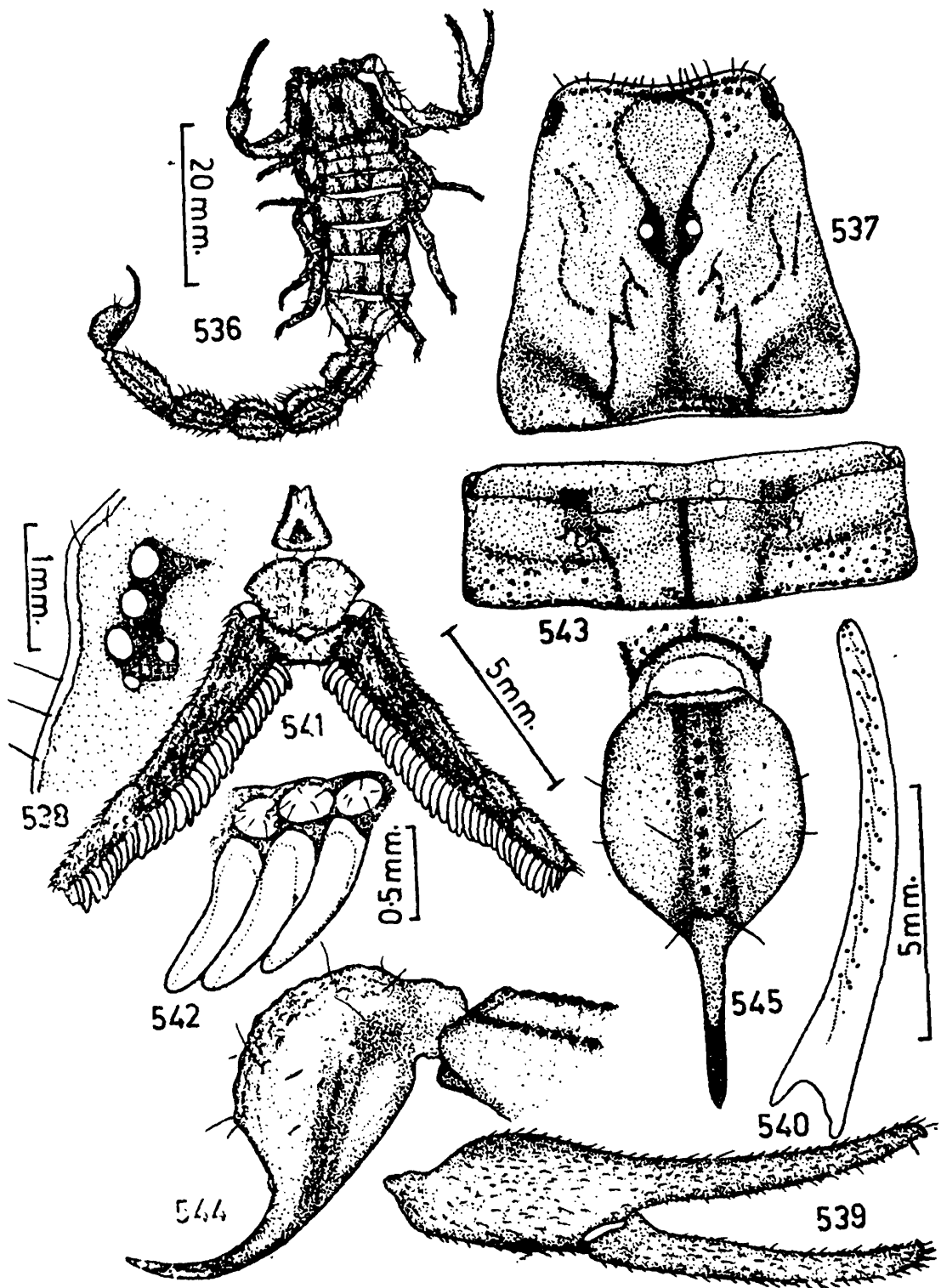


FIGS. 526-535. *Mesobuthus tamulus indicus* (Pocock)

- 526. Dorsal view of male.
- 527. Carapace, dorsal view.
- 528. Lateral eyes, lateral view.
- 529. Manus and fingers, exterior view.
- 530. Movable finger, dorsal view.
- 531. Pectines, genital operculum and cephalothoracic sternum, ventral view.

Outer or anterior surface provided with a crenulated carinae and seven to eight sub-denticular tubercles prominent. Inter-carinal space almost smooth. Patella more than as long as carapace in male and almost as long as carapace in female. Entire surface smooth except a subdenticular crest on anterior surface. Manus robust in male as in text-fig. 529. Length of under hand more than half the length of carapace and more than as wide as patella in male. Length of under hand half the length of carapace and almost as wide as patella in female. Immovable finger shorter than patella in male and almost as long as patella in female. Movable finger longer than immovable finger. Dentition on the fingers non-imbricated, scalloped at the base in male, but scallops not deep as in text-fig. 529. Fifteen teeth in outer row on movable finger as in text-figs. 530 and 540. All segments thickly clothed with microscopic red hairs. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 546-550. Legs with femur granular and carinae on inner surface serrated, carinae on outer surface almost smooth. Tibia carinated, smooth and III & IV pairs provided with a tibial spur. Tarsomere I carinated, smooth, provided with a pair of pedal spurs and flanked below with a row of paired bristles. Tarsomere II smooth, pale yellow flanked below with a row of paired reddish spinnules. A pair of claws normal. Pectines well developed and nearly five times longer than wide as in text-fig. 531 and 541. Middle lamellae divided into ten in male and twelve small digits in female. Fulcra almost round. Lamellae and fulcra covered with microscopic, reddish setae. Pectinal teeth well developed and elongated as in text-fig. 532 and 34/34 in male; short, more tapering as in text-fig. 542 and 36/37 in female. Basal piece smooth, anterior margin notched in the middle but more deeply notched in male. Genital operculum provided with two sclerites. The sclerites divided on posterior portion from which a pair of conspicuous male genital

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532. Pectinal teeth and fulcra, ventral view.
533. Tergite, dorsal view.
534. Telson and anal rim of metasomal segment V, lateral view.
535. Telson, ventral view.



Figs. 536-545. *Mesobuthus tamulus indicus* (Pocock)

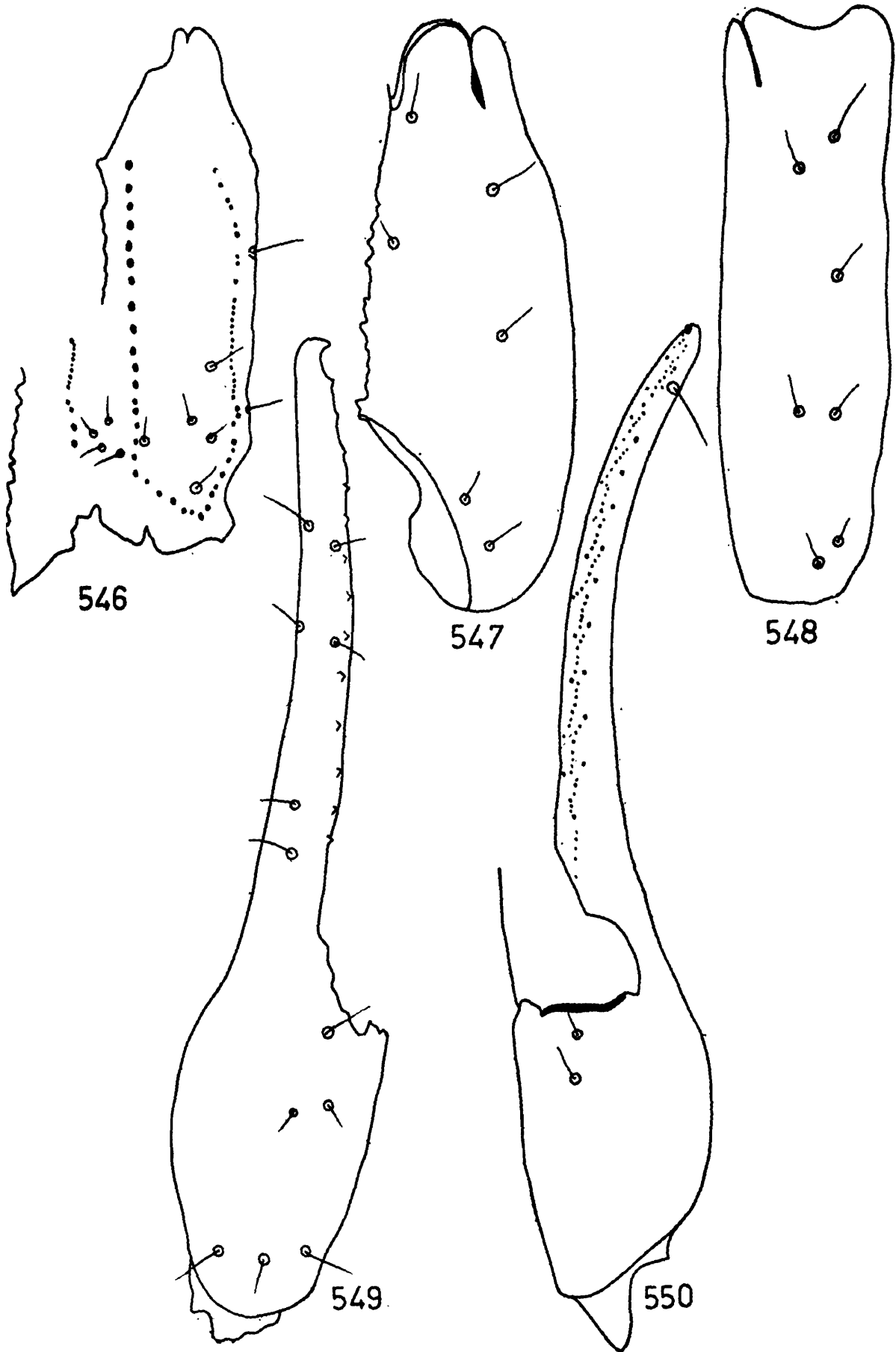
- 536. Dorsal view of female.
- 537. Carapace, dorsal view.
- 538. Lateral eyes, lateral view.
- 539. Manus and fingers, exterior view.
- 540. Movable finger, dorsal view.

papillae protruding out as in text-fig. 531. The sclerites united in the middle in female as in text-fig. 541. Cephalothoracic sternum triangular provided with a depression in the middle of posterior portion, as in text-figs. 531 and 541.

Mesosoma : All tergites finely and closely granular. Tergites I-VI provided with a median carina and two lateral carinae. All carinae granular on posterior portion. Lateral carinae slightly diverging outwards and ending anteriorly into a blackish patch as in text-figs. 533 and 543. Posterior margin of each tergite granular. Pretergal portion finely granular with smooth posterior margin, dark pigmented on posterior portion and provided with a pair of small, rounded yellowish spots in the middle. Tergite VII with a median carina on anterior portion and two pairs of granular lateral carinae as in text-figs. 526 and 536. Posterior margin granular above. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth. Posterior margin of each sternite very finely crenulated. Sternite V smooth, provided with two pairs of weakly developed smooth carinae. Posterior margin smooth; presternal portion smooth.

Metasoma : Cauda five times as long as carapace. Basal segment wider than long. Segments I-IV with dorsal, dorso-lateral carinae weakly crenulated. Lateral carinae crenulated on segments I and II, weakly crenulated on segment III and very weakly developed on segment IV. Inferior lateral and inferior carinae almost smooth on segments I & II, weakly crenulated on segment III, moderately crenulated on segment IV as in text-figs. 526 and 536. Intercarinal space more coarsely granular. Anterior peduncle of each segment very finely and closely granular. Each carina setose on either side. Segment V always more than as long as carapace. Inferior lateral carinae crenu-

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541. Pectines, genital operculum and cephalothoracic sternum, ventral view.
542. Pectinal teeth and fulcra, ventral view. 543. Tergite, dorsal view.
544. Telson and anal rim of metasomal segment V, lateral view.
545. Telson and anal rim of metasomal segment V, ventral view.



lated but more crenulated on posterior portion. Inferior carinae crenulated but developed only anterior portion. Single inferior median carina almost evenly crenulated as in text-figs. 526 and 536. Intercarinal space granular. Anal rim of this segment granular as in text-figs. 534, 544 and 545. Telson more than as long as but vesicle not as deep or wide as fifth caudal segment. Ventral surface moderately granular. Ventral median crest not prominent and ending into a weak subaculear nodule. Ventral and lateral bands prominent and deep brown. Aculeus not as long as the length of vesicle, curved, sharp, dark on distal portion as in text-figs. 535, 536, 544 and 545.

Distribution : INDIA : Rajasthan.

Remarks : We have received the paratypes (19 examples) from B.M. (N.H.), London, Regd. No. 1896.7.30.17-25 described by Pocock (1900) in *Fauna Brit. India*, Arachn. (p. 25), present illustrations and description are based on the types received. We have included this species in our fauna because this species has been recorded from Rajasthan, India.

28. *Mesobuthus tamulus gujaratensis* (Pocock)

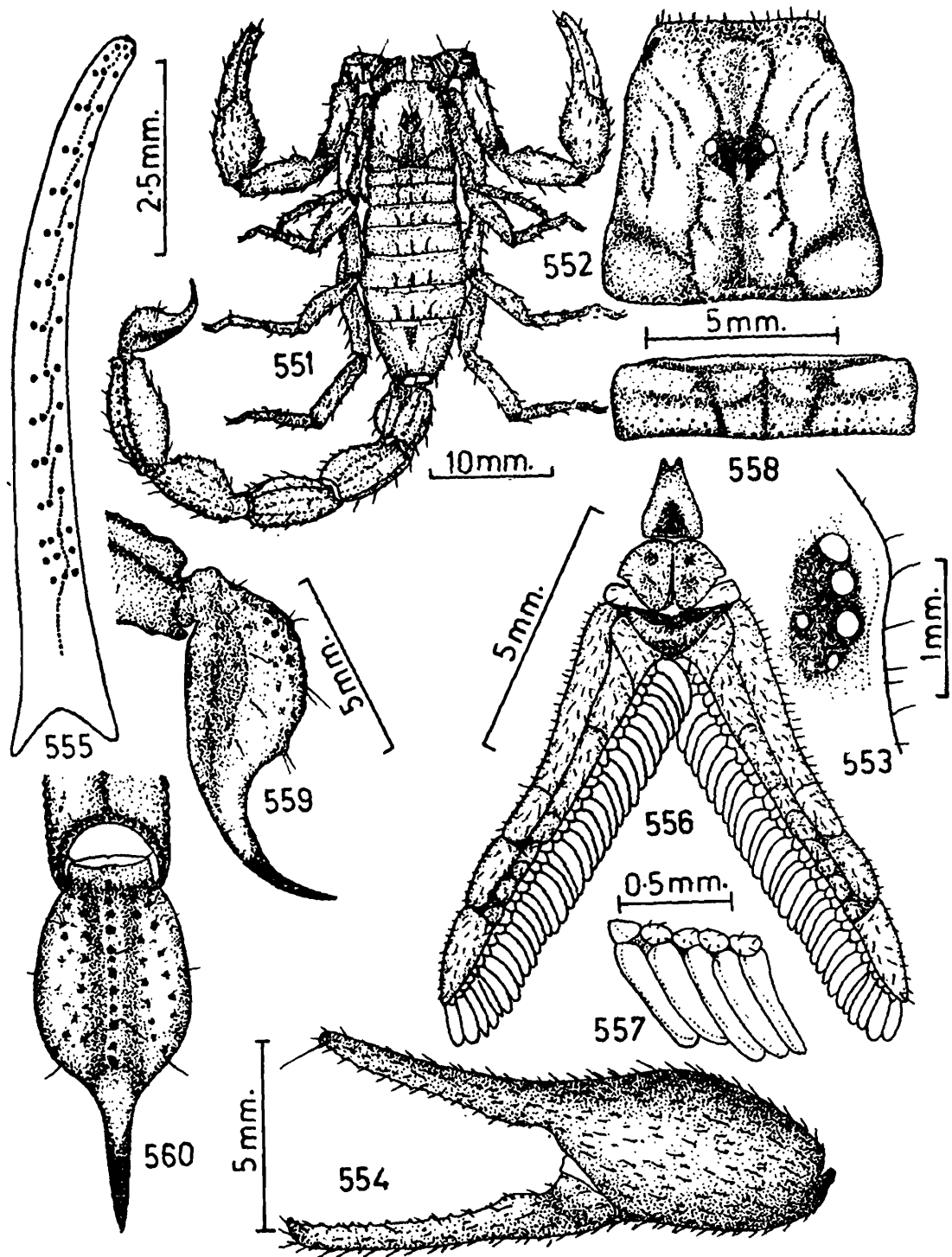
(Figs 551—576)

1900. *Buthus tamulus gujaratensis* Pocock, *Fauna Brit. India*, Arachn., : 25.

General : Male and female bigger in size with body colour, yellowish brown, female with comparatively more reddish brown. Entire carapace and mesosomal tergites granular. All carinae on body black and weakly granular. Ocular tubercle black.

FIGS. 546-550. *Mesobuthus tamulus indicus* (Pocock)

- 546. Femur, dorsal, interior and exterior views.
- 547. Patella, dorsal view.
- 548. Patella, exterior view.
- 549. Manus and immovable finger, exterior view.
- 550. Manus and immovable finger, ventral view.



FIGS. 551-560. *Mesobuthus tamulus gujaratensis* (Pocock)

- 551. Dorsal view of male.
- 552. Carapace, dorsal view.
- 553. Lateral eyes, lateral view.
- 554. Manus and fingers, exterior view.
- 555. Movable finger, dorsal view,

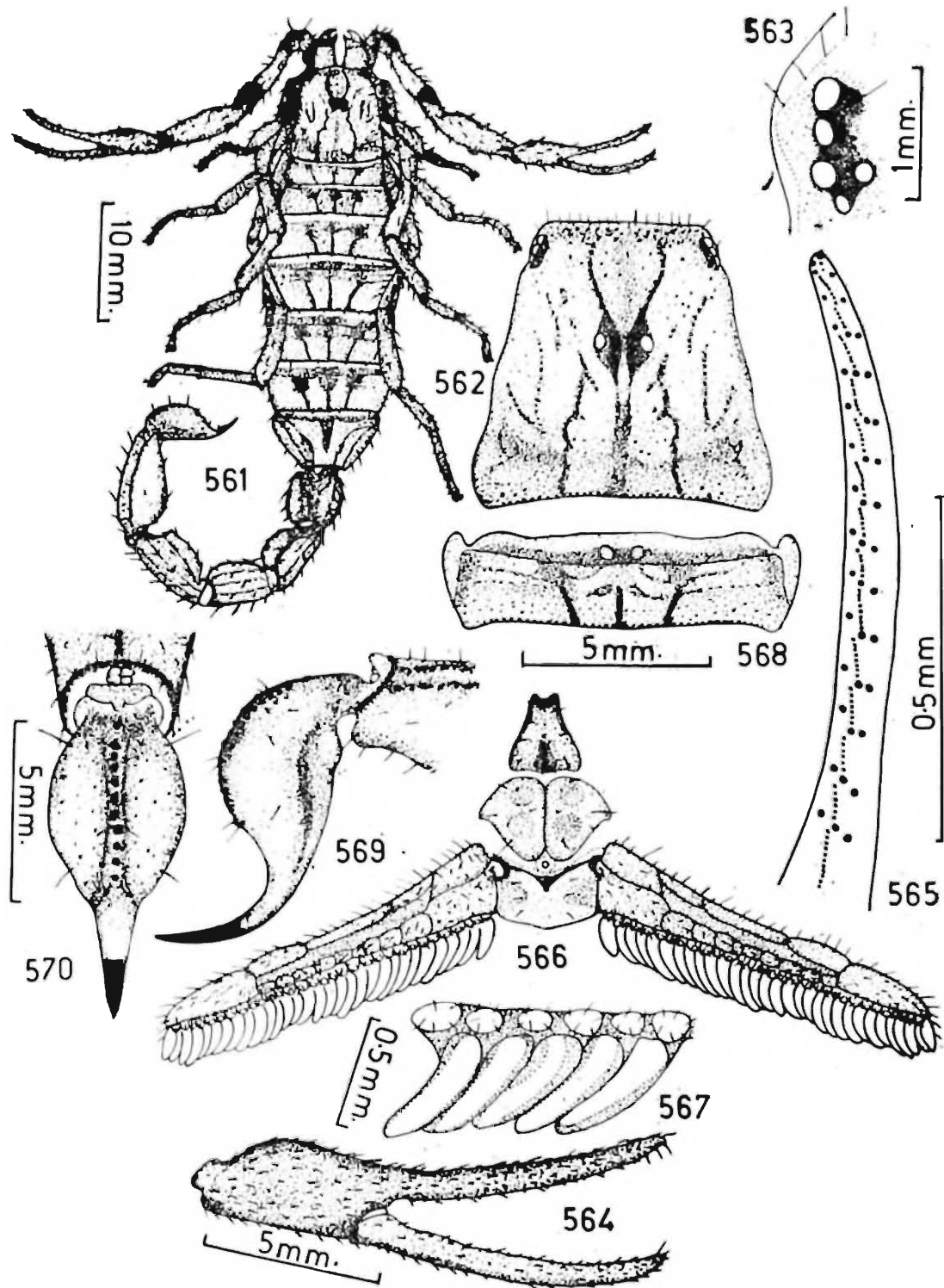
Chelicera yellow. Pedipalp with globous hand in male. Legs comparatively thin and pale yellow on tips. Ventral body surface pale yellow. Pectines well developed. Last mesosomal sternite provided with two pairs of weak carinae.

Measurements : Male total length 68.00 mm. Carapace 7.50 mm. long; Mesosoma 19.50 mm. long; Metasoma 41.00 mm. long.

Female total length 65.25 mm. Carapace 7.25 mm. long; Mesosoma 21.25 mm. long; Metasoma 36.75 mm. long.

Carapace : Entire surface granular but weakly granular in middle portion. All carinae granular. Interocular area weakly granular on anterior portion and provided with a pair of anterior carinae, continued anteriorly from median ocular tubercles. Posterior median carinae not isolated from central median carinae and forming 'Lyre-form' configuration in female but slightly isolated and more granular in male as in text-figs. 552 and 562. Lateral carinae granular. Anterior margin almost smooth and flanked above with a rows of many reddish setae. Lateral margins finely crenulated with a sub-marginal ridge. Posterior margin granular and almost straight. Lateral ocular tubercles black, granular and provided with five contiguous eyes as in text-figs. 553 and 563. A pair of smooth median ocular tubercles provided a pair of median eyes, situated anteriorly in the ratio 1 : 1.25 as in text-figs. 552 and 562. Chelicera with yellow basal segment; smooth ventral surface covered with fine silky hairs. Fingers yellow but dark brown on dentitions. Dentition on fingers as characterised in the family and genus. Dorsal and ventral distal teeth on movable fingers equal. Pedi-

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556. Pectines, genital operculum and cephalothoracic sternum, ventral view.
557. Pectinal teeth and fulcra, ventral view.
558. Tergite, dorsal view.
559. Telson and anal rim of metasomal segment V, lateral view.
560. Telson and anal rim of metasomal segment V, ventral view.

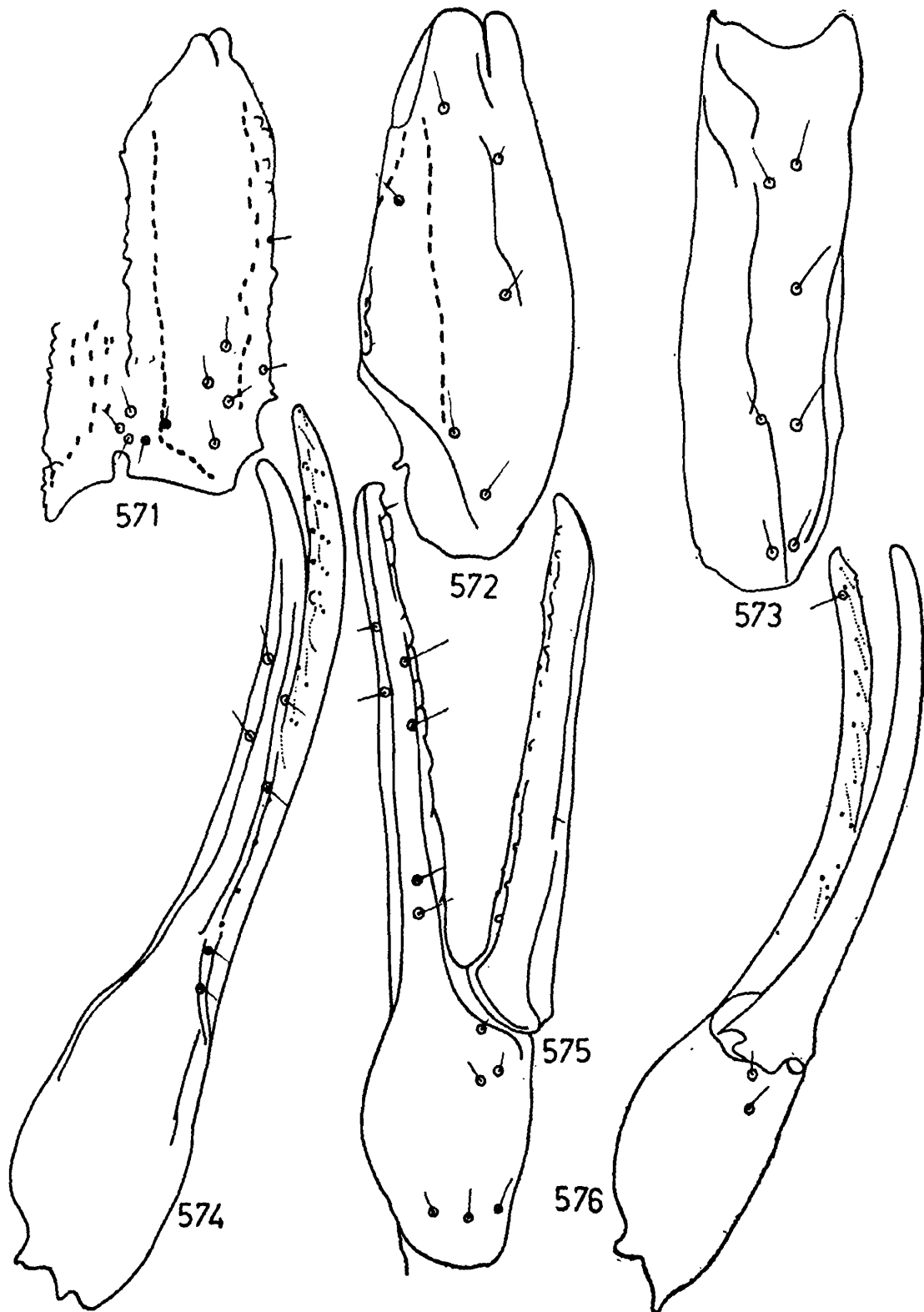


FIGS. 561-570. *Mesobuthus tamulus gujaratensis* (Pocock)

- 561. Dorsal view of female.
- 562. Carapace, dorsal view.
- 563. Lateral eyes, lateral view.
- 564. Manus and fingers, exterior view.

palp with more bulbous hand in male as in text-fig. 554. Femur almost as long as carapace in male and always shorter in female. Carinae on outer side weakly granular. Dorsal carinae granular but more granular in female. Outer or anterior surface provided with crenulated carinae. Intercarinal space weakly granular. Patella longer than carapace in male, but almost as long as carapace in female. Entire surface smooth, except a sub-denticular crest on inner or anterior surface. Manus bulbous, more than as wide as patella in male as in text-fig. 554, thin, less than as wide as patella in female as in text-fig. 564. Length of under hand nearly two third the length of carapace in male where as slightly more than half the length of carapace in female. Im-movable finger shorter than patella in male but always longer than patella in female. Movable finger longer than immovable finger. Dentition on the fingers non-imbricated and scalloped at the base in male but the scallops not deep as in text-fig. 551. Movable finger provided with fifteen teeth in outer row as in text-figs. 555 and 565. All segments sparsely clothed with minute hairs. Trichobothrial pattern on femur, patella, manus and im-movable finger as in text-figs. 571-576. Legs slightly pale. Outer carinae on femur weakly granular but inner carinae serrated. Outer carinae of patella smooth, inner carinae crenulated. Inter-carinal space smooth. Tibia carinated but smooth, provided with a tibial spur on III and IV pairs. Tarsomere I carinated and flanked below with a row of paired bristles or spinules and provided with a pair of pedal spur. Tarsomere II smooth, flank-ed below with a row of paired red spinules. A pair of claw normal. All segments covered with bristles and hairs. Pectines

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- 565. Movable finger, dorsal view.
 - 566. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 - 567. Pectinal teeth and fulcra, ventral view.
 - 568. Tergite, dorsal view.
 - 569. Telson and anal rim of metasomal segment V, lateral view.
 - 570. Telson and anal rim of metasomal segment V, ventral view.



Figs. 571-576. *Mesobuthus tamulus gujaratensis* (Pocock)

- 571. Femur, dorsal, interior and exterior views.
- 572. Patella, dorsal view.
- 573. Patella, exterior view.
- 574. Manus and fingers, dorsal view.
- 575. Manus and fingers, exterior view.
- 576. Manus and fingers, ventral view.

well developed and five times longer than wide as in text-figs. 556 and 566. Middle lamellae divided into ten small segments in male and eleven segments in female. Fulcra almost triangular to round. Pectinal teeth elongated as in text-fig. 557 and 34/35 in male and more tapering as in text-fig. 567 and 30/31 in female. Middle lamellae and fulcra covered with microscopic setae. Basal piece smooth and provided with a median notch on anterior margin. Median notch deep in male. Genital operculum provided with a pair of sclerites, slightly divided on posterior portion in male, from which a pair of conspicuous male genital papillae protrude out as in text-fig. 556. The sclerites united in the middle in female as in text-fig. 566. Cephalothoracic sternum triangular, provided with a small depression in the middle of posterior portion as in text-figs. 556 and 566.

Mesosoma : All tergites granular but each tergite more closely and coarsely granular on lateral portions. Tergites I-VI provided with a median and two lateral carinae, developed on posterior portion of each tergite and granular, more granular in male. Lateral carinae diverging outward into a smooth mosaic reticulation. Posterior margin of each tergite granular as in text-figs. 558 and 568. Pretergal portion black and weakly pigmented on posterior portion; provided with a pair of yellow elliptical spots in the middle and granular on lateral portion. Tergite VII provided with a short granular median carina developed on anterior portion, two pairs of granular lateral carinae diverging outward as in text-figs. 551 and 561. Pretergal portion very finely granular on lateral portion. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Sternite I without presternal portion. Presternal portion smooth on sternite II-IV. Sternite V weakly granular on lateral portions, provided with two pairs of weakly granular carinae. Presternal portion smooth.

Metasoma : Cauda slightly less than five times as long as carapace in male where as in female hardly five times as long as carapace. Basal segment always wider than long. Segments I-IV with dorsal, dorsolateral carinae crenulated on segments I & III.

Lateral carinae crenulated on segment I, developed on three fourth posterior portion of segment II and very poorly developed on one third portion of segment III. Inferior lateral and inferior carinae nearly smooth on segments I & II, weakly crenulated on segments III and IV as in text-figs. 551 and 561. Intercarinal space granular and anterior peduncle of each segment very finely and closely granular. Each carina setose on either sides. Segment V longer than carapace or patella. Inferior lateral carinae granular and increasing in size on posterior portion. Inferior carinae granular and developed only on anterior portion. Single inferior median carina almost evenly crenulated as in text-figs. 551 and 561. Intercarinal space weakly granular. Each carina setose on both sides. Anal rim of this segment evenly granular as in text-figs. 559, 560, 569 and 570. Telson slightly longer than fifth caudal segment but vesicle not as wide or deep as fifth caudal segment. Ventral surface weakly granular. Ventral median crest weak and ending into a weak sub-aculear nodule. Ventral and lateral bands prominent and deep brown. Aculeus sharp curved, deep brown to red on distal portion and less than as long as vesicle. Setation on the vesicle as in text-figs. 559, 560, 569 and 570.

Distribution : INDIA : Gujarat and Rajasthan.

Remarks : Present diagrams and descriptions are based on the syntypes received from B.M. (N.H.), London, (3 ♂ 3 ♀) in spirit, Regd. No. 1896, 10.20 40-45. We have also examined some specimens identified by us. Some of the identified specimens have been kept in Western Regional Station, ZSI, Poona.

29. *Mesobuthus tamulus gangeticus* (Pocock)

(Figs. 577-601)

1900. *Buthus tamulus gangeticus* Pocock, *Fauna Brit. India, Arachn.*, : 25.

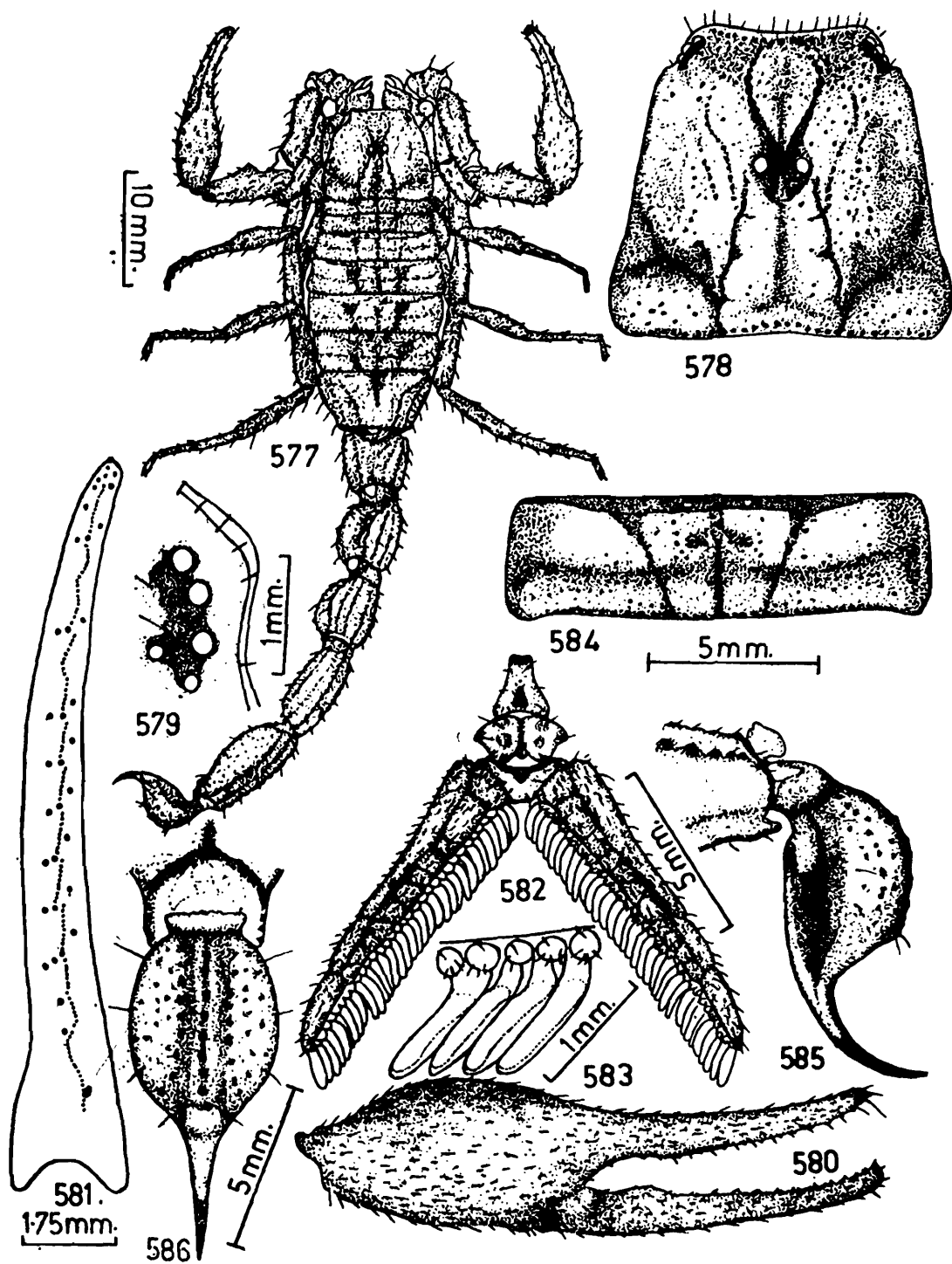
General : Male and female of large body size, handsome, yellowish brown scorpions. All carinae black, weakly granular.

Pretergites black on posterior portion and with a pair of conspicuous yellowish elliptical spots on middle portion. Caudal region more reddish on posterior segments and telson. Pedipalp more strong and bulbous in male as in text-fig. 577. Legs pale yellow on tips. Ventral body portion pale yellow. Pectines well developed. Last mesosomal sternite smooth and provided with two pairs of granular carinae and the lateral pair of keels extend on sternite IV.

Measurements : Male total length 74.00 mm. Carapace 8.50 mm. long; Mesosoma 22.50 mm. long; Metasoma 43.00 mm long.

Female total length 78.00 mm. Carapace 9.00 mm. long; Mesosoma 26.00 mm. long; Metasoma 43.00 mm. long.

Carapace : Entire surface granular but coarsely granular on lateral portions. Interocular region provided with a pair of granular anterior forming a ring as in text-figs. 578 and 588, and granular on anterior and lateral portions. Superciliary crest granular with many red setae. Posterior median carinae joining the central median carinae and forming 'Lyre-form' configuration as in text-figs. 578 and 588. Lateral carinae granular. Lateral ocular tubercles black, granular and provided with five contiguous lateral eyes as in text-figs. 579 and 589. Median ocular tubercles almost smooth, black and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.25 as in text-figs. 578 and 588. Anterior margin almost smooth and provided with many microscopic red setae. Lateral margins finely crenulated with finely granular submarginal ridge and provided with few setae. Posterior margin granular and nearly straight. Chelicera with basal segment pigmented on dorsal portion, ventral portion thickly clothed with fine silky hairs. Both fingers pale but reddish on dentition. Dentition as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger subequal. Pedipalp with bulbous manus in male as in text-fig. 580. Femur as long as carapace. Carinae granular but more granular in female. Outer and anterior surface provided with crenulated crest and eight to nine sub-denticular tubercles prominent. Intercarinal space weakly and finely granular. Patella longer than carapace or femur and almost smooth ex-

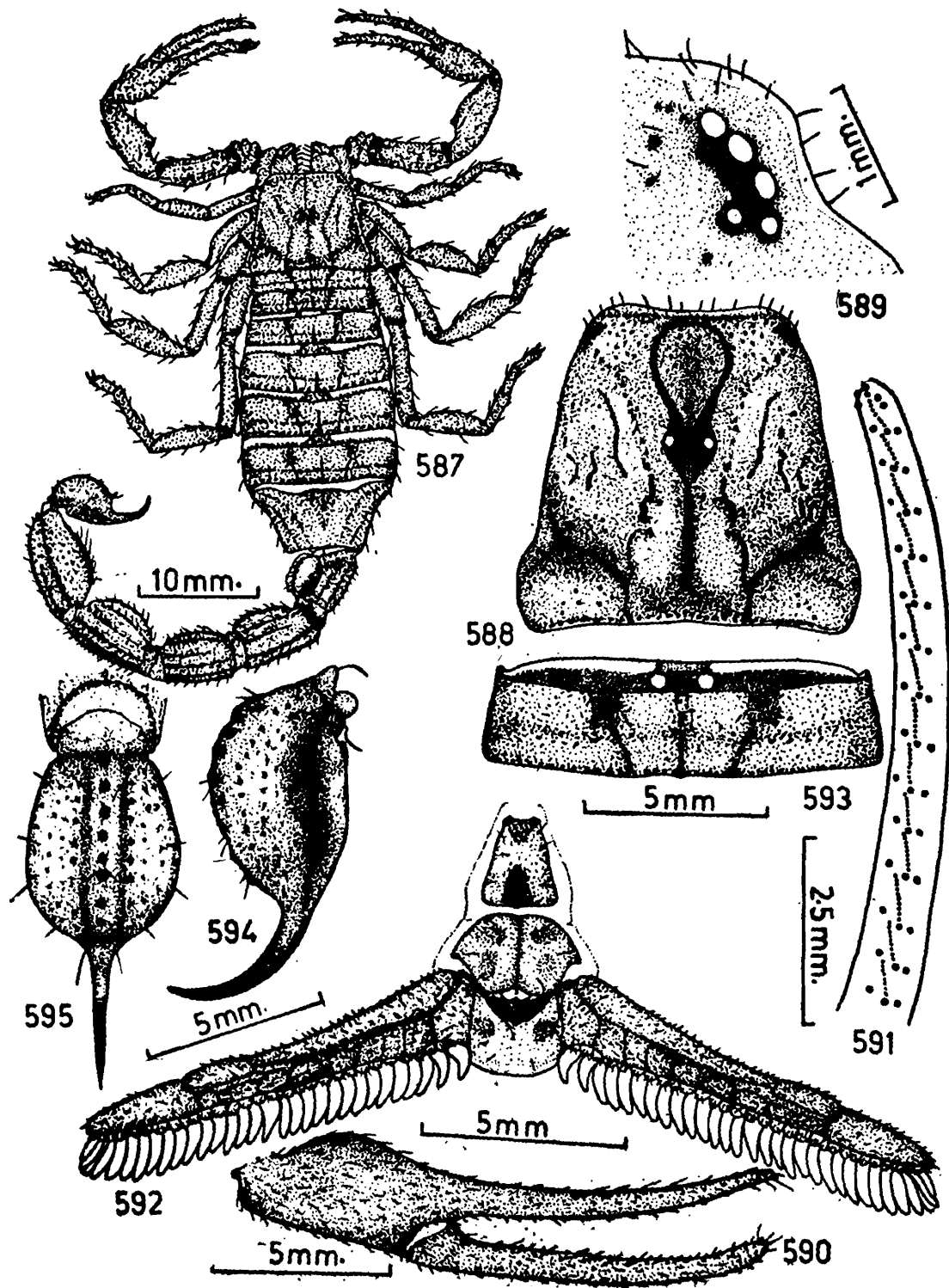


Figs. 577-586 *Mesobuthus tamulus gangeticus* (Pocock)

- 577. Dorsal view of male.
- 578. Carapace, dorsal view.
- 579. Lateral eyes, lateral view.
- 580. Manus and fingers, exterior view.
- 581. Movable finger, dorsal view.

cept a crenulated crest on anterior surface. Hand or manus more bulbous, smooth and more than as wide as patella in male as in text-fig. 580. Length of under hand more than half the length of carapace in male but almost half in female. Immovable finger less than as long as patella in male but almost as long as in female. Movable finger always longer than patella. Dentition on the finger non-imbricated and scalloped at the base in male but scallops not deep as in text-fig. 580. Outer row on movable finger provided with fourteen teeth in male and fifteen teeth in female as in text-figs. 581 and 591. All segments of pedipalps clothed with short, microscopic red hairs. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 596-601. Legs more stout in female. Outer carinae on femur very finely, weakly granular but almost smooth on patella on legs I & II. Inner carinae crenulated on legs I & II and finely serrated on legs III & IV. Tibia carinated but smooth and provided with a stout tibial spur on III and IV pairs. Tarsomere I smooth flanked below with a row of paired bristles and a pair of pedal spur. Tarsomere II smooth, flanked below with a row of paired, red spinules. Claws normal and reddish on tips. All segments of legs clothed sparsely with bristles. Pectines well developed and nearly five and a half times longer than wide. Middle lamellae divided into eleven to twelve small digits in male and nine to ten small digits in female. Fulcra almost triangular. Lamellae and fulcra clothed with microscopic, red, setae. Pectinal teeth flat, laterally as in text-fig. 583; 34/35 in male as in text-fig. 582 and 30/31 in female as in text-fig. 592. Basal piece granular and notched in the middle on anterior margin but deeply notched in male. Genital operculum provided with two sclerites united

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582. Pectines, genital operculum and cephalothoracic sternum, ventral view.
583. Pectinal teeth and fulcra, ventral view.
584. Tergite, dorsal view.
585. Telson and anal rim of metasomal segment V, lateral view.
586. Telson and anal rim of metasomal segment V, ventral view.



Figs. 587-595. *Mesobuthus tamulus gangeticus* (Pocock)

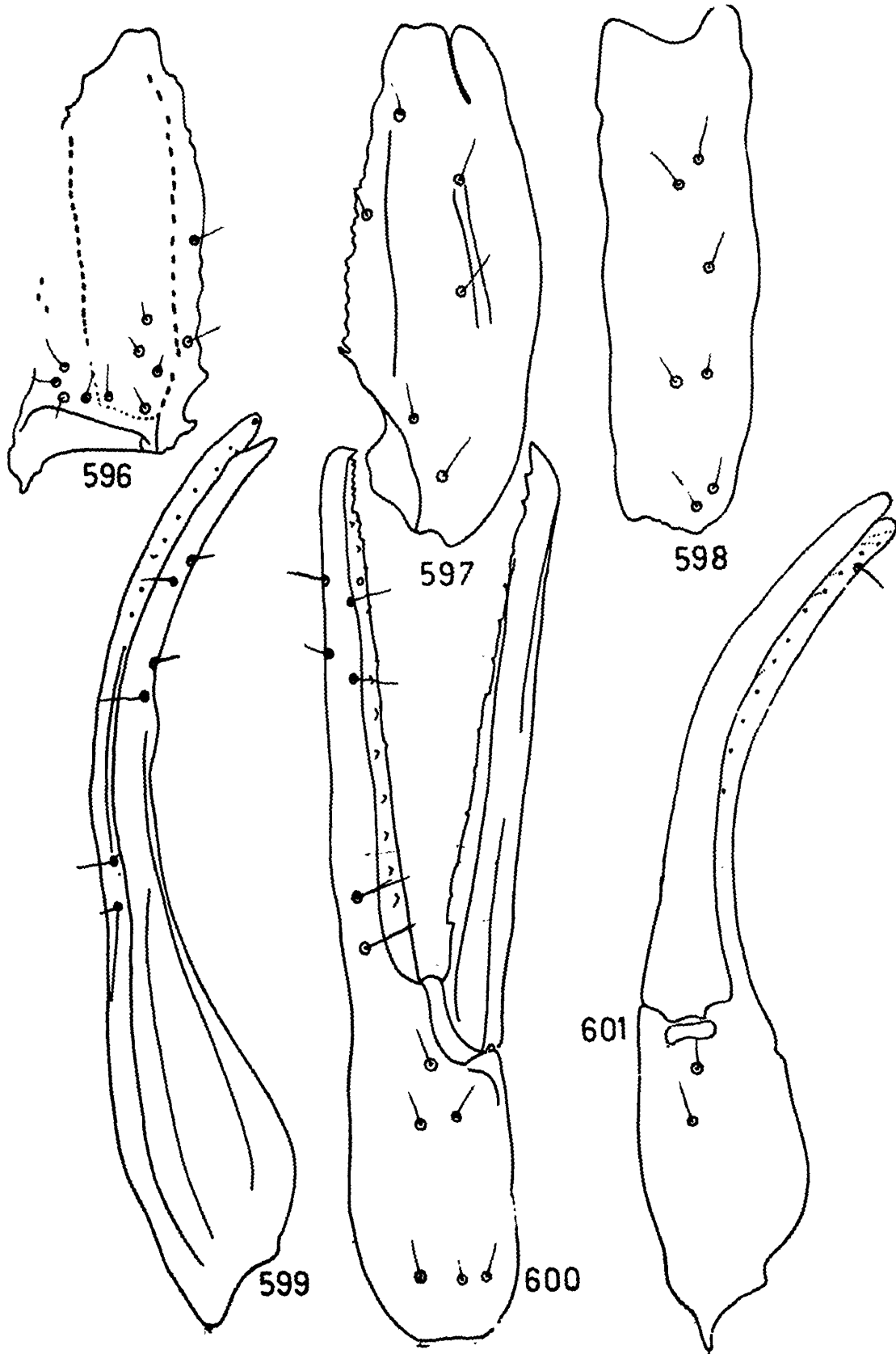
- 587. Dorsal view of female.
- 588. Carapace, dorsal view.
- 589. Lateral eyes, lateral view.
- 590. Manus and fingers, exterior view.
- 591. Movable finger, dorsal view.

in the middle portion in female as in text-fig. 592. The sclerites separated in posterior portion in male from which a pair of conspicuous male papillae protruding out as in text-fig. 582. Sclerites weakly and sparsely clothed with red microscopic setae. Cephalothoracic sternum triangular and provided with a median depression on posterior portion.

Mesosoma : All tergites coarsely but sparsely granular. Tergites I-VI provided with a median and two lateral carinae. Median carinae developed only on posterior portion of each tergite. Two lateral carinae granular, developed only on posterior portion and diverging outward anteriorly as in text-figs. 584 and 594. Pretergal portion black and weakly granular on posterior portion and provided with a pair of conspicuous yellow spots in the middle. Posterior margin of each tergite granular. Tergite VII provided with a median granular carina developed on anterior portion and two pairs of lateral granular carinae, diverging outwards as in text-figs. 577 and 587. Pretergal portion black weakly granular. Posterior margin granular. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Sternites III & IV with smooth lateral carinae, ending into the inner margin of book lungs. Presternal portion smooth on sternites II-IV. Posterior and lateral margins almost smooth and flanked with many microscopic red setae. Sternite V granular but coarsely granular only on lateral portions and provided with two pairs of granular carinae. Lateral margins crenulated. Posterior margin granular. Presternal portion smooth.

Metasoma : Cauda more than five times as long as carapace in male and less than five times in female. Basal segment always wider than long. Segments I-IV with dorsal, dorsolateral, in-

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592. Pectines, genital operculum and cephalothoracic sternum, ventral view.
593. Tergite, dorsal view.
594. Telson, lateral view.
595. Telson, and anal rim of metasomal segment V, ventral view.



ferior lateral and inferior carinae, all carinae crenulated. Lateral carinae crenulated on segments I-III and weakly developed on segment IV. All carinae setose on both sides. Intercarinal space granular. Anterior peduncle of each segment granular. Segment V not as long as carapace, provided with dorsal carinae, granular and weakly developed in male. Inferior lateral carinae crenulated but more crenulated on posterior portion. Inferior carinae developed on anterior portion and granular. Single inferior median almost evenly crenulated. Anal rim of this segment crenulated as in text-figs. 585, 586 and 595. Intercarinal space granular. Telson as long as fifth caudal segment but vesicle always less than as wide or deep as fifth caudal segment. Ventral surface of the vesicle granular. Ventral median crest granular, ending into a weak sub-aculear nodule. Ventral and lateral bands more dark. Setation on vesicle as in text-figs. 585, 586 and 595. Aculeus stout, sharp, curved but not as long as vesicle and dark on distal portion.

Distribution : INDIA : Bhudana, Shasia Mahader, Chamdhar, Srinagar, Dhikala, Ramganga, Paterpani, Sarapduli, Boscar, Gairal, Kolaswar, Barkote, Pauri, Kirtinagar, Kilkdeshnar, Tehri, Sarapduli (Corbet National Park), Bijrani, Malani, Jamnagwari; Amdanda, Machani, Dhela, Nainital, Bartek bag, Almora; Dehra Dun; Uttar Pradesh.

Remarks : We have examined, illustrated and described on the basis of syntypes received from B.M. (N.H.), London, Regd. No. 1896.10.20, 34-39. The information indicates that these are the available types described by Pocock. We have also examined many specimens identified by us and some identified specimens have been kept in Western Regional Station, ZSI, Poona.

FIGS. 596-601 *Mesobuthus tamulus gangeticus* (Pocock)

- 596. Femur, dorsal, interior and exterior views.
- 597. Patella, dorsal view.
- 598. Patella, exterior view.
- 599. Manus and fingers, dorsal view.
- 600. Manus and fingers, exterior view.
- 601. Manus and fingers, ventral view.

30. *Mesobuthus tamulus tamulus* (Fabricius)

(Figs. 602-625)

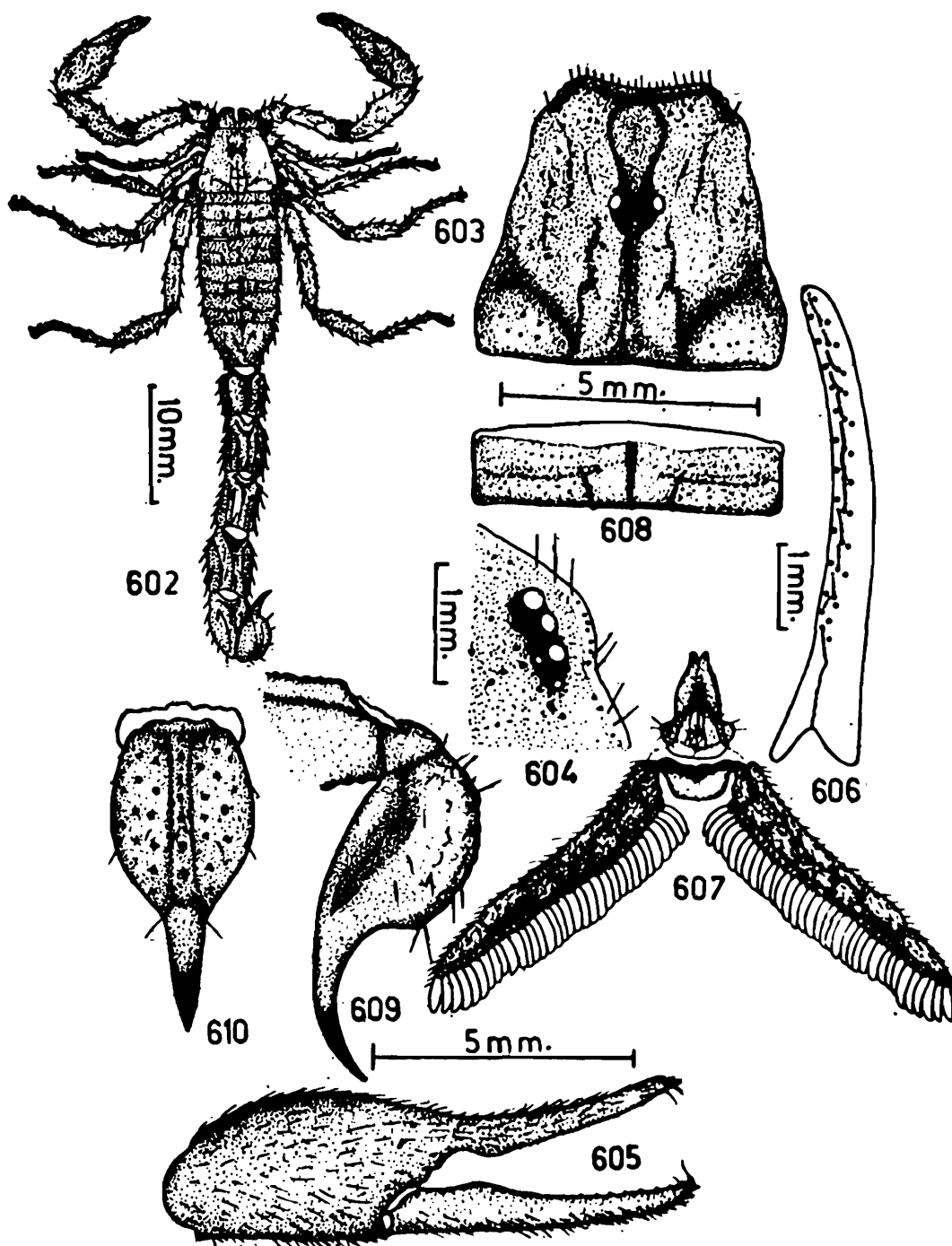
1798. *Buthus tamulus* Fabricius, *Ent. Syst. Suppt.*, : 294.
 1896. *Buthus tamulus* : Pocock, *J. Bombay nat. Hist. Soc.*, 7 : 303.
 1900. *Buthus tamulus tamulus* : Pocock, *Fauna Brit. India, Arachn.*, : 23.

General : Male and female bigger in body size and yellow to reddish brown in colour. Male more slender, darker and granular than female. Carapace with black granular carinae, blackish in middle portion. Ocular tubercles black. All tergites black in middle portion; entire surface granular with granular carinae. Pedipalp manus more bulbous in male. Legs slightly pale. Metasoma powerful and strong. Ventral side pale yellow. Pectines well developed. Last mesosomal sternite provided with granular carinae.

Measurements : Male total length 48.50 mm. Carapace 5.50 mm. long; Mesosoma 14.50 mm. long; Metasoma 28.50 mm. long.

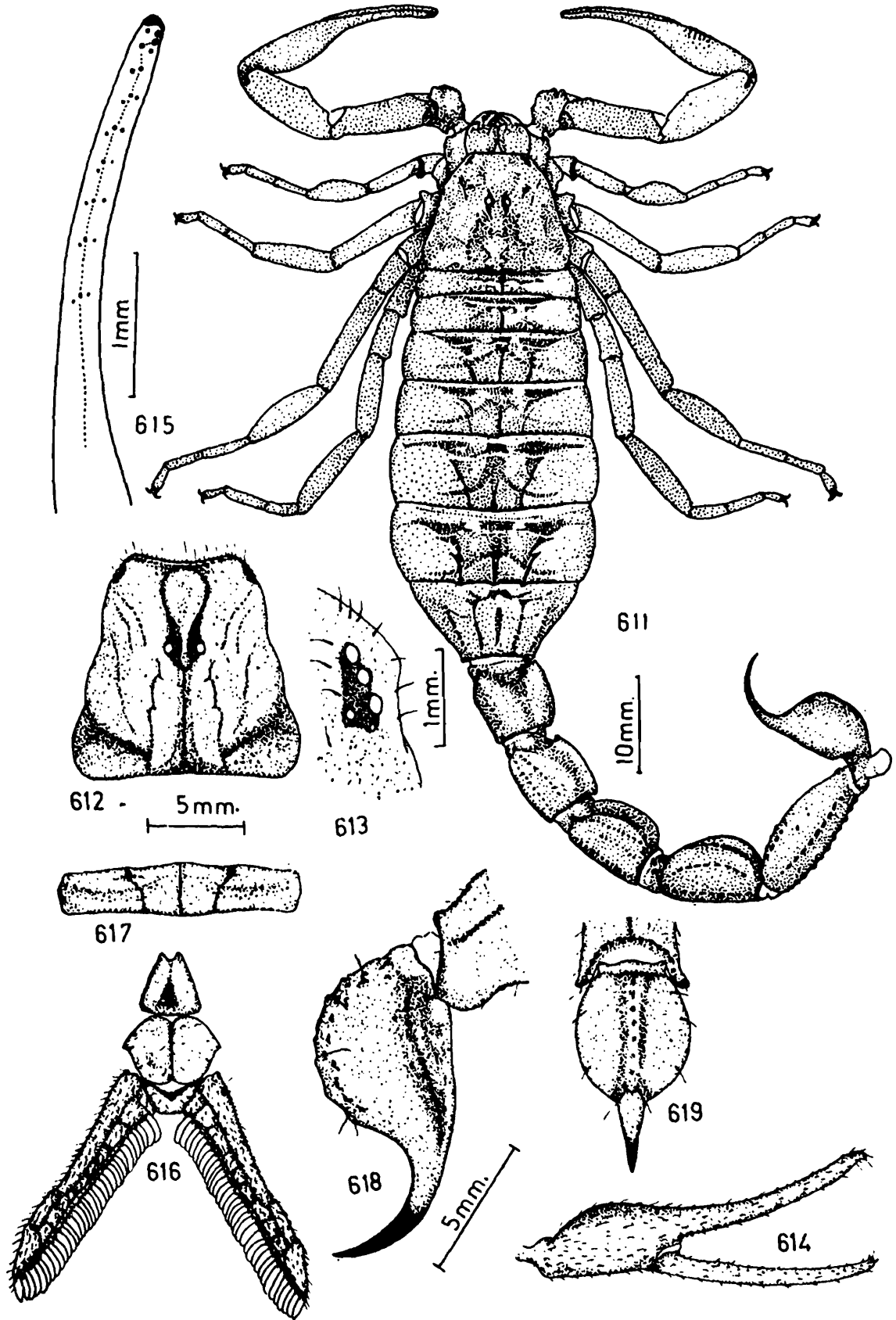
Female total length 57.00 mm. Carapace 7.00 mm. long; Mesosoma 15.00 mm. long; Metasoma 35.00 mm. long.

Carapace : Entire surface coarsely granular but more granular on lateral portions. Interocular region carinated and granular on anterior margin. Posterior median and central median carinae joining to form 'Lyre-form' configuration in female but weakly separated in male as in text-figs. 603 and 612. Ocular tubercles black and granular. Lateral ocular tubercles provided with five lateral eyes as in text-figs 604 and 613. A pair of median eyes situated anteriorly in the ratio 1:1.5 as in text-figs. 603 and 612. Anterior margin finely crenulated and provided with many setae. Lateral margins very finely crenulated and provided with a submarginal ridge. Posterior margin granular and nearly straight. Chelicera with basal segment pigmented on dorsal surface. Ventral surface pale and thickly clothed with fine silky hairs. Fingers dark but reddish to brown on dentition. Dentition on fingers as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger subequal in length. Pedipalp more stronger and



FIGS. 602-610. *Mesobuthus tamulus tamulus* (Fabricius)

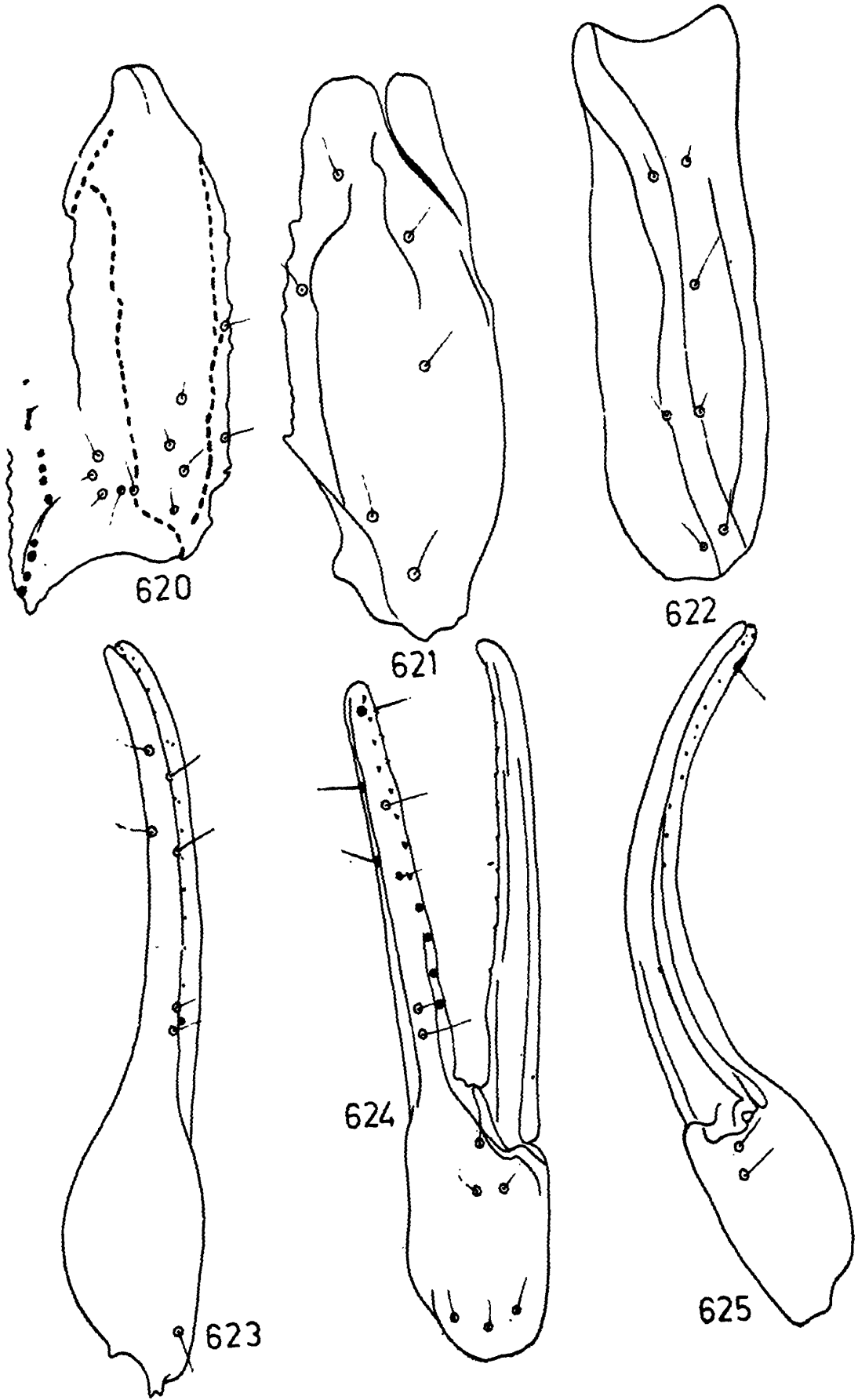
602. Dorsal view of male. 603. Carapace, dorsal view. 604. Lateral eyes, lateral view. 605. Manus and fingers, exterior view. 606. Movable finger, dorsal view. 607. Pectines, genital operculum and cephalothoracic sternum, ventral view. 608. Tergite, dorsal view. 609. Telson and anal rim of metasomal segment V, lateral view. 610. Telson, ventral view.



bulbous in male as in text-fig. 602. Femur as long as carapace in male but shorter than carapace in female. All carinae almost crenulated. Outer or anterior surface provided with five to six sub-denticular tubercles on crenulated carinae. Intercarinal space granular. Patella longer than carapace in male but as long as carapace in female. All carinae smooth except a sub-denticular crest on inner or anterior surface. Manus more than as wide as patella in male. Length of under hand always more than half the length of carapace. Immovable finger less than as long as patella in male but almost as long as patella. Dentition on the fingers non-imbricated, fourteen teeth in outer row as in text-figs. 606 and 615, scalloped in male but scallops not deep as in text-fig. 605. All segments clothed with fine microscopic hairs. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 620-625. Legs more stronger in female. Outer carinae on femur and patella granular but inner carinae crenulated to serrated. Intercarinal space granular. Tibia carinated but smooth and provided with a stout tibial spur on III and IV pairs. Tarsomere I almost smooth, flanked below with a row of paired bristles or spinules and provided with a pair of pedal spurs. Tarsomere II flanked below with a row of small paired, reddish to brown spinules. A pair of claws more stronger in female. All segments sparsely clothed with microscopic setae. Pectines well developed and more than six times long-

FIGS. 611-619. *Mesobuthus tamulus tamulus* (Fabricius)

611. Dorsal view of female.
612. Carapace, dorsal view.
613. Lateral eyes, lateral view.
614. Manus and fingers, exterior view.
615. Movable finger, dorsal view.
616. Pectines, genital operculum and cephalothoracic sternum, ventral view.
617. Tergite, dorsal view.
618. Telson and anal rim of metasomal segment V, lateral view.
619. Telson and anal rim of metasomal segment V, ventral view.



er than wide in male and 4.75 times longer than wide in female. Middle lamellae divided into eleven small segments in male and nine digits in female. Triangular to round fulcra, distinguished between adjacent teeth. Lamellae and fulcra covered with microscopic red setae. Pectinal teeth flat and 34/35 in male and 26/27 in female as in text-figs. 607 and 616. Basal piece sclerotized and anterior margin notched in the middle but deeply notched only in male. Genital operculum provided with two well sclerotized sclerites, separated in male from which a pair of male genital papillae protruding out as in text-fig. 607. The sclerites united in female as in text-fig. 616. In both male and female sclerites sparsely covered with few microscopic red setae. Cephalothoracic sternum triangular and provided with depression on posterior portion.

Mesosoma: All tergites granular but more granular on lateral and posterior portions. Tergites I-VI provided with a median and two lateral carinae. A median carina granular and developed throughout the length of each tergite. Lateral carinae granular, diverging out on lateral sides into a smooth mosaic configuration as in text-figs. 608 and 617. Posterior margin of each tergite granular. Pretergal portion finely granular. Tergite VII provided with a broad median carina, developed only on half anterior portion and two pairs of lateral granular carinae diverging outward. Posterior margin smooth as in text-figs. 602 and 611. Pretergal portion finely granular. Sternites I-IV smooth, weakly clothed with few setae and each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth. Last sternite smooth, provided with two pairs of smooth to weakly granular carinae. Lateral carinae may extend on IV sternite. Presternal portion smooth. Posterior margin of each sternite weakly crenulated.

FIGS. 620-625. *Mesobuthus tamulus tamulus* (Fabricius)

- 620. Femur, dorsal, interior and exterior views.
- 621. Patella, dorsal view. 622. Patella, exterior view.
- 623. Manus and fingers, dorsal view.
- 624. Manus and fingers, exterior view.
- 625. Manus and fingers, ventral view.

Metasoma : Cauda more than five times as long as carapace in male and almost five times as long as carapace in female. Basal segment always wider than long. Segments I-IV with dorsal carinae crenulated on segments I-III; weakly crenulated on segment IV. Dorsolateral and lateral carinae crenulated on segments I-IV. Inferior lateral carinae crenulated on segments I-IV. Inferior carinae smooth on segments I-II, weakly crenulated on segments III and IV, each carina setose on both sides. Intercarinal space granular but the granules more fine on dorsal portions, specially on anterior peduncle of each segment. Segment V more than as long as carapace and provided with weakly developed and poorly granular dorsolateral carinae; inferior lateral carinae crenulated. Inferior carinae granular and developed on anterior portion. Single inferior median carina crenulated. Anal rim of this segment granular as in text-figs. 609 and 619. Intercarinal space granular. Telson more than as long as fifth caudal segment. Vesicle globular but less than as wide and deep as fifth caudal segment. Ventral surface of vesicle covered with many granules. Lateral and ventral median bands prominent, ventral median crest ending into a subaculear nodule. Aculeus stout, sharp, dark brown on distal portion and less than as long as vesicle. Setation on the vesicle as in text-figs. 609, 610, 618 and 619.

Distribution : INDIA : Nasik, Dhule, Nanded, Bhir, Aurangabad, Bombay, Poona, Ahmadnagar, Sholapur, Satara, Sangli and Kolhapur, Maharashtra; Hyderabad, Andhra Pradesh; Bhavani Town, Tamil Nadu.

Remarks : We have examined, illustrated and described on the basis of a male and female specimens which are not the type specimens. We received these specimens from B.M. (N.H.), London, Regd. No. 1889.6.9. 1-7 and 1897.5.10. 18-19. We have also studied numerous identified specimens. These identified specimens are housed in Western Regional Station, ZSI, Poona.

31. *Mesobuthus hendersoni* (Pocock)

(Figs. 626-650)

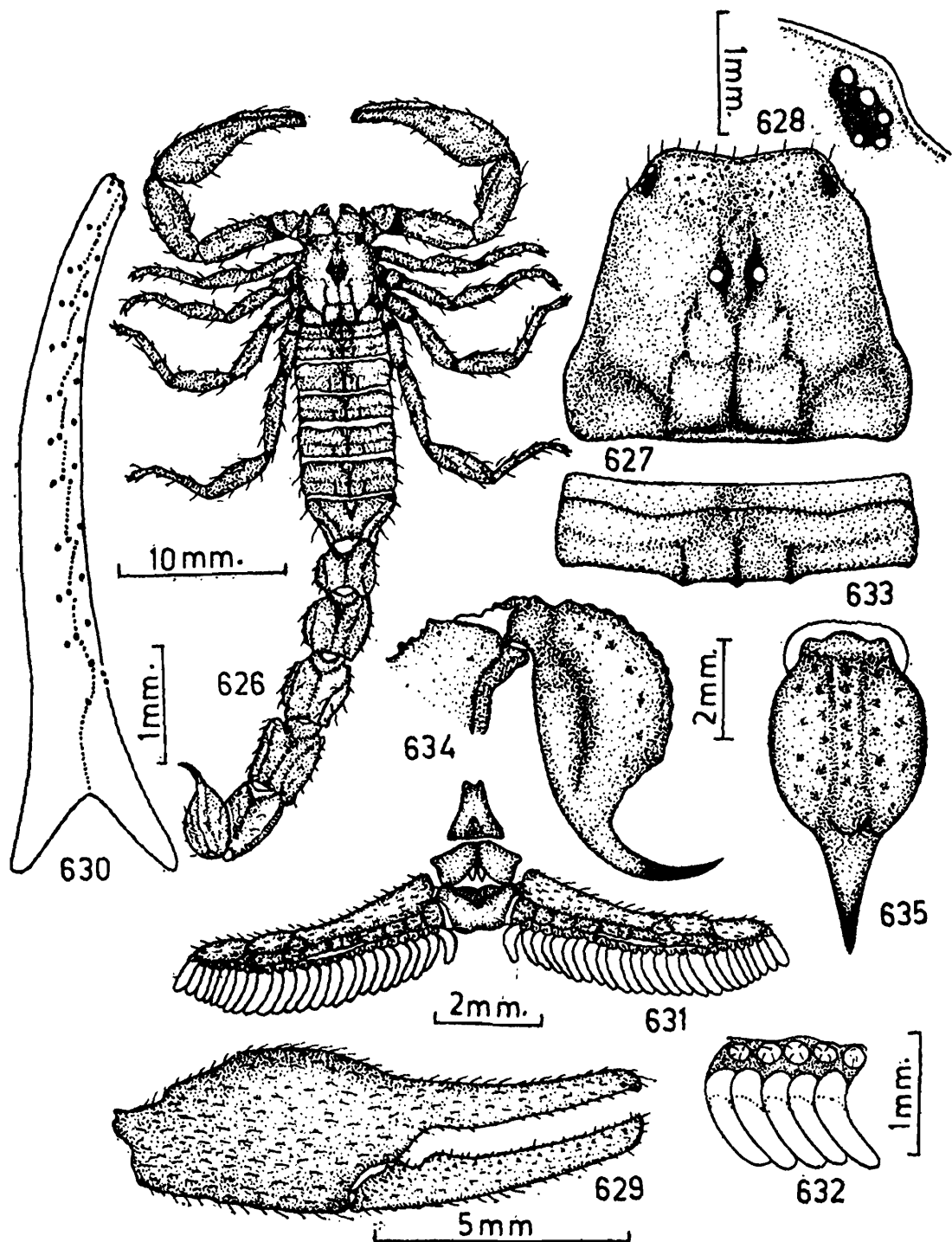
1900. *Buthus hendersoni* Pocock, *Fauna Brit. India, Arachn.*, : 26.

General : Male and female of medium body size and yellowish brown in colour. Entire body surface covered with coarse granules. Carinae very weakly pigmented. Almost all carinae granular. Ocular tubercles weakly granular and black. Vesicle globular with sharp aculeus. Pedipalp with globular manus (or hand) in male as in text-fig. 626. Legs pale yellow and more stout in female. Pectines well developed. Last mesosomal sternite granular throughout and provided with two pairs of granular carinae.

Measurements : Male total length 46.75 mm. Carapace 5.50 mm. long; Mesosoma 14.50 mm. long; Metasoma 26.75 mm. long.

Female total length 49.50 mm. Carapace 6.50 mm. long; Mesosoma 17.50 mm. long; Metasoma 25.50 mm. long.

Carapace : Almost entire surface evenly covered with coarse granules. Interocular region covered with even larger granules. Ocular tubercles black and granular. Carinae weakly developed, granular and poorly distinguished from other granulation. Central median and posterior median carinae granular and weakly 'Lyre-form' Central median and posterior median furrows shallow and bifid posteriorly. Anterior carinae not forming a circular ring. Lateral carinae poorly developed. Five contiguous of lateral eyes as in text-figs. 628 and 638. A pair of median eyes situated anteriorly in the ratio 1 : 1.5 as in text-figs. 627 and 637. Anterior margin smooth except finely granular in the middle portion. Lateral margins smooth but weakly crenulated on the anterior portion and with a submarginal ridge. Posterior margin smooth and nearly straight. Chelicera with pale yellow basal segment, almost smooth but very weakly granular on anterior portion. Fingers dark yellowish brown and more dark brown on dentitions. Dentition on the fingers as characterised in the family and genus. Ventral surface of basal seg-



FIGS. 626-635. *Mesobuthus hendersoni* (Pocock)

- 626. Dorsal view of male.
- 627. Carapace, dorsal view.
- 628. Lateral eyes, lateral view.
- 629. Manus and fingers, exterior view.
- 630. Movable finger, dorsal view.

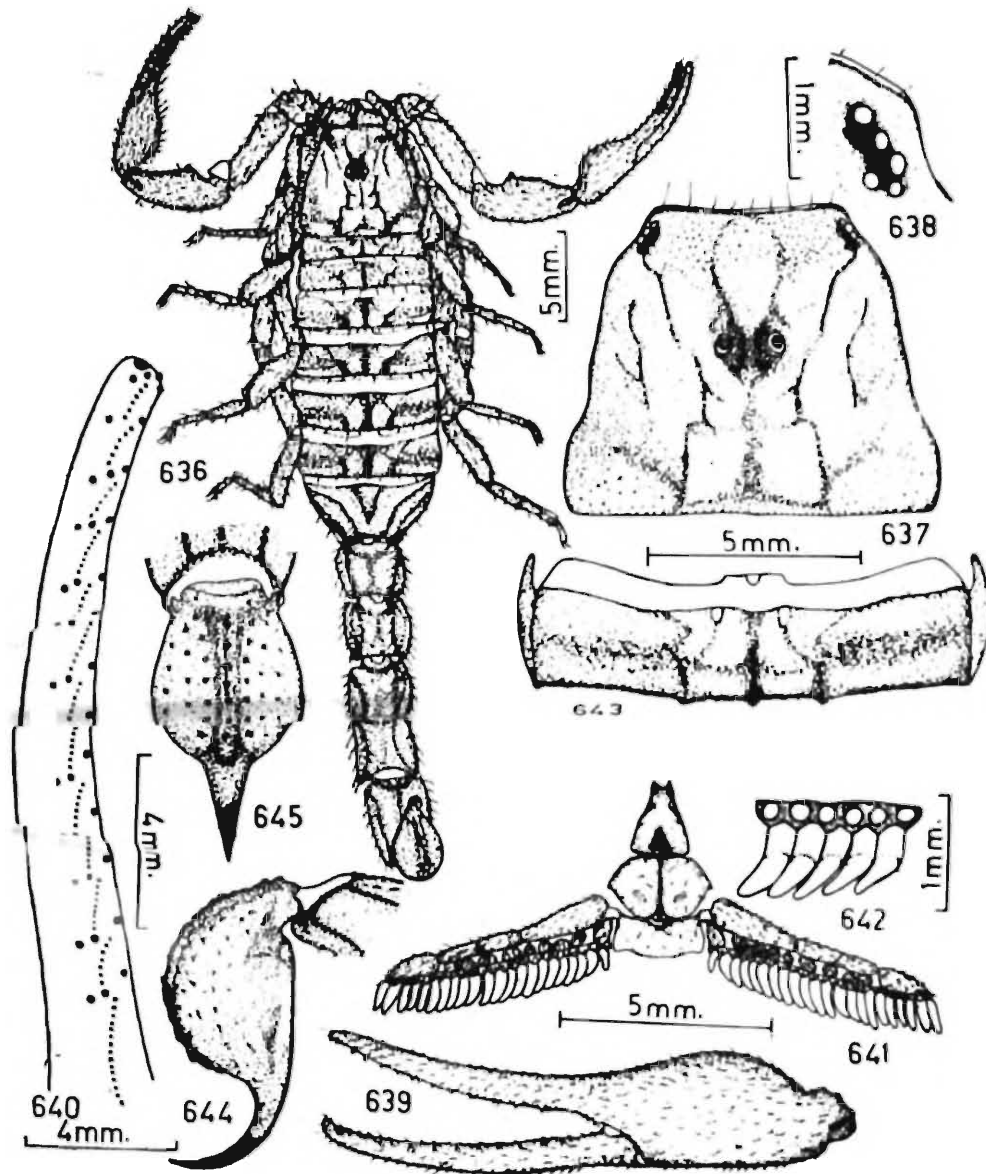
ment thickly covered with fine silky hairs. Pedipalp more stouter in male as in text-fig. 629. Femur slightly shorter than carapace. All carinae granular. Outer or anterior surface provided with a evenly crenulated crest. Intercarinal space finely granular. Patella as long as carapace in male but shorter than carapace in female. Inner or anterior surface provided with weakly crenulated carina. Dorsal and exterior carinae smooth. Intercarinal space weakly granular but more granular on inner surface. Manus (or hand) globular, robust and more than as wide as patella in male as in text-fig. 629, but always as wide as patella in female. Length of under hand slightly shorter in female. Movable finger always longer than carapace. Dentition on fingers non-imbricated, scalloped in male as in text-fig. 629 and outer row provided with thirteen teeth as in text-figs. 630 and 640. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 646-650. All segments covered with microscopic hairs. Legs slightly stout in female. Femur and patella carinated, anterior carinae serrated, posterior carinae weakly granular. Intercarinal space granular but more granular on femur. Tibia carinated but smooth, provided with a stout tibial spur on III and IV pairs. Tarsomere I carinated but smooth and each provided with a pair of pedal spur. Tarsomere II pale yellow, smooth, furnished below with a row of paired reddish spinules. A pair of claws normal. All segments covered with microscopic hairs. Pectines well developed and four and a half times longer than wide. Middle lamellae divided into nine small digits. Fulcra round and well developed. Lamellae and fulcra clothed sparsely with microscopic red setae. Pectinal teeth well developed in male as in text-figs. 632 and 642 and 24/25 in

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631. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 632. Pectinal teeth and fulcra, ventral view.
 633. Tergite, dorsal view.
 634. Telson and anal rim of metasomal segment V, lateral view.
 635. Telson, ventral view.

male as in text-fig. 631 while 21/22 in female as in text-fig. 641. Basal piece deeply notched on anterior middle portion in male but weakly notched in female. Genital operculum always wider than long and sclerites divided on posterior portion and from which a pair of conspicuous male genital papillae visible in male as in text-fig. 631, but sclerites fused in the middle in female as in text-fig. 641. Cephalothoracic sternum triangular, provided with a median depression on posterior portion as in text-figs. 631 and 641.

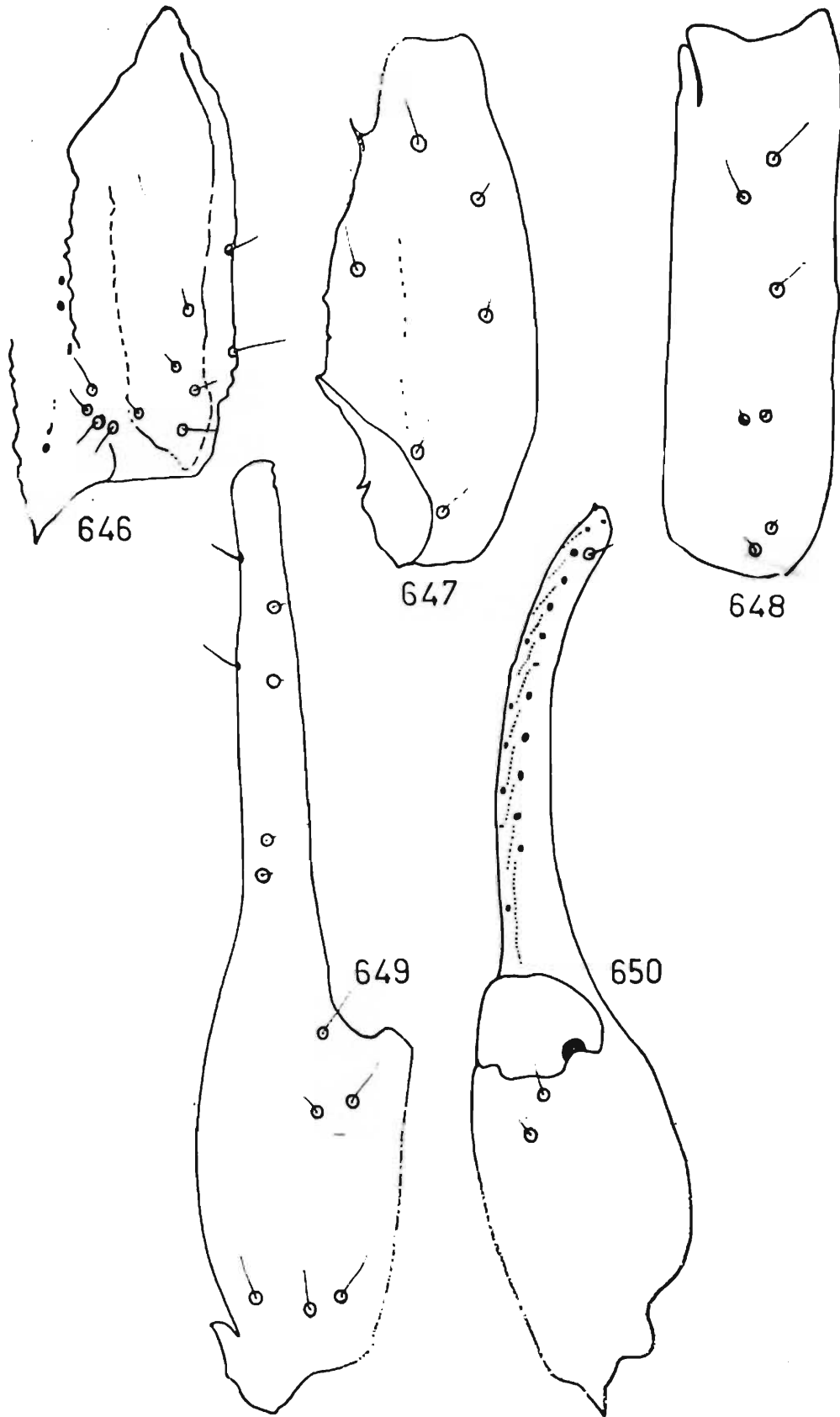
Mesosoma : All tergites coarsely granular but more granular on lateral portion. Tergites I-VI tri-keeled. All carinae granular weakly spiniform posteriorly. Lateral carinae developed only on posterior portion of each tergite as in text-figs. 633 and 643. Pretergal portion smooth. Posterior margin of each tergite weakly granular. Tergite VII provided with two pairs of granular lateral carinae as in text-figs. 626 and 636. Pretergal portion smooth. Posterior margin granular above. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth. Last sternite granular but more granular in female and provided with two pairs of granular carinae. Lateral carinae developed on middle portion. Posterior margin granular. Presternal portion smooth.

Metasoma : Cauda five times as long as Carapace in male and four times in female. Basal segment wider than long but as deep as long. Caudal segment III more wider and almost as long as deep. Segments I-IV provided with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae. All carinae granular. Dorsal carinae weakly spiniform posteriorly but more spiniform on segment III. Intercarinal space granular. Anterior peduncle of each segment finely granular on dorsal surface. Posterior margin of each segment granular on dorsal surface. Segment V as long as carapace in male and shorter than carapace in female. Inferior lateral, inferior and inferior median carinae evenly granular. Intercarinal space coarsely granular. Anal rim of this segment granular as in text-figs. 634, 644 and 645. Telson always longer than carapace or last caudal segment. Vesicle more than as wide



FIGS. 636-645. *Mesobuthus hendersoni* (Pocock)

636. Dorsal view of female. 637. Carapace, dorsal view. 638. Lateral eyes, lateral view. 639. Manus and fingers, exterior view. 640. Movable finger, dorsal view. 641. Pectines, genital operculum and cephalothoracic sternum, ventral view. 642. Pectinal teeth and fulcra, ventral view. 643. Tergite, dorsal view. 644. Telson and anal rim of metasomal segment V, lateral view. 645. Telson and anal rim of metasomal segment V, ventral view.



or deep as last caudal segment. Ventral surface granular. Ventral and lateral bands more darker. Ventral median crest weakly granular and ending posteriorly into a weak subaculear nodule. Aculeus more curved, sharp and less than as long as vesicle as in text-figs. 634, 635, 644 and 645.

Distribution : INDIA : Cudappah, Andhra Pradesh; Yercaud in Shevaroy Hills, Trichanapally, Tanjore, Madras, Tamil Nadu.

Remarks : We have examined, described and illustrated on the basis of the two lots of syntypes received from B.M. (N.H.), London, Regd. No. 1896.7.30. 51-58, (3 ♂, 1 ♂ Immature, 3 ♀ Regd. No. 1896.7.30 (3 ♂, 1 ♀) Label kept with specimens tally with the information given in *Fauna Brit. India, Arachn.*, p. 26 (1900) From the information available we presume that these specimens belong to the series of type specimens, examined by Pocock in 1900. We have also examined some specimens identified by us. Some identified specimens are deposited in Western Regional Station, ZSI, Poona.

32. *Mesobuthus rugiscutis* (Pocock)

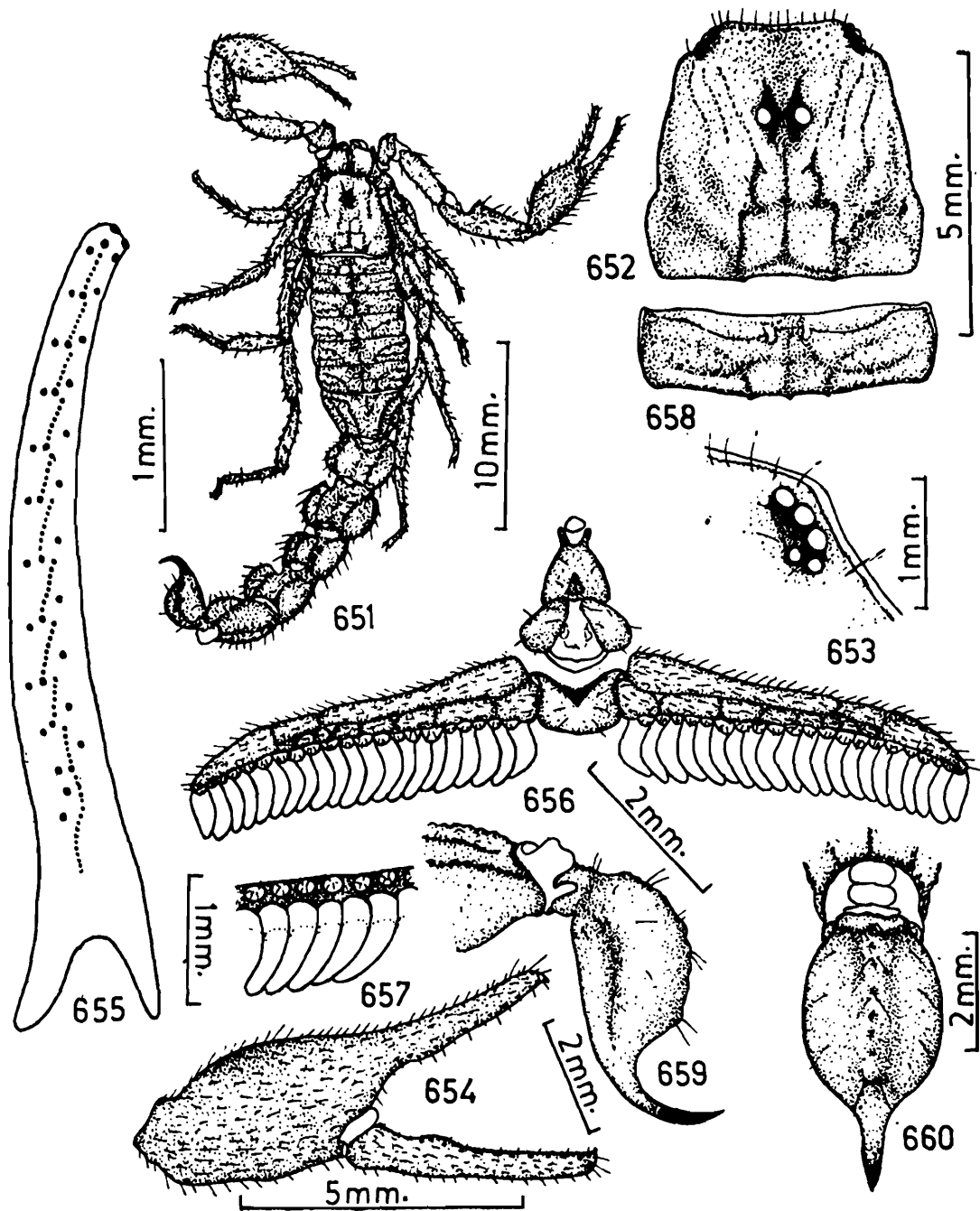
(Figs. 651-676)

1897. *Buthus rugiscutis* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 106.
 1899. *Buthus rugiscutis* : Kraepelin, *Tierr. Scorp. etc.*, : 20.
 1900. *Buthus rugiscutis* : Pocock, *Fauna Brit. India, Arachn.*, : 26-27.

General : Male and female of medium body size and yellowish brown in colour, male slightly pale but darker on posterior caudal segments. Legs pale yellow in male and same as body colour in female. Pedipalp with globular hand in male as in text-fig. 651. All carinae granular and pigmented in female. Entire body weakly covered with coarse granules. Carapace

FIGS. 646-650. *Mesobuthus hendersoni* (Pocock)

646. Femur, dorsal, interior and exterior views.
 647. Patella, dorsal view.
 648. Patella, exterior view.
 649. Manus and immovable finger, exterior view.
 650. Manus and immovable finger, ventral view.



FIGS. 651-660. *Mesobuthus rugiscutis* (Pocock)
 651. Dorsal view of female.
 652. Carapace, dorsal view.
 653. Lateral eyes, lateral view.
 654. Manus and fingers, exterior view.
 655. Movable finger, dorsal view.
 656. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 657. Pectinal teeth and fulcra, ventral view.

with weakly developed anterior carinae. The ocular tubercles granular. Mesosomal tergites tri-keeled. Pectines well developed. Last mesosomal sternite with four granular carinae. Metasoma with ten granular carinae on segments I-IV. Telson with globular vesicle and aculeus sharp and curved.

Measurements : Male total length 38.75 mm. Carapace 5.00 mm. long; Mesosoma 12.00 mm. long; Metasoma 21.75 mm. long.

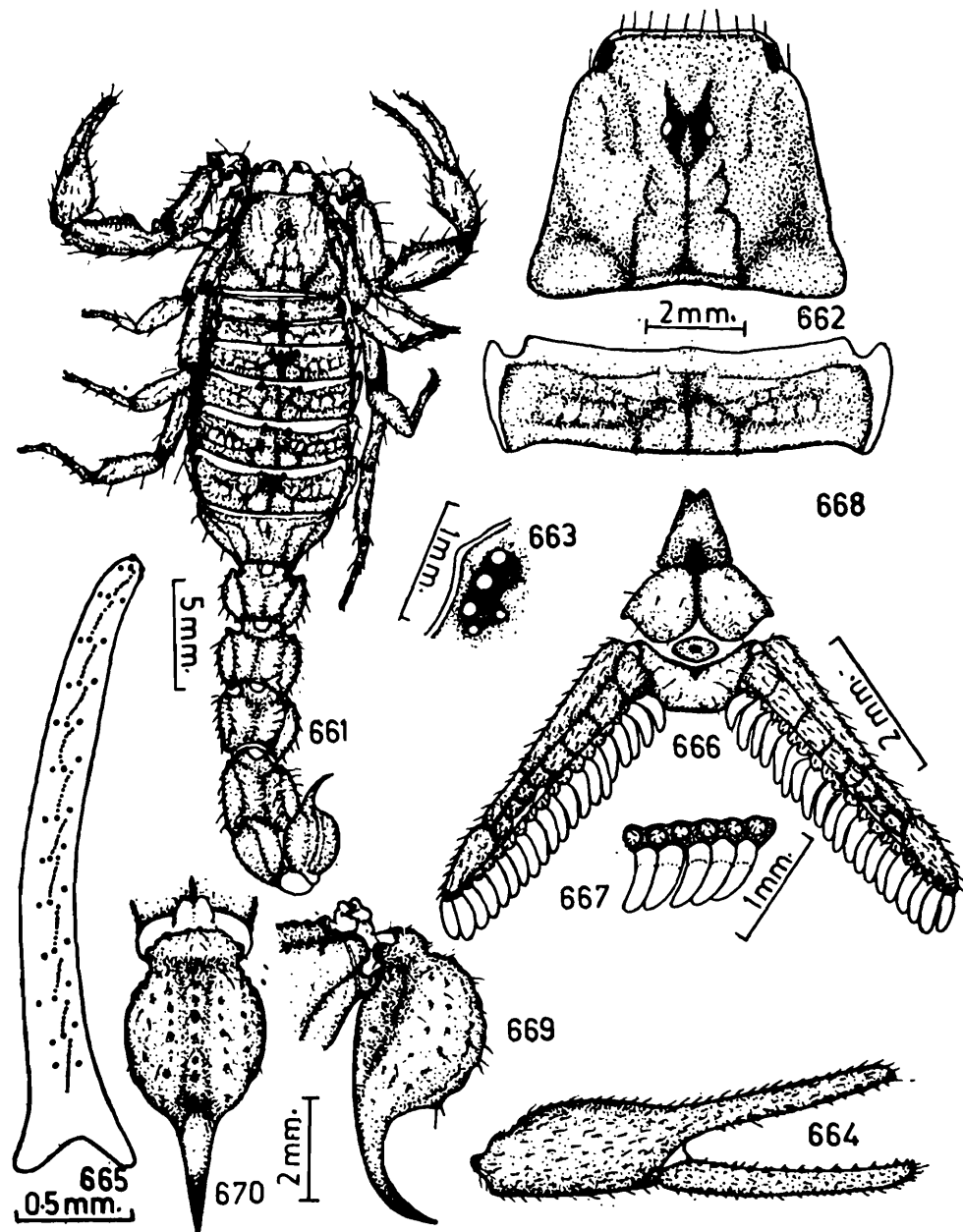
Female total length 42.75 mm. Carapace 5.25 mm. long; Mesosoma 15.50 mm. long; Metasoma 22.00 mm. long.

Carapace : Entire surface covered with coarse granules. All carinae granular. Posterior median and central median carinae roughly joining and forming a 'Lyre-form' configuration as in text-figs. 652 and 662. Lateral carinae granular and weakly developed on middle portion. Anterior carinae granular and developed only on posterior portion. Ocular tubercles black and weakly granular. Central median depression prominent and bifid on posterior portion. Five lateral eyes as in text-figs. 653 and 663. A pair of median eyes situated anteriorly in the ratio 1 : 1.5 as in text-figs. 652 and 662. Anterior margin granular and provided with few microscopic red setae. Lateral margins finely crenulated with submarginal ridge. Posterior margin granular. Chelicera with basal segment pigmented on dorsal surface but more darker on anterior portion, ventral surface pale yellow and thickly clothed with fine silky hairs. Fingers dark brown on dentition. Dentition as characterised in the family and genus. Distal teeth of dorsal and ventral arm of movable finger almost equal. Pedipalp with bulbous and robust manus in male as in text-fig. 654. Femur always shorter than carapace. All carinae granular. Intercarinal space weakly and finely granular. Patella slightly shorter than either carapace or femur. Entire surface smooth except a sub-crenulated carinae on inner

658. Tergite, dorsal view.

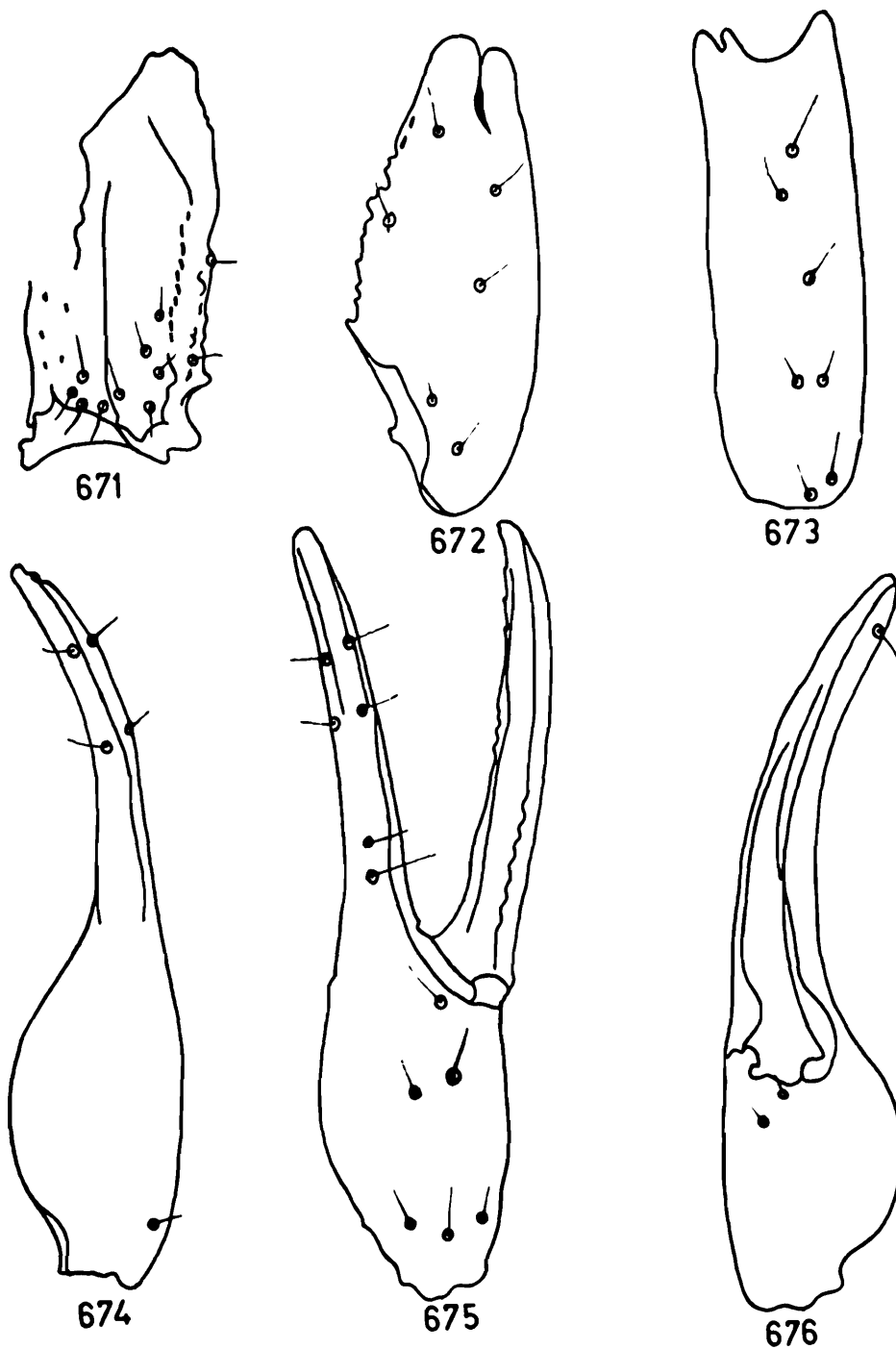
659. Telson and anal rim of metasomal segment V, lateral view.

660. Telson and anal rim of metasomal segment V, ventral view.



Figs. 661-670. *Mesobuthus rugiscutis* (Pocock)

- 661. Dorsal view of female.
- 662. Carapace, dorsal view.
- 663. Lateral eyes, lateral view.
- 664. Manus and fingers, exterior view.
- 665. Movable finger, dorsal view.
- 666. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 667. Pectinal teeth and fulcra, ventral view.
- 668. Tergite, dorsal view.
- 669. Telson and anal rim of metasomal segment V, lateral view.
- 670. Telson and anal rim of metasomal segment V, ventral view.



FIGS. 671-676. *Mesobuthus rugiscutis* (Pocock)

- 671. Femur, dorsal, interior and exterior views.
- 672. Patella, dorsal view.
- 673. Patella, exterior view.
- 674. Manus and fingers, dorsal view.
- 675. Manus and fingers, exterior view.
- 676. Manus and fingers, ventral view.

or anterior surface. Manus bulbous and robust in male. Length of under hand equal to the length of caudal segment IV in male but always shorter in female. Movable finger as long as carapace in male but longer than carapace in female. Immobile finger always shorter than carapace. Dentition on the finger non-imbricated scalloped in male as in text-fig. 654 and outer row comprises of twelve teeth as in text-figs. 655 and 665. Trichobothrial pattern on femur, patella, manus and immobile finger as in text-figs. 671-676. Legs more carinated and darker in female. Femur and patella with granular carinae but inner carinae more crenulated. Intercarinal space granular but very weakly granular in male. Tibia carinated but smooth, provided with a moderately developed tibial spur on III and IV pairs. Tarsomere I smooth, carinated provided with a pair of pedal spur. Tarsomere II furnished below with a pair of pedal spur and a paired row of minute red spinules. A pair of claw normal and reddish on tips. Pectines well developed and five times longer than wide. Middle lamellae divided into seven to eight small digits. Fulcra rounded. Lamellae and fulcra covered with microscopic red setae. Pectinal teeth well developed in male as in text-fig. 657 and 21/21 in male as in text-fig. 656, 20/20 in female as in text-fig. 666. Basal piece with a deep anterior median notch. Genital operculum always wider than long and a pair of sclerites united in the middle in female as in text-fig. 666 but exposed on posterior portion in male from which a pair of conspicuous male genital papillae visible as in text-fig. 656. Sclerites sparsely clothed with few microscopic red setae.

Mesosoma : All tergites granular but more coarsely granular on lateral portions. Tergites I-VI tri-keeled, all carinae granular, and weakly spiniform posteriorly as in text-figs. 658 and 668. A pair of lateral carinae, poorly developed on tergite, granular and running outward in the middle portion of each tergite. Posterior margin of each tergite granular. Prestergal portion smooth in middle portion but weakly granular on lateral portions. Tergite VII with two pairs of granular lateral carinae as in text-figs. 651 and 661. Posterior margin of this segment granular. Pretergal portion weakly granular. Posterior margin also granular. Sternum I-IV smooth and each provided with a pair of slit like

stigmata for book lungs. Presternal portion smooth. Sternite V finely and weakly granular and provided with two pairs of smooth to very poorly granular carinae. Presternal portion smooth.

Metasoma : Cauda slightly more than four times as long as carapace. Basal segment always wider than long. All carinae granular and each carina setose on either sides. Segments I-IV with ten carinae. Intercarinal space granular. Anterior peduncle of each segment very finely and closely granular. Posterior margin of each segment granular and provided with few setae on ventral portion. Segment V slightly shorter than carapace and with only inferior lateral, inferior and single inferior median carinae. All carinae granular and setose on both sides. Intercarinal space granular. Anal rim of this segment evenly granular as in text-figs. 659, 660, 669 and 670. Dorsal median portion smooth. Anterior and posterior peduncle of this segment smooth. Telson longer than segment V. Vesicle slightly less than as wide or deep as segment V. Ventral surface weakly granular. Ventral median crest ending into a weak subaculear nodule. Ventral and lateral bands dark brown. Setation on the vesicle as in text-figs. 659, 660, 669 and 670. Aculeus short, more curved, sharp and reddish on distal portion.

Distribution : INDIA : Mahabaleshwar, Satara; Paud, Poona; Maharashtra.

Remarks : We have examined, described and illustrated on the basis of the syntypes received from B.M. (N.H.), London, Regd. No. 1896.6.13. The information available indicates that these specimens belong to the type series examined by Pocock in 1897. We have also examined some identified specimens. The identified specimens are kept in Western Regional Station, ZSI, Poona.

The sub-species *nigritus* described by Pocock under this species has been discarded after observing the type specimen of *nigritus* Pocock received from B.M. (N.H.), London.

33. *Mesobuthus pachyurus* (Pocock)

(Figs. 677-700)

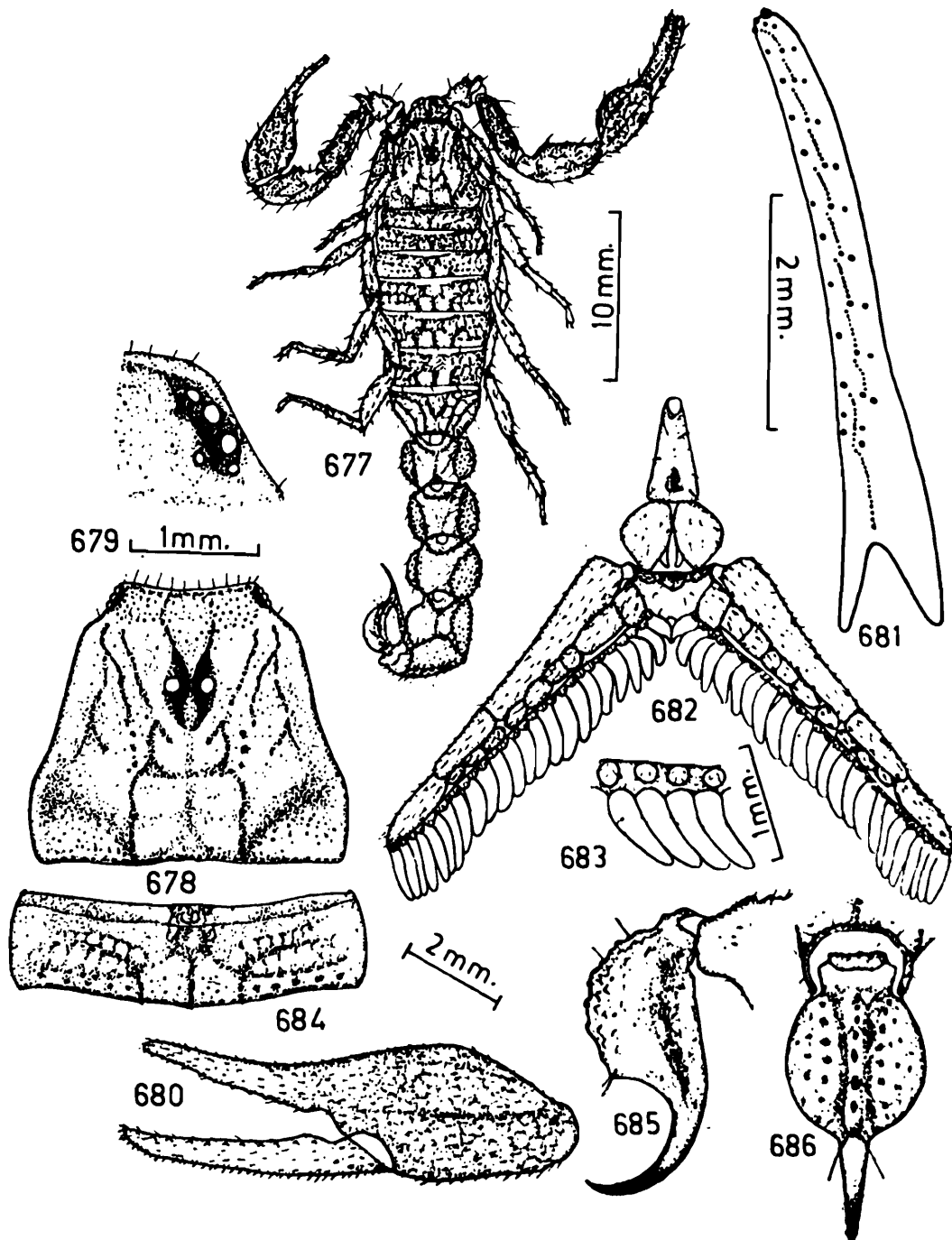
1897. *Buthus pachyurus* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 107.
 1899. *Buthus pachyurus* : Kraepelin, *Tierr. Scop. etc.*, : 20.
 1900. *Buthus pachyurus* : Pocock, *Fauna Brit. India, Arachn.*, : 27.

General : Male and female of median body size and brown to black in colour. Chelicera slightly pale. Appendages same as body colour. Telson dark reddish to brown. Ventral body surface dark yellow infested with brown patches but last mesosomal sternite dark brown to black and provided with two pairs of weakly developed carinae. Pectines well developed and yellow. Entire body surface coarsely and thickly granular. Female slightly smooth than male. Pedipalp with robust manus in male.

Measurements : Male total length 43.50 mm. Carapace 5.75 mm. long; Mesosoma 13.75 mm. long; Metasoma 24.00 mm. long.

Female total length 45.00 mm. Carapace 6.00 mm. long; Mesosoma 14.50 mm. long; Metasoma 24.50 mm. long.

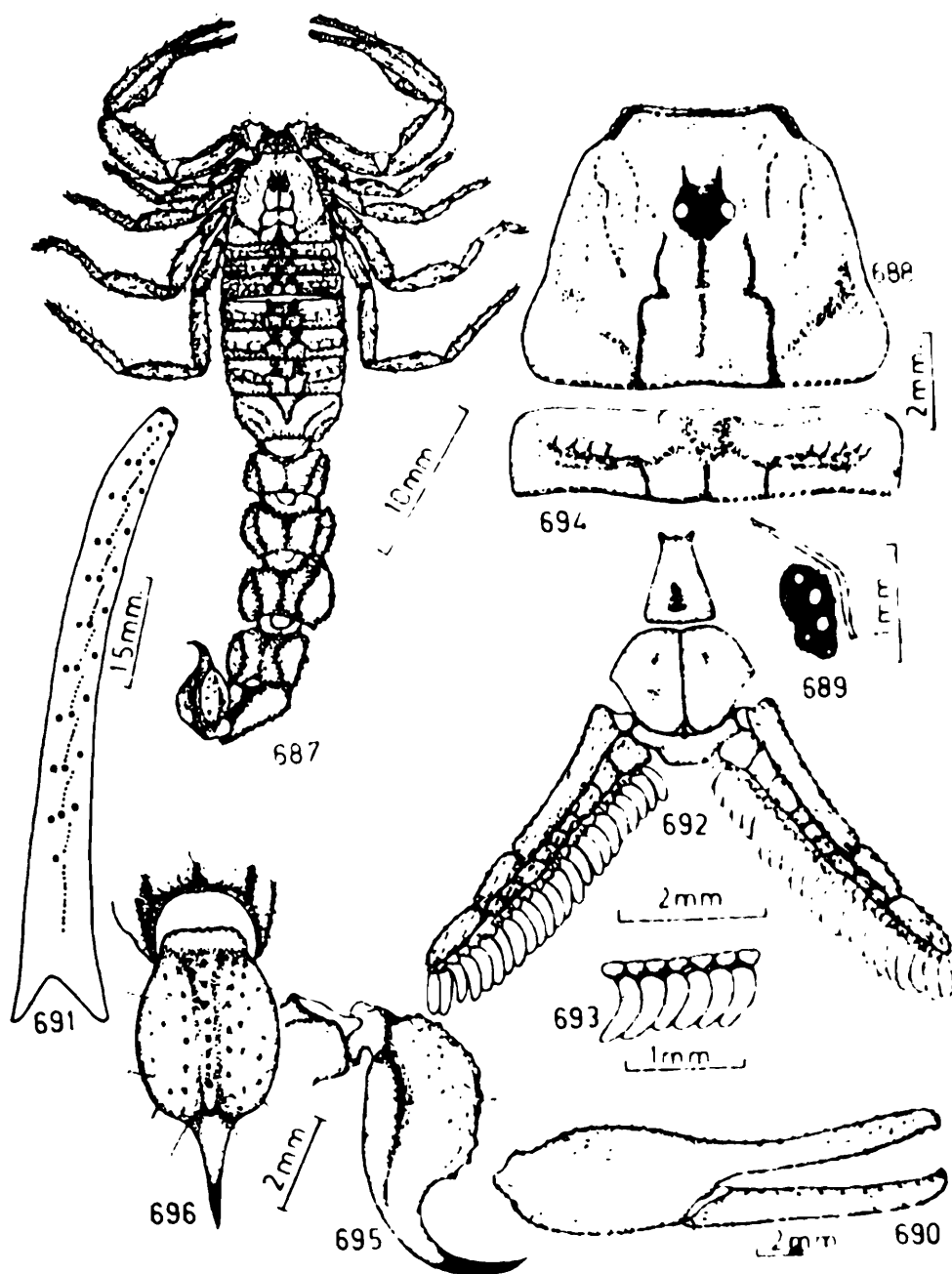
Carapace : Entire surface granular but granules more bigger and closer in male. Almost all carinae granular. Posterior median joining central median carinae and forming a 'Lyre-form' configuration as in text-figs. 678 and 688. Lateral carinae granular and developed only in the middle portion. Supercilliary crest granular and mixed with granular anterior carinae. Anterior carinae never form a granular ring in the interocular region. Interocular region more closely granular. Lateral ocular tubercles granular and provided with five contiguous lateral eyes as in text-figs. 679 and 689. A pair of median eyes situated anteriorly in the ratio, slightly more than 1 : 1.75 as in text-figs. 678 and 688. Anterior margin granular and provided with few red setae. Lateral margins finely crenulated with submarginal ridge. Median furrow bifid posteriorly and anteriorly continues upto median eyes, this furrow prominent in male. Chelicera slightly pale, pigmented on basal segment but more darker on anterior portion. Finger darker but reddish on dentition. Dentition on the fingers as characterised in family and genus. Dorsal and



FIGS. 677-686. *Mesobuthus pachyurus* (Pocock)

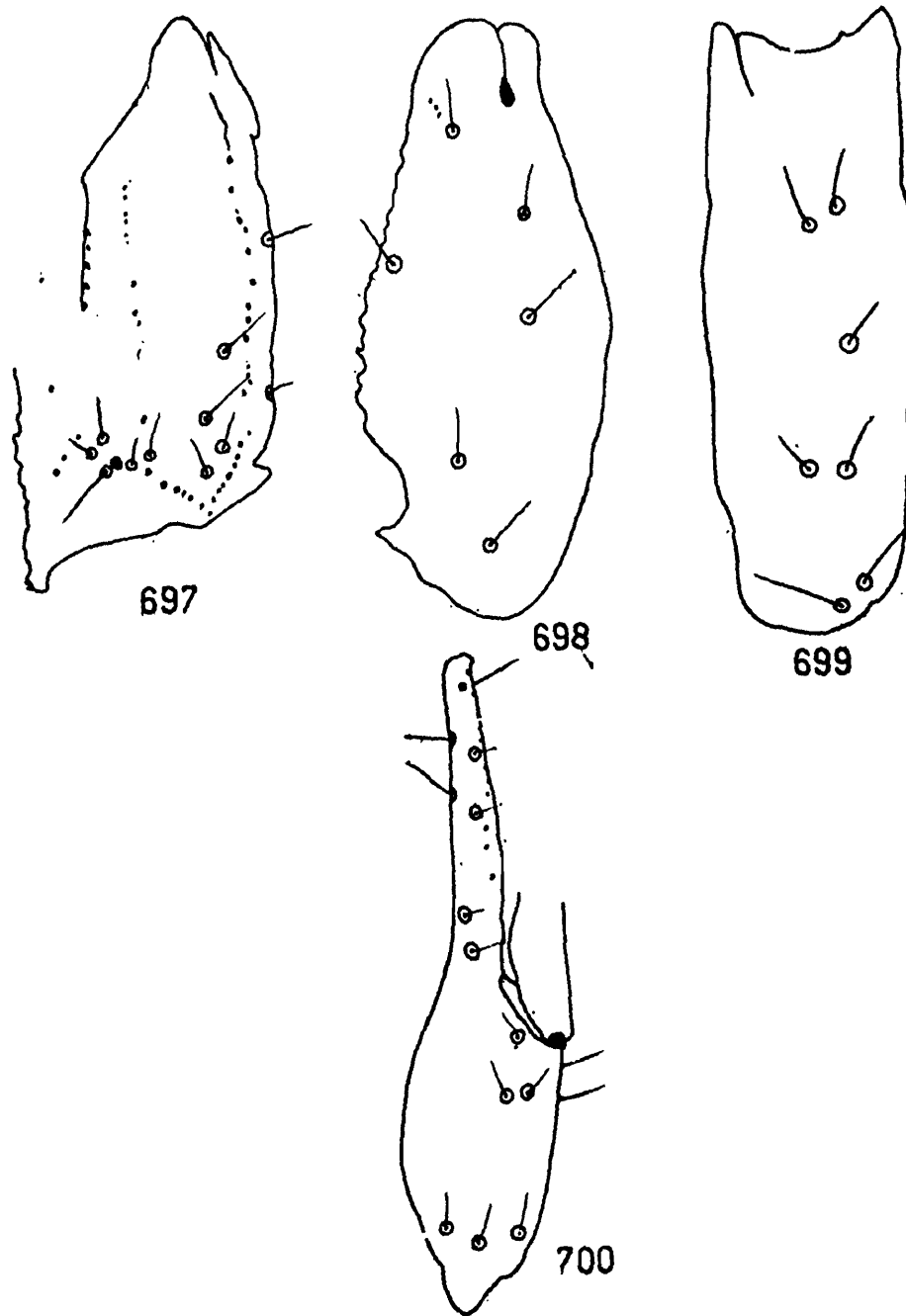
677. Dorsal view of male. 678. Carapace, dorsal view. 679. Lateral eyes, lateral view. 680. Manus and fingers, exterior view. 681. Movable finger, dorsal view. 682. Pectines, genital operculum and cephalothoracic sternum, ventral view. 683. Pectinal teeth and fulcra, ventral view. 684. Tergite, dorsal view. 685. Telson and anal rim of metasomal of segment V, lateral view. 686. Telson and anal rim of metasomal segment V, ventral view.

ventral distal teeth of movable finger subequal. Basal segment and fingers clothed below with fine silky hairs. Pedipalp more stronger and stouter in male and manus of chela robust as in text-fig. 677. Femur always shorter than carapace. Inner or posterior carinae poorly granular. Outer or anterior surface provided with crenulated carina and four to five sub-denticular prominent tubercles. Intercarinal space finely granular. Patella also shorter than carapace. Outer surface smooth without carinae. Inner or anterior surface finely granular and provided with a crenulated carina. Manus (or hand) robust and more than as wide as patella in male as in text-fig. 680. Length of under hand equal to the length of caudal segment IV in male but shorter in female. Movable finger always as long as carapace. Dentition on the fingers non-imbricated, scalloped in male as in text-fig. 680 and outer row comprises eleven to twelve teeth as in text-figs. 681 and 691. All segments clothed with microscopic hairs. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 697-700. Legs stouter in female. Femur and patella finely granular on smooth and with weakly granular carinae. Tibia carinated but smooth and furnished with a strong tibial spur on III and IV pairs. Tarsomere I carinated but smooth and furnished with a pair of pedal spur, anterior spur divided. Tarsomere II slightly pale, furnished below with a paired row of small red spinules. Claws normal, reddish on tips. Pectines well developed and four and a half times longer than wide as male as in text-fig. 682 and four times longer than wide in female as in text-fig. 692. Middle lamellae divided into eight to nine small digits. Fulcra round. Lamellae and fulcra clothed sparsely with microscopic red setae. Pectinal teeth well developed in male as in text-fig. 683 and 24/24 in number while 23/23 in female as in text-figs. 682 and 692. Basal piece provided with moderate median notch on anterior margin. Genital operculum always wider than long. Sclerites slightly divided on posterior portion in male and a pair of conspicuous male genital papillae protruding out as in text-fig. 682. Sclerites united in middle in female as in text-fig. 692, clothed weakly with few microscopic red setae. Cephalothoracic sternum triangular with a median depression on posterior portion.



FIGS. 687-696. *Mesobuthus pachyurus* (Pocock)

687. Dorsal view of female. 688. Carapace, dorsal view. 689. Lateral eyes, lateral view. 690. Manus and fingers, exterior view. 691. Movable finger, dorsal view. 692. Pectines, genital operculum and cophalothoracic sternum, ventral view. 693. Pectinal teeth and fulcra, ventral view. 694. Tergite, dorsal view. 695. Telson and anal rim of metasomal segment V, lateral view. 696. Telson and anal rim of metasomal segment V, ventral view.



Figs. 697-700. *Mesobuthus pachyurus* (Pocock)

- 697. Femur, dorsal, interior and exterior views.
- 698. Patella, dorsal view.
- 699. Patella, exterior view.
- 700. Manus and immovable finger, exterior view.

Mesosoma : All tergites granular but coarsely granular on posterior portion of each tergite, while granules on anterior portion of each tergite few and smaller. Anterior three tergites with few shining, smooth granules. Tergites I-VI tricarinated and developed only on posterior portion and carinae more granular in male. Lateral carinae running outward and forming a mosaic structure on each side. Posterior margin of each tergite granular as in text-figs. 684 and 694. Pretergal portion smooth in middle and finely granular on lateral portion with finely granular on posterior margin. Tergite VII provided with two pairs of granular carinae as in text-figs. 677 & 687. Lateral margins creunlated. Posterior margin granular. Pretergal portion granular on lateral portion and posterior margins. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth. Sternite V finely and weakly granular and provided with two pairs of granular carinae. Presternal portion smooth.

Metasoma : Cauda almost four times as long as carapace. Basal segment always more than as wide as long. Segments I-IV with ten granular carinae. Intercarinal space granular. Dorsal surface almost smooth but anterior peduncle finely granular but more granular in female. Posterior margin smooth except first caudal segment. Each carina setose on either sides. Segment V always shorter than carapace or patella and only with inferior lateral carinae. Inferior and single inferior median carinae granular. Intercarinal space granular. Dorsal surface almost smooth. Anterior peduncle finely granular. Anal rim of this segment evenly granular as in text-figs. 685, 686, 695 and 696. Telson more than as long as caudal segment V. Vesicle less than as wide or deep as last caudal segment. Ventral and lateral surface covered with many bigger granules. Ventral median crest prominent and ending into a short, sub-triangular, sub-aculear nodule, supported by a pair of long setae at the base as in text-figs. 685 and 695. Ventral and lateral bands slightly brownish. Aculeus long but shorter than vesicular length, curved, sharp, dark brown on distal portion as in text-figs. 685, 686, 695 and 696.

Distribution : INDIA : Sangli, Sholapur, Satara, Poona, Aurangabad and Nasik in Maharashtra.

Remarks : We have examined, described and illustrated on the basis of the syntypes received from B.M. (N.H.), London, Regd. No. 1896.9.26, 17-29. Information from the label kept with specimens and *Fauna Brit. India, Arachn.*, p. 27, we presume that these specimens are the type specimens originally described by Pocock in 1897. We have also examined many specimens identified by us. These identified specimens are housed in Western Regional Station, ZSI, Poona.

Genus 10. *Androctonus* Hempr. & Ehrenb.

1828. *Androctonus* Hempr. & Ehrenb., *Symb. Phys.*, 7 : 1-2.
 1829. *Prionurus* : Hempr. & Ehrenb., *Symb. Phys.*, : 3-5.
 1900. *Buthus* : Pocock, *Fauna Brit. India, Arachn.*, : 13-27.
 1948. *Androctonus* : Vachon, *Archs. Inst., Pasteur Algeria*, 26 (3) : 288-216.
 1972. *Androctonus* : Stahnke, *Ent. News*, 83 : 121-133.

Characters : Lateral and central carinae of the carapace well developed but not distinctly joining with the central median carinae. Cheliceral fixed finger provided with two teeth on inferior surface. Pedipalp tarsus (movable fingers) furnished with a row of three granules just proximal to terminal tooth. Caudal segment IV with strongly developed dorsal carinae. Width of vesicle less than width of distal end of caudal segment V, vesicular surface smooth without subaculear nodule. Cephalothoracic sternum triangular. Trichobothria *d1*, *d3* and *d4* on femur form β angle (Fig. 710)

Type species : *Androctonus australis* (Linn.)

Distribution : INDIA, PAKISTAN, IRAN, MESOPOTAMIA.

34. *Androctonus australis finitimus* (Pocock)

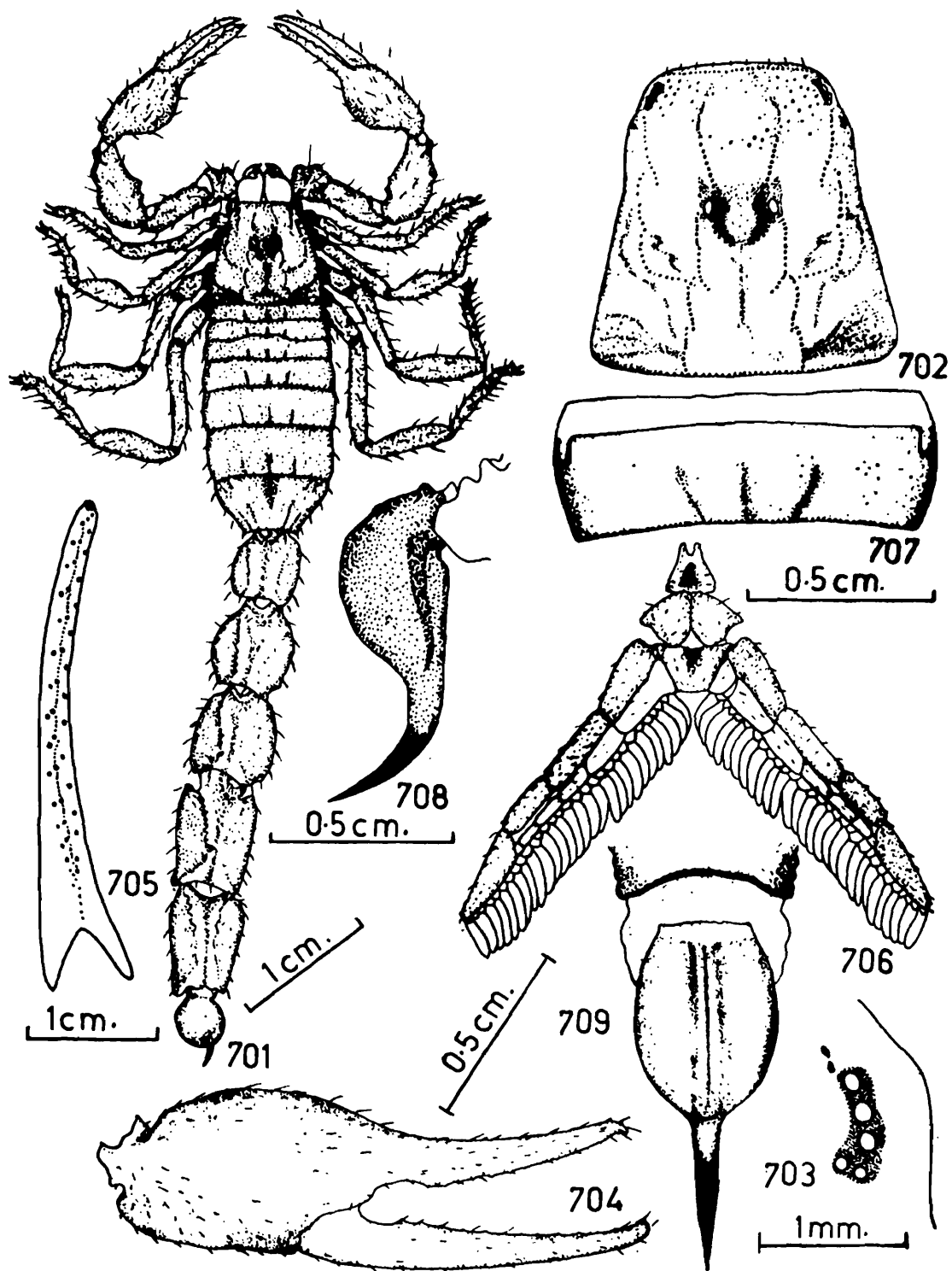
(Figs. 701-713)

1897. *Prionurus austarlis finitimus* Pocock, *J. Bombay nat. Hist. Soc.*, **11** : 103.
1899. *Buthus australis finitimus* : Kraepelin, *Tierr. Scorp. etc.*, : 16.
1900. *Buthus australis finitimus* : Pocock, *Fauna Brit. India, Arachn.*, : 16.
1948. *Androctonus australis finitimus* : Vachon, *Archs. Inst. Pasteur Alger.*, **26**(3) : 288-316 and **26**(4) : 441-481.

General : Male of bigger size; body colour yellow. Entire surface granular, all carinae also granular. Carapace, mesosoma orchy-yellow, metasoma more dark on posterior segments. Pedipalp orchy-yellow. Legs pale yellow. Ventral side of body pale. Pectines well developed. Last mesosomal sternite provided with four granular carinae. Dorsal carinae of metasomal segments III and IV much more elevated and spiniform posteriorly.

Measurements : Total length 67.00 mm. Carapace 8.00 mm. long; Mesosoma 19.00 mm. long; Metasoma 40.00 mm. long.

Carapace : Entire surface granular. All carinae granular. Central median carinae never form "H" shaped or a 'Lyre-form' configuration as in text-fig. 702. Ocular tubercles dark and granular. Anterior margin granular and provided with ten to twelve small reddish setae. Lateral margins crenulated but more crenulated on anterior portion. Posterior margin granular. Five contiguous lateral eyes as in text-fig. 703. A pair of median eyes situated anteriorly in the ratio 1 : 1.25 as in text-fig. 702. Chelicera with basal segment pale and almost smooth. Fingers dark and dark brown on marginal portions. Dentition on the fingers as characterised in the family and genus. Pedipalp with heavy, globular manus as in text-fig. 701. Femur shorter than carapace. Almost all carinae granular. Outer or anterior side provided with a crenulated crest and nine to ten sub-denticular tubercles. Patella longer than femur but always shorter than carapace. Carinae on outer side smooth. Carinae on dorsal and ventral sides granular. Inner or anterior surface provided with almost smooth crest with two sub-denticular tubercles. Manus or hand globular as in text-



FIGS. 701-709 : *Androctonus australis finitimus* (Pocock)

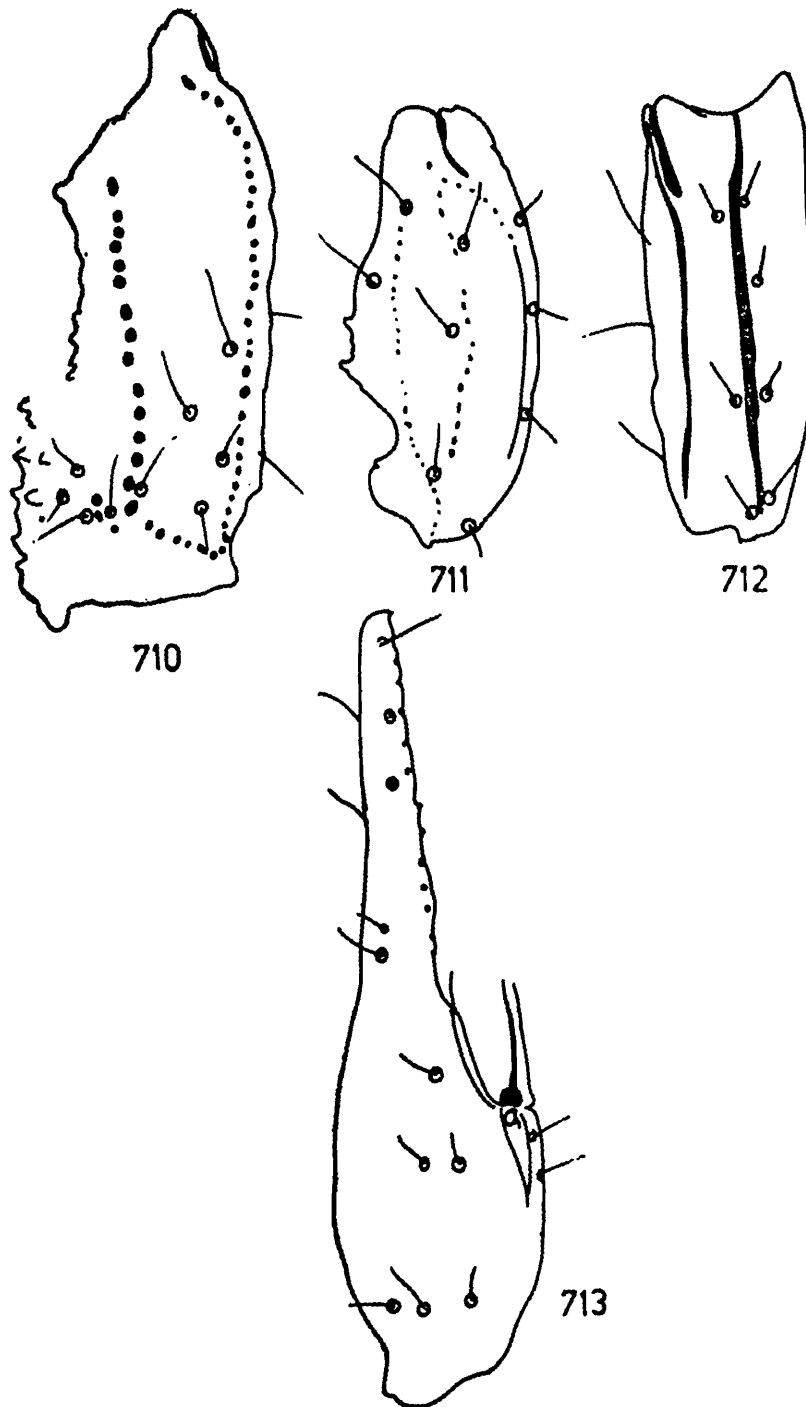
- 701. Dorsal view of male.
- 702. Carapace, dorsal view.
- 703. Lateral eyes, lateral view.
- 704. Manus and fingers, exterior view.
- 705. Movable finger, dorsal view.

fig. 704 and length of under hand shorter than femur. Immobile fingers almost as long as femur but movable finger longer than carapace. Dentition on the fingers non-imbricated and movable finger comprises fourteen teeth in outer row as in text-fig. 705. Trichobothrial pattern on femur, patella, manus and immobile finger as in text-figs. 710-713. Legs with femur and patella granular and carinae crenulated. Tibia carinated but smooth and III and IV pairs with strong tibial spurs. Tarsomere I laterally flat and provided with a comb of long setae on dorsal and ventral margins. Tarsomere II cylindrical and flanked below with two rows of short reddish spinules. Pectines well developed and almost five times longer than wide. Middle lamellae divided into seven small digits. Fulcra well distinguished and nearly triangular. Lamellae and fulcra covered with microscopic setae. Basal piece with anterior margin slightly notched in the middle portion and clothed sparsely with minute setae. Genital operculum wider than long and sclerites slightly divided on posterior portion from which small male genital papillae protruding out as in text-fig. 706. Cephalothoracic sternum small and triangular.

Mesosoma : All tergites granular but more granular on posterior portion of each tergite. Tergites I-VI with a median and two lateral carinae, all carinae granular and developed only on posterior portion of each tergite as in text-fig. 707. Tergite VII provided with two pairs of lateral granular carinae as in text-fig. 701, granules sparse on posterior portion. Pretergal portion smooth. Sternites I-IV smooth and each provided with slit like stigmata for book lungs. Presternal portion smooth with smooth posterior margin. Sternite V provided with two pairs of crenulated carinae.

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706. Pectines, genital operculum and cephalothoracic sternum, ventral view.
707. Tergite, dorsal view.
708. Telson and anal rim of metasomal segment V, lateral view.
709. Telson and anal rim of metasomal segment V, ventral view.

Metasoma : Cauda five times as long as carapace. Basal segment longer than wide. Segments I-IV with dorsal carinae



FIGS. 710-713. *Androctonus australis finitimus* (Pocock)

710. Femur, dorsal, interior and exterior views.

711. Patella, dorsal view.

712. Patella, exterior view.

713. Manus and immovable finger, exterior view.

crenulated, dentiform on posterior portion and much more elevated on segments III and IV. Dorsolateral carinae evenly crenulated. Lateral carinae weakly developed only on posterior portion of segment I. Inferior lateral carinae evenly crenulated on segments II-IV. Interior carinae poorly crenulated on segment I, crenulated on segments II-IV. Segment V dorso-ventrally flat, dorsal carinae developed and crenulated on anterior portion. Inferior lateral carinae crenulated but dentiform on posterior portion. Single inferior median carina very weakly developed and crenulated. Anal rim of this segment weakly developed and poorly crenulated. Intercarinal space almost smooth on all segments. Telson with vesicle not as wide or deep as segment V. Ventral surface weakly granular. Ventral median crest not developed and no subaculear nodule present. Lateral and ventral bands dark. Setation not clear. Aculeus as long as vesicular length, not much curved, sharp and dark on distal portion as in text-figs. 708 & 709.

Distribution : INDIA : Western Rajasthan; PAKISTAN : Sindh, Kotri.

Remarks : We have received the type specimen (one ♂) from B.M. (N.H.), London, Regd. No. 1896. 7-30.69 and the present illustrations and descriptions are based on the type specimen only. We have also examined some specimens identified by us. Some of these identified specimens are deposited in Western Regional Station, ZSI, Poona.

Genus 11, *Odontobuthus* Vachon

1950. *Odontobuthus* Vachon, *Archs. Inst. Pasteur Alger.*, 28 (2) : 152-193
1972. *Odontobuthus* : Stahnke, *Ent. News*, 83 : 121-133.

Characters : The lateral and central median carinae of the carapace usually joining with weakly developed, short carinae. Fixed fingers of chelicera provided with two minute teeth on under surface. Metasomal segment V convex on dorsolateral sides

and without carinae. Width of vesicle not less than the distal width of metasomal segment V. Five to seven very large granules arranged in transverse rows on distal and proximal margins of metasomal segments III and IV respectively. Four small granules near the terminal tooth of pedipalp tarsus (movable finger) plus a large apical granule. Dentition non-imbricated. Cephalothoracic sternum triangular. Trichobothria *d1*, *d3* and *d4* on femur form β angle (Fig. 722)

Type species : *Odontobuthus doriae* Thorell.

Distribution : ASIA : INDIA, PAKISTAN, BALUCHISTAN, AND IRAN.

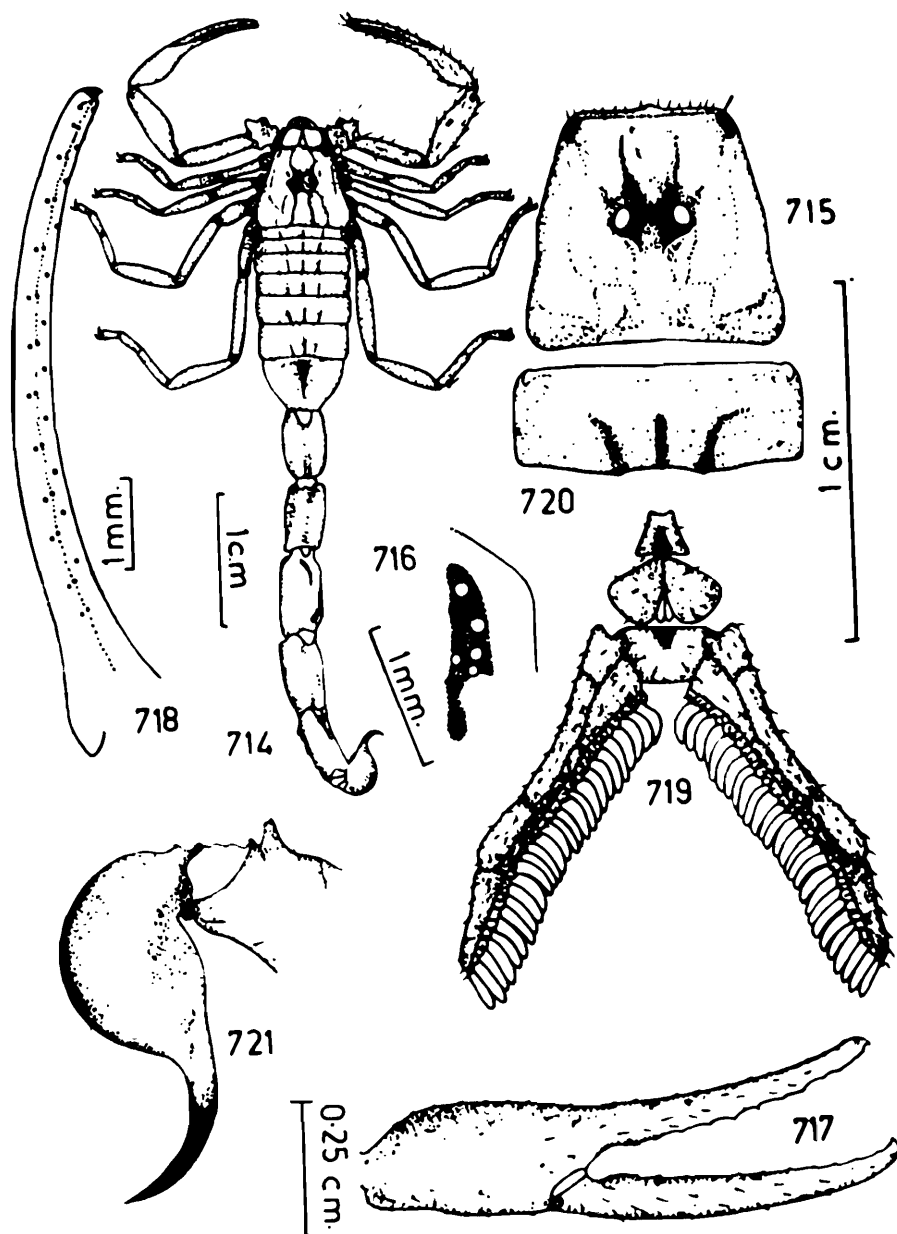
35. *Odontobuthus doriae odonturus* (Pocock)

(Figs. 714-726)

1897. *Buthus doriae odonturus* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 104.
 1890. *Buthus doriae odonturus* : Kraepelin, *Tierr. Scorp. etc.*, : 27.
 1903. *Buthus doriae odonturus* : Pocock, *Fauna Brit. India, Arachn.*, : 16-17.
 1950. *Odontobuthus doriae odonturus* : Vachon, *Archs. Inst. Pasteur Alger.*, 28(2) : 152-193.

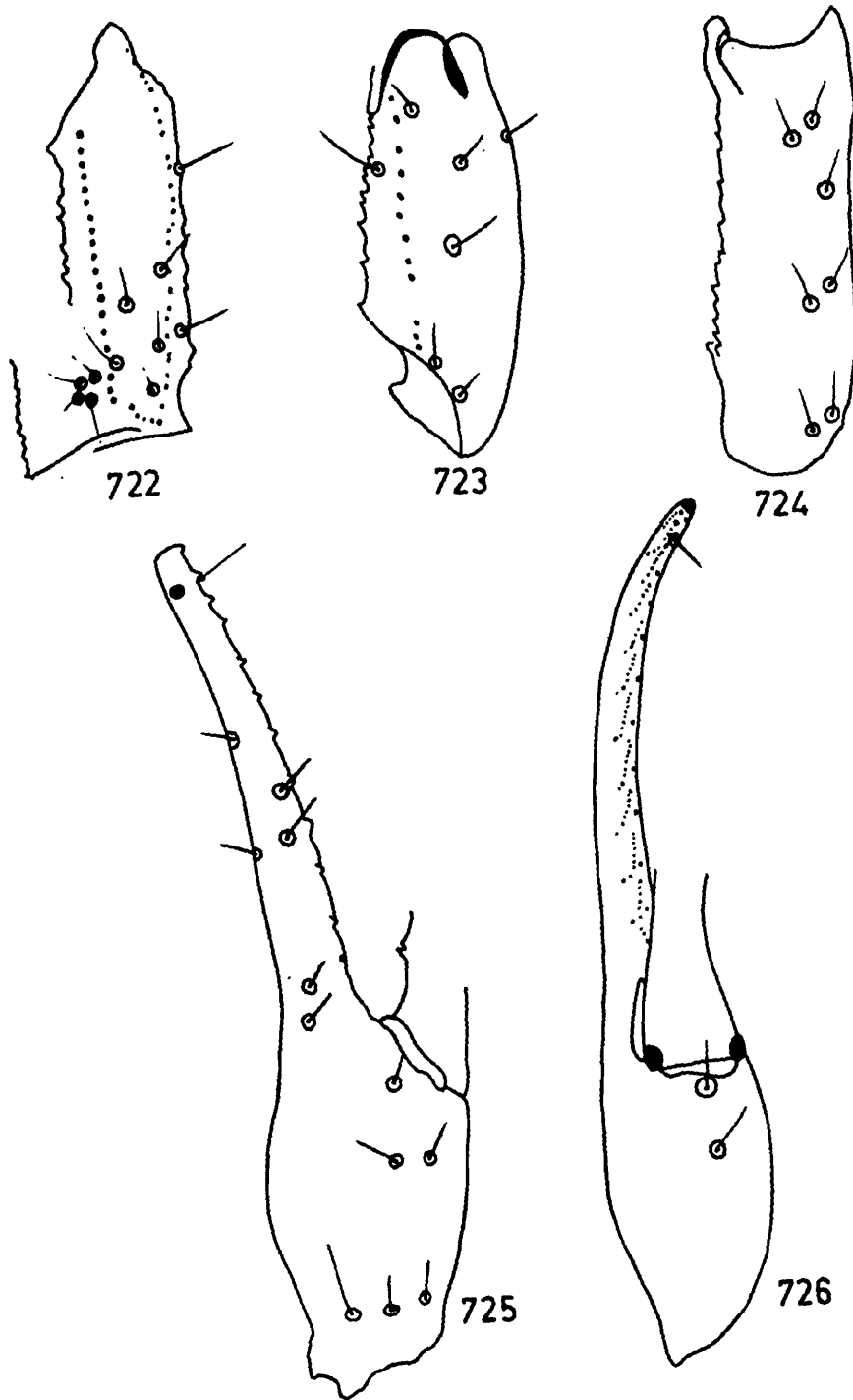
General : Male of big and slender body size, yellowish in colour. Entire body surface granular. All carinae granular. Metasomal region slightly darker on posterior segments. Appendages paler than body colour. Ocular tubercles dark black. The posterior median and central median carinae of carapace not forming H shape or in 'Lyre-form' as in text-fig. 715. Pectines well developed. Last mesosomal sternite provided with two pairs of granular carinae.

Measurements : Total length 56.00 mm. Carapace 6.50 mm. long; Mesosoma 14.50 mm. long; Metasoma 35.00 mm. long.



Figs. 714-721. *Odontobuthus doriae odonturus* (Pocock)

- 714. Dorsal view of male.
- 715. Carapace, dorsal view.
- 716. Lateral eyes, lateral view.
- 717. Manus and fingers, exterior view.
- 718. Movable finger, dorsal view.
- 719. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 720. Tergite, dorsal view.
- 721. Telson and anal rim of metasomal segment V lateral view.



Figs. 722-726. *Odontobuthus doriae odonturus* (Pocock)

- 722. Femur, dorsal, interior and exterior views.
- 723. Patella, dorsal view.
- 724. Patella, exterior view.
- 725. Manus and immovable finger, exterior view.
- 726. Manus and immovable finger, ventral view.

Carapace : Entire surface granular but more granular on lateral portions. All carinae granular. The posterior median carinae very widely separated, joining with lateral carinae and continue upto lateral ocular tubercles. Central median carinae never join with posterior median carinae and form H shape or 'Lyre-form' configuration as in text-fig. 715. Superciliary crest granular and continued behind the eyes by a pair of converging granular series. Anterior margin smooth and provided with ten to twelve microscopic red setae. Lateral margins finely crenulated and provided with finely granular submarginal ridge. Posterior margin granular. Five contiguous lateral eyes as in text-fig. 716. A pair of median eyes placed more apart from each other and situated anteriorly nearly in the ratio 1 : 1.25 as in text-fig. 715. Chelicera with basal segment smooth on dorsal side and clothed below with a tuft of fine silky hairs. Fingers reddish brown on dentition. Dentition on fingers as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger almost subequal. Pedipalp slender and weak. Femur almost as long as carapace. All femoral carinae crenulated except inner carinae. Outer or anterior surface provided with crenulated crest and six to seven tubercles prominent. Patella slightly longer than carapace. Outer carinae smooth, carinae on dorsal and ventral surface granular. Inner or anterior surface provided with two sparsely crenulated crest. Manus or hand slender and the length of under hand shorter than femur and less than as wide as patella. Dentition on the fingers non-imbricated and twelve teeth in outer row of movable finger as in text-fig. 718. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 722-726. Legs slightly pale yellow. The carinae on femur and patella serrated. Intercarinal space sparsely granular. Tibia slightly flat on lateral sides, provided with dorsal comb of long setae and a short tibial spur on III and IV pairs. Tarsomere I compressed laterally and provided with comb of long bristles on dorsal and ventral sides and a pair of short pedal spurs. Tarsomere II flanked below and on distal portion with few long bristles and spinules. Pectines well developed and four and a half times longer than wide. Middle

lamellae divided into eight small digits. Fulcra distinguished and triangular in shape. Lamellae and fulcra clothed with microscopic red setae. Pectinal teeth 28/28. Basal piece broad and the anterior margin slightly notched in the middle portion. Genital operculum always wider than long and the sclerites weakly divided on posterior portion from which a weak male genital papillae protruding out as in text-fig. 719. Cephalothoracic sternum small and triangular.

Mesosoma : All tergites granular but more granular on posterior portion. Tergites I-VI with three granular carinae, developed on posterior portion as in text-fig. 720. Posterior margin granular. Tergite VII provided with two pairs of granular lateral carinae, median carina granular and developed on anterior portion as in text-fig. 714. Posterior margin smooth. Pretergal portion smooth. Sternites I-IV smooth, each provided with slit like stigmata for book lungs and a smooth to weakly crenulated lateral carina developed on inner margin of each book lung. Presternal portion smooth on sternites II-IV. Sternite V weakly granular on lateral portions and provided with two pairs of crenulated carinae. Presternal portion smooth.

Metasoma : Cauda nearly six times as long as carapace. Basal segment always longer than wide. Segments I-IV with dorsal carinae crenulated on segment I, weakly crenulated on segment II and very weakly developed on segment III. Dorso-lateral carinae weakly crenulated on segments I & II, poorly developed on segments I-III but developed on three fourth posterior portion of segment II and one fourth posterior portion of segment III. Inferior lateral carinae crenulated on segments I-IV and slightly dentiform on posterior end. Inferior carinae modified, nearly smooth on segment I, dentiform on posterior portion of segments II and III but smooth on middle portion and forming a transverse row of four dentiform tubercles on posterior margins, anterior margin of segments III and IV provided with a transverse row of six small uniform, dentiform tubercles. Inferior carinae very weakly developed on segment IV. Segment V thin and less globular than anterior segment. Inferior lateral carinae crenulated on anterior portion and dentiform on posterior

portion. Inferior carinae crenulated and developed on anterior portion. Single inferior median carina evenly serrated. Anal rim of this segment serrated, dentiform and lateral tubercles lobate and divided as in text-fig. 721. Intercarinal space nearly smooth but weakly granular on ventral side of segment V. Telson nearly as long as fifth caudal segment but more than as wide or deep as fifth caudal segment. Entire surface smooth, ventral median crest smooth, no subaculear nodule. Ventral and lateral bands brownish. Aculeus nearly as long as vesicular length, sharp and dark on distal portion as in text-fig. 721. Setation on the vesicle not clear.

Distribution : INDIA : Bikaner, Rajasthan; PAKISTAN : Upper Sind, Khelat frontier.

Remarks : We have received the type specimen (one ♂) from B.M. (N.H.), London, Regd. No. 1896.10.20.23 and present illustrations and descriptions are based only on the type specimen. We have included this species in our fauna because two male specimens have been reported from Rajasthan. The identified specimens are deposited in Western Regional Station, ZSI, Poona.

2. Subfamily CENTRURINAE

1891. *Centrurinae* Kraepelin, *Jb. hamb. wiss. Anst.*, 7 : 149.
 1896. *Centrurinae* : Pocock, *Ann. Mag. nat. Hist.*, 17(6) : 428.
 1899. *Isometrinae* : Kraepelin, *Tierr. Scorp. etc.*, : 64.
 1900. *Centrurinae* : Pocock, *Fauna Brit. India, Arachn.*, : 42.

Characters : III and IV pairs of legs never furnished with tibial spur. Trichobothrial pattern on pedipalp of 'A' type (Figs. 46-50)

Distribution : ASIA : Eastern Mediterranean area, Northern Baluchistan, Pakistan, India, Sri Lanka, Java, Sumatra; Australia; AFRICA : South Africa, West Indies and Galapagos Isl.

Genus 12. *Isometrus* Hempr. and Ehrenb.

1829. *Isometrus* Hempr. & Ehrenb., *Symb. Phys. Scorp.*, : 3.
 1891. *Isometrus* : Kraepelin, *Jb. hamb. wiss. Anst.*, **8** : 244.
 1900. *Isometrus* : Pocock, *Fauna Brit. India, Arachn.*, : 44-45.
 1969. *Isometrus* : Vachon, *Senckenberg. biol.*, **50** : 417-420.
 1972. *Isometrus* : Stahnke, *Ent. News*, **83** : 121-133.
 1972. *Isometrus* : Vachon, *Cah. Pacif.*, **16** : 169-180.

Characters : Carapace sometimes with only median carinae. Mesosomal tergites monocarinated. Inferior surface of cheliceral fixed finger with one tooth. Cephalothoracic sternum small, triangular and not as long as genital operculum. Caudal region slender; vesicle as wide as metasomal segment V and with a strong, triangular subaculear spine at the base of aculeus. Pedipalp tarsus (movable finger) with 5-6 distinct median oblique rows of granules (non-imbricated) plus a short apical and a compound basal row. Tarsomere I not depressed and fringed with setae. Trichobothria *d1*, *d3* and *d4* on femur form β angle (Fig. 735)

Type species : *Isometrus europeus* (Linn.)

Distribution : ASIA : INDIA, SRI LANKA, BURMA, JAVA; AUSTRALIA; AFRICA; SOUTH AMERICA AND SOUTH SEA ISLANDS.

Discussion : This genus has so far been represented by nine species from India. After studying the trichobothrial pattern on pedipalp it is revealed that these species belong to the subgenus *Raddyanus* Vachon 1972. Under this subgenus, we have described two new species. We have also proposed a new subgenus *Closotrichus* under which we have described one new species.

Key to the subgenera of genus Isometrus

1. Trichobothria *db* placed always proximal to *et* but distal to *est* (Fig. 739);
 Vesicle is not bulbous (Fig. 734). *Raddyanus*
 Trichobothria *db* placed always distal to
et (Fig. 910); Vesicle is more bulbous
 (Fig. 904). *Closotrichus*

Subgenus (i) : *Raddyanus* Vachon.1972. *Raddyanus* Vachon, *Cah. palif.*, 16 : 169-180*Characters* : Trichobothria *db* placed always proximal to *et* but distal to *est*; vesicle not much bulbous.*Type-species* : *Isometrus maculatus* (Geer)*Distribution* : Same as generic distribution.*Key to the species of the subgenus Raddyanus*

1. Metasoma 5 to 6 times as long as carapace;
vesicle twice as long as aculeus. .2
Metasoma 7 to 8 times as long as carapace;
vesicle more than twice as long as aculeus.. .6
2. Metasoma always 5 times as long as carapace;
sub-aculear spine provided with one pair of small denticulate granules on inner margin. .. .3
Metasoma always 6 times as long as carapace;
sub-aculear spine provided with one or three pairs of small denticulate granules on inner margin. .4
3. Mesosomal tergite with a pair of conspicuous median yellow bands (Fig. 727);
Vesicle elongate and longer than wide (Fig. 734); Pectinal teeth 12/13 (Fig. 732). .*vittatus*
Mesosomal tergite with 5 black and 6 yellow bands (Fig. 741); vesicle globular and as long as wide (Fig. 749); Pectinal teeth 12/14 (Fig. 746). .. .*rigidulus*
4. Subaculear spine provided with only one pair of small denticulate granules on inner margin; Manus of pedipalp smooth and acarinated. .5
Subaculear spine provided with three pairs of small denticulate granules on inner margin; Manus of pedipalp granular and strongly carinated (Fig. 759). ..*brachycentrus*

5. Pectinal teeth 15/16; Body size more than 35 mm in length; Body colour yellowish variegated with blackish brown patches; Manus of pedipalp short, stout in male as in female. *.thrustoni*
 Pectinal teeth 11/12; Boy size not more than 30 mm. in length; Body colour brownish variegated with yellow patches (Figs. 799 & 814); Manus of pedipalp very long in male (Fig. 799). *.isudensis*
6. Metasoma 8 times as long as carapace; subaculear spine provided with one pair of small denticulate granules on inner margin; Manus of pedipalp very long and thin in male; Pectinal teeth 17/17. *.europaeus*
 Metasoma 7 times as long as carapace; subaculear spine provided with two or three pairs of small denticulate granules on inner margin; Manus of pediplap short and stout in male; Pectinal teeth less than 17/17. 7
7. Aculeus very short and less than one third of vesicular length; Dorsal carinae of metasomal segments II and III may or may not be ending posteriorly into an upstanding procurved spines; Sub-aculear spine provided with three pairs of small denticulate granules on inner margin. *.8*
 Aculeus slightly longer and less than half the length of vesicle; Dorsal carinae of metasomal segments II and III posteriorly spiniform; Sub-aculear spine provided with two small denticulate granules on inner margin. *.assamensis*

8. Ratio of median eyes to anterior and posterior margins of carapace 1 : 1.9 (Fig. 868); Vesicle tapering distally and much granular on ventral surface; Fingers of pedipalp short and stout; Trichobothria *e1* placed proximally to *d5* on femur (Fig. 876); Dorsal carinae of metasomal segments II and III ending posteriorly into very strong, procurved and up standing spines (Fig. 887).

.acanthurus

Ratio of median eyes to anterior and posterior margins of carapace 1 : 2.25 (Fig. 883); Vesicle globular on distal portion and very weakly granular on ventral surface; Fingers of pedipalp thin and long; Trichobothria *e1* placed in a same plane to *d5* on femur (Fig. 872); Dorsal carinae of metasomal segments II and III ending posteriorly into a very small subdenticular granules (Fig. 882).

.corbett

36. *Isometrus (Raddyanus) vittatus* Pocock

(Figs. 727-740)

1900. *Isometrus vittatus* Pocock, *Fauna Brit. India, Arachn.*, : 51.
 1972. *Isometrus (Raddyanus) vittatus* : Vachon, *Cah. Pacif.*, 16 : 169-180.

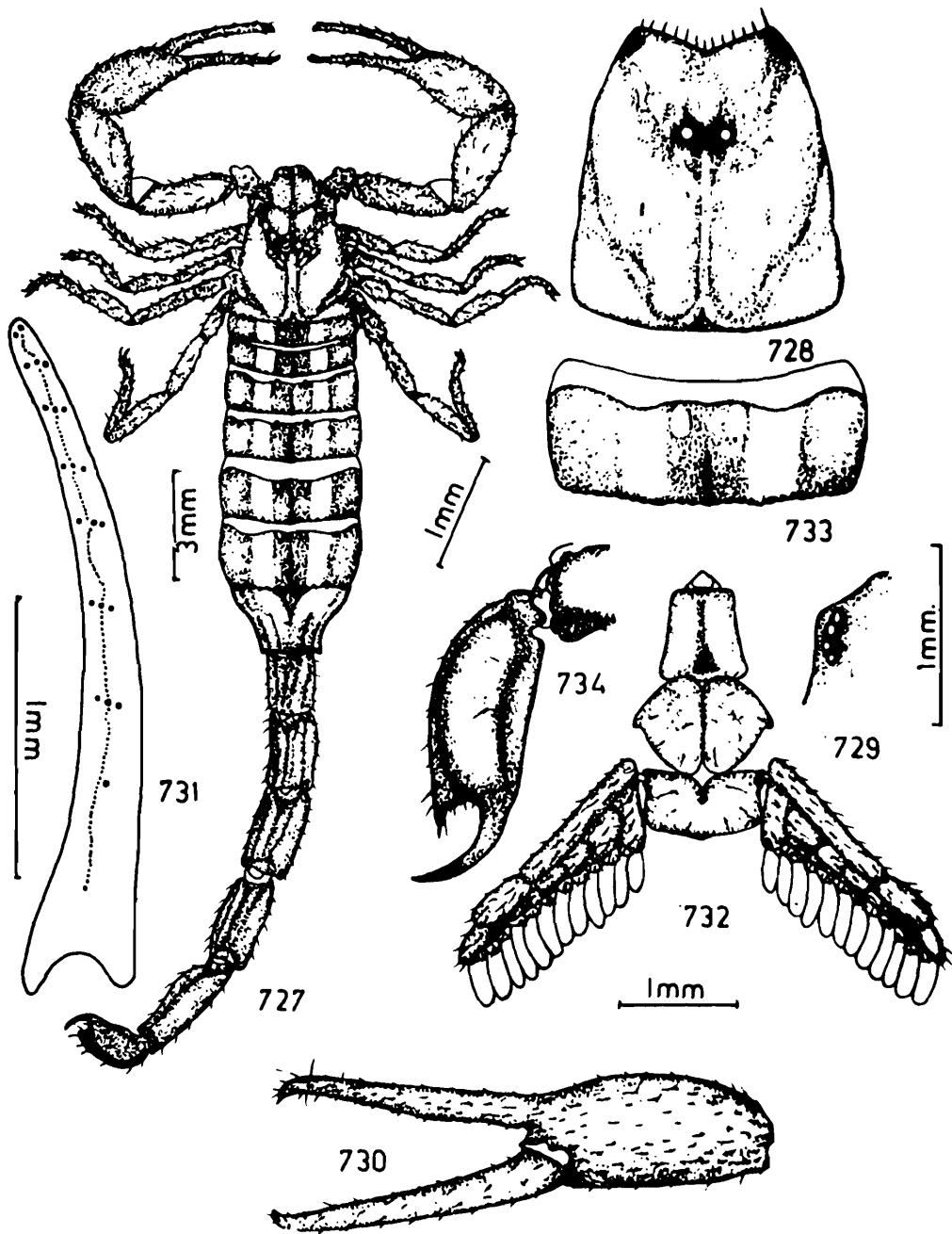
General: Female very small, yellowish brown with a pair of conspicuous yellow bands on mesosomal tergites, separated by median brown band as in text-fig. 727. Almost entire body very weakly and finely granular. Carapace without carinae, smooth, black on ocular tubercles. Mesosomal tergites monocarinated. Metasomal segments very finely granular, carinated but last two segments smooth. Telson smooth with triangular subaculear nodule. Aculeus sharp, less curved. Appendages pale yellow and delicate. Pectines well developed. Last mesosomal sternite with two pairs of carinae.

Measurements : Total length 23.25 mm. Carapace 2.75 mm. long; Mesosoma 7.25 mm. long; Metasoma 13.25 mm. long.

Carapace : Surface very finely and weakly granular but more granular on lateral portion. Interocular area almost smooth. Posterior median depression shallow. Ocular tubercles black and granular. Lateral ocular tubercles provided with five lateral eyes as in text-fig. 729. Median tubercles finely granular, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.25 as in text-fig. 728. Anterior margin smooth and more invaginated in the middle. Lateral margins smooth, with finely granular sub-marginal ridge. Posterior margin granular above and nearly straight. Chelicera pale yellow, basal segment smooth and provided with many fine silky hairs on ventral surface. Fingers yellow but brownish on dentition. Dentition as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger almost subequal. Pedipalp comparatively short. Femur shorter than carapace, carinated, carinae finely crenulated. Outer or anterior surface with weakly crenulated carina; provided with five sub-denticular tubercles. Inter-carinal space very finely but weakly granular. Patella longer than femur but always as long as carapace. Carinae weakly developed and granular. Outer or posterior surface smooth. Inner or anterior surface granular and provided with four sub-denticular tubercles. Manus or hand entirely smooth and length of under hand less than femur but equal to second caudal segment, and always more than as wide or deep as patella as in text-fig. 730. Fingers darker and brown at proximal portion while pale yellow at tips. Movable finger slightly shorter than carapace or patella but longer than femur. Immobile finger shorter than femur. Dentition on fingers non-imbricated and outer row on movable finger comprises seven teeth as in text-fig. 731. All segments weakly and sparsely clothed with setae. Trichobothrial pattern on femur, patella, manus and immobile as in text-figs. 735-740. Legs more yellowish, femur and

FIGS. 727-734. *Isometrus (Raddyanus) vittatus* Pocock

727. Dorsal view of female.
728. Carapace, dorsal view.



- 729. Lateral eyes, lateral view.
- 730. Manus and fingers, exterior view.
- 731. Movable finger, dorsal view.
- 732. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 733. Tergite, dorsal view.
- 734. Telson and anal rim of metasomal segment V, lateral view.

patella granular, carinated. All carinae granular. Tibia carinated but smooth. Tarsomere I smooth provided with a pair of pedal spur on distal portion. Tarsomere II pale yellow, smooth, clothed below with a thick row of non-paired bristles. Claws delicate, short, pointed and reddish brown on tips. Pectines pale yellow, well developed and three times longer than wide. Middle lamellae divided into seven to eight small digits. Fulcra well distinguished and slightly elongated. Lamellae and fulcra covered with microscopic white setae. Teeth short pointed, well developed, tubular and 12/13 in number as in text-fig. 732. Basal piece with anterior margin invaginated and deeply notched in the middle. Genital operculum always wider than long, provided with a pair of sclerites fused in the middle. Cephalothoracic sternum triangular provided with a narrow, small depression on posterior portion as in text-fig. 732.

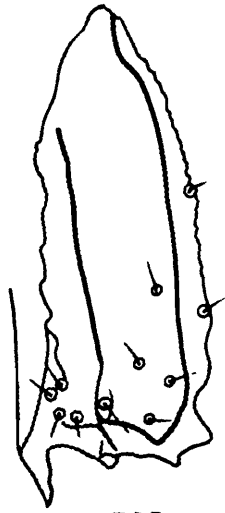
Mesosoma : All tergites with a pair of conspicuous submedian yellow bands as in text-fig. 733, weakly and finely granular on lateral and posterior portions. Posterior margin of each tergite granular and crenulated. Pretergal portion smooth with finely granular posterior margin. Lateral portions almost smooth. Tergite I without carina. Tergites II-VI with a median carina, granular and developed only on posterior portion as in text-fig. 733. Tergites VII with two pairs of granular lateral carinae as in text-fig. 727. Posterior margin granular above. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth with smooth posterior margin. Sternite V granular on lateral portion and provided with two pairs of weakly crenulated carinae. Lateral margins finely crenulated but posterior margin smooth. Presternal portion not visible.

Metasoma : Cauda almost five times as long as carapace. Basal segment always longer than wide. Segment I provided with dorsal, dorsolateral, lateral, inferior lateral and inferior

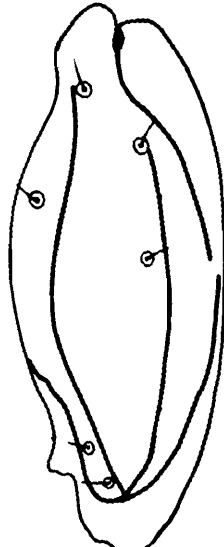
FIGS. 735-740. *Isometrus (Raddyanus) vittatus* Pocock

735. Femur, dorsal, interior and exterior views.

736. Patella, dorsal view.



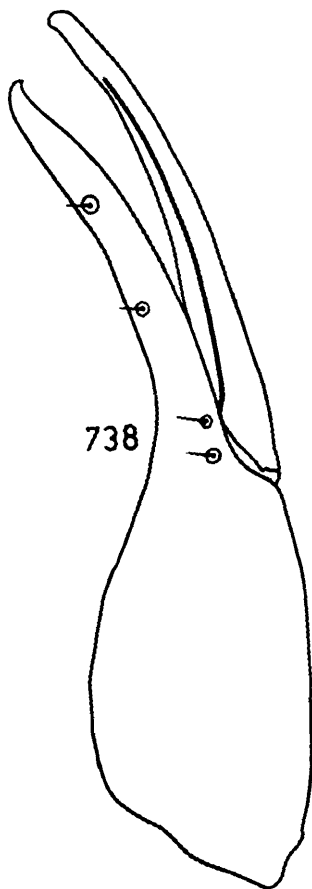
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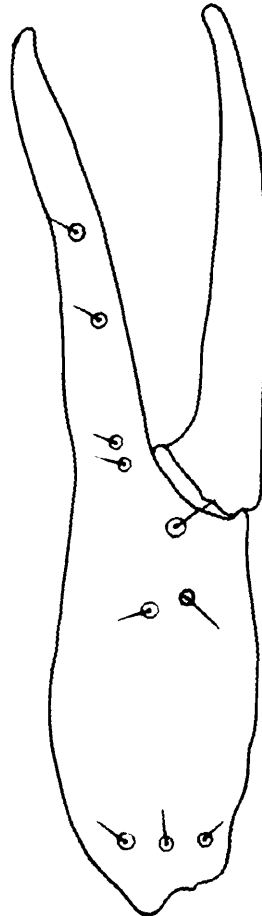
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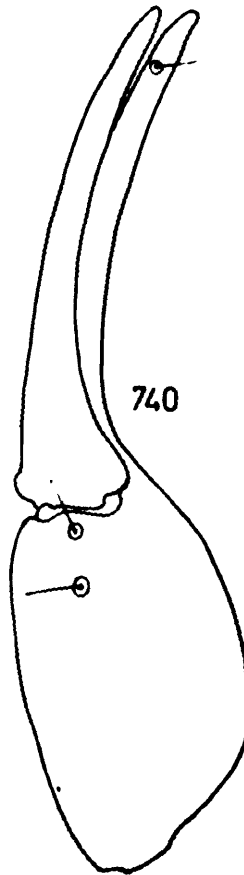
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738



739



740

- 737. Patella, exterior view.
- 738. Manus and fingers, dorsal view.
- 739. Manus and fingers, exterior view.
- 740. Manus and fingers, ventral view.

carinae. All carinae granular but dorsals finely serrated. Segments II-IV with granular dorsal, dorsolateral, inferior lateral and inferior carinae. Lateral carinae granular and present on segment II but only on posterior portion. Intercarinal space finely granular. Anterior peduncle of each segment granular. Segment V as long as carapace, very weakly and finely granular, provided only with inferior and single inferior median smooth carinae. Anal rim of this segment smooth. Telson slightly longer than carapace or caudal segment V. Vesicle as wide or deep as caudal segment V, smooth on ventral and lateral portions. Ventral median crest smooth, ending into a flat, triangular subaculear nodule provided with a pair of minute denticles on inner margin and a apicle denticle. Ventral and lateral bands more brown and conspicuous. Aculeus sharp, less curved, brown on distal portion and half the length of vesicle as in text-fig. 734.

Distribution : INDIA : Madras, Tamil Nadu and Kowdi, Poona, Maharashtra.

Remarks : We have studied the specimens received from B.M. (N.H.), London, Regd. No. nil. This specimen is studied by M. Vachon in 1972. Our present description and illustrations are made on the basis of same specimen. We have also examined one male specimen identified by us. This specimen is deposited in Western Regional Station, ZSI, Poona.

37. *Isometrus (Raddyanus) rigidulus* Pocock

(Figs. 741-756)

1897. *Isometrus rigidulus* Pocock, *J. Bombay nat. Hist. Soc.*, **11** : 113.
 1900. *Isometrus rigidulus* : Pocock, *Fauna Brit. India, Arachn.*, : 52.
 1972. *Isometrus (Raddyanus) rigidulus* : Vachon, *Cah. Pacif.*, **16** : 169-180.

General : Female of small to medium size. Blackish brown with many yellow spots and stripes on body and appendages. Posterior caudal segments including telson more darker. Entire body surface almost coarsely granular. Chelicera slightly paler. Pedipalp paler on femur and manus but patella and fingers dark brown. Carapace almost without carinae. Tergites

with five black and six yellow stripes and monocarinated as in text-fig. 741. Metasomal segments spiniform posteriorly. Telson with a triangular subaculear nodule. Pectines pale yellow and well developed. Last mesosomal sternite granular and provided with four weakly crenulated carinae.

Measurements : Total length 29.25 mm. long. Carapace 3.50 mm. long; Mesosoma 9.00 mm. long; Metasoma 16.75 mm. long.

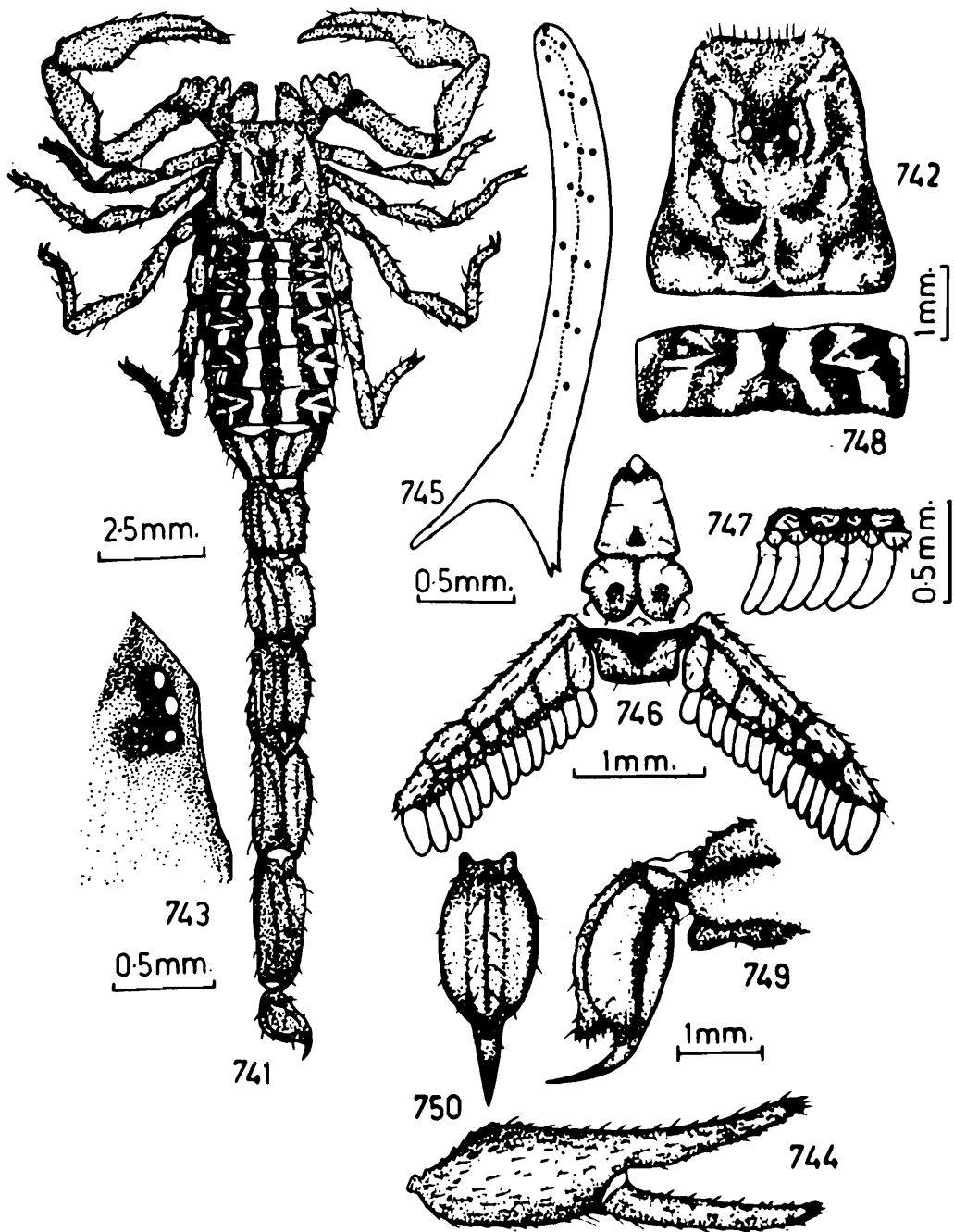
Carapace : Entire surface granular. Interocular area blackish brown and more closely granular. Ocular tubercles granular and black. Lateral ocular tubercles provided with five contiguous lateral eyes as in text-fig. 743. Median ocular tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.75 as in text-fig. 742. Anterior margin smooth and slightly invaginated. Lateral margins almost smooth and supported with a granular submarginal ridge. Posterior margin granular. Posterior median portion slightly elevated. Median depression shallow on anterior and middle portion. Chelicera with elongated basal segment, dorsal surface with black reticulation. Ventral surface pale and thickly clothed with silky hairs. Fingers dark and more brownish but more darker on dentition. Dentition as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger subequal. Pedipalp not much stronger, hand or manus slightly globular. Femur shorter than carapace. Carinae well developed and granular. Outer or anterior surface provided with crenulated crest but five to six sub-denticular tubercles prominent. Inner or posterior surface provided with weakly granular carina. Intercarinal space granular. Carinae on dorsal surface only well developed and granular. Outer and ventral surface without a carinae. Inner surface provided with many sub-dentiform tubercles and granules. Intercarinal space weakly granular on inner and dorsal surface. Manus or hand of chela smooth except very short inner basal carinae and weakly granular on inner surface as in text-fig. 744. Length of under hand shorter than carapace but as long as patella. Immobile finger shorter than femur. Dentition on fingers non-imbricated and movable finger comprises seven teeth in outer row as in text-fig. 745. Trichobothrial pattern on femur, patella, manus, immobile finger as in text-figs. 751-756. Legs

slightly pale, femur and patella carinated and all carinae granular. Intercarinal space granular but weakly granular on patella. Tibia carinated but carinae smooth, intercarinal space also smooth; tibial spur absent. Tarsomere I elongated, smooth and furnished below with a row of long unpaired bristles. A pair of claws normal and reddish brown on tips. Pectines pale yellow, well developed and 3.25 times longer than wide. Middle lamellae divided into seven to eight small digits. Fulcra well distinguished and almost round. Lamellae and fulcra clothed with reddish microscopic setae. Pectinal teeth elongated, tubular and 14/15 in number as in text-fig. 746. Basal piece sclerotized and anterior margin invaginated with a deep median notch. Genital operculum always wider than long. A pair of sclerites united in the middle. Cephalothoracic sternum smooth, triangular and provided with a depression on posterior middle portion as in text-fig. 746.

Mesosoma: All tergites granular and each tergite with >>—<< shaped yellow lateral marks and five black and six yellow spots on posterior portion as in text-fig. 741. Tergites I-VI monocarinated and carinae granular. Lateral margins crenulated. Posterior margin granular and some granules tuberculated. Pretergal portion not visible. Tergite VII provided with two pairs of granular lateral carinae and a median carina as in text-fig. 741. Lateral margins crenulated. Posterior margin granular. Pretergal portion not visible. Sternites I-IV smooth except a few lateral portions weakly granular and each provided with a pair of slit like stigmata for book lungs. Lateral margins smooth but posterior margins of each tergite weakly and broadly crenulated. Presternal portion not visible. Sternite V granular throughout and provided with two pairs of granular carinae. Lateral margins finely crenulated. Posterior margin smooth. Presternal portion not visible.

FIGS. 741-750. *Isometrus (Raddyanus) rigidulus* Pocock

- 741. Dorsal view of female.
- 742. Carapace, dorsal view.
- 743. Lateral eyes, lateral view.
- 744. Manus and fingers, exterior view.



- 745. Movable finger, dorsal view.
- 746. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 747. Pectinal teeth and fulcra, ventral view.
- 748. Tergite, dorsal view.
- 749. Telson and anal rim of metasomal segment V, lateral view.
- 750. Telson, ventral view,

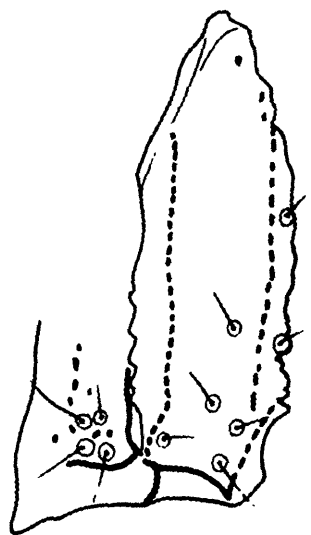
Metasoma : Cauda almost five times as long as carapace. Basal segment always longer than wide and as wide as deep. Segments I-IV with dorsal, dorsolateral, inferior lateral and inferior carinae. All carinae granular and more crenulated on segment I. Dorsal carinae weakly dentiform posteriorly on segments II and III but more prominent and pointed on segment III. Lateral carinae granular only on segments III and IV. Anterior peduncle very finely granular. Segment V slightly longer than carapace and also as wide or deep as preceding caudal segments. Dorsal surface convex. Dorsal carinae sparsely granular and developed on three fourth anterior portion. Inferior lateral carinae evenly granular but less crenulated. Single inferior median carina granular and bifurcated on posterior margin. Intercarinal space more granular on dorsal portion. Anterior peduncle finely granular. Anal rim of this segment granular. Telson less than as long as carapace or caudal segment V. Vesicle slightly less than as wide or deep as caudal segment V but as long as caudal segment IV. Dorsal surface smooth. Lateral and ventral surfaces almost smooth but provided with lateral, inferior lateral and inferior median granular carinae. Inferior or ventral median crest ending posteriorly into a thick, triangular subaculear nodule, provided with a pair of bigger denticles and a pair of smaller denticles on inner margin. Lateral and ventral bands not much prominent. Aculeus not much curved, pointed, dark brownish on distal portion and almost half the length of vesicles as in text-figs. 749 and 750.

Distribution : INDIA : Gwalior, Madhya Pradesh.

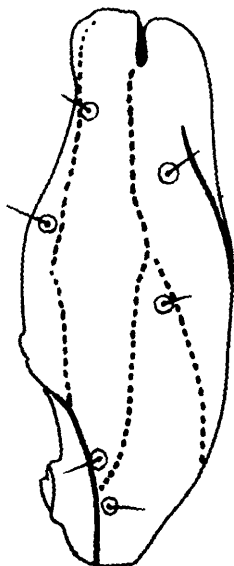
Remarks : We have studied the type specimen (one ♀) received from B.M.(N.H.), London, Regd. No. 1893.12.20.4. Present description and illustrations are based on the type specimen. This specimen is examined by Max Vachon in 1972.

FIGS. 751-756. *Isometrus (Raddyanus) rigidulus* Pocock

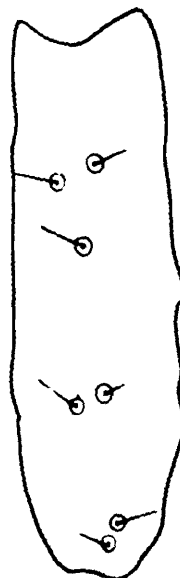
- 751. Femur, dorsal, interior and exterior views.
- 752. Patella, dorsal view.
- 753. Patella, exterior view.
- 754. Manus and fingers, dorsal view.



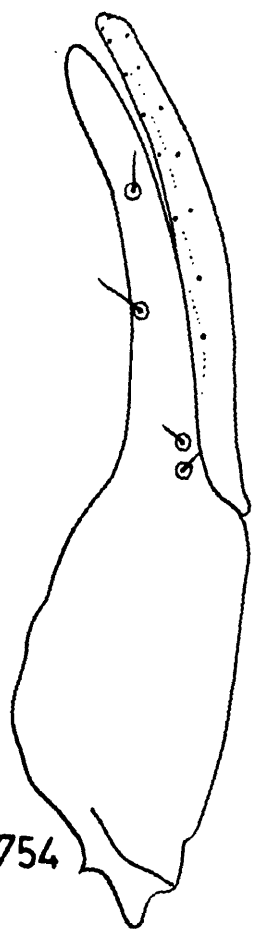
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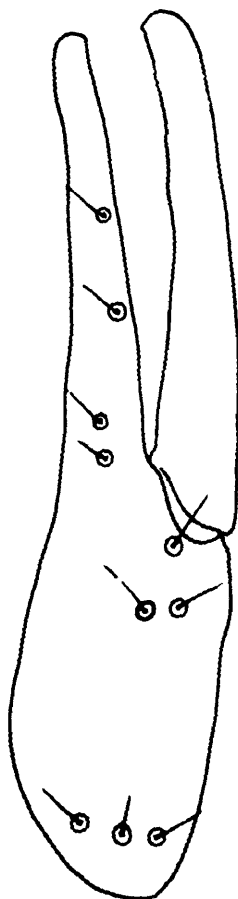
752



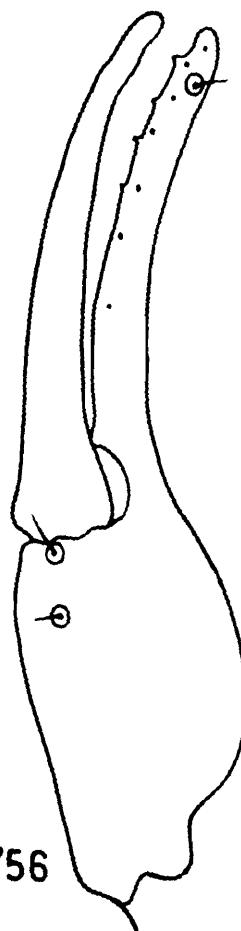
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754



755



756

755. Manus and fingers, exterior view.
756. Manus and fingers, ventral view.

38. *Isometrus (Raddyanus) brachycentrus* Pocock
(Figs. 757-770)

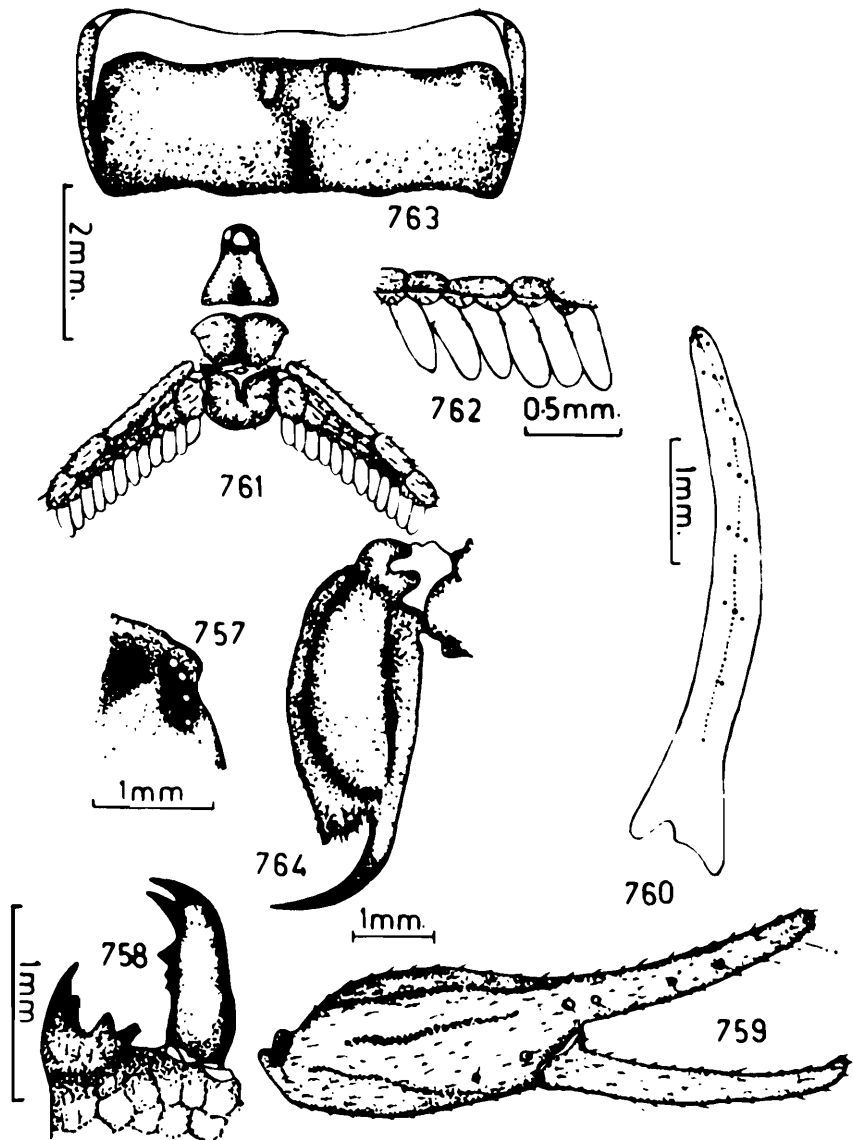
1899. *Isometrus brachycentrus* Pocock, *J. Bombay nat. Hist. Soc.*, **12** : 263.
 1900. *Isometrus brachycentrus* : Pocock, *Fauna Brit. India, Arachn.*, : 50.
 1972. *Isometrus (Raddyanus) brachycentrus* : Vachon, *Cah. Pacif.*, **16** : 169-180.

General : Female of medium body size, dark brown, dark black on metasoma. Appendages dark brown. Ventral surface pale brown but pectines yellowish brown. Entire body surface finely and closely granular. Carinae well developed and granular on appendages and metasomal segment. Single median carina on mesosomal tergites weakly developed and granular. Last mesosomal sternite dark brown, granular with two pairs of granular carinae. Pectines well developed. Telson with granular vesicle and strong, triangular sub-aculear nodule.

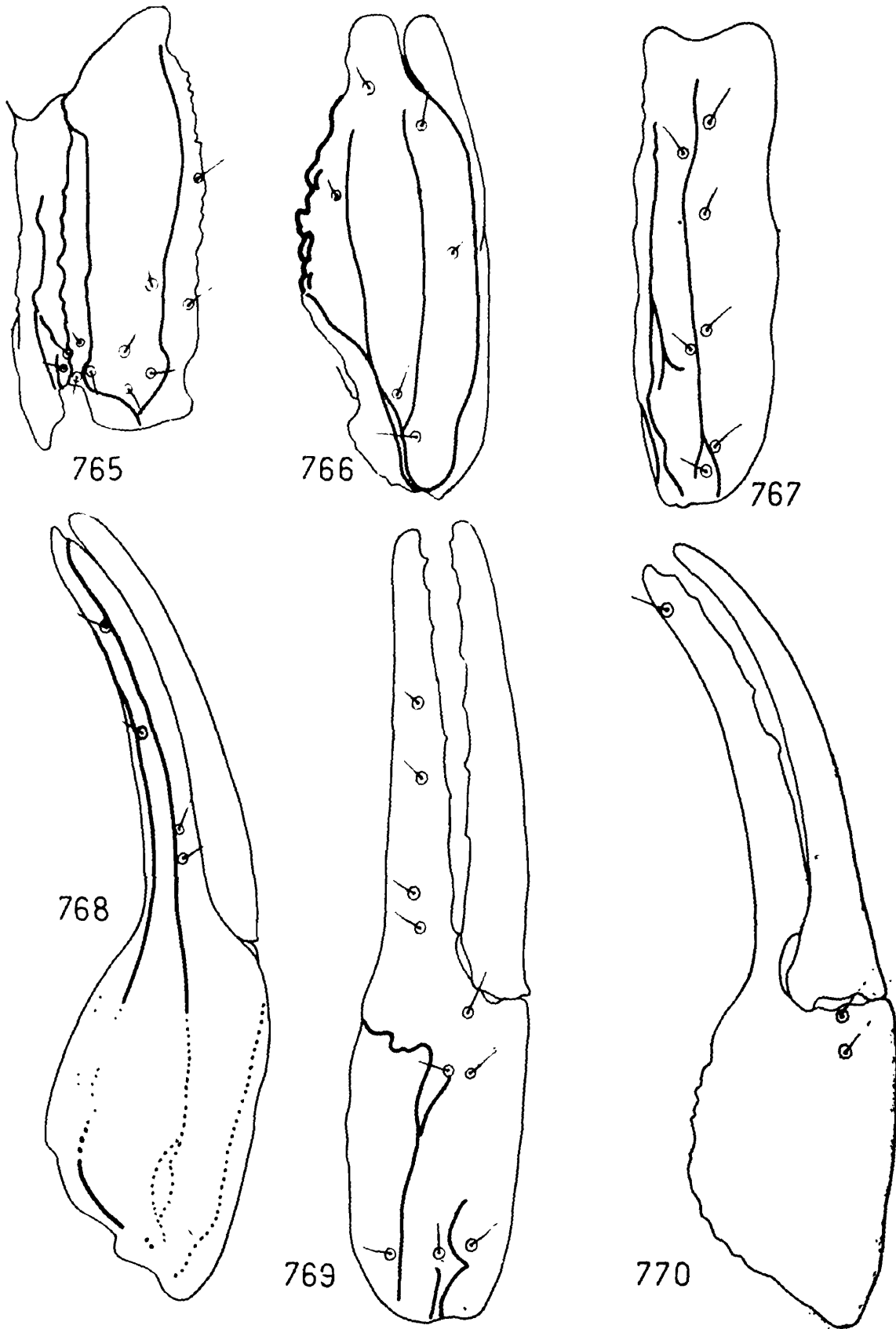
Measurements : Total length 42.25 mm. Carapace 4.50 mm. long; Mesosoma 13.25 mm. long; Metasoma 24.50 mm. long.

Carapace : Entire surface finely and almost closely granular, without carinae. Ocular tubercles granular. Lateral ocular tubercles provided with five pairs of lateral eyes as in text-fig. 757. Median ocular tubercles evenly granular ending abruptly in front and behind, provided with a pair of median eyes. Anterior margin smooth but granular above, provided with few microscopic hairs. Lateral margin finely crenulated and supported with granular submarginal ridge. Posterior margin finely granular. Chelicera with basal segment dark brown, dark blackish reticulation on dorsal surface. Ventral surface pale covered sparsely with few silky hairs. Fingers dark brown, blackish on dentition. Dentition as characterised in the family and genus. Dorsal and ventral distal teeth of movable finger equal as in text-fig. 758. Pedipalp dark brown. Femur flat and always as long as carapace. All carinae crenulated but outer carinae weakly crenulated. Intercarinal space finely granular. Patella slightly longer than femur, as well as carapace. All carinae well developed and granular. Intercarinal space finely granular on inner side and weakly granular on dorsal and exterior surface. Inner or anterior surface provided with five to

six subdenticular tubercles. Manus or hand with two granular carinae, entire surface finely granular and inner surface provided with few dentiform granules as in text-fig. 759. Length of



- FIGS. 757-764. *Isometrus (Raddyanus) brachycentrus* Pocock
- 757. Lateral eyes, lateral view.
 - 758. Chela of chelicera, dorsal view.
 - 759. Manus and fingers, exterior view.
 - 760. Movable finger, dorsal view.
 - 761. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 - 762. Pectinal teeth and fulcra, ventral view.
 - 763. Tergite, dorsal view.
 - 764. Telson and anal rim of metasomal segment V, lateral view.



FIGS. 765-770. *Isometrus (Raddyanus) brachycentrus* Pocock
765. Femur, dorsal, interior and exterior views.

under hand less than femur or carapace. Manus always more than as wide as patella. Movable finger longer than carapace but as long as patella. Immovable finger shorter than carapace. Dentition on the finger non-imbricated and outer row on movable finger comprises seven teeth as in text-fig. 760. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 765-770. Legs brownish but pale on distal segments. Femur and patella with granular carinae and intercarinal space finely granular. Tibia carinated but carinae almost smooth or very weakly granular. Intercarinal space smooth. Tarsomere I carinated but smooth, provided with a pair of pedal spurs and covered with long microscopic hairs. Tarsomere II smooth, clothed below with long hairs. Claws normal, dark reddish brown. Pectines well developed and 3.5 times longer than wide. Middle lamellae subdivided in seven small digits. Fulcrá well distinguished and slightly elongated. Lamellae and fulcra sparsely clothed with microscopic reddish setae. Pectinal teeth elongated as in text-fig. 762 and 12/12 in number. Basal piece broad, with a narrow anterior margin and deep median notch. Genital operculum always wider than long, provided with a pair of sclerites fused in the middle. Cephalothoracic sternum broad, triangular with a shallow depression on the posterior median portion as in text-fig. 761.

Mesosoma : All tergites finely and closely granular but more closely granular on posterior lateral portions. Tergites I without carinae. Tergites II-VI with only single median carina as in text-fig. 763. Median carina granular on posterior portion. Lateral and posterior margin of each tergite granular. Pretergal portion weakly and finely granular with very evenly and finely granular on posterior margin. Tergite VII more finely and closely granular, provided with two pairs of granular lateral

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- 766. Patella, dorsal view.
 - 767. Patella, exterior view.
 - 768. Manus and fingers, dorsal view.
 - 769. Manus and fingers, exterior view.
 - 770. Manus and fingers, ventral view.

carinae and a weakly elevated, broad median granular carina. Lateral margin crenulated and posterior margin smooth but granular submarginally. Pretergal portion weakly and finely granular with finely granular posterior margin. Sternites I-IV pale, smooth and each provided with a pair of slit like stigmata for book lungs. Presternal portion smooth with almost smooth posterior margin. Sternite IV weakly granular on posterior lateral portion. Sternite V dark, granular but more granular on lateral portion and provided with two pairs of well developed crenulated carinae. Lateral and posterior margins granular. Presternal portion almost smooth with finely granular posterior margin.

Metasoma : Cauda thin, long and almost six times as long as carapace. Basal segment always longer than wide but as wide as deep. All segments as wide as deep. Segments I-IV with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae well developed and granular. Intercarinal space finely and closely granular except dorsal surface. Dorsal surface finely but poorly granular. Anterior peduncles granular. Posterior margin granular on segment I, segments II-IV smooth on dorsal portion but granular on ventral portion. Segment V longer than carapace and granular on entire surface. Inferior lateral and single inferior median carinae granular. Anterior peduncle almost smooth. Anal rim of this segment finely granular. Telson longer than last caudal segment. Vesicle as long as caudal segment III and as wide or deep as caudal segment V. Entire ventral surface weakly granular. Ventral median crest granular, ending into a broad, laterally flat, almost triangular subaculear spine or node. Subaculear node provided with three pairs of small teeth on inner margin. Lateral and ventral bands dark brown. Aculeus brown on distal portion as in text-fig. 764.

Distribution : INDIA : Mangalore, Karnataka and Kerala.

Remarks : We have examined, described and illustrated on the basis of the type specimen received from B.M. (N.H.), London, Regd. No. 1896.7.30.74. This type has been examined by Prof. Dr. M. Vachon in 1972. Some of the drawings could not be prepared as the specimen was broken.

39. *Isometrus* (*Raddyanus*) *thrustoni* Pocock

(Figs. 771-798)

1893. *Isometrus thrustoni* Pocock, *J. Bombay nat. Hist. Soc.*, 7(3) : 297.
1899. *Isometrus thrustoni* : Kraepelin, *Tierr. Scorp; etc.*, : 67.
1900. *Isometrus thrustoni* : Pocock, *Fauna Brit. India, Arachn.*, : 47-48.

General : Male and female smaller to medium in body size with yellowish brown colour but more brownish on caudal segments. Male always more slender and smaller in body size. Tergites coloured with six yellow bands and five dark brownish bands, two lateral and a central brown bands distinct and continuous but two lateral secondary brownish bands occupying only posterior portion of each tergite as in text-fig. 771. Carapace mainly yellowish with many brownish patches. Interocular area brownish on lateral portion and yellowish in the middle. Ocular tubercles black. Entire body surface finely granular but female more granular and darker than male. Tergites provided with only median granular carina. Caudal segments with granular and crenulated carinae. Telson granular on ventral surface. Last mesosomal sternite with two pairs of finely granular carinae. Pectines well developed and pale yellow. Chelicera and pedipalp brownish on distal portions and fingers. Legs paler but with brown bands.

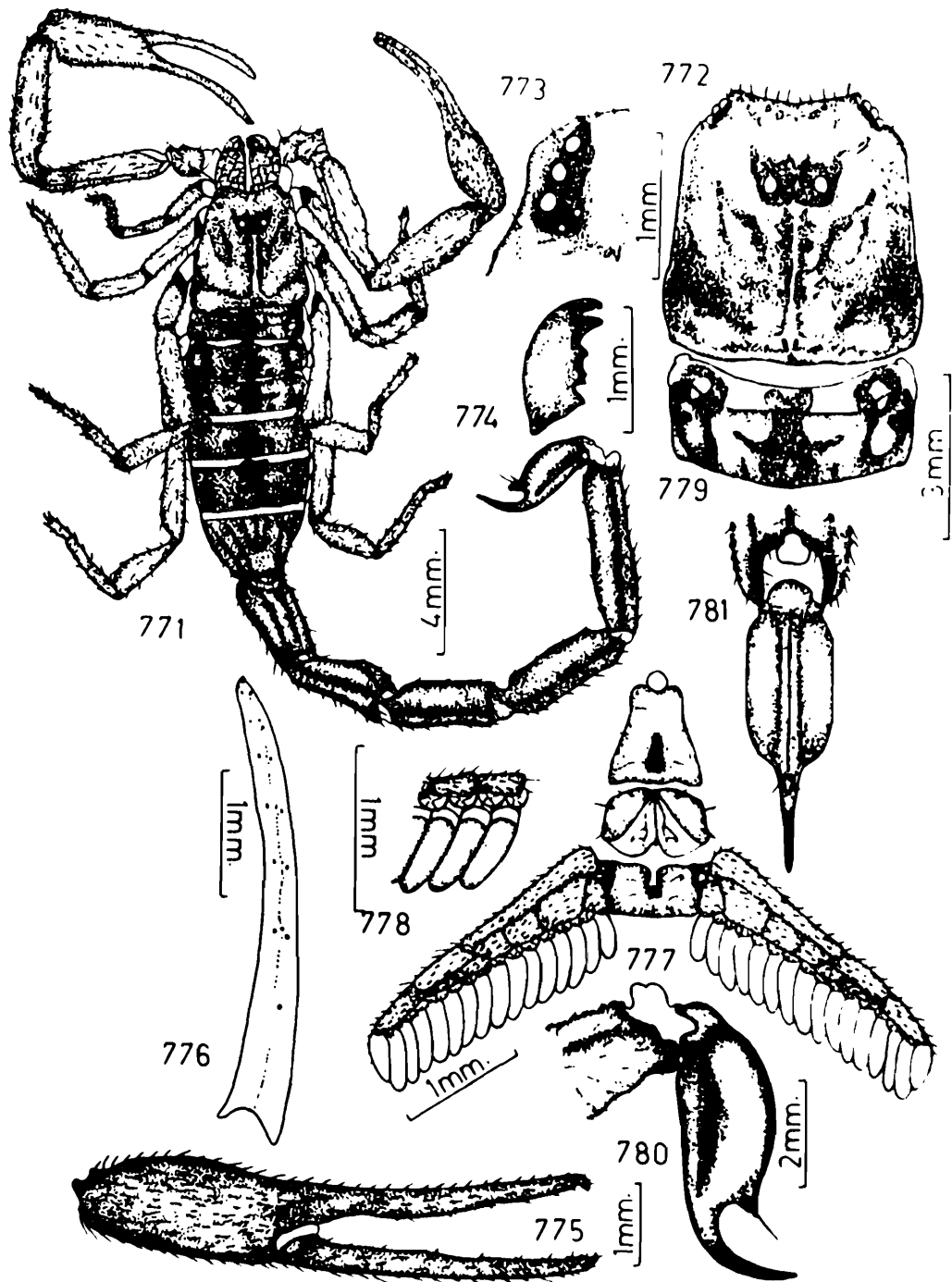
Measurements : Male total length 40.50 mm. Carapace 4.00 mm. long; Mesosoma 10.25 mm. long; Metasoma 26.25 mm. long. Female total length 47.00 mm. Carapace 5.00 mm. long; Mesosoma 14.25 mm. long; Metasoma 27.75 mm. long.

Carapace : Entire surface covered with fine granules. No carinae developed except black granular ocular tubercles. Lateral ocular tubercles more granular and provided with five lateral eyes as in text-figs. 773 and 784. A pair of median eyes situated anteriorly in the ratio 1 : 2 as in text-figs. 772 and 783. Posterior median depression shallow and granular on anterior portion. Interocular area brownish and more granular. Anterior margin granular above and invaginated in the middle portion. Lateral margins finely crenulated but more crenulated on ante-

rior portion. Posterior margin granular and almost straight as in text-figs. 772 and 783. Chelicera with basal segment pigmented on dorsal surface but more darker on anterior portion. Ventral surface covered with short silky hairs. Fingers short and reddish brown on dentition. Dentition as characterised in the family and genus. Dorsal distal tooth on movable finger slightly shorter than ventral distal tooth as in text-figs. 774 and 785. Pedipalp stronger in female than in male. Femur slightly longer than carapace. Outer and inner carinae granular. Outer or anterior surface provided with a crenulated carinae and few granules tuberculate. Intercarinal space finely and weakly granular. Patella always longer than femur, carinae well developed and granular except smooth outer carinae. Inner or anterior surface provided with crenulated carina and provided with six to seven denticulate tubercles. Intercarinal space very weakly and finely granular. Hand weakly granular and almost as wide as patella as in text-figs. 775 and 786. Length of under hand less than carapace. Movable finger slightly shorter than patella in female but as long as patella in male. Dentition on the fingers non-imbricated and seven teeth comprising outer row on movable finger as in text-figs. 776 and 787. Immobile finger shorter than movable finger but slightly longer than carapace in both sexes. Trichobothrial pattern on femur, patella, manus and immobile finger as in text-figs. 793-798. Legs slightly pale with few brownish bands. Femur and patella carinated and all carinae granular. Inner or anterior surface with crenulated carina. Intercarinal space finely granular. Tibia carinated, carinae finely granular. Intercarinal space smooth. Tarsomere I carinated, dorsal carinae

FIGS. 771-781. *Isometrus (Raddyanus) thrustoni* Pocock

- 771. Dorsal view of male.
- 772. Carapace, dorsal view.
- 773. Lateral eyes, lateral view.
- 774. Movable finger of chelicera, dorsal view.
- 775. Manus and movable finger of pedipalp, exterior view.
- 776. Movable finger of pedipalp, dorsal view.
- 777. Pectines, genital operculum and cephalothoracic sternum, ventral view.



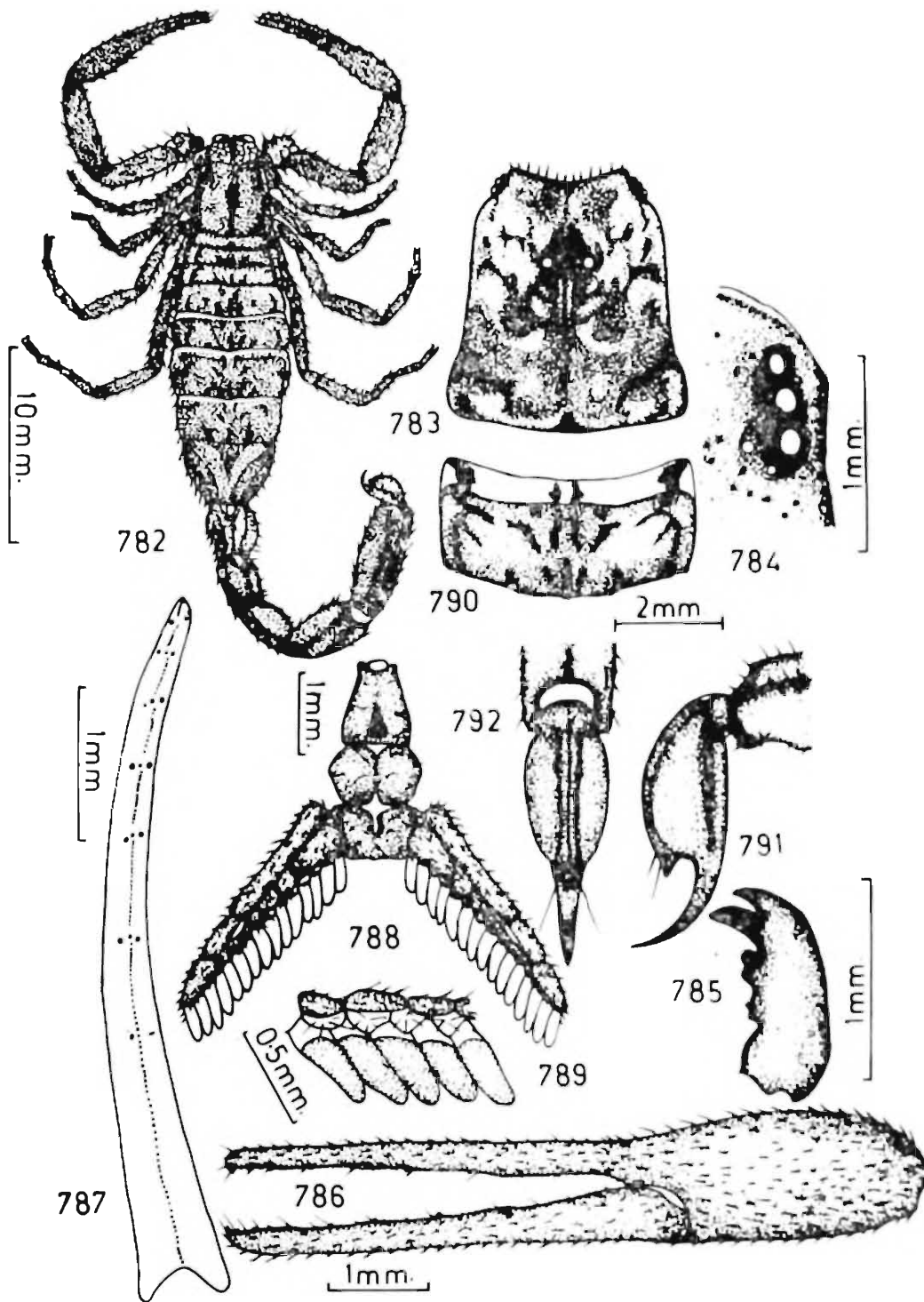
- 778. Pectinal teeth and fulcra, ventral view.
- 779. Tergite, dorsal view.
- 780. Telson and anal rim of metasomal segment V, lateral view.
- 781. Telson and anal rim of metasomal segment V, ventral view.

crenulated. Intercarinal space smooth, provided below with long, paired setae and a pair of pedal spur. Tarsomere II smooth, pale yellow and provided with a row of paired setae. All segments weakly covered with setae. Claws normal, dark reddish brown on tips. Pectines well developed and 4 times longer than wide. Middle lamellae subdivided into seven to eight small digits. Fulcra well distinguished and elongated. Lamellae and fulcra weakly covered with microscopic reddish setae. Teeth tubular, more elongated in male as in text-figs. 778 & 789 and count 16/16 in male, 15/15 in female as in text-figs. 777 and 788. Basal piece sclerotized, smooth and provided with deep notch in the middle of anterior margin. Genital operculum provided with a pair of sclerites, exposed in male from which a pair of small but conspicuous male genital papillae visible as in text-fig. 777, sclerites fused in middle in female as in text-fig. 788. Cephalothoracic sternum triangular and provided with a deep depression in middle posterior portion as in text-figs. 777 and 788.

Mesosoma : All tergites granular but more granular on lateral portions. Tergites in male less granular and smooth. Tergites I-VI provided with a granular median carina, developed only on posterior portion of each tergite as in text-figs. 779 & 790. Posterior margin granular. Pretergal portion granular but more granular on lateral portion and with finely granular posterior margin. Yellow and brown bands on each tergite more prominent in female. Tergite VII with two pairs of granular carinae and more granular than preceding segments as in text-figs. 771 and 782. Lateral margins crenulated. Posterior margin granular.

FIGS. 782-792. *Isometrus (Raddyanus) thrustoni* Pccock

- 782. Dorsal view of female.
- 783. Carapace, dorsal view.
- 784. Lateral eyes, lateral view.
- 785. Movable finger of chelicera, dorsal view.
- 786. Manus and finger, exterior view.
- 787. Movable finger of pedipalp, dorsal view.
- 788. Pectines, genital operculum and cephalothoracic sternum, ventral view.



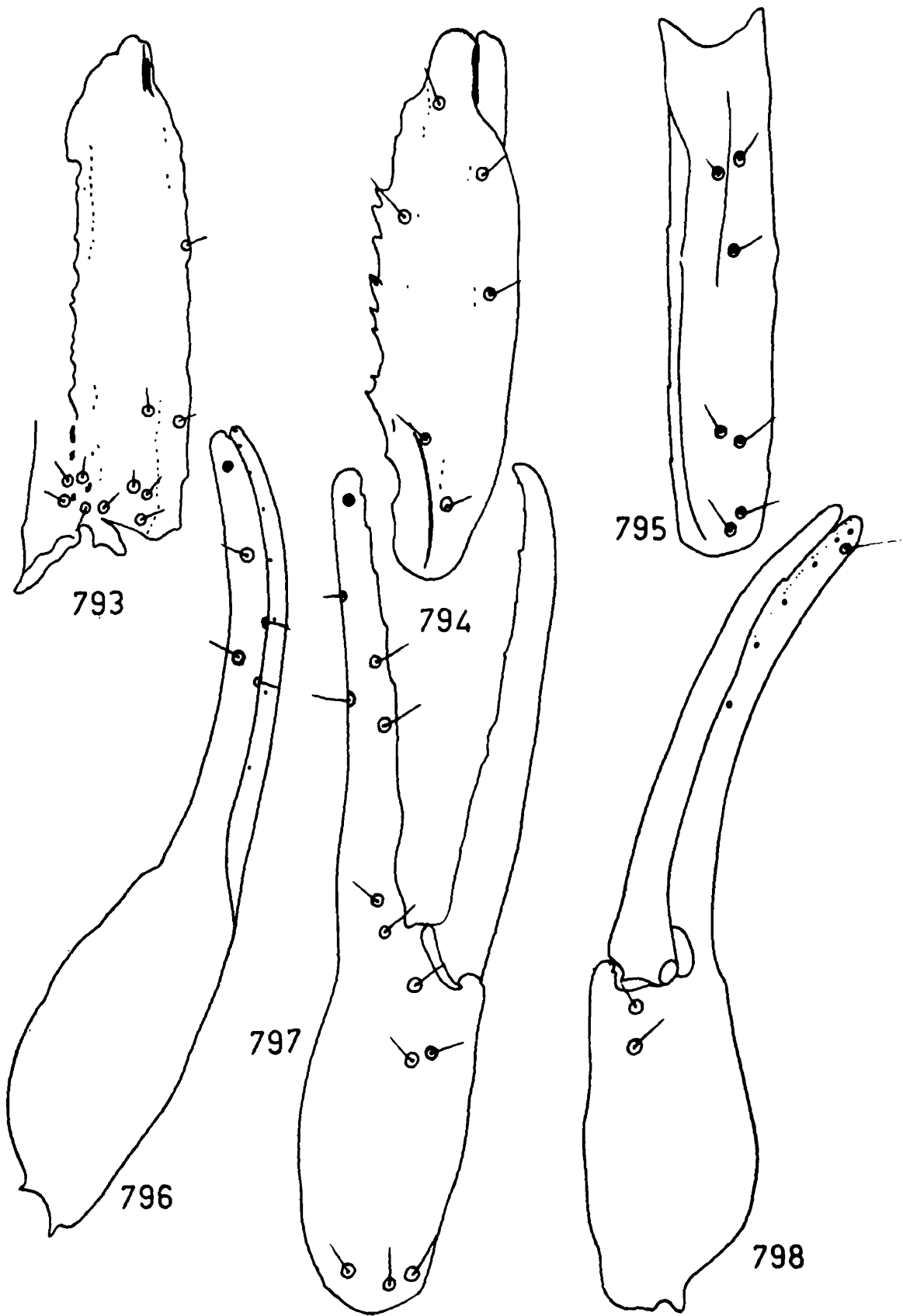
- 789. Pectinal teeth and fulcra, ventral view.
- 790. Tergite, dorsal view.
- 791. Telson and anal rim of metasomal segment V, lateral view.
- 792. Telson and anal rim of metasomal segment V, ventral view.

Pretergal portion granular with granular posterior margin. Sternites I-IV smooth except granular lateral portion of sternite IV, and each provided with a slit like stigmata for book lungs. Posterior margin smooth. Lateral margins smooth except the granular margins for sternite IV. Sternite V granular, more granular on lateral portion and provided with two pairs of granular carinae. Lateral carinae developed only on middle portion. Median carina developed on posterior portion. Lateral margins crenulated. Posterior margin granular. Presternal portion almost smooth but posterior margin finely granular.

Metasoma : Cauda more than six times as long as carapace in male and more than five times in female. Basal segment always longer than wide. Segment I with all ten carinae, granular and dorsal and dorsolateral carinae slightly dentiform on posterior end. Segments II-IV provided with dorsal, dorsolateral, inferior lateral and inferior carinae, granular and dorsal carinae dentiform on posterior end. Intercarinal space granular but more granular on lateral portions. Anterior peduncle very finely granular on dorsal surface. Posterior margin granular. Segment V always longer than carapace and provided with weak dorsolateral carinae. Inferior lateral and single inferior median carinae well developed and evenly granular. Intercarinal space granular but more granular in female. Anterior peduncle very finely granular on dorsal surface. Anal rim of this segment unevenly granular as in text-fig. 780 but almost smooth in female as in text-fig. 792. Telson as long as carapace in female but slightly longer than carapace in male but always shorter than segment V. Vesicle almost as long as caudal segment I and almost as wide or deep as caudal segment V. Ventral surface on vesicle more

FIGS. 793-798. *Isometrus (Raddyanus) thrustoni* Pocock

- 793. Femur, dorsal, interior and exterior views.
- 794. Patella, dorsal view.
- 795. Patella, exterior view.
- 796. Manus and fingers, dorsal view.
- 797. Manus and fingers, exterior view.
- 798. Manus and fingers, ventral view.



granular. Ventral and lateral bands not prominent. Ventral median crest weakly developed, poorly crenulated and ending into a sub-aculear triangular spine, provided on inner surface with a pair of long setae at the base. Aculeus short and half as long as vesicle, dark on distal portion, sharp as in text-figs. 780, 781, 791 and 792.

Distribution : INDIA : Bhopal, Madhya Pradesh; Kolhapur, Maharashtra; Belgaum, Karnataka; Cuddappah, Andhra Pradesh; Coonoor, Yeracaud in Shevaroy hills, Trichinopoly and Tinnevely, Tamil Nadu.

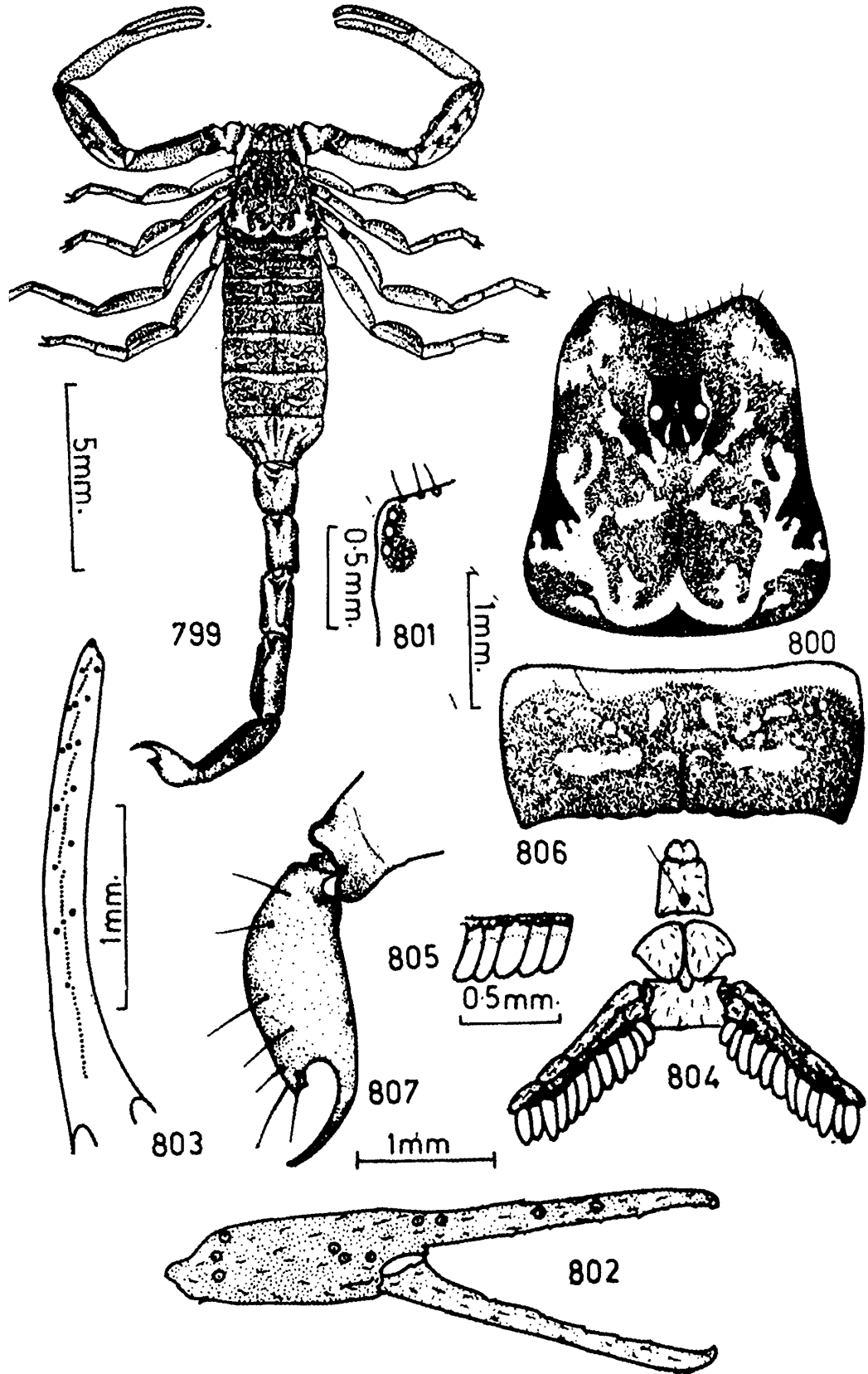
Remarks : We have examined the specimens received from B.M. (N.H.), London, Regd. No. 1894.10.24. 42-46. The lot of type specimens received was containing 1 ♂, 4 ♀ 1 ♂ immature and 5 ♀ immature. The label inserted was indicating "*Holotype*", whereas actually it was not designated. So we consider these specimens as "Syntypes" The present illustrations and descriptions are based on these specimens.

40. *Isometrus (Raddyanus) isadensis* sp. nov.
(Figs. 799-823)

General : Female with smaller size, pedipalp very thin and short as in text-fig. 802. General body colouration brick brown to reddish. Entire body surface granular. Appendages infuscated,

FIGS. 799-807. *Isometrus (Raddyanus) isadensis* sp. nov.

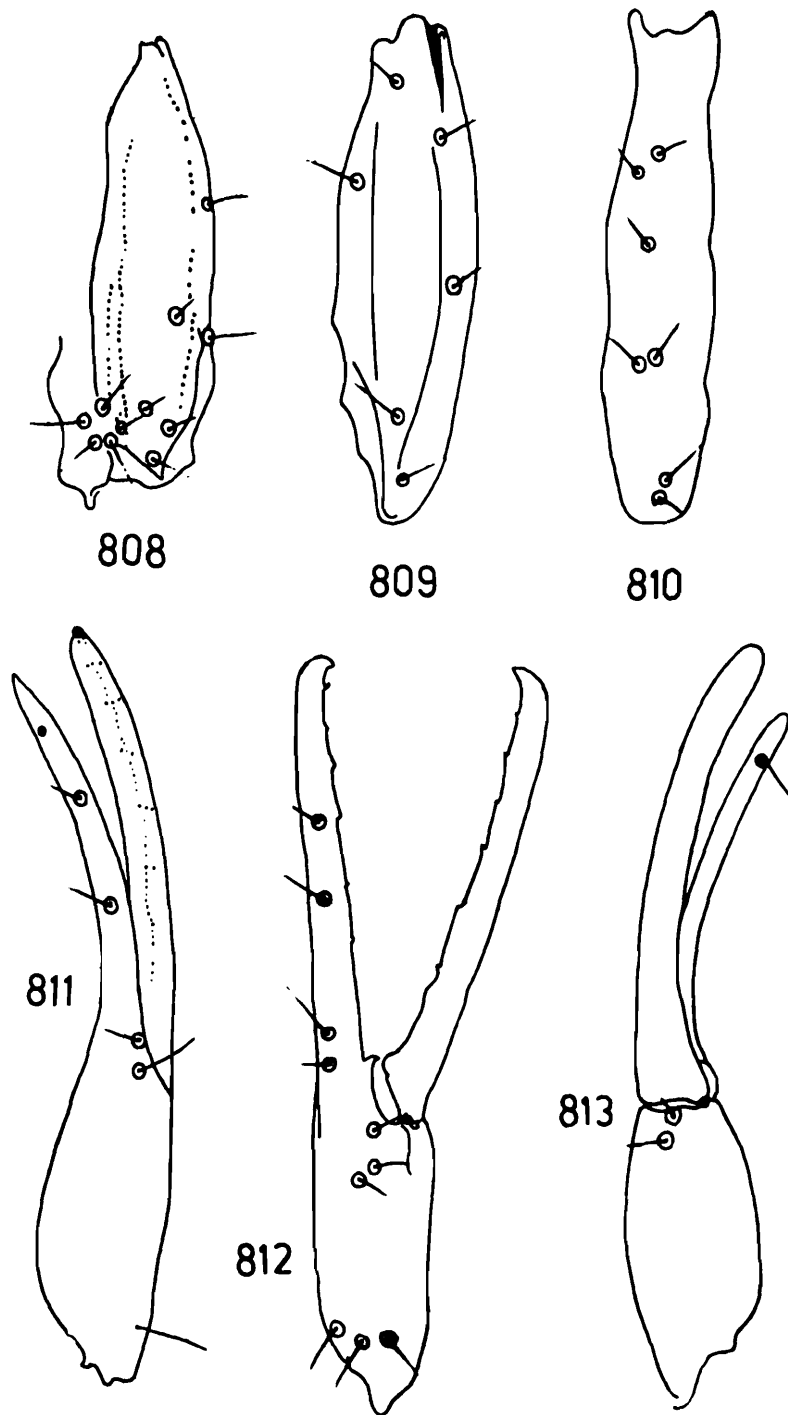
- 799. Dorsal view of female.
- 800. Carapace, dorsal view.
- 801. Lateral eyes, lateral view.
- 802. Manus and fingers, exterior view.
- 803. Movable finger, dorsal view.
- 804. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 805. Pectinal teeth and fulcra, ventral view.
- 806. Tergite, dorsal view.
- 807. Telson and anal rim of metasomal segment V, lateral view.



granular on femur and patella. Ventral side of the body pale yellow and smooth. Pectines well developed. Last mesosomal sternite darker, almost smooth but two pairs of smooth carinae well developed.

Measurements : Total length 19.00 mm. Carapace 2.50 mm. long; Mesosoma 6.00 mm. long; Metasoma 10.50 mm. long.

Carapace : Entire surface almost evenly granular. Interocular region not much prominent but granular. Anterior margin smooth, weakly invaginated and furnished with eight to nine setae. Lateral margins finely crenulated. Posterior margin granular and nearly straight. Ocular tubercles dark black; lateral ocular tubercles granular and provided with five contiguous lateral eyes as in text-fig. 801. Median ocular tubercles black granular and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.5 as in text-fig. 800. Chelicera with short fingers and elongated basal segment. Basal segment pigmented on dorsal side but more darker on anterior portion. Ventral surface pale yellow and clothed with fine silky hairs, extend on fingers. Both the fingers darker at the base. Dentition on the fingers as characterised in the family and genus. Dorsal and ventral distal teeth on movable finger subequal in length. Pedipalp thin as in text-fig. 799, femur as long as carapace and all carinae granular. Inner or posterior surface without any prominent crest. Intercarinal space granular. Patella slightly longer than femur or carapace. Outer carinae not developed but dorsal, ventral and inner carinae weakly granular. Inner or anterior surface furnished with a weak crenulated crest. Hand narrow, elongated, clear dark yellow and under hand always shorter than carapace or femur as in text-fig. 802. Fingers longer than carapace and dentition on fingers non-imbricated and seven teeth in outer row on movable finger as in text-fig. 803. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 808-813. Legs carinated on femur. Tibia carinated but smooth. Tarsomeres I and II smooth and clothed below with two rows of small setae. All segments weakly clothed with microscopic hairs. Pectines well developed and four times longer than wide. Middle lamellae clearly divided into six digits. Fulcra well developed and elongated. Fulcra and lamellae



FIGS. 808-813. *Isometrus (Raddyanus) isadensis* sp. nov.

- 808. Femur, dorsal, interior and exterior views.
- 809. Patella, dorsal view.
- 810. Patella, exterior view.
- 811. Manus and fingers, dorsal view.
- 812. Manus and fingers, exterior view.
- 813. Manus and fingers, ventral view.

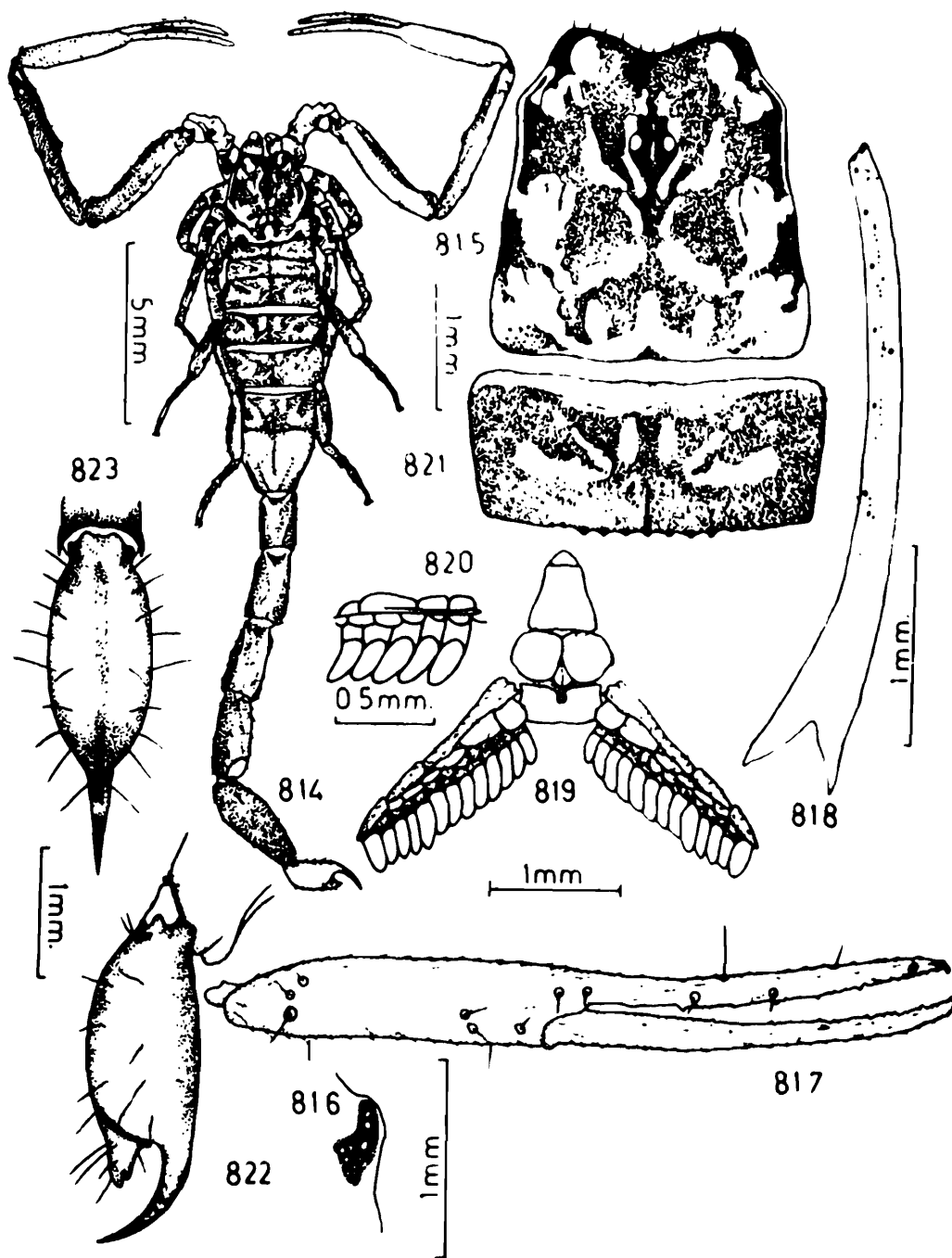
clothed with microscopic white hairs. Pectinal teeth as in text-fig. 804 and count 11/12 as in text-fig. 804. Basal piece with anterior margin deeply notched in the middle portion. Genital operculum always wider than long and united in the middle as in text-fig. 804. Cephalothoracic sternum sub-triangular.

Mesosoma : All tergites granular but little more granular on posterior portion. Tergites I-VI coloured with >>-<< shaped yellow mark on each side. Tergites II-VI with a clear circular to elliptical spot on each side of the median carina as in text-fig. 816. Pretergal portion finely granular with granular posterior margins. Tergites VII with two pairs of crenulated carinae as in text-fig. 799. Pretergal portion smooth. Sternite I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Sternite V granular, more darker and furnished with two pairs of crenulated, well developed carinae.

Metasoma : Cauda six times as long as carapace. Basal segment always longer than wide. Segments I-IV with dorsal carinae weakly and delicately crenulated. Dorsolateral carinae crenulated, lateral carinae crenulated and developed on segments I-III, inferior lateral carinae and inferior carinae weakly crenulated on segments I-IV. Intercarinal space finely granular. Segment V with inferior lateral and single inferior median carinae weakly crenulated. Intercarinal space granular. Anal rim of this segment granular as in text-fig. 807. Telson always shorter than caudal segment V. Vesicle almost smooth on entire surface, and more than as wide or deep as caudal segment V. Ventral and lateral bands not prominent. Ventral median crest smooth and ending into a strong, triangular, subaculear spine. Subaculear spine furnished with a pair of small teeth on inner margin.

FIGS. 814-823. *Isometrus (Raddyanus) isadensis* sp. nov.

- 814. Dorsal view of male.
- 815. Carapace, dorsal view.
- 816. Lateral eyes, lateral view.
- 817. Manus and fingers, exterior view.
- 818. Movable finger, dorsal view,



- 819. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 820. Pectinal teeth and fulcra, ventral view.
- 821. Tergite, dorsal view.
- 822. Telson and anal rim of metasomal segment V, lateral view.
- 823. Telson and anal rim of metasomal segment V, ventral view.

Aculeus sharp, not much curved and more than half the length of vesicle. Setation on the vesicle as in text-fig. 807.

Type specimen : *Holotype* : female. *Paratype* 1 ♀ *Allotype* 1 ♂, deposited at National Collection, Calcutta, Regd. Nos. 5083/18, 5084/18 and 5085/18.

Type-locality : *Holotype* collected from Moshi river near Isad vill. Gangakhed, Aurangabad, Maharashtra; 12.vii.1972. Coll. M. Babu Rao, (G.R.B. Survey) *Paratype* same as *Holotype* and *Allotype* collected from Khamgaon Tank, 50 km E to Poona, Maharashtra; 14.xi.1968. coll. B. S. Lamba.

Discussion : This species closely resembles with *Isometrus (Raddyanus) thrustoni* Poc. but can be separated from it as follows : (i) Pectinal teeth 11-13 in number whereas in *I. (R.) thrustoni* Poc. pectinal teeth 15-16 in number. (ii) Manus of pedipalp very thin and elongated in male and short in female but in *I. (R.) thrustoni* Poc. manus of pedipalp always shorter. (iii) Body colouration also differs very much.

Remarks : The illustrations for *Allotype* are given separately as in text-figs. 814-823 and it differs from *Holotype*, in having very long, thin and slender pedipalp, in which it shows close resemblance with *Isometrus (Raddyanus) europaeus* (Linn.).

41. *Isometrus (Raddyanus) europaeus* (Linn.)

(Figs. 824-840)

1758. *Scorpio europaeus* Linn., *Syst. Nat. ed.*, 10 : 625.
 1778. *Scorpio europaeus* : De Geer, *Mem. Hist. Ins.*, 7 : 346.
 1828. *Isometrus europaeus* : Hempr. & Ehrenb., *Symb. Phys. Scorp.*, : 3.
 1845. *Lychas europaeus* : C. L. Koch, *Arachn.*, 12 : 1.
 1888. *Isometrus europaeus* : Oates, *J. Bombay nat. Hist. Soc.*, 3 : 250.
 1891. *Isometrus dentatus* : Kraepelin, *Jb. hamb. wiss. Anst.*, 8 : 245.
 1897. *Isometrus maculatus* : Lonnbarg, *Ann. Mus. Nat. Hist.*, 7(1) : 86.
 1900. *Isometrus europaeus* : Pocock, *Fauna Brit. India, Arachn.*, : 46 47.

General : Male of bigger, very much elongated, slender body, metasoma more than eight times as long as carapace. Body colour with six yellowish brown and four longitudinal blackish bands on each tergite. Carapace and tergites entirely granular. Ocular areas black. Telson slightly more darker and brownish. Pedipalp slender, elongated, light yellowish in colour but darker on patella. Sternites pale yellow and last sternite provided with two pairs of crenulated carinae and outer pair developed only on middle portion. Pectines well developed and pale yellow.

Measurements : Total length 64.75 mm. Carapace 5.25 mm. long; Mesosoma 16.25 mm. long; Metasoma 43.25 mm. long.

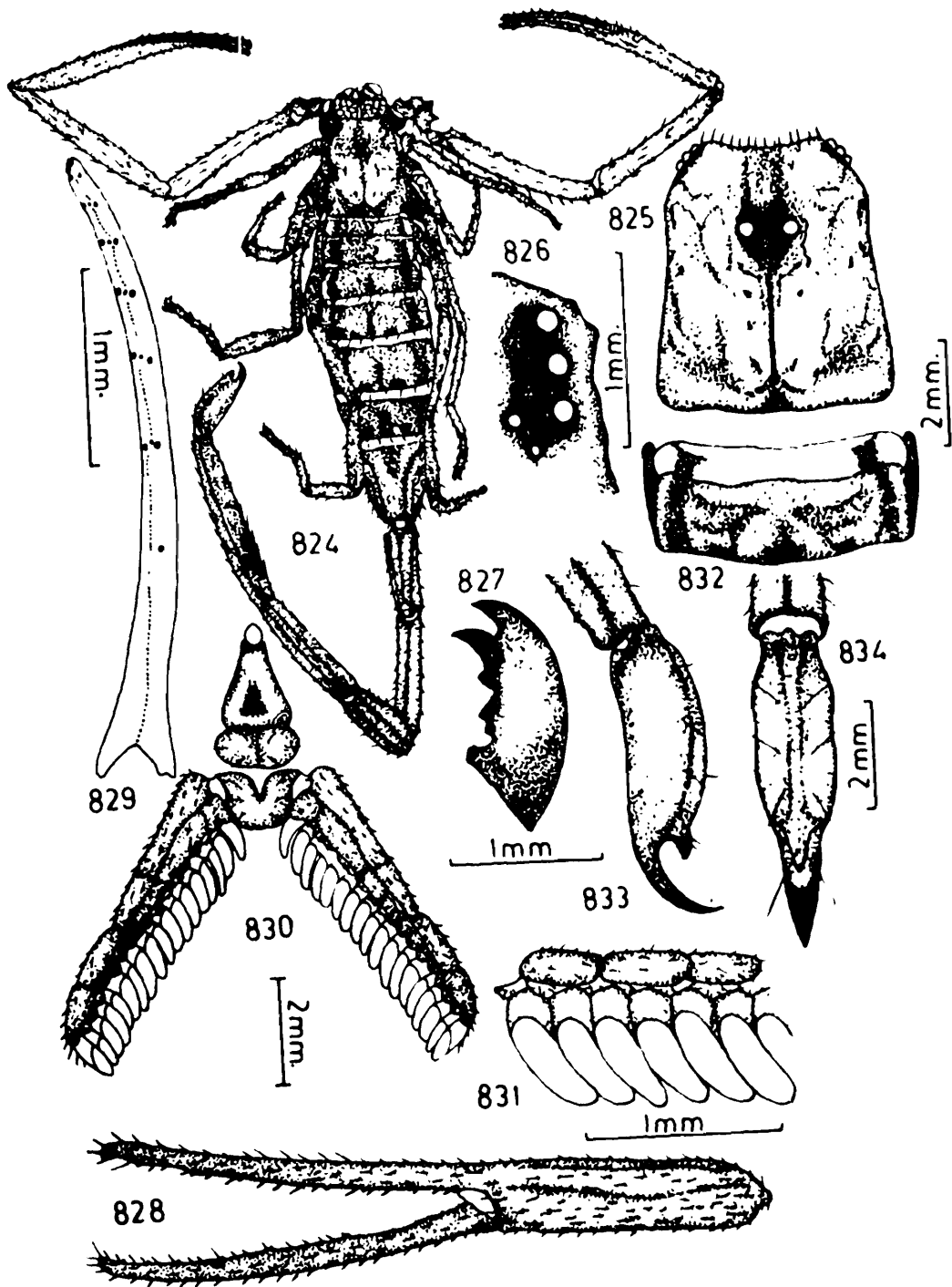
Carapace : Entire surface weakly and sparsely granular but more granular on anterior portion and no carinae developed. Ocular tubercles black and granular, lateral ocular tubercles provided with five lateral eyes as in text-fig. 826. A pair of median ocular tubercles granular and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.25 as in text-fig. 825. Interocular area darker on lateral portion whereas median portion pale and weakly furrowed. Posterior median furrow more deep and darker on anterior portion. Anterior margin smooth, slightly invaginated in the middle. Lateral margin almost smooth but weakly and finely crenulated on anterior and posterior portion. Posterior margin weakly granular and almost straight as in text-fig. 825. Chelicera with basal segment elongated, on dorsal surface covered with black pigmented reticulation but more darker on anterior portion. Ventral surface covered thickly with silky hairs. Fingers brownish but more darker on dentition and dentition as characterised in the family and genus. Dentition on movable finger as in text-fig. 827, dorsal and ventral teeth subequal. Pedipalp flat, more elongated and more than six times as long as carapace as in text-fig. 824. Femur almost twice as long as carapace and provided with weakly granular carinae. Outer and inner carinae almost smooth. Outer or anterior surface provided with granular carinae. Intercarinal space weakly and sparsely granular. Patella as long as femur but with almost smooth intercarinal space; carinae well developed but smooth. Anterior or inner surface

provided with few tuberculate and few smaller granules. Hand smooth and only outer carinae weakly developed and smooth as in text-fig. 828. Length of under hand as long as carapace. Fingers darker, brown but pale on anterior portion and shorter than either femur or patella. Dentition on fingers non-imbricated and outer row on movable finger consists of seven teeth as in text-fig. 829. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 835-840. Legs elongated, femur and patella carinated and all carinae granular and sometimes serrated. Intercarinal space granular. Tibia carinated but weakly granular without tibial spur. Tarsomere I carinated but carinae smooth and provided below with a row of paired elongated setae and a pair of pedal spurs on distal end. Tarsomere II almost smooth and provided with a row of paired setae. A pair of claw short but strong and dark brown. All segments weakly covered with microscopic whitish hairs. Pectines well developed and five times longer than wide. Middle lamellae subdivided into seven small digits. Elongated, sub-triangular fulcra well distinguished between the two adjacent teeth. Lamellae and fulcra sparsely covered with red microscopic setae. Pectinal teeth elongated, tubular as in text-fig. 831, count 18/17. Basal piece sclerotized and provided with a deep median notch on anterior margin. Genital operculum wider than long and two sclerites united in the middle. Male genital papillae seen after lifting the sclerites. Cephalothoracic sternum triangular with a deep depression in the middle portion as in text-fig. 830.

Mesosoma: Each tergite weakly granular but little more granular on posterior portion. Tergites I-VI provided with six yellow and five dark brown bands as in text-fig. 832. Brown

FIGS. 824-834. *Isometrus (Raddyanus) europaeus* (Linn.)

- 824. Dorsal view of male.
- 825. Tergite, dorsal view.
- 826. Lateral eyes, lateral view.
- 827. Movable finger of chelicera, dorsal view.
- 828. Manus and fingers, exterior view.
- 829. Movable finger, dorsal view.
- 830. Pectines, genital operculum and cephalothoracic sternum, ventral view.



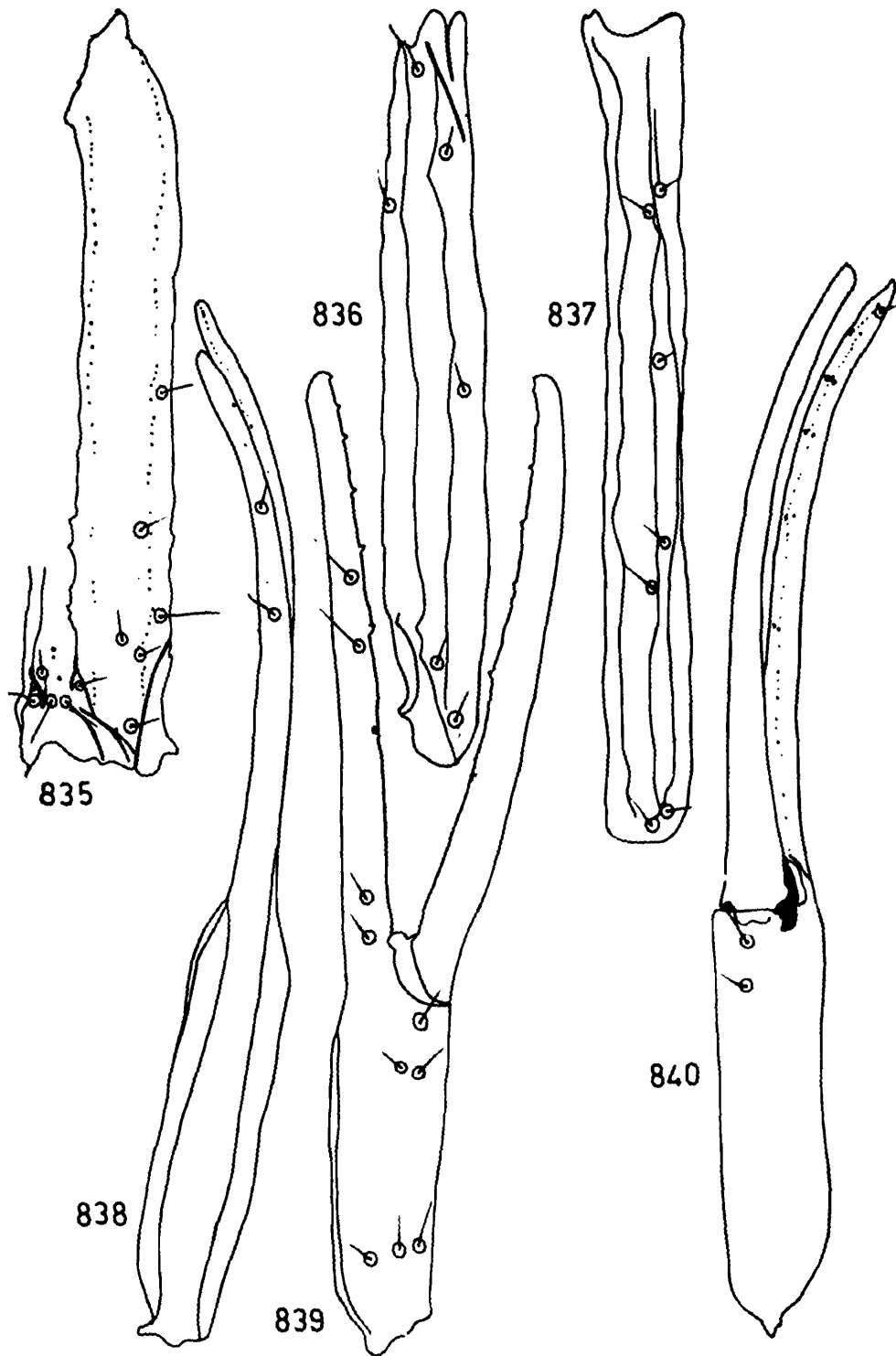
- 831. Pectinal teeth and fulcra, ventral view.
- 832. Tergite, dorsal view.
- 833. Telson and anal rim of metasomal segment V, lateral view.
- 834. Telson and anal rim of metasomal segment V, ventral view.

bands on middle portion of each tergite developed only on posterior portion. Single median carina developed only on posterior portion of each tergite and weakly granular as in text-fig. 832. Posterior margin weakly granular. Pretergal portion of each tergite smooth and posterior margin smooth but not straight. Tergite VII provided with four weakly crenulated carinae as in text-fig. 824. Lateral margins weakly crenulated. Posterior margin granular. Pretergal portion smooth with smooth posterior margin but posterior margin more evaginated on median lateral portions. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Posterior and lateral margins almost smooth. Sternite IV with weakly crenulated lateral margins. Presternal portion smooth with smooth posterior margin invaginated weakly in the middle portion. Sternite V weakly granular but more granular on lateral portions and provided with four carinae. Lateral carinae very weakly crenulated and interrupted in the posterior notch. Inner carinae almost smooth and developed only on posterior portion. Lateral margins crenulated. Posterior margin smooth. Pretergal portion smooth with smooth posterior margin weakly invaginated in the middle portion.

Metasoma : Cauda more than eight times as long as carapace. Basal segment always longer than wide and provided with all ten carinae. Dorsal, dorsolateral and lateral carinae granular but inferior lateral and inferior carinae very weakly granular. Segments II-IV with eight carinae and lateral carinae completely absent. Dorsal and dorsolateral carinae granular, inferior lateral carinae weakly granular. Inferior carinae very poorly granular on segment II and almost smooth on segments III and IV. Inter-carinal space very weakly granular. Anterior peduncle smooth. Posterior margin granular. Segment V almost twice the length of carapace. Dorsal carinae almost smooth and well developed. Lateral carinae very weakly crenulated. Inferior laterals very

Figs. 835-840. *Isometrus (Raddyanus) europaeus* (Linn.)

835. Femur, dorsal, exterior and interior views.
836. Patella, dorsal view.



- 837. Patella, exterior view.
- 838. Manus and fingers, dorsal view.
- 839. Manus and fingers, exterior view.
- 840. Manus and fingers, ventral view.

poorly developed and interrupted. Single inferior median carina weakly crenulated. Intercarinal space smooth. Anal rim of this segment granular. Telson much shorter than last caudal segment but longer than carapace. Vesicle slightly shorter than carapace and more than as wide as fifth caudal segment. Inferior median crest well developed, very weakly granular and ending into a pointed subaculear nodule, provided on inner surface with a pair of denticle. Lateral and inferior bands weak but more darker in colour. Aculeus shorter than vesicular length, dark brownish red on distal portion; less curved and pointed. Seta-tion on vesicle not clear as in text-figs. 833 and 834.

Distribution : INDIA : Minikoi, Laccadive Islands, Bombay, Maharashtra; Andaman Islands; PAKISTAN : Karachi; SRI LANKA : Trincomali and Peradeniya; BURMA : Rangoon and Auyab.

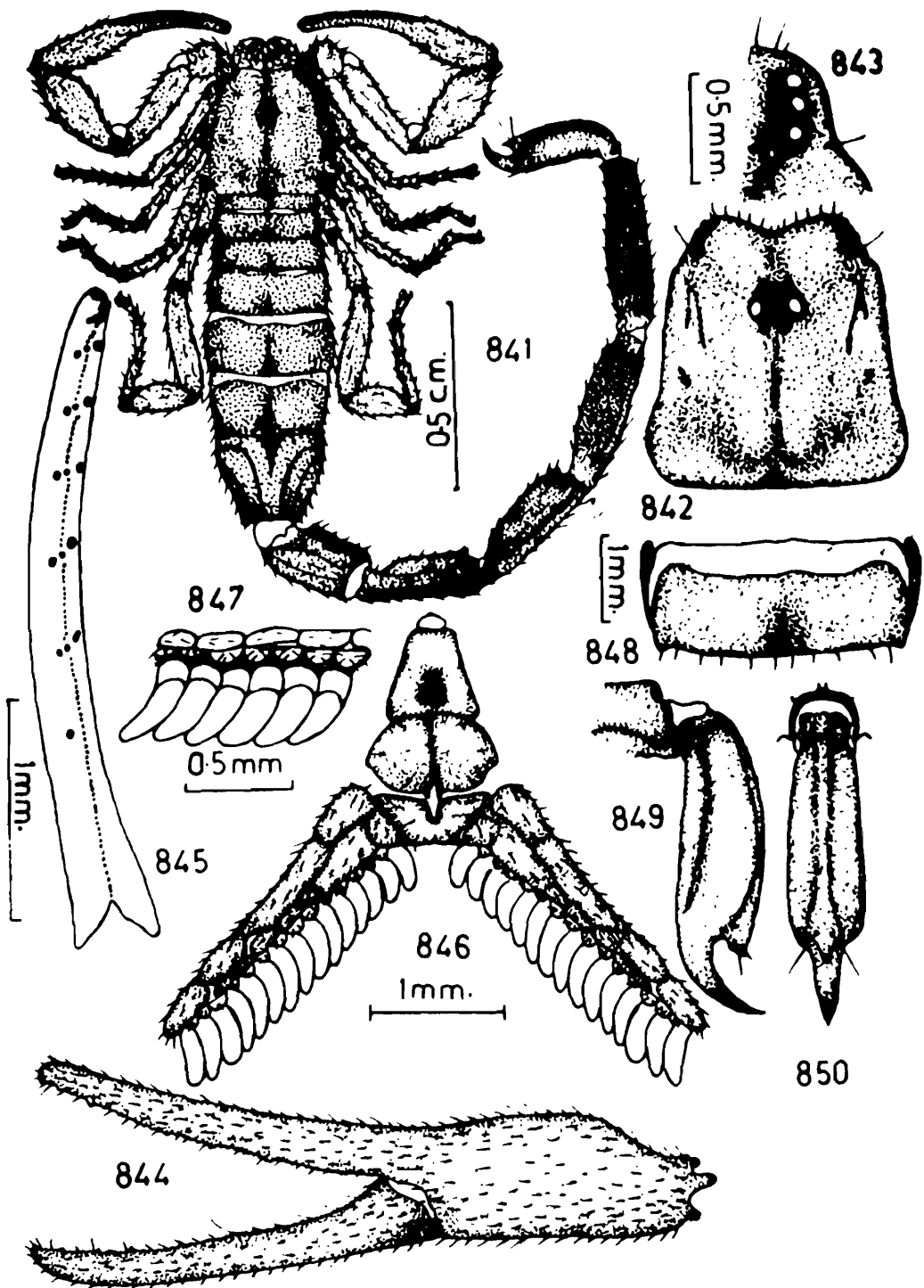
Remarks : We have examined the *Leucotype* received from B.M. (N.H.), London, Regd. No. 1952.12.11.1. The present illustrations and descriptions are based on the same specimen.

42. *Isometrus (Raddyanus) assamensis* Oates (Figs. 841-866)

1888. *Isometrus assamensis* Oates, *J. Bombay nat. Hist. Soc.*, 3 : 250.
 1893. *Isometrus assamensis* : Pocock, *Weber's Reise Niedere O-Ind.*, 3 : 90.
 1900. *Isometrus assamensis* : Pocock, *Fauna Brit. India, Arachn.*, : 48
 1972. *Isometrus (Raddyanus) assamensis* : Vachon, *Cah. Pacif.*, 16 : 169-180.

General: Male and female small yellowish brown scorpions. Female slightly bigger, more darker and granular than male.

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- FIGS. 841-850. *Isometrus (Raddyanus) assamensis* oates
841. Dorsal view of male.
 842. Carapace, dorsal view.
 843. Lateral eyes, lateral view.
 844. Manus and fingers, exterior view.
 845. Movable finger, dorsal view.
 846. Pectines, genital operculum and cephalothoracic sternum, ventral view.



- 847. Pectinal teeth and fulcra, ventral view.
- 848. Tergite, dorsal view.
- 849. Telson and anal rim of metasomal segment V, lateral view.
- 850. Telson and anal rim of metasomal segment V, ventral view.

Carapace yellowish with few brownish spots. Mesosomal tergites with five yellow and four brownish bands. Metasomal segments carinated, I-III segments yellowish, IV-V brownish and Telson dark brown. Chelicera yellowish. Pedipalp slightly darker and brownish. Legs pale yellow. Ventral side of body pale yellow. Pectines well developed and yellow. Last mesosomal sternite weakly granular and provided with very poorly developed granular lateral carinae.

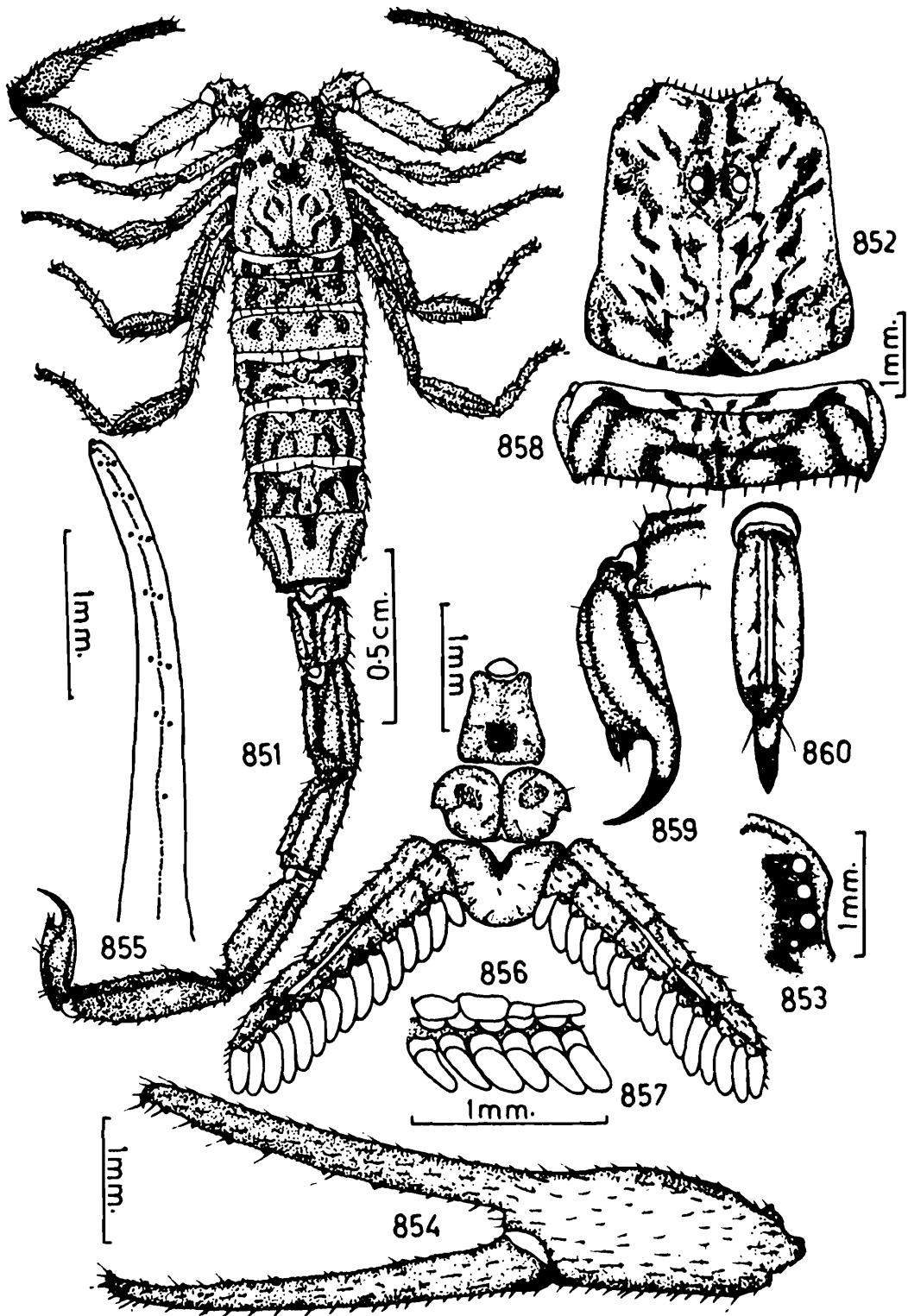
Measurements : Male total length 34.25 mm. Carapace 3.00 mm. long; Mesosoma 9.25 mm. long; Metasoma 22.00 mm. long.

Female total length 35.00 mm. Carapace 3.50 mm. long; Mesosoma 11.00 mm. long; Metasoma 20.50 mm. long.

Carapace : Entire surface covered with fine granules but more granular on lateral portions. Interocular region dark brown. Posterior median depression prominent only on posterior portion. Ocular tubercles granular and lateral tubercles provided with five lateral eyes as in text-figs. 843 and 853. Median ocular tubercles with a pair of median eyes, situated anteriorly in the ratio 1 : 2.25 as in text-figs. 842 and 852. Anterior margin smooth, invaginated in middle and provided with few setae. Lateral margins finely crenulated and provided with a submarginal crenulated ridge. Posterior margin granular and almost straight as in text-figs. 842 and 852. Chelicera pale and basal segment pigmented on dorsal surface but more darker on anterior portion. Ventral surface thickly covered with short silky hairs extending on fingers. Fingers short and dark reddish brown on dentition. Dentition as characterised in the family and genus.

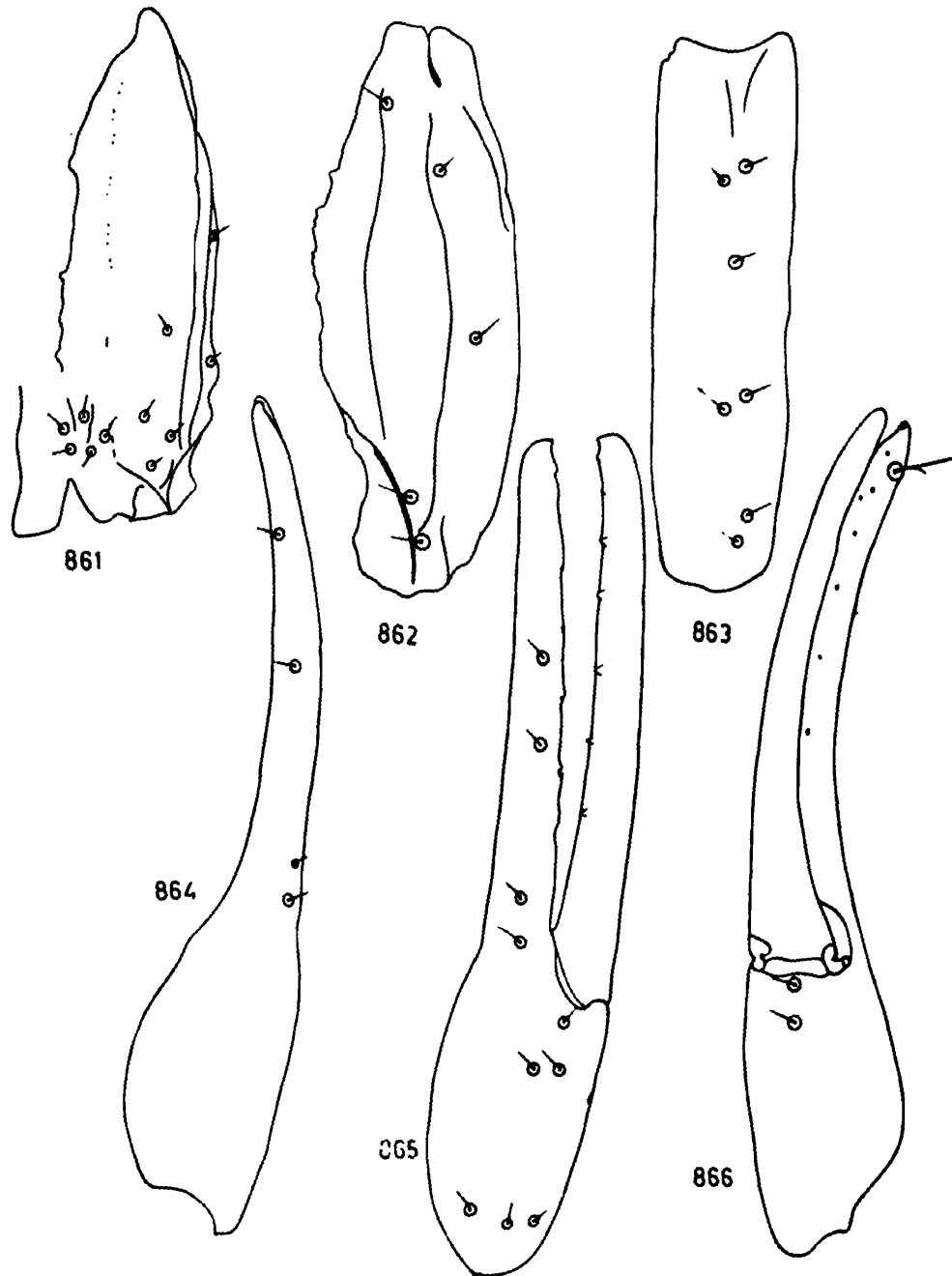
FIGS. 851-860. *Isometrus (Raddyanus) assamensis* Oates

- 851. Dorsal view of female.
- 852. Carapace, dorsal view.
- 853. Lateral eyes, lateral view.
- 854. Manus and fingers, exterior view.
- 855. Movable finger, dorsal view.
- 856. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 857. Pectinal teeth and fulcra, ventral view.
- 858. Tergite, dorsal view.



859. Telson and anal rim of metasomal segment V, lateral view.
 860. Telson and anal rim of metasomal segment V, ventral view.

Dorsal and ventral distal teeth almost subequal. Pedipalp slightly stronger in female. Femur as long as carapace. All carinae granular. Outer or anterior surface provided with crenulated carina and three to four weak denticulate tubercles. Intercarinal space weakly granular. Patella longer than carapace or femur. Outer carina smooth. Dorsal and ventral carinae granular, dorsolateral carinae weakly crenulated. Inner or anterior surface provided with crenulated crest with three to four dentiform tubercles. Intercarinal space more granular on inner side and almost smooth on outer. Hand very weakly and finely granular but without carinae and less than as wide as patella as in text-figs. 844 and 854. Length of under hand more than half the length of patella in male and almost half in female. Movable finger equal to the length of patella in female and slightly shorter in male. Dentition on fingers non-imbricated and outer row comprises of seven teeth on movable finger as in text-figs. 845 and 855. Immovable finger always shorter than femur. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 861-866. Legs slightly pale with few black bands. Femur and patella crenulated, all carinae crenulated, intercarinal space granular. Tibia carinated but carinae less crenulated. Tarsomere I crenulated above and smooth, Intercarinal space with a row of non paired, short setae. Claws short and dark on distal portion. All segments weakly covered with few setae. Pectines well developed, four times longer than wide. Middle lamellae subdivided into seven digits. Fulcra well distinguished. Lamellae and fulcra sparsely covered with whitish microscopic setae. Pectinal teeth long and tubular in male as in text figs. 847 and count 15/15 in male and female as in text-figs. 846 & 856. Basal piece with anterior margin provided with a deep median notch in middle. Genital operculum wider than long and provided with two sclerites united in middle in female but separated on posterior portion in male and from under which a pair of conspicuous male genital papillae protruding out as in text-fig. 846. Cephalothoracic sternum triangular and provided with a shallow depression in posterior middle portion as in text-figs. 846 & 856,



FIGS. 861-866. *Isometrus (Raddyanus) assamensis* Oates

- 861. Femur, dorsal, interior and exterior views.
- 862. Patella, dorsal view.
- 863. Patella, exterior view.
- 864. Manus and fingers, dorsal view.
- 865. Manus and fingers, exterior view.
- 866. Manus and fingers, ventral view.

Mesosoma : Each tergite with six yellow and five blackish bands as in text-fig. 851. All tergites granular but more granular on lateral and median portions. Tergites I-VI, each provided with a granular median carina as in text-figs. 848 & 858. Lateral and posterior margins granular. Pretergal portion finely granular on lateral portion and with finely granular posterior margin. Tergite VII provided with two pairs of granular lateral carinae as in text-figs. 841 & 851. Lateral margins serrated, posterior margin granular above. Pretergal portion granular on lateral portions, posterior margin granular. Sternites I-IV smooth and each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion smooth with posterior margin invaginated in the middle portion. Sternite V granular and provided with weakly developed and poorly granular lateral carinae. Lateral carinae marked posteriorly with stout setae. Lateral margins weakly crenulated. Posterior margin smooth. Presternal portion smooth with smooth posterior margin, invaginated in the middle portion.

Metasoma : Cauda more than seven times as long as carapace in male and slightly less than six times as long as carapace in female. Basal segment always longer than wide. Segment I with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae, all carinae weakly crenulated and dorsal carinae weakly spiniform posteriorly. Segments II-IV with dorsal, dorsolateral, inferior lateral and inferior carinae. All carinae weakly crenulated. Dorsal carinae on segments II and III spiniform posteriorly but more spiniform in male as in text-fig. 841. Intercarinal space granular. Anterior peduncle finely granular on dorsal portion. Posterior margin smooth. Last caudal segment always longer than carapace. Dorsal surface round and granular. Only inferior lateral and single inferior carinae crenulated. Intercarinal space granular. Anterior peduncle smooth, posterior margin smooth in male and weakly granular in female. Telson slightly longer than carapace but longer than caudal segment I and shorter than caudal segment II. Vesicular surface smooth. Lateral and ventral bands not prominent. Ventral crest weakly developed, smooth and ending into a strong triangular subaculear spine. Subaculear node provided on inner surface with

two pairs of minute denticles. Aculeus very short and less than as long as half the vesicular length, curved, short and almost dark brown in colour. Setation on the vesicle is not clear as in text-figs. 849, 850, 859 and 860.

Distribution : INDIA : Uttar Pradesh.

Remarks : We have examined the type specimens received from B.M.(N.H.), London, Regd. No. 1889.7.31.76-77. The present illustrations and descriptions are based on the above types observed. Here we would like to mention that according to *Fauna Brit. India, Arachn.*, Pocock, he has described this species on the basis of one male and one female specimens (Regd. No. 1889.7.31.76-77) but the lot received consists of six specimens in which only one male was with a label as 'TYPE'. It is very confusing to distinguish the female type from the lot. Other four specimens collected from Bankatti Kheri forest, Uttar Pradesh on 29.2.1912 by A. A. Imma were latter on mixed with the type specimens. We have observed all the above specimens and one male and female were chosen for measurements, description and illustrations.

**43. *Isometrus (Raddyanus) acanthurus* Pocock
(Figs. 867-881)**

1899. *Isometrus acanthurus* Pocock, *J. Bombay nat. Hist. Soc.*, 12 : 264.
1900. *Isometrus acanthurus* : Pocock, *Fauna Brit. India, Arachn.*, : 51-52,

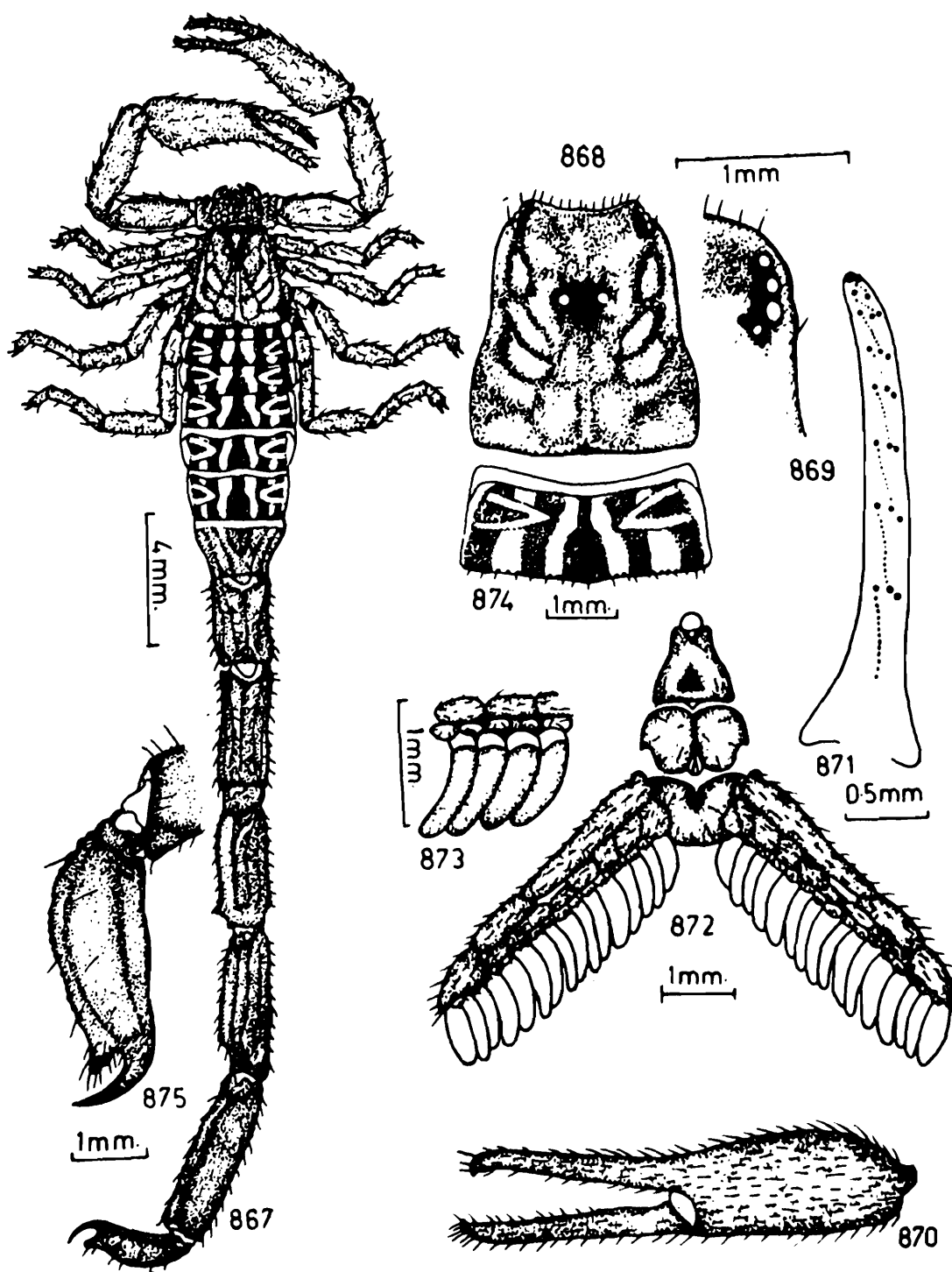
General : Male of medium size, thin, slender, yellowish with long metasoma. Entire body coarsely granular. Carapace without carinae. Mesosomal tergites monocarinated. Last mesosomal sternites with two pairs of granular carinae. Pectines well developed. Metasomal segments granular and carinated. Telson coarse on ventral surface, ventral median crest crenulated ending into broad subaculear node. Aculeus short and sharp. Pedipalp smooth. Legs granular and carinated on femur and patella.

Measurements : Total length 40.00 mm. Carapace 3.75 mm long; Mesosoma 10.50 mm. long; Metasoma 25.75 mm. long.

Carapace : Entire surface coarsely granular. Carinae not developed. Interocular area almost yellow (black in original description) and occupied with slightly bigger granules on lateral portion. Posterior median depression more prominent on posterior portion and granular. Ocular tubercles granular, lateral ocular tubercles provided with five contiguous lateral eyes as in text-fig. 869. Median ocular tubercles granular provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.9 as in text-fig. 868. Anterior margin smooth. Lateral margins smooth but provided with a granular submarginal ridge. Posterior margin smooth but sparsely granular above and not straight as in text-fig. 868. Chelicera pale yellow, basal segment elongate, smooth on dorsal surface. Ventral surface clothed thickly with fine silky hairs. Fingers dark brown on dentition. Dentition on fingers as characterised in the family and genus. Dorsal distal tooth of movable finger slightly shorter than ventral distal tooth. Pedipalp almost smooth with globular manus and short fingers as in text-fig. 870. Femur slightly longer than carapace. Carinae very weakly and irregularly granular. Intercarinal space very finely and closely granular. Outer or anterior surface provided with crenulated carina and many subdenticular tubercles. Patella longer than carapace or femur. Inner and dorsal carinae granular but outer and ventral carinae smooth. Intercarinal space finely granular on inner side while almost smooth on outer and ventral sides. Inner or anterior surface provided with a crest of sub-denticular tubercles. Manus without carinae but inner surface finely granular. Length of under hand always shorter than femur but almost as long as carapace. Movable finger as long as under hand. Immobile finger shorter than movable finger. Dentition on fingers non-imbricated and outer row on movable finger comprises of seven

FIGS. 867-875. *Isometrus (Raddyanus) acanthurus* Pocock

- 867. Dorsal view of male.
- 868. Carapace, dorsal view.
- 869. Lateral eyes, lateral view.
- 870. Manus and fingers, exterior view.
- 871. Movable finger, dorsal view.



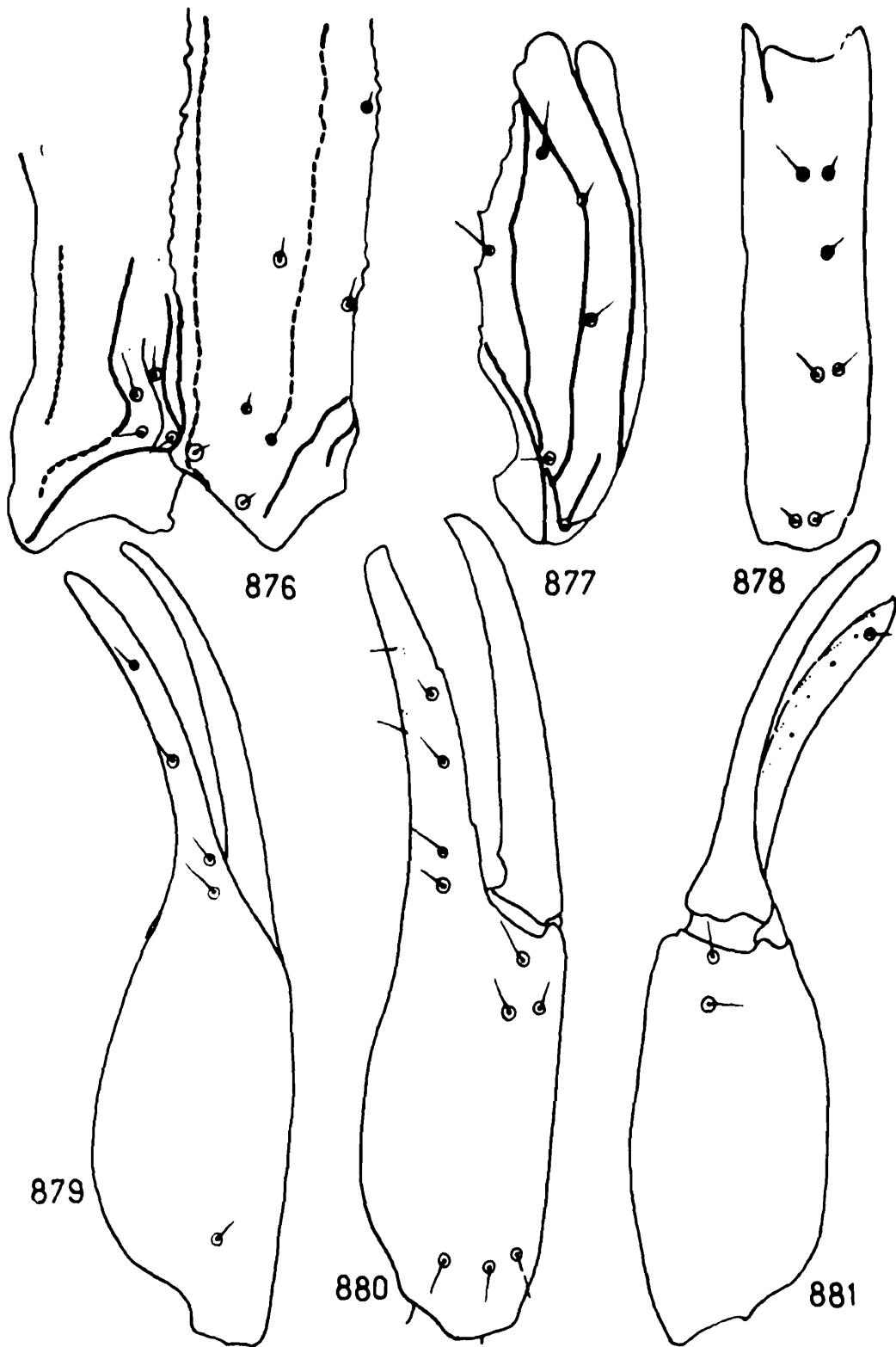
- 872. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 873. Pectinal teeth and fulcra, ventral view.
- 874. Tergite, dorsal view.
- 875. Telson and anal rim of metasomal segment V, lateral view.

teeth as in text-fig. 871. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 876-881. Legs yellow but distal digits more paler. Femur and patella granular, carinated and all carinae granular. Tibia carinated but smooth, intercarinal space also smooth. Tarsomere I smooth, carinated on outer surface, inner surface provided with short bristles. Tarsomere II smooth, ventral surface provided with a row of unpaired short bristles. All segments clothed sparsely with microscopic reddish hairs. Claws normal and dark on tips. Pectines well developed and four and a half times longer than wide. Middle lamellae subdivided into seven small digits. Fulcra well distinguished and slightly elongate. Lamellae and fulcra sparsely covered with microscopic reddish setae. Teeth well developed, elongated as in text-fig. 873 and 16/16 in number as in text-fig. 872. Basal piece sclerotized, smooth and anterior margin deeply notched in the middle. Genital operculum wider than long, provided with a pair of sclerites united in the middle and from under which a pair of small, pointed and conspicuous male genital papillae visible in text-fig. 872. Cephalothoracic sternum triangular, smooth provided with a shallow depression in the middle of posterior portion as in text-fig. 872.

Mesosoma : All tergites finely, closely granular and with five black and six yellow bands as in text-fig. 867. Tergites I-VI monocarinated and median carinae granular, well developed on posterior portion as in text-fig. 874. Lateral margins finely crenulated. Posterior margin smooth and provided with bigger granules on dorsal surface as in text-fig. 874. Pretergal portion not visible. Tergite VII granular provided with two pairs of crenulated carinae as in text-fig. 867. Inner carinae with posterior sub-denticular tubercle. Lateral margin almost serrated. Posterior margin smooth but finely granular. Sternites almost

FIGS. 876-881. *Isometrus (Raddyanus) acanthurus* Pocock

- 876. Femur, dorsal, interior and exterior views.
- 877. Patella, dorsal view.
- 878. Patella, exterior view.



- 879. Manus and fingers, dorsal view.
- 880. Manus and fingers, exterior view.
- 881. Manus and fingers, ventral view.

smooth but finely granular on lateral portions of sternites III and IV. Sternites I-IV provided each with a pair of small, slit like stigmata for book lungs. Lateral margins almost smooth or finely crenulated. Posterior margin weakly crenulated and not straight. Presternal portion not visible. Sternite V granular provided with two pairs of granular carinae. Lateral margins serrated. Posterior margin smooth. Presternal portions not visible.

Metasoma: Cauda thin, elongated and nearly seven and a half times as long as carapace. Basal segment almost twice as long as wide. Segment I with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae serrated. Segment II with lateral weakly developed and granular. Dorsal, dorsolateral, inferior lateral and inferior carinae well developed and serrated. Segments III and IV without lateral carinae. Dorsal carinae of segments II and III ending posteriorly into an upstanding, pro-curved spines but on segments I and IV, these carinae ending posteriorly into a triangular, blunt sub-denticular tubercles. Intercarinal space finely granular on dorsolateral portion but very weakly granular on ventral portion. Dorsal surface of each segment almost smooth but anterior peduncle very finely and closely granular. Posterior margin smooth. Segment V longer than carapace. Dorsal carinae sparsely granular and developed only on one fourth posterior portion. Dorsolateral carinae sparsely granular and weakly developed. Inferior lateral carinae evenly granular throughout. Inferior carinae very weak and present only on one fourth of anterior portion. Single inferior median carina well developed and evenly crenulated. Intercarinal space almost coarsely granular on dorsal surface while very weakly granular on lateral and ventral surface. Anal rim of this segment granular. Telson shorter than caudal segment V but as long as caudal segment III. Vesicle always less than as wide or deep as segment V; granular on lateral and ventral surface. Ventral median crest well developed, crenulated, ending into a broad, blunt, triangular subaculear nodule. Subaculear nodule provided with two pairs of bigger teeth and a pair of basal minute teeth on inner margin. Ventral surface also provided with a pair of lateral granular crest. Ventral and lateral

bands more clear and dark in colour. Aculeus very short almost one fourth of vesicular length, much curved, sharp and dark brown on distal portions as in text-fig. 875.

Distribution : INDIA : Poona, Kolaba, Maharashtra.

Remarks : We have examined the type specimen (1 ♂) received from B.M. (N.H.), London, Regd. No. 1897.9.17.90. Present description, illustrations are based on the type studied. Due to prolonged preservation the original body colour has become very light. We have also studied some specimens identified by us. These specimens are deposited in Western Regional Station, ZSI, Poona.

44. *Isometrus (Raddyanus) corbeti* sp. nov.

(Figs. 882-895)

General : Female brownish yellow, body very thin, elongated, specially the metasoma very long. Entire body surface not much granular. Female more longer than male. Manus or chela more robust in male than in female. Metasomal segments carinated, more elongated and dorsal carinae spiniform posteriorly on segments II and III. Telson more longer in female than in male and provided with a strong triangular subacicular nodule but not sharp and armed with two pairs of minute teeth on inner margin. Pectines well developed and both male and female with 15 teeth in comb. A pair of conspicuous male genital papillae visible and in female, sclerites fused completely on median line.

Body colour brownish yellow but male more darker than female. Carapace yellow and variegated with brownish spots, interocular area darker. Mesosomal tergites with a median, four lateral brownish and six yellowish bands as in text-fig. 882. Sternites yellow except last two, variegated with few brownish bands. Metasomal segments also variegated with brown bands but each segment more darker on dorsal surface. Caudal segment V almost completely dark brown. Telson also dark brown with few yellowish spots and bands. Chelicera darker on basal

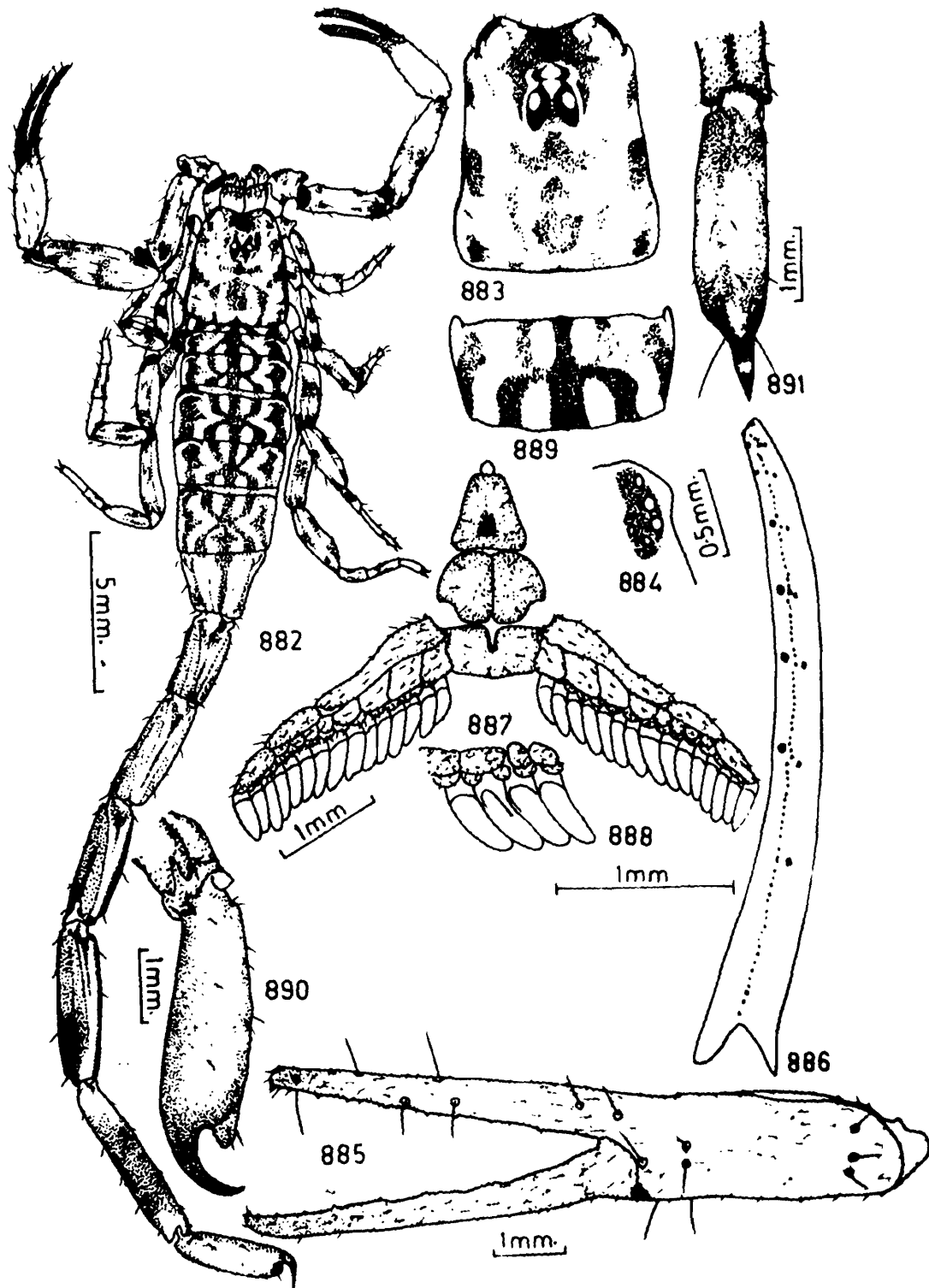
segment. Pedipalp yellowish with few black spots on femur, patella and manus light but darker on fingers. Legs yellow with few darker stripes.

Measurements : Total length 39.00 mm. Carapace 3.75 mm. long; Mesosoma 9.50 mm. long; Metasoma 25.75 mm. long.

Carapace : Entire surface granular, without carinae. Lateral ocular tubercles black, granular, granules bigger in size and provided with five lateral eyes as in text-fig. 884. Median ocular tubercles also granular, black and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.25 as in text-fig. 883. Anterior margin smooth, invaginated and provided with few reddish setae. Lateral margins very finely crenulated and provided with finely granular submarginal ridge. Posterior margin also finely crenulated. All furrows very shallow and poorly granular. Chelicera with basal segments elongated, smooth on dorsal surface and ventral surface covered with tuft of white silky hairs, extending on fingers. Fingers comparatively short and reddish on dentition. Dentition on fingers as characterised in the family and genus. Dorsal and ventral distal teeth on movable finger subequal in length. Pedipalp normal with femur as long as carapace, all carinae well developed and granular but inner carina thick and more granular. Intercarinal space finely granular except ventral surface. Patella longer than femur or carapace, granular, carinae developed only on dorsal surface provided with crenulated carinae but few granules more tuberculate and dentiform. Intercarinal space very weakly granu-

FIGS. 882-891. *Isometrus (Raddyanus) corbeti* sp. nov.

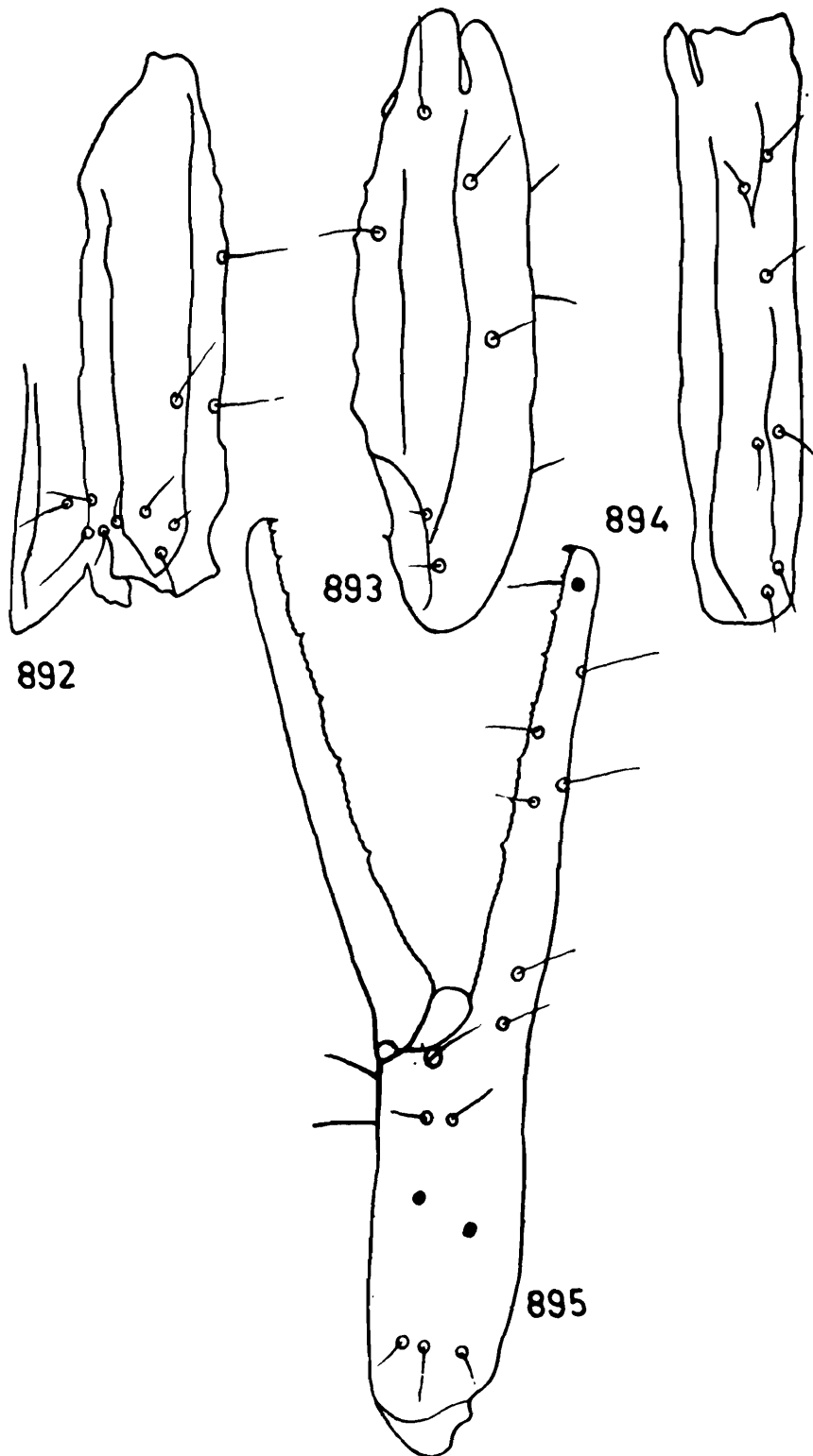
- 882. Dorsal view of female.
- 883. Carapace, dorsal view.
- 884. Lateral eyes, lateral view.
- 885. Manus and fingers, exterior view.
- 886. Movable fingers, dorsal view.
- 887. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 888. Pectinal teeth and fulcra, ventral view.
- 889. Tergite, dorsal view.



890. Telson and anal rim of metasomal segment V, lateral view.
 891. Telson and anal rim of metasomal segment V, ventral view.

lar. Manus narrow and elongated and length of under hand slightly longer than half the length of patella, acarinated and smooth. Fingers comparatively short and stout. Movable finger as long as carapace or femur. Immovable finger shorter than movable finger. Dentition on fingers non-imbricated and outer row on movable finger comprises seven minute teeth as in text-fig. 886. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 892-895. Legs stout, carinated on femur, patella, tibia and tarsomere I. Intercarinal space finely granular on femur and patella but smooth on tibia and tarsomere I. Tarsomere I provided on ventral side with a row of long paired setae or hairs and a pair of short pedal spurs on distal end. Tarsomere II acarinated, smooth, cylindrical and thickly clothed ventrally with a row of paired setae. All digits sparsely clothed with few long white and reddish brown setae. A pair of claw of each leg normal, sharp, brown on tips. Pectines well developed and four times longer than wide. Middle lamellae subdivided into seven small digits. Fulcra well defined and round to elongate. Lamellae and fulcra sparsely clothed with white microscopic setae. Teeth elongate, not much tapering distally as in text-fig. 888 and 15/15 in number. Basal piece smooth with anterior margin slightly invaginated and provided with a moderately deep median notch. Genital operculum wider than long and a pair of sclerites united in the middle. Cephalothoracic sternum triangular but almost as long as wide and provided with a median, elongated depression. Basal piece, genital operculum and cephalothoracic sternum clothed very sparsely with few reddish microscopic setae as in text-fig. 887.

Mesosoma: All tergites entirely finely granular. Tergites I-VI monocarinated and carina developed only on posterior median portion as in text-fig. 889. Lateral and posterior margins granular. Pretergal portion also finely granular with granular posterior margin. Tergite VII with a poorly distinct median carina and two pairs granular lateral carinae as in text-fig. 882. Lateral margins crenulated. Posterior margin smooth but thickly granular on submarginal portion. Pretergal portion finely granular with granular posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs.



FIGS. 892-895. *Isometrus (Raddyanus) corbeti* sp. nov.

892. Femur, dorsal, interior and exterior views.

893. Patella, dorsal view.

894. Patella, exterior view.

895. Manus and fingers, exterior view.

Lateral and posterior margins smooth on sternites I-III. Lateral margins finely crenulated on sternite IV. Presternal portion absent on sternite I while smooth with posterior margin on sternites II-IV. Sternite V finely granular but more closely granular on lateral carinae. Median carinae obsolete. Lateral and posterior margins finely crenulated. Presternal portion smooth with smooth posterior margins.

Metasoma : Cauda very thin, long and slightly less than seven times as long as carapace. Basal segment twice as long as wide or deep. Segment IV slightly shorter than four times as wide or deep. Segment I with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae, all carinae finely crenulated. Segments II-IV with dorsal, dorsolateral, inferior lateral and inferior carinae, carinae finely crenulated. Lateral carinae distinct only on one fourth posterior portion of segment II. Dorsal carinae ending posteriorly into a sub-tuberculate spines on segments II and III. Intercarinal space finely, weakly and irregularly granular. Anterior peduncle thickly but very finely granular. Posterior margins granular on dorsal and lateral portions but smooth on ventral side. Segment V longer than patella and round on dorsal evenly but poorly granular and weakly crenulated. Intercarinal space weakly granular. Anterior peduncle smooth, posterior margin smooth on dorsal portion but anal rim of this segment weakly granular. Telson longer than segment III but shorter than segment IV. Vesicle cylindrical slightly longer than segment I and as wide or deep as segment V. Entire vesicular surface smooth except ventral median smooth crest, ending posteriorly into broad, triangular subaculear spine, provided with two pairs of minute teeth on inner margin. Lateral and ventral bands not prominent. Aculeus much curved, short and about one third of vesicular length, sharp and reddish brown on distal portion. Setation on vesicle as in text-figs. 890 & 891.

Type specimens : *Holotype* : ♀, *Allotype* : ♂ in spirit, deposited in National Collection, ZSI, Calcutta, Regd. Nos. 5086/18 and 5087/18.

Type-locality : *Holotype* : Corbet National Park, Stn. No. 12, Dhikala-Boscar Rd., Dist. Pauri, Uttar Pradesh, India; 3.iii.1973, Coll. Asket Singh; *Allotype* : Same as *Holotype*.

Distribution : INDIA : Uttar Pradesh.

Discussion : This species resembles with *Isometrus* (Rad-dyanus) *acanthurus* Pocock but it can be separated as follows : (i) Metasoma seven times as long as carapace but in *I. (R.) acanthurus* (Poc.) metasoma six times as long as carapace. (ii) Manus of pedipalp thin, elongated, fingers longer than the length of under hand whereas in *I. (R.) acanthurus* (Poc.) manus of pedipalp robust, shorter and fingers about as long as the length of under hand. (iii) Telson less granular with only a ventral median crest, vesicle much globular on distal portion whereas in *I. (R.) acanthurus* (Poc.) vesicle thickly granular with a pair of granular sub-median crests. Vesicle much broad at the base and narrowed on distal portion.

Remarks : Separate illustrations are not given for *Allotype* as it does not show much differences from the *Holotype*.

Sub-genus (ii) **Closotrichus** sg. nov.

Characters : Trichobothria *db* is placed distal to *et*, vesicle more bulbous.

Distribution : INDIA : Karnataka, Kerala.

45. *Isometrus* (*Closotrichus*) *sankeriensis* sp. nov.

(Figs. 896-910)

General : Male slender, delicate, white scorpion. Telson blackish at the base of aculeus and vesicle much globular and with a strong pointed subaculear spine. Pectines well developed.

Body variegated with black to brown bands and spots. Carapace mostly yellow but with few dark spots, interocular area black with a median elongated whitish spots, ocular tubercles dark. Mesosomal tergites with three dark and four yellow bands as in text-fig. 896. Metasomal segments more darker on posterior portion. Telson blackish at the base. Appendages variegated with dark spots. Manus of pedipalp clear yellow but dark on fingers. Sternites and pectines light yellow.

Measurements : Total length 33.00 mm. Carapace 3.00 mm. long; Mesosoma 8.00 mm. long; Metasoma 22.00 mm. long.

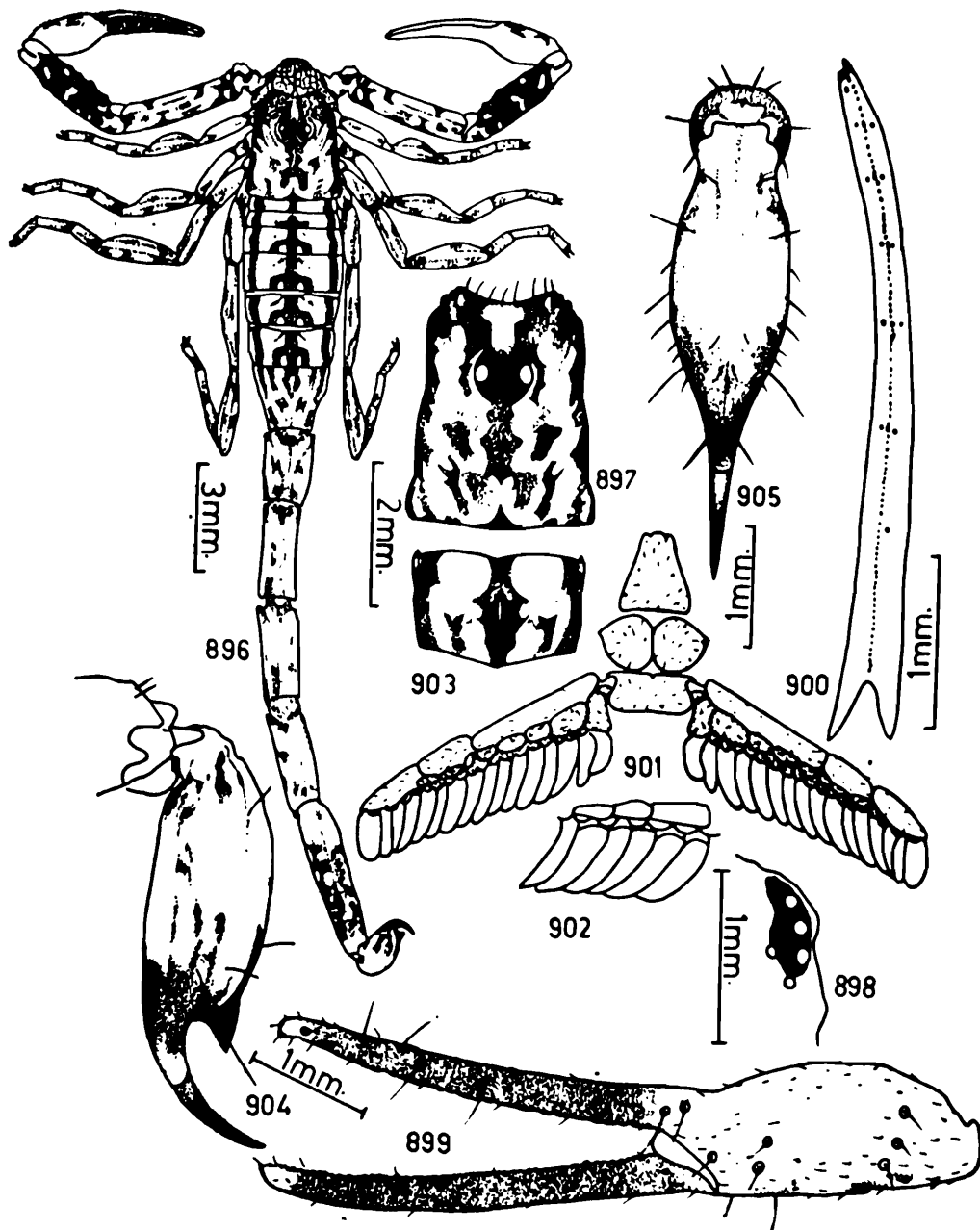
Carapace : Entire surface coarsely granular. Lateral ocular tubercles granular. Anterior margin smooth and nearly straight. Lateral margins finely crenulated and supported with a finely crenulated submarginal line. Posterior margin finely crenulated and almost straight. Five lateral eyes as in text-fig. 898. A pair of median eyes, situated anteriorly in the ratio 1 : 2.25 as in text-fig. 897. Basal segment of chelicera bigger and dorsal surface pigmented. Ventral surface whitish and provided with a tuft of fine silky hairs. Both the fingers pigmented and more darker on dentition. Dentition as characterised in the family and genus. Dorsal and ventral distal teeth on movable finger subequal. Pedipalp slender, long, variegated with dark colour. Femur always longer than carapace. Femoral carinae crenulated and the outer anterior surface provided with crenulated crest of six to seven sub-triangular tubercles. Patella as long as femur; more darker in colour and the carinae on dorsal surface crenulated, tarinae on outer surface almost smooth. Inner or anterior surface smooth, except a sub-denticular crest of four to five sub-triangular dentiform tubercles. Manus or hand whitish and both the fingers longer than carapace as in text-fig. 899. Movable finger armed with seven non-imbricated teeth as in text-fig. 900. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 906-910. Legs paler than body colour and variegated with dark colour. Femoral carinae crenulated to serrated. Tibia carinated but smooth. Tarsomeres smooth, clothed below with two rows of long bristles. Pectines well developed and three times longer than wide. Middle lamellae divided into seven digits. Fulcra well developed and roughly triangular. Lamellae and fulcra sparsely covered with white, short, microscopic hairs. Pectinal teeth elongated as in text-fig. 902, count 15/16 in male. Basal piece small and deeply notched on anterior

FIGS. 896-905. *Isometrus (closotrichus) sankeriensis* sg. and sp. nov.

896. Dorsal view of female.

897. Carapace, dorsal view.

898. Lateral eyes, lateral view,



- 899. Manus and fingers, exterior view.
- 900. Movable finger, dorsal view.
- 901. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 902. Pectinal teeth and fulcra, ventral view.
- 903. Tergite, dorsal view.
- 904. Telson and anal rim of metasomal segment V, lateral view.
- 905. Telson, ventral view.

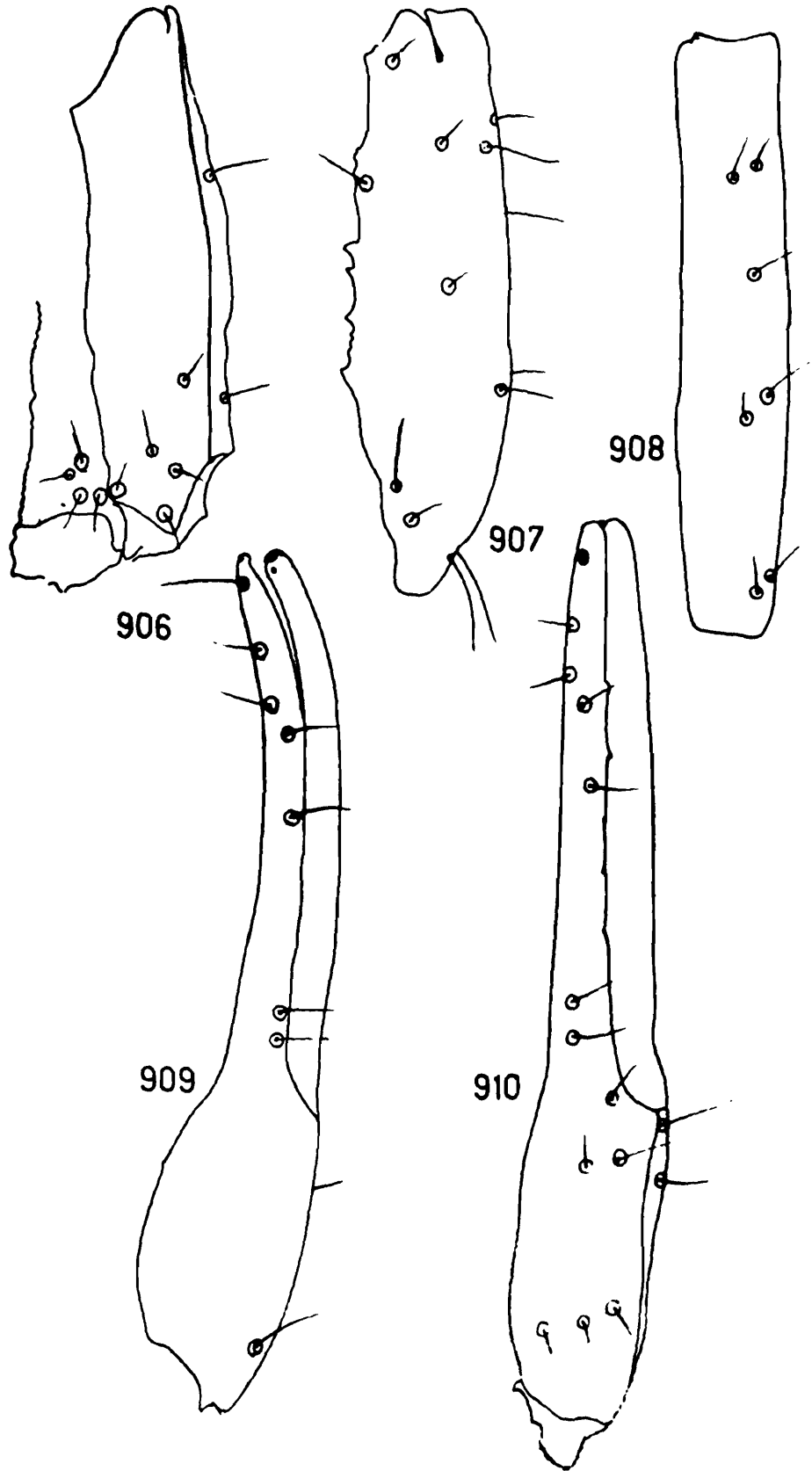
margin. Genital operculum longer than wide, exposed on posterior half and pair of conspicuous male genital papillae visible. Cephalothoracic sternum triangular as in text-fig. 901.

Mesosoma : All tergites coarsely and finely granular but more granular on lateral and posterior portions. Single median carina well developed and granular on posterior portion but smooth on anterior portion as in text-fig. 903. Tergite VII with two pairs of diverging crenulated carinae and a broad median carina developed on anterior portion as in text-fig. 896. Pretergal portion not visible. Sternites I-IV pale, whitish, smooth and each provided with a pair of slit like stigmata for book lungs. Pre-sternal portion smooth. Sternite V variegated with colour, weakly granular and two pairs of crenulated carinae well developed.

Metasoma : Cauda more than six times as long as carapace. Basal segment always longer than wide and all caudal segments of same width. Segments I-IV with dorsal, dorsolateral, inferior lateral and inferior carinae finely but delicately serrated and slightly more serrated on posterior portion. Lateral carinae developed only on segment I and delicately serrated. Segment V with inferior carinae irregularly developed and finely granular. Single inferior median carina finely and evenly serrated. Inter-carinal space finely granular. Telson as long as caudal segment IV. Vesicle globular, elongate and as wide as caudal segment V, entire ventral surface weakly granular, lateral and ventral median bands not prominent; ventral median crest weakly crenulated and continued into a strong, triangular, pointed subaculear nodule. Aculeus normally curved, sharp, pointed, dark on distal portion and as long as half the length of vesicle. Seta-tion as in text-figs. 904 and 905.

FIGS. 906-910. *Isometrus (closotrichus) sankeriensis* sg. and sp. nov.

- 906. Femur, dorsal, interior and exterior views.
- 907. Patella, dorsal view.
- 908. Patella, exterior view.
- 909. Manus and fingers, dorsal view.
- 910. Manus and fingers, exterior view.

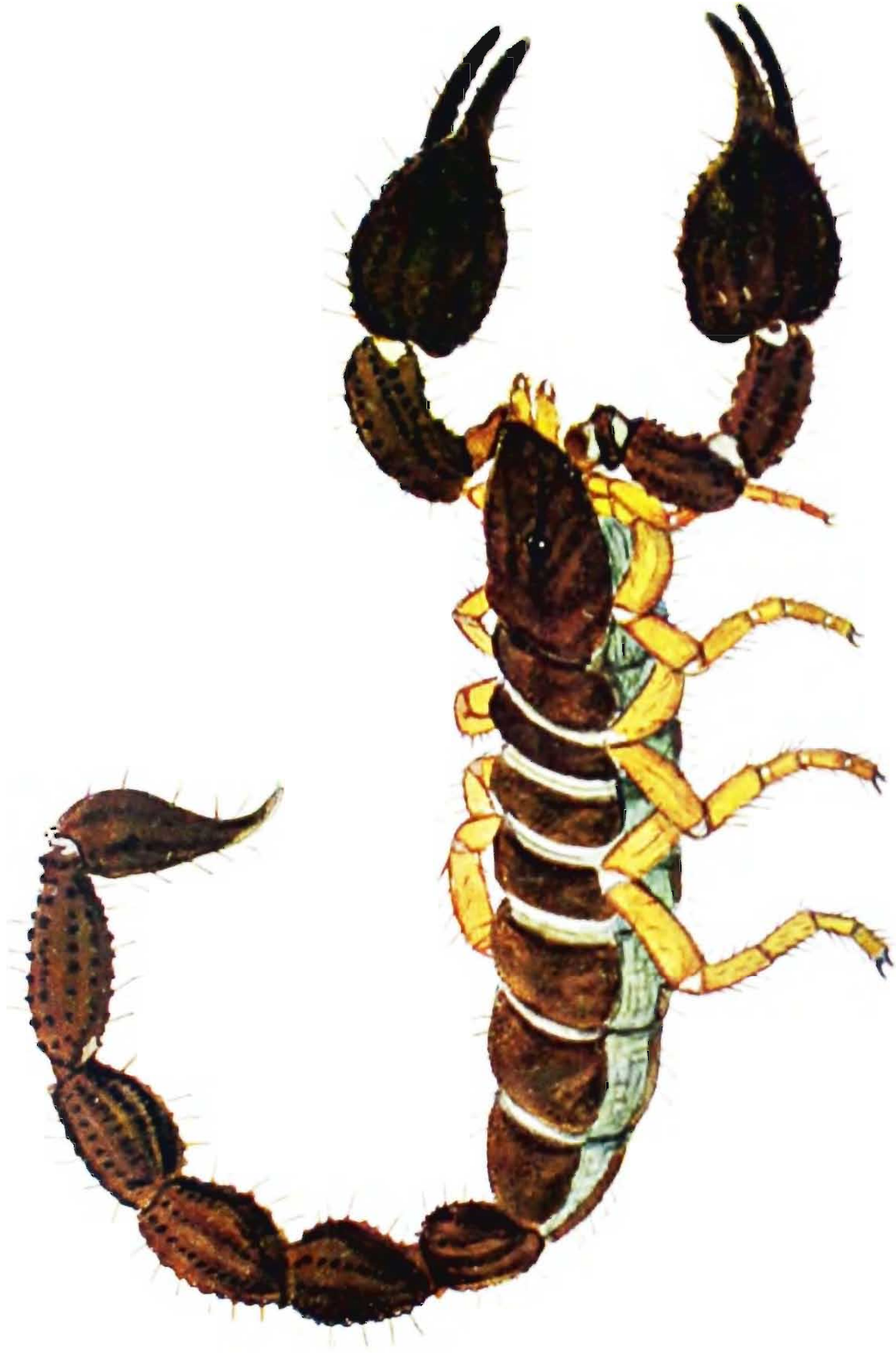


Type specimens : *Holotype* : male, *Allotype* : 1 ♀ 1 ♀ immature in spirit, deposited in National Collection; ZSI, Calcutta, Regd. Nos. 5088/18 and 5089/18.

Type locality : Sankeri, Karwar, Karnataka, India; 25.xii. 1975, Coll. U. A. Gajbe. *Allotypes* collected from Silent Valley forest, Kerala; India, 20 & 24.i.1979. Coll. R. S. Pillai.

Distribution : INDIA : Karwar, Karnataka; Silent Valley, Kerala.

Discussion : This species is entirely different from other Indian forms in having a different pattern of trichobothria on immovable finger of pedipalp. On the basis of which a new sub-genus has been proposed.



Family CHAERILIDAE

Chaerilus tricostatus Pocock ♀

Family II CHAERILIDAE

1900. Chaerilidae Pocock, *Fauna Brit. India. Arachn.*, : 53.
1952. Chaerilidae : Bristowe, *Ann. Mag. nat. Hist.*, 12 Ser. 5(55) : 697-707.
1973. *Chaerilidae* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 3^e ser. Zool. 104 (140) : 912-914.

Characters : Cephalothoracic sternum pentagonal with posterior median pit (Fig. 33) Legs provided with a pair of pedal spur but anterior spur never double. Tarsomere II provided below with two rows of stout bristles and provided with a median series of very fine spicules. Maxillary processes of I pair of legs expanded on anterior margin (Fig. 38) Pectines short, weakly developed with few teeth. Stigmata of book lungs circular (Fig. 40) Carapace narrowed in front with transversely truncated anterior margin (Fig. 36) and a pair of lateral eyes provided with an amber-coloured spot on ventrolateral portion (Fig. 36) Movable and immovable fingers of chelicera provided with many minute teeth on inner margin. The dorsal fang (or arm) of movable finger of chelicera provided with three teeth (Fig. 31) and dorsal distal tooth is always shorter than ventral distal tooth. Fingers of pedipalp furnished with very irregular dentition. Trichobothrial pattern on femur, pátella, manus and immovable finger is always of B type (Figs. 51-56) i.e., femur with 9 trichobothria (1 interior, 4 dorsal and 4 exterior); patella with 14 trichobothria (1 interior dorsal, 1 interior ventral, 2 dorsal, 2 exterior basal, 1 exterior sub-basal, 1 exterior median, 2 exterior sub-terminal, 1 exterior terminal and 3 ventral); manus with 7 trichobothria (3 exterior basal, 1 exterior sub-terminal, 1 exterior terminal, 1 ventral and 1 interior basal); immovable finger with 7 trichobothria (1 interior terminal, 1 exterior basal, 1 exterior sub-basal, 1 dorsal basal, 1 exterior sub-terminal, 1 dorsal terminal, 1 exterior terminal) Males usually with longer narrower chelae than females, and slightly or considerably longer tail; vesicle of telson sometimes much modified in male.

Type-genus : *Chaerilus* Simon.

Distribution : INDIA : (Himalayas, from Kashmir to Assam); BURMA, SUMATRA, JAVA, INDONESIA, SRI LANKA, BORNI0 AND CELEBES.

Genus 13. Chaerilus Simon

- 1877. *Chaerilus* Simon, *Ann. Soc. ent. Fr.*, 7(5) : 238.
- 1879. *Chaerilus* : Karsch, *MLitt munch. ent. Ges.*, 3 : 101.
- 1889. *Chelomachus* : Thorell, *Ann. Mus. Genova*, 27 : 583.
- 1890. *Uromachus* : Pocock, *Ann. Mag. nat. Hist.*, 5(6) : 250.
- 1899. *Chaerilus* : Kraepelin, *Tierr. Scorp. etc.*, : 157.
- 1900. *Chaerilus* : Pocock, *Fauna Brit. India, Arachn.*, : 53-54.
- 1973. *Chaerilus* : Vachon, *Bull. Mus. natn. Hist. nat. Paris*, 3^e ser. Zool. 104 (140) : 912-914.

Characters : Same as in family characters.

Type species : *Chaerilus variegatus* Simon.

Distribution : Same as family distribution.

Key to the species of the genus Chaerilus

- 1. Manus of pedipalp provided with 7 to 8 thickly granular carinae and dorsal surface of manus with five carinae. Last mesosomal sternite smooth or at the most provided with smooth and obsolete carinae :2

Manus of pedipalp provided with 5 to 6 carinae of obsolete granules, arranged in single row and dorsal surface of manus with three carinae. Last mesosomal sternite provided with two pairs of granular carinae*tricosatus*

2. Median eyes situated anteriorly in the ratio 1 : 1.5 or more; Interocular area of carapace smooth or granular. Fingers of pedipalp longer and exceeding the width of manus, basal width of immovable finger less than half the length . 3
- Median eyes situated anteriorly in the ratio less than 1 : 1.5; Interocular area of carapace always closely granular. Fingers of pedipalp short and not exceeding width of manus, basal width of immovable finger about two-third of its length . *ceylonensis*
3. Aculeus about half as long as vesicular length . 6
- Aculeus very short about one third or one fourth as long as vesicular length . . . 4
4. Aculeus one third in female (and one eighth in male) as long as vesicular length. Median eyes situated anteriorly in the ratio 1 : 1.8; Interocular area smooth. . *pictus*
- Aculeus one fourth as long as vesicular length. Median eyes situated anteriorly in the ratio 1 : 1.5 or 1 : 1.9; Interocular area granular . 5
5. Interocular area evenly granular; median eyes situated anteriorly in the ratio 1 : 1.5. Pectinal teeth 6/6. Manus of pedipalp longer and more than twice as wide *insignis*
- Interocular area weakly granular; median eyes situated anteriorly in the ratio 1 : 1.9. Pectinal teeth 4/4. Manus of pedipalp robust and as long as wide . *gemmifer*

6. Last mesosomal sternite provided with obsolete carinae; Interocular area granular on anterior portion and smooth on posterior portion 7
- Last mesosomal sternite without carinae; Interocular area coarsely granular on anterior portion and mesosomal tergites sparsely covered with pearl like granules *granosus*
7. Mesosomal tergites almost smooth or only few obsolete granules present; Interocular area weakly granular on anterior portion; Inferior carinae on metasomal segment II granular in male *truncatus*
- Mesosomal tergites very closely and distinctly granular; Interocular area coarsely granular on anterior portion; Inferior carinae on metasomal segment II smooth in male .. *anthracinus*

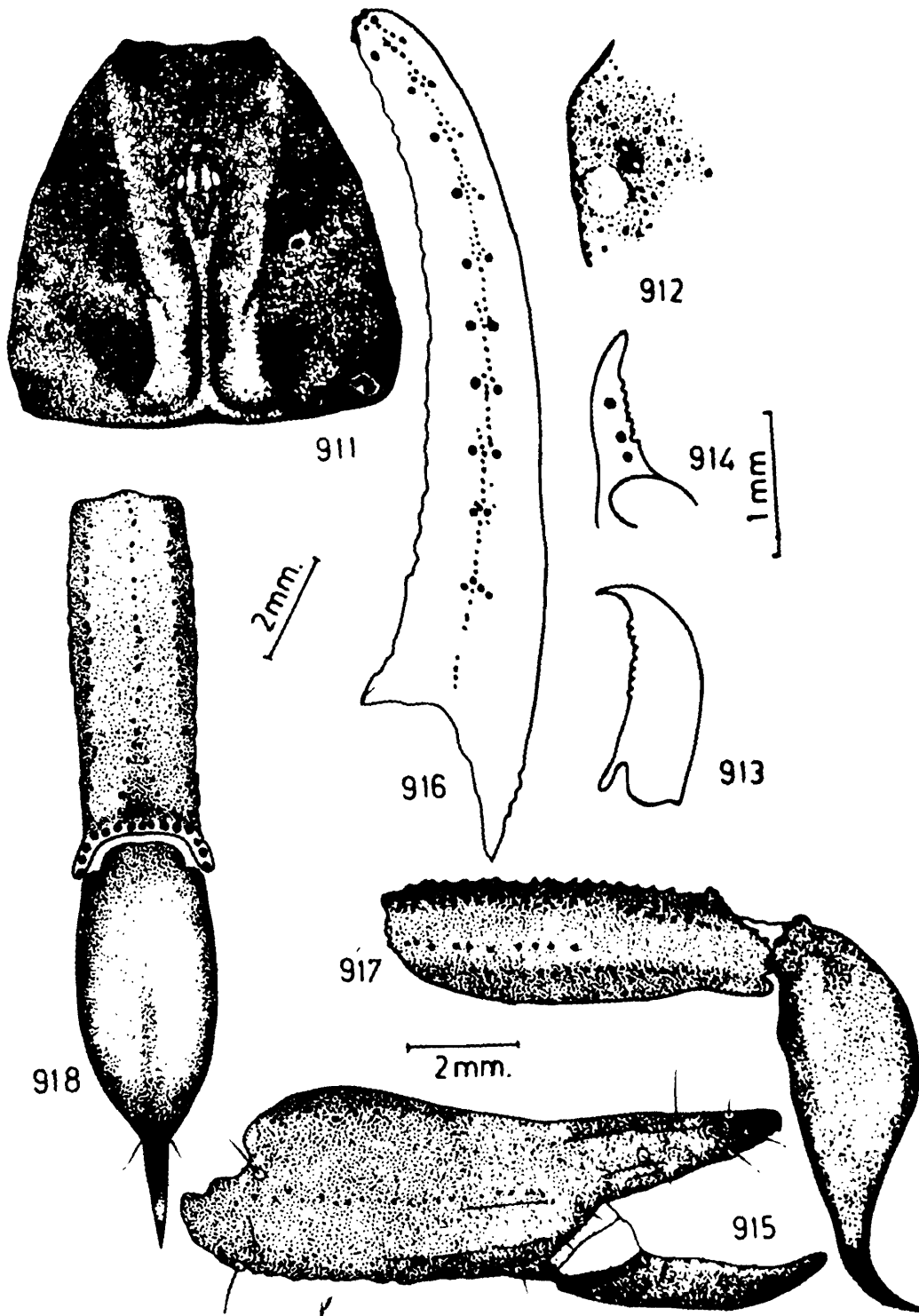
46. *Chaerilus tricostatus* Pocock (Figs. 911-924)

1899. *Chaerilus tricostatus* Pocock, *J. Bombay nat. Hist. Soc.*, 12 : 266.
1900. *Chaerilus tricostatus* : Pocock, *Fauna Brit. India, Arachn.*, : 59-60.

General: Male with slender body of medium size. Entire body surface finely to coarsely granular. Tergites carinated, cauda thick and segments carinated. Telson with bulbous vesicle, granular on entire surface and with short aculeus. Ventral surface smooth except last sternite with four granular carinae.

FIGS. 911-918. *Chaerilus tricostatus* Pocock

911. Carapace dorsal view.
912. Lateral eyes, lateral view.
913. Movable finger of chelicera, inner view.



- 914. Immobile finger of chelicera, inner view.
- 915. Manus and fingers, exterior view.
- 916. Movable finger of pedipalp, dorsal view.
- 917. Metasomal segment V and telson, lateral view.
- 918. Metasomal segment V and telson, ventral view.

Pectines poorly developed. Chelicera very finely granular with long fingers. Pedipalp slender, elongated; femur, patella and manus carinated, manus with five to six carinae and dorsal surface with only three carinae. Legs carinated on femur and patella, otherwise smooth.

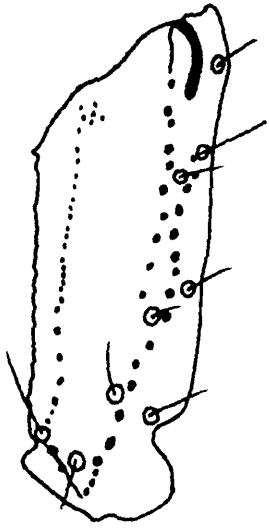
Body colour reddish brown to brick red but more darker on carapace, cauda brownish but pale on telson. Chelicera light on basal segment but dark brown on fingers. Pedipalp and legs same as body colour but darker on carinae. Fingers almost black or blackish brown. Ventral surface light brown. Pectines brownish yellow on lamellae and yellow on teeth.

Measurements: Total length 52.25 mm. Carapace 7.50 mm. long; Mesosoma 15.50 mm. long; Metasoma 29.25 mm. long.

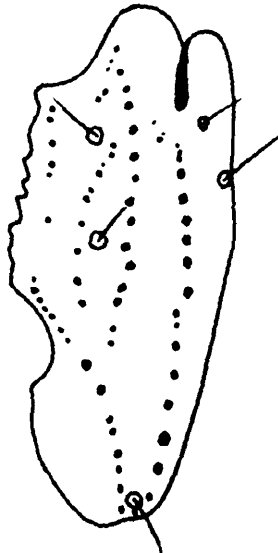
Carapace: Entire surface granular but lateral portions more closely granular, middle portion flat, less granular and bordered with a coarsely granular carinae on lateral portions. Central median carinae continued anteriorly upto lateral ocular tubercles. Interocular area granular but more granular on anterior portion. Lateral ocular tubercles small, granular and provided with two lateral eyes and ventro-laterally with an amber coloured spot as in text-fig. 912. Median ocular tubercle smooth and more elevated, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.9 as in text-fig. 911. Posterior lateral and central median furrows deep and granular, bifid posteriorly. Lateral ocular furrows very shallow and continued posteriorly into central median furrow. Anterior margin straight granular and provided with few microscopic setae. Lateral margins crenulated on anterior portion but smooth on remaining portion and provided with a granular submarginal ridge. Posterior margin smooth, straight but granular on dorsal surface. Chelicera granular on dorsal surface of basal segment

FIGS. 919-924. *Chaerilus tricostatus* Pocock

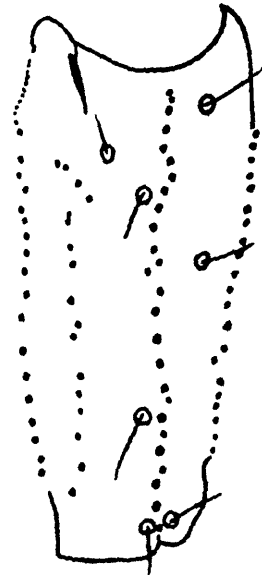
- 919. Femur, dorsal view.
- 920. Patella, dorsal view.
- 921. Patella, exterior view.
- 922. Patella, ventral view.
- 923. Manus and immovable finger, exterior view.
- 924. Manus and immovable finger, ventral view.



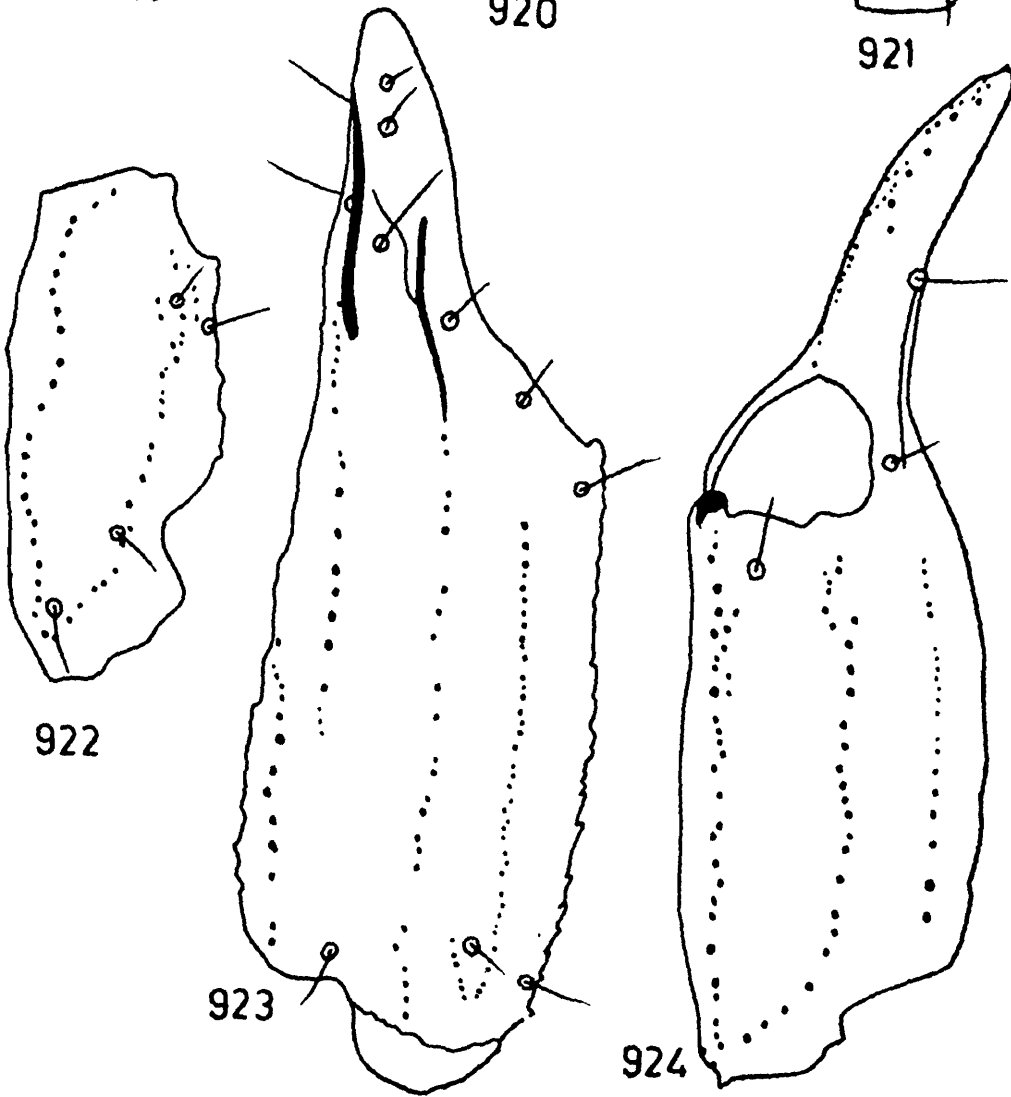
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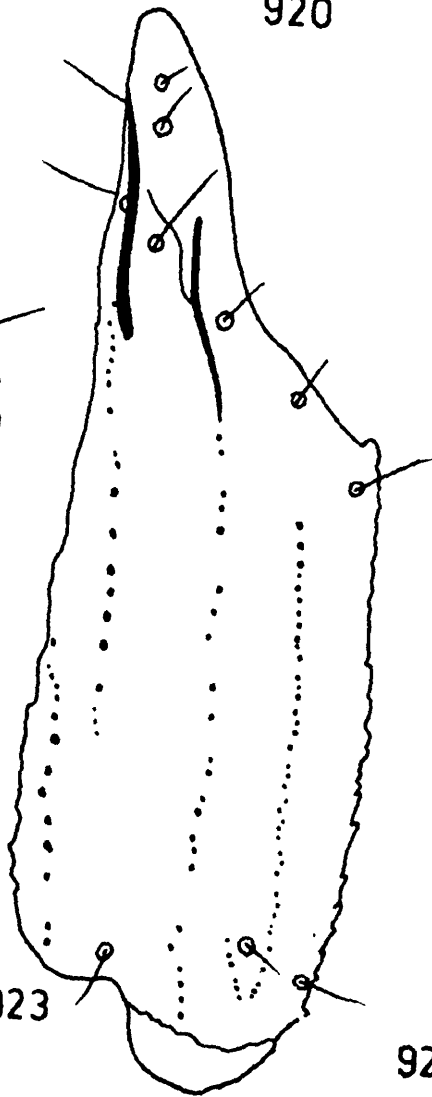
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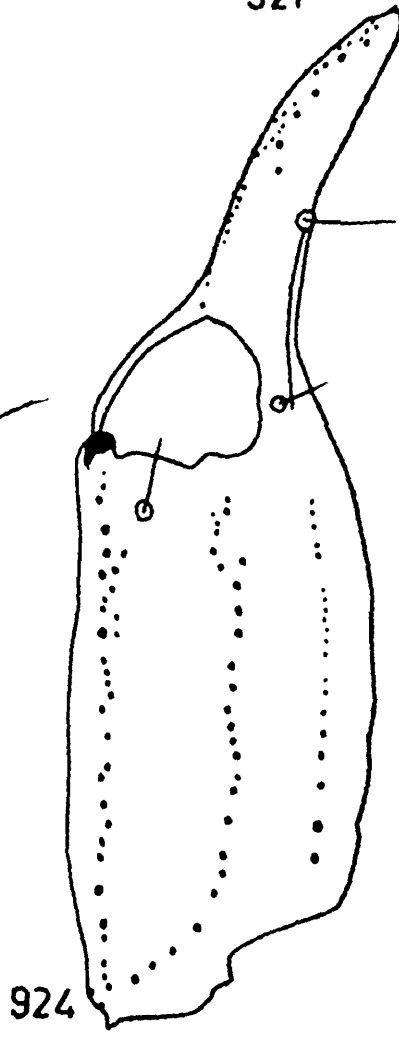
921



922



923



924

but smooth on ventral surface and covered with white, silky hairs which extend on both fingers. Fingers elongated and sharp on dentition. Dentition as in the family but ventral inner edge of movable and immovable fingers provided with eight and seven minute teeth respectively as in text-figs. 913 and 914. Pedipalp thin, elongated, manus twice longer than wide. Femur longer than carapace, carinated but dorsal and ventral inner carinae not clearly developed. Dorsal and ventral carinae granular but granules irregularly arranged and obsolete. Anterior or inner surface granular and few granules denticular. Posterior or outer surface smooth. Dorsal and ventral intercarinal space finely but sparsely granular. Patella longer than femur and carinated. All carinae granular but most of the granules obsolete. Anterior or inner margin proximally elevated and provided with three minute tubercles. Intercarinal space very sparsely, weakly and finely granular. Manus narrow, elongated and length of under hand more than as long as patella, but twice longer than wide, with six carinae, the dorsal-inner carina sparsely granular and weakly developed, other carinae distinct but obsolete. Dorsal surface with only three carinae as in text-fig. 915. Intercarinal space finely but more regularly and closely granular. Fingers thickly granular but very weakly carinated. Movable finger as long as patella but immovable finger very short. Dentition on fingers irregular and as in text-fig. 916. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 919-924. Legs with femur granular on ventral margins but dorsal or upper carinae smooth, intercarinal space smooth. Patella smooth without carinae. Tibia also smooth. Tarsomere I smooth but with carina, provided with small spicules on distal portion and margin, also provided with a pair of pedal spur. Tarsomere II smooth and armed below with a row of long paired bristles and a median row with small spinules. All digits covered sparsely with long bristles. Pectines weakly developed. Marginal and inner lamellae fused to form a single lamella. Fulcra well developed and shape roughly triangular to round. Lamellae and fulcra sparsely covered with microscopic setae. Pectinal teeth well developed and 5/5 in number. Basal piece rectangular with straight anterior margin, covered with few microscopic setae. Genital operculum broken.

Cephalothoracic sternum pentagonal, slightly longer than wide, entire surface smooth but with a deep notch on the posterior portion.

Mesosoma : Tergites entirely granular but more granular on posterior and lateral portions and granulation of mixed type. Tergites I and II without carina, lateral margins smooth but posterior margins granular. Pretergal portion finely granular. Tergites III-VI each provided with small lateral granules on submedian portion which represent lateral carinae. Lateral margins smooth, posterior margins granular. Pretergal portion and posterior margin finely granular. Tergite VII provided with a pair of distinct outer lateral granular carinae. Inner lateral carinae weakly granular and inconspicuous. Lateral margins granular while posterior margins smooth and slightly invaginated in the middle portion. Sternites I-IV smooth, each provided with a pair of circular stigmata for book lungs. Lateral and posterior margins smooth and provided with few microscopic setae. Presternal portion not clearly distinct and smooth. Sternite V provided with two pairs of sparsely granular carinae. Lateral and posterior margins granular and with few setae.

Metasoma : Cauda about four times as long as carapace. Basal segment one and a half times as long as wide. All segments carinated and all carinae granular and crenulated. Lateral carinae granular on segment I but represented with few granules on segments II, III and IV, but well developed on segment I. Anterior peduncle and posterior margin finely granular. Intercarinal space finely but sparsely granular. Segment V slightly shorter than carapace, laterally and dorsoventrally flat, dorsal surface very weakly granular, carinae granular but dorsal and dorsolateral carinae with obsolete granules, dorsolateral carinae developed on 2/3 anterior portion. Inferior lateral and single inferior median carinae sparsely granular and granules crenulated and serrated. Inferior median carinae bifid on posterior portion as in text-fig. 917. Anal rim of this segment with obsolete granules. Intercarinal space sparsely granular. Anterior peduncle with finely and closely granular while smooth on posterior portion. Telson longer than carapace but as long as patella of pedipalp. Vesicle shorter than carapace as well as

caudal segment V. Dorsal surface smooth but finely granular on lateral and ventral surface. Ventral and lateral bands shallow and not much prominent. Ventral median crest obsolete. Aculeus broad at the base, not much curved, dark brown on distal portion, sharp and slightly less than half the length of vesicle as in text-figs. 917 and 918.

Distribution : INDIA : Sadiya (*Type locality*) Assam; Khasia hills, Meghalaya.

Remarks : We have examined, described and illustrated on the basis of the male *Holotype* received from B.M. (N.H.) London. Regd. No. 1897. 6.24.1. Our studies are based on the above type material. The illustration of pectines and genital operculum is not given as this portion of type specimen was badly damaged.

47. *Chaerilus ceylonensis* Pocock

(Figs. 925-939)

1894. *Chaerilus ceylonensis* Pocock, *Ann. Mag. nat. Hist.*, 12(6) : 38.

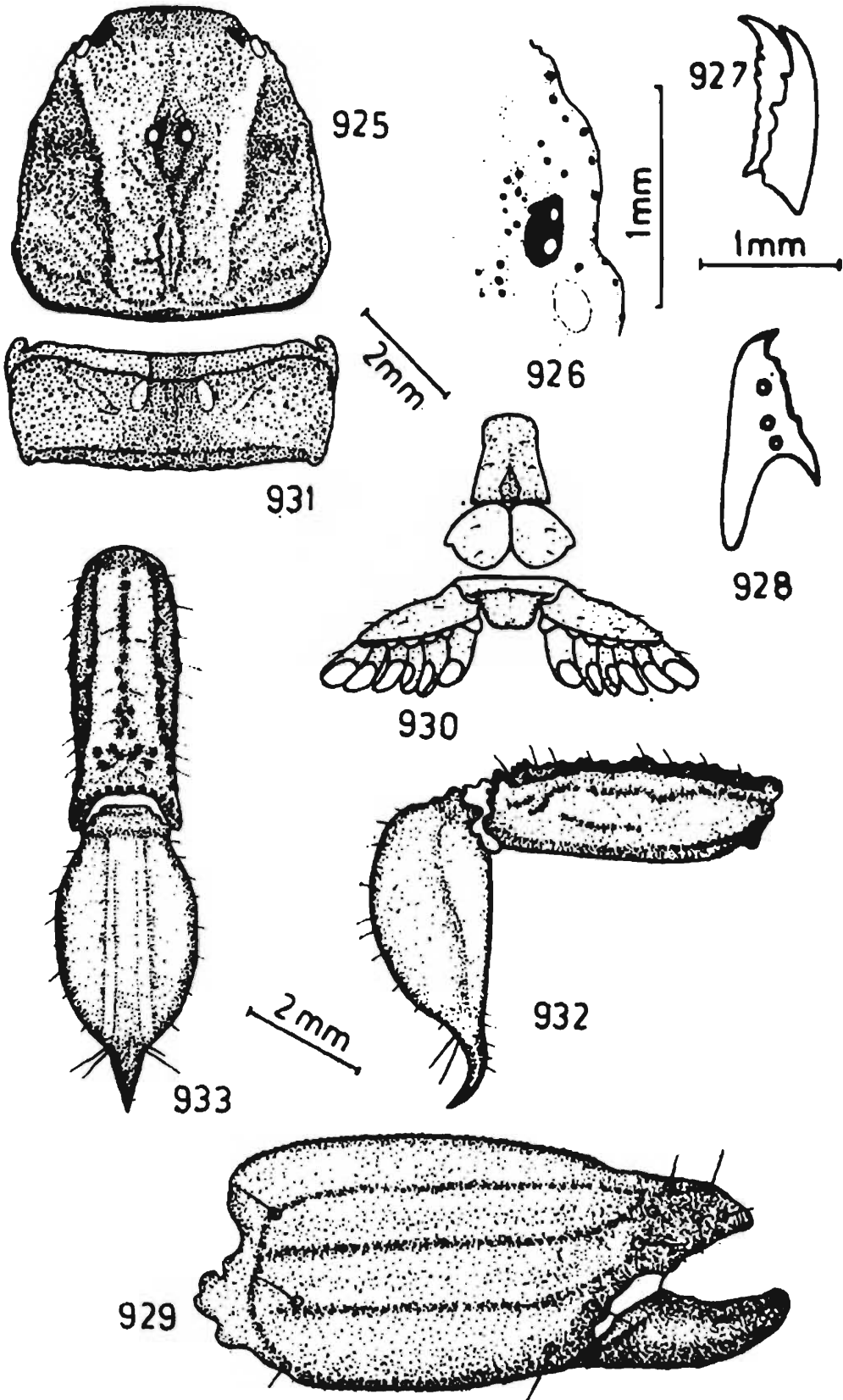
1899. *Chaerilus ceylonensis* : Kraepelin, *Tierr. Scorp. etc.*, : 159.

1900. *Chaerilus ceylonensis* : Pocock, *Fauna Brit. India, Arachn.*, : 62.

General : Male of small size. Carapace coarsely granular, chelicera small and finely granular on dorsal surface of basal segment. Pedipalp short with stout chela. Legs normal, granular on femur. Pectines moderately developed. Genital oper-

FIGS. 925-933. *Chaerilus ceylonensis* Pocock

- 925. Carapace of female, dorsal view.
- 926. Lateral eyes, lateral view.
- 927. Movable finger of chelicera, inner view.
- 928. Immovable finger of chelicera, inner view.
- 929. Manus and fingers of pedipalp, exterior view.
- 930. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 931. Tergite, dorsal view.
- 932. Metasomal segment V and telson, lateral view.
- 933. Metasomal segment V and telson, ventral view.



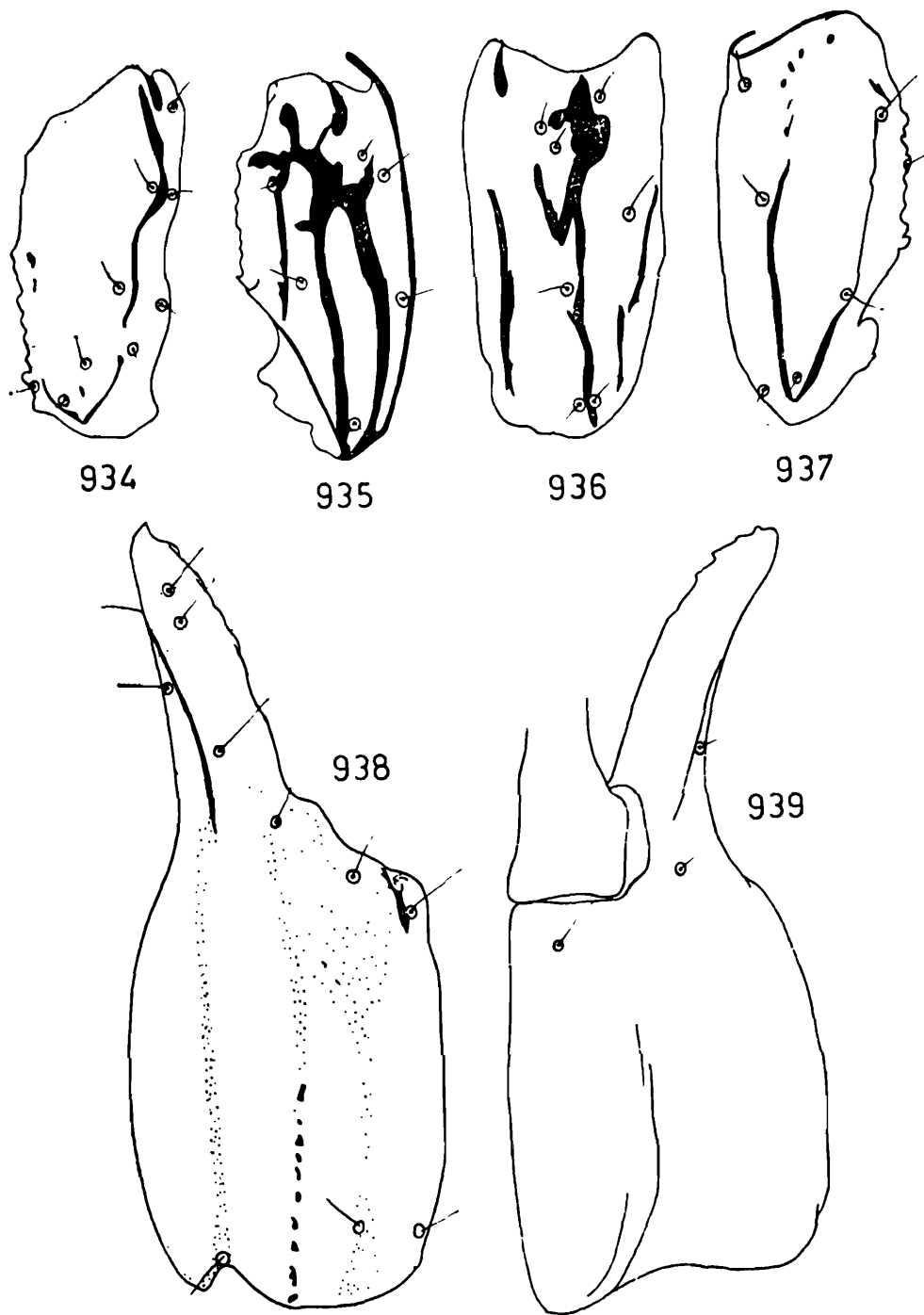
culum wider than long. Cephalothoracic sternum pentagonal but as long as wide. Mesosoma thickly covered with coarse granules on all tergites, sternites smooth but weakly granular on the last sternite. Metasoma comparatively short, each segment carinated. Telson bulbous on vesicle. Aculeus short but sharp.

Body colour dull brown but more darker on ocular tubercles and fingers of pedipalp; carinae slightly darker. Basal segment of chelicera pale yellow but fingers brownish. Pedipalp light brown but fingers dark brown to black colour. Legs light brown. Pectines yellow. Mesosoma light brown on dorsal side and pale yellow on ventral. Metasoma slightly darker than mesosoma but vesicle light in colour. Aculeus reddish brown.

Measurements : Total length 38.50 mm. Carapace 5.50 mm. long; Mesosoma 13.00 mm. long; Metasoma 20.00 mm. long.

Carapace : Entire surface covered with coarse granules but intervening with few fine granules. Only posterior lateral, posterior median furrows and a small portion interior to lateral granular carinae smooth. Posterior median furrow bifid on posterior end and continued along with posterior margin into posterior lateral furrows. Lateral carinae not much distinct from other granulation and border median portion. Interocular portion slightly elevated in middle. Lateral ocular tubercles small, granular, provided with a pair of lateral eyes on each side and an amber coloured spot on ventrolateral portion as in text-fig. 926. Median ocular tubercles granular, slightly elevated, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.4 as in text-fig. 925. Anterior margin almost straight, crenulated and ended laterally into a notch. Lateral margins very finely crenulated and each provided with a submarginal granular ridge. Posterior margin granular and straight as in text-fig. 925. Chelicera finely granular on basal segment but smooth and fully covered with many short, silky hairs, extending on fingers. Fingers long, slender dentition provided with pointed teeth but inner ventral edges of movable and immovable fingers provided with ten and six minute teeth respectively as in text-figs. 927 and 928. Pedipalp short with heavy manus. Femur shorter than carapace, carinated but inner dorsal and ventral

carinae more distinctly granular than outer dorsal and ventral carinae. Outer carinae obsolete. Intercarinal surface coarsely granular and some granules tuberculate, outer surface smooth. Patella as long as femur, carinated but carinae not much distinct; dorsal and ventral inner varinae granular, other carinae almost obsolete. Intercarinal space finely granular on dorsal and dorsal outer surface but almost smooth on ventral outer surface, ventral surface also smooth. Inner or anterior surface finely but thickly granular, only few granules bigger and tuberculate. Manus very stout and length of under hand more than carapace, also wider than as long as femur or patella as in text-fig. 929, carinated but carinae comprising many minute granules, intercarinal space granular but granules arranged in regular minute ridges but conspicuously thickly accumulated minute granules at the base of immovable finger and anterior portion of manus. Fingers comparatively short and movable finger as long as width of the manus, immovable finger almost half the length of movable finger. Immovable finger carinated but carinae obsolete, weakly granular. Movable finger smooth. Dentition on fingers regular in ten to eleven oblique rows of minute granules. Trichobothrial pattern on femur, patella, manus and immovable figures as in text-figs. 934-939. Femur of legs granular and outer carinae thickly granular but dorsal or inner carinae weakly granular. Carinae on patella smooth, only few granules present on IV leg. Tibia smooth. Tarsomere I smooth with a ventral median row of microscopic spicules, the distal edge also provided with many minute spicules and also with a pair of pedal spur. Tarsomere II smooth, a row of paired long bristles on ventral surface and a ventral median row of small spinules. All digits weakly and sparsely clothed with microscopic hairs but tarsomere II more closely clothed with hairs. Pectines moderately developed and three times longer than wide. Lamellae fused to form a single lamella. Fulcra almost round except proximal elongated one. Lamellae and fulcra clothed with few microscopic reddish setae. Basal piece smooth, straight on anterior margin but semi-circular on posterior margin. Genital operculum wider than long, a pair of smooth sclerites united but small male genital papillae visible only after lifting the sclerites. Cephalothoracic sternum pentagonal, slightly longer than wide, surface



Figs. 934-939. *Chaerilus ceylonensis* Pocock

- 934. Femur, dorsal and exterior views.
- 935. Patella, dorsal view.
- 936. Patella, exterior view.
- 937. Patella, ventral view.
- 938. Manus and immovable finger, exterior view.
- 939. Manus and immovable finger, ventral view.

smooth but provided with a deep circular notch on posterior portion and clothed with few reddish microscopic setae as in text-fig. 930.

Mesosoma : All tergites finely granular on anterior portion and posterior portion coarsely granular. Tergites I-VI without carinae. Lateral margins finely crenulated. Posterior margin smooth but coarse granules present on dorsal portion. Pretergal portion very finely granular with posterior margin as in text-fig. 931. Tergite VII with a distinct pair of outer lateral carinae but crenulated only on half of the posterior portion. Inner lateral carinae represented with few strong tuberculate granules at the base. Lateral margins crenulated. Posterior margin smooth but granular on upper portion. Pretergal portion and posterior margin finely granular. Sternites I-IV smooth, each provided with a pair of circular stigmata for book lungs. Lateral and posterior margins smooth. Sternite V weakly granular on posterior and posterior lateral portion. Lateral margins crenulated. Posterior margin granular. Presternal portion not distinct.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment more than twice as wide as long, provided with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae. All carinae granular but dorsal and dorsolateral more crenulated but inferior carinae obsolete on anterior portion and granular on posterior. Segments II-IV with all carinae granular but lateral carinae developed only on one fourth of posterior portion of each segment. Dorsal and dorsolateral carinae more clearly granular and crenulated. Dorsal surface weakly granular and almost flat except anterior transverse furrow. Intercarinal space weakly granular but more granular on posterior portion of each segment. Anterior peduncles very finely but thickly granular. Posterior margins finely granular on dorsal portion but coarsely granular on lateral and ventral portions. Segment V longer than femur or patella but shorter than carapace, more narrowed and dorsoventrally flat than preceding segments. Dorsal surface flat but more granular. Dorsal carinae not much distinct but sparsely granular and granules almost obsolete. Dorsolateral carinae granular and granules serrated, serration more strong on posterior portion. Single inferior median carina bifid on posterior

portion. Anal rim of this segment serrated as in text-figs. 932 and 933. Intercarinal space more granular and some granules tuberculate. Anterior peduncle almost smooth on dorsal portion but finely granular on ventral portion. Telson longer than carapace. Vesicle not as long as but more than as wide or deep as fifth segment. Dorsal surface smooth, but lateral and ventral surface finely granular. Lateral and ventral bands smooth and distinct. Ventral median crest obsolete. Aculeus broad at the base, not much curved, short, one third of the vesicular length, sharp and dark reddish brown on distal portion. Setation on vesicle not much clear and as in text-figs. 932 and 933.

Distribution : SRI LANKA : Troncomalae (*Type locality*)

Remarks : We have examined, described and illustrated on the basis of *Holotype* male specimen received from B.M. (N.H.) London, Regd. No. 1893.10.20.4. This species is so far known from type locality i.e., Sri Lanka. We presume that this species is available in the Indian sub-continent, though we have no record so far of this species occurring in India proper.

48. *Chaerilus pictus* (Pocock)

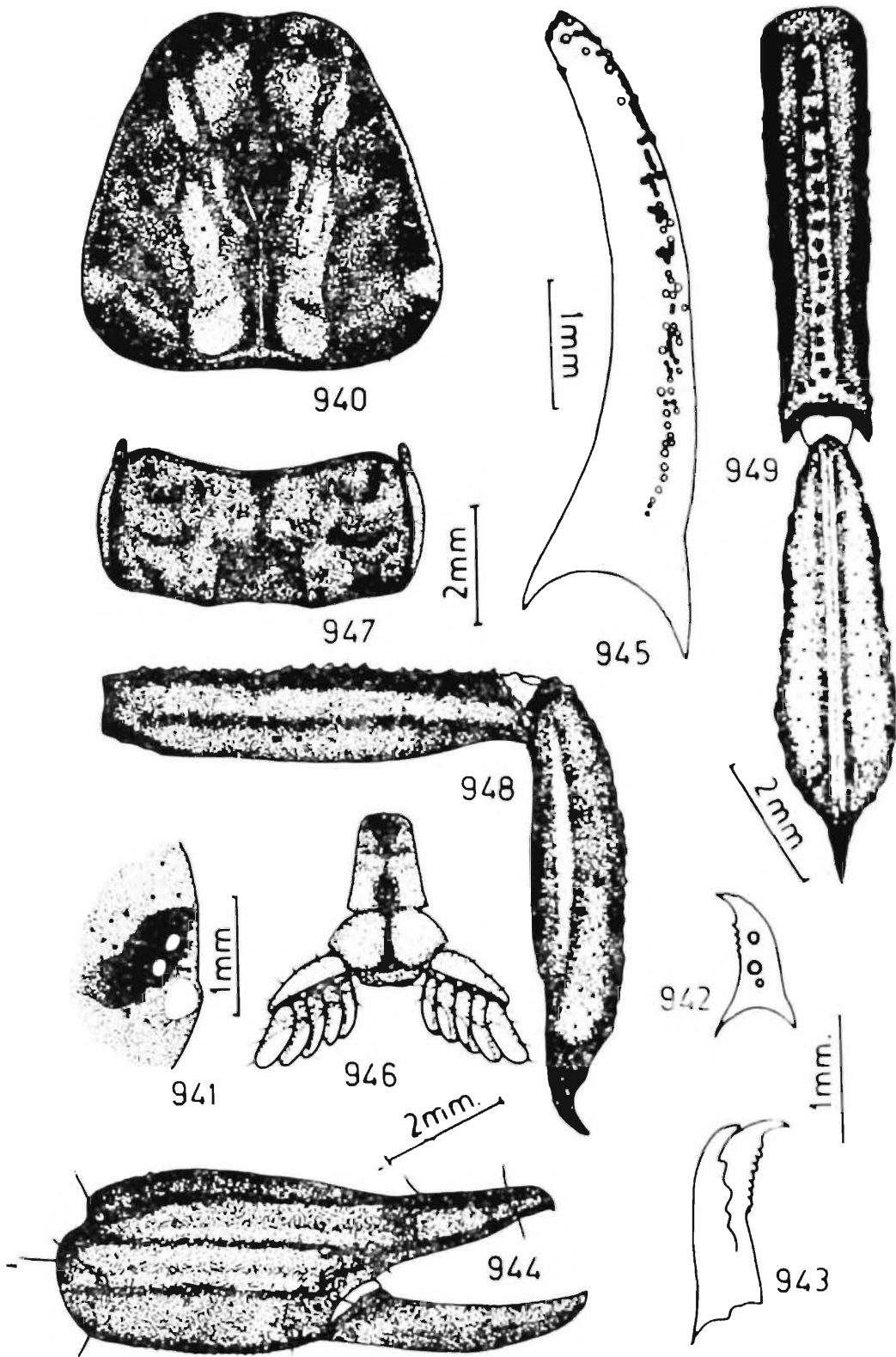
(Figs. 940-964)

1890. *Uromachus pictus* Pocock, *Ann. Mag. nat. Hist.*, 5(6) : 250.
 1899. *Chaerilus pictus* : Kraepelin, *Tierr. Scorp. etc.*, : 159.
 1900. *Chaerilus pictus* : Pocock, *Fauna Brit. India, Arachn.*, : 61-62.

General : Male slender and elongated with very long metasoma and body size almost double the female. Female with short

FIGS. 940-949. *Chaerilus pictus* (Pocock)

940. Carapace of male, dorsal view.
 941. Lateral eyes, lateral view.
 942. Immovable finger of chelicera, inner view.
 943. Movable finger of chelicera, inner view.
 944. Manus and fingers of pedipalp, exterior view.
 945. Movable finger, dorsal view.
 946. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 947. Tergite, dorsal view.



948. Metasomal segment V and telson, lateral view.
 949. Metasomal segment V and telson, ventral view.

metasoma. Telson also very peculiar and modified in male. Body surface weakly granular and very few coarse granular are present. Carinae on carapace and mesosoma not well distinguished, metasoma carinaed and except few carinae, all carinae crenulated. Chelicera normal and finely granular on basal segment. Pedipalp short, stout and more robust on manus. Manus with seven carinae. Legs smooth except femur, clothed with few reddish bristles. Ventral surface of body smooth. Pectines weakly developed.

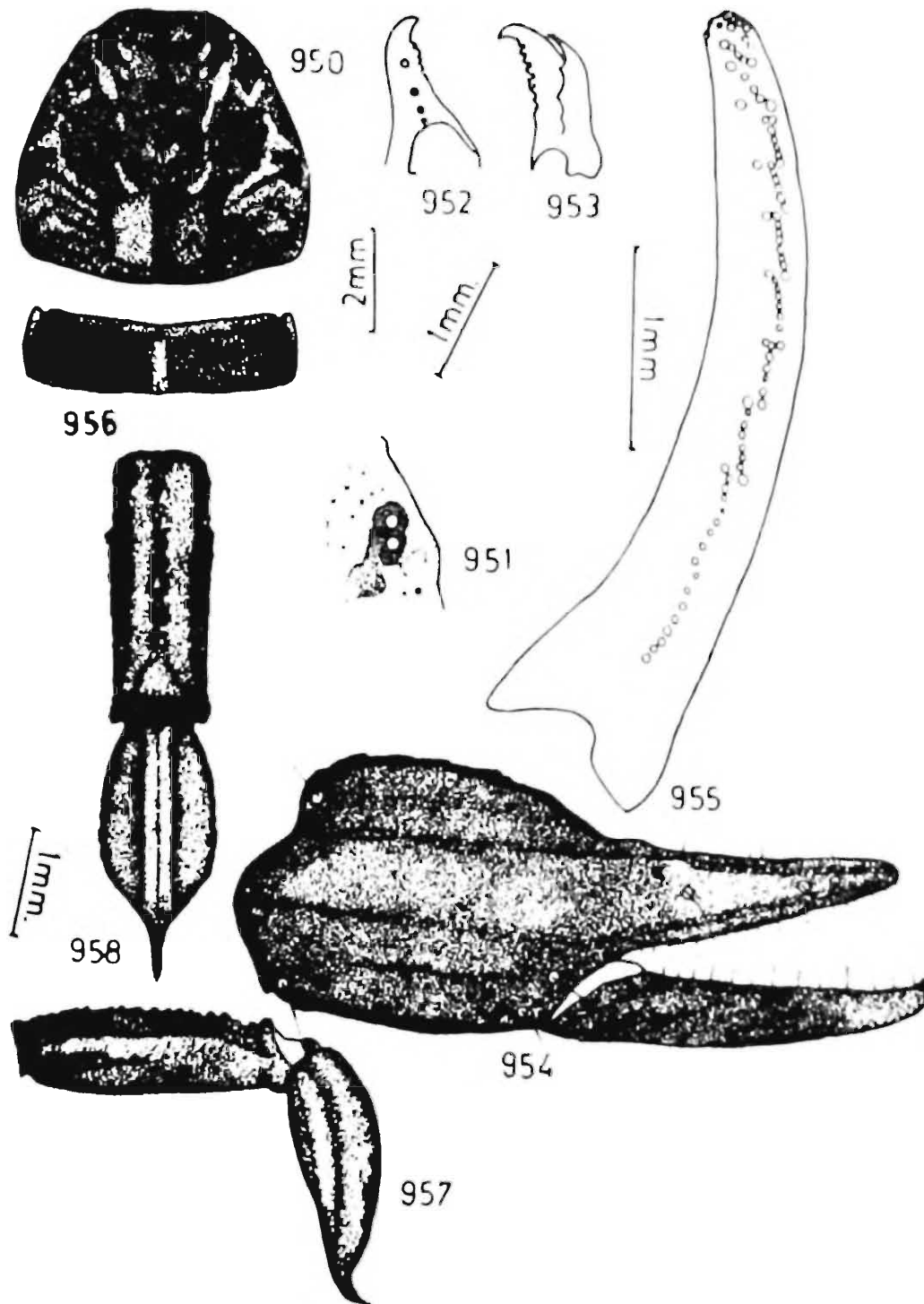
Body colour differs in male and female. Male with reddish brown as basic colour and with blackish variegation. Carapace mostly reddish brown variegated with blackish patches. Mesosomal tergites with a pair >> - << shaped reddish brown marking with few reddish brown spots but also variegated with blackish spots. Sternite pale brown. Metasoma dark brown with reddish tint, but telson light brown. Chelicera yellow but reddish on fingers. Pedipalp reddish brown but blackish on carinae, fingers black. Legs reddish brown on proximal digits but light on distal digits. Female more yellowish without reddish tint, variegated with blackish patches. Legs pale yellow.

Measurements: Male total length 62.00 mm. Carapace 6.75 mm. long; Mesosoma 15.00 mm. long; Metasoma 40.25 mm. long; Female total length 32.75 mm. Carapace 5.00 mm. long; Mesosoma 8.25 mm. long; Metasoma 19.50 mm. long.

Carapace: Surface weakly granular but more granular on lateral portions and anterior portion of median furrow. Lateral carina more distinct in male but obsolete in both male and female. Median portion flat but more distinct in male. Lateral ocular tubercles smooth, provided with two lateral eyes and an amber coloured spot on ventrolateral portion as in text-figs. 941 and 951. Median ocular tubercles smooth, not much elevated,

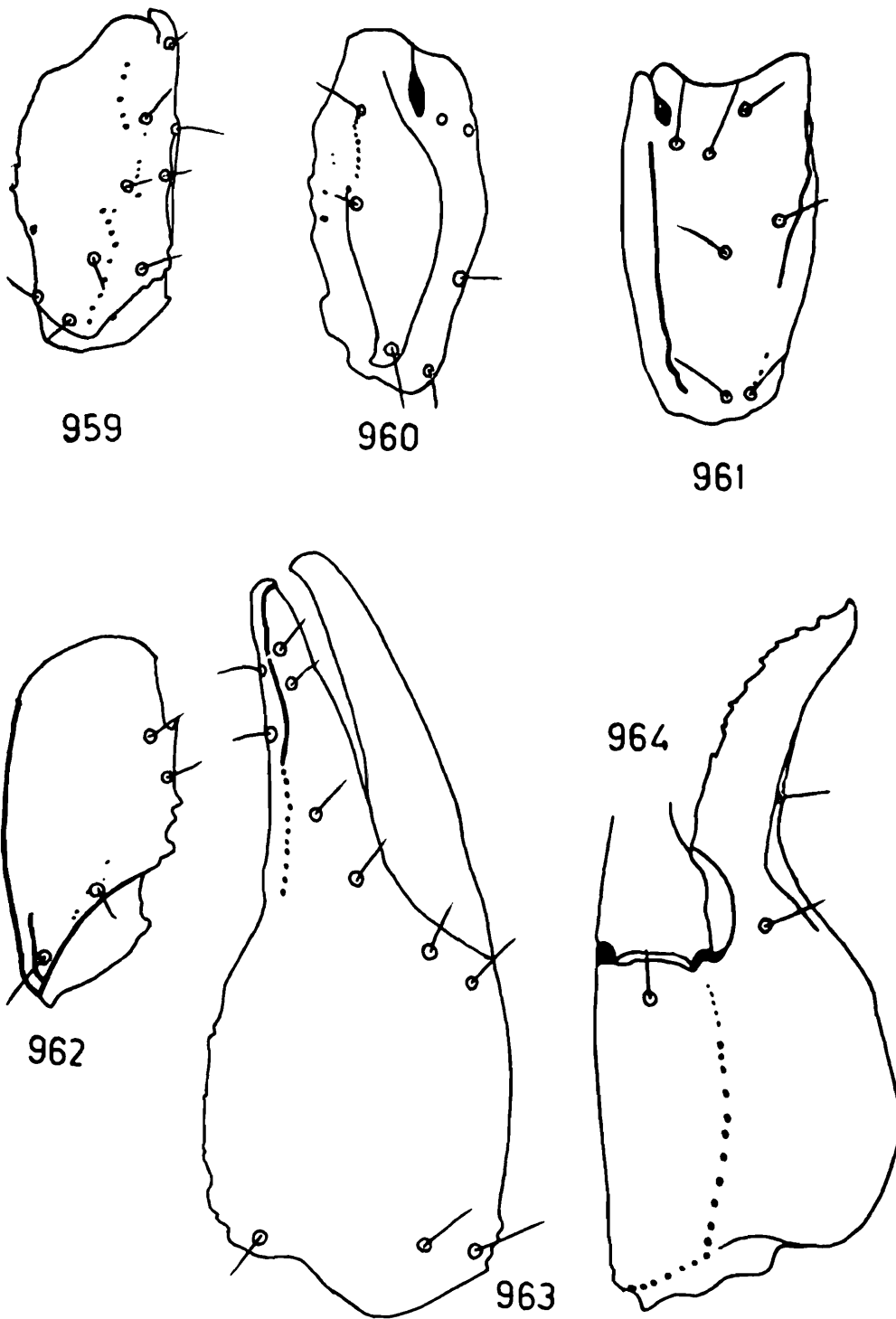
FIGS. 950-958. *Chaerilus pictus* (Pocock)

- 950. Carapace of female, dorsal view.
- 951. Lateral eyes, lateral view.
- 952. Immovable finger of chelicera, inner view.
- 953. Movable finger of chelicera, inner view.



- 954. Manus and fingers of pedipalp, exterior view.
- 955. Movable finger, dorsal view.
- 956. Tergite, dorsal view.
- 957. Metasomal segment V and telson, lateral view.
- 958. Metasomal segment V and telson, ventral view.

provided with a pair of median eyes, situated anterior in the ratio 1 : 1.8 as in text-figs. 940 and 950. Furrows distinct only on median and posterior lateral portion. Anterior margin smooth and straight. Lateral margins also smooth with weakly granular submarginal ridge. Posterior margin smooth and straight. Chelicera finely granular on dorsal surface of basal segment but smooth and thickly clothed on ventral surface with fine, short, silky hairs, extending on both fingers. Fingers comparatively short, but sharp and pointed on dentition. Dentition as characterised in the family and genus but inner ventral edges of movable and immovable finger provided with eight and five minute teeth respectively as in text-figs. 942, 943, 952 and 953. Pedipalp short, stout with robust manus, carinated on all digits. Femur with inner and outer dorsal carinae more distinct than inner and outer ventral carinae. Anterior or outer surface granular and few granules tuberculated. Posterior or inner surface smooth with obsolete carina. Intercarinal space granular but clear granulation seen only on ventral proximal portion. Patella longer than femur but shorter than carapace. Entire surface almost smooth of very finely and irregularly granular. Anterior or inner surface with tuberculate granules. Posterior or outer surface smooth with obsolete outer carina. Dorsal inner and ventral inner carinae granular. Dorsal outer and ventral outer carinae obsolete. Manus robust in both sexes but more bulbous in female as in text-fig. 954. Length of under hand more than as long as patella in male but as long as patella in female, provided with seven carinae, all carinae comprising many minute granules and elevated from surface. Intercarinal space granular and granules arranged in small ridges. Intercarinal granulation more clear and distinct in male. Fingers granular, granules more clear at the base in male while obsolete in female. Immobile finger carinated. Movable finger as long as the length of under hand in male and longer in female but always shorter than carapace. Immobile finger carinated, always shorter than femur. Dentition on fingers irregular and dentition on movable finger as in text-figs. 945 and 955. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 959-964. Legs smooth except finely granular but carinae on dorsal surface



Figs. 959-964. *Chaerilus pictus* Pocock
 959. Femur, dorsal and exterior views.
 960. Patella, dorsal view.
 961. Patella, exterior view.
 962. Patella, ventral view.
 963. Manus and fingers, exterior view.
 964. Manus and fingers, ventral view.

smooth. Patella and tibia smooth with smooth carinae. Tarsomere I smooth with minute spicules on distal ventral surface and provided with a pair of pedal spur. Tarsomere II smooth, provided with a row of long paired bristles on ventral surface and a median ventral row of small spinules. All digits of each legs clothed sparsely with microscopic reddish bristles. Pectines weakly developed and about three times longer than wide. Lamellae fused to form a single broad lamella. Fulcra distinct, subtriangular. Lamella and fulcra clothed with many microscopic hairs. Pectinal teeth broad, elongated, well developed and 5/5 in number in both sexes. Basal piece small but strongly sclerotised, smooth, anterior margin straight. Genital operculum longer than wide, sclerites fused in the middle in female and a pair of small genital papillae visible after lifting the sclerites in male. Sclerites smooth and sparsely covered with few microscopic hairs. Cephalothoracic sternum pentagonal, longer than wide, smooth surface provided with a deep median notch on posterior portion as in text-fig. 946.

Mesosoma : All tergites weakly granular but granulation on posterior portion of each tergite more clear and posterior margin of each tergite also clearly granular but all granules obsolete. Tergites I and II without carinae but a pair of bigger granules present on posterior margin representing lateral carinae. Tergites III and IV provided with a pair of lateral carinae, weakly granular in female but obsolete in male. Lateral margins smooth, pretergal portion smooth with finely and evenly granular posterior margin as in text-figs. 947 and 956. Tergite VII provided with two pairs of lateral carinae, weakly granular. Lateral margins weakly granular. Posterior margin granular. Pretergal portion smooth with finely granular posterior margin. Sternites I-IV smooth, each provided with a pair of circular stigmata for book lungs. Lateral and posterior margins smooth. Sternite V smooth, without carinae, posterior and lateral margins smooth. Presternal portion and posterior margin smooth.

Metasoma : Cauda six times as long as carapace in male but only four times in female. Basal segment longer than wide in male but wider than long in female. Segment II twice as wide

in male but as long as wide in female. Segments III & IV also twice as wide in male but slightly longer than wide in female. Segment V five times as wide in male. Segments I & II with weakly granular dorsal and dorsolateral carinae; lateral, inferior lateral and inferior carinae smooth, and obsolete. Segments III & IV without lateral carinae and remaining carinae granular. Intercarinal space weakly granular. Dorsal surface flat except on segment I. Anterior peduncle finely but thickly granular and posterior margin also granular. Segment V about one and a half times longer than carapace in male but shorter than carapace in female, dorsoventrally compressed, flat on dorsal surface. Dorsal carinae very sparsely granular. Dorsolateral carinae granular and developed on more than $3/4$ anterior portion. Inferior lateral and inferior median carinae also granular but granules more crenulate. Inferior median carina bifid on posterior portion. Anal rim of this segment crenulated in male while serrated in female. Intercarinal space weakly crenulated as in text-figs. 948, 949, 957 and 958. Telson slender, elongated, dorsoventrally compressed in male but slightly globular, short in female. Vesicle five times as wide in male as in text-figs. 948 and 949, while only twice as wide in female as in text-figs. 957 and 958. Vesicular surface fully covered with small granules but granules tuberculate in male. A pair of lateral lobes clear on distal end of the vesicle but more clear in male. Lateral bands not clear in male but ventral bands distinct in both sexes. Ventral median crest poorly and finely granular in female but more distinct in male, clearly granular and ending into the base of aculeus. Aculeus short, much curved, and without distinct bulbous portion at the base in female. Aculeus about one eighth and one third of vesicular length in male and female respectively.

Distribution : INDIA : Mawsmai cave, Meghalaya; Sylhet, (Type-locality) BANGLADESH.

Remarks : We have examined, described and illustrated on the basis of *Paratypes* received from B.M. (N.H.) London; Regd. No. Nil. We have also examined 2 ♂, 1 ♀, from the collections received from Eastern Regional Station, Shillong and National Collection, ZSI, Calcutta.

49. *Chaerilus insignis* Pocock

(Figs. 965-979)

1894. *Chaerilus insignis* Pocock, *Ann. Mag. nat. Hist.*, 13(6) : 82.
 1900. *Chaerilus insignis* : Pocock, *Fauna Brit. India, Arachn.*, : 58-59.

General : Male of medium size. Entire body finely to coarsely granular. Chelicera finely granular on dorsal surface and fingers thin, long and immovable finger fully provided with many small denticles on inner edge. Pedipalp very thin, long, with narrow chela, carinated and granular on all digits, manus with seven carinae. Legs almost smooth. Pectines poorly developed, genital operculum exposed, from which a pair of small but conspicuous male papillae visible. Mesosomal tergites finely granular, I-VI with a pair of rudimentary granular carinae, VII with four granular carinae. All sternites smooth. Metasoma carinated, all carinae granular and serrated on IV & V segments. Telson with elongated and bulbous vesicle, aculeus not much curved.

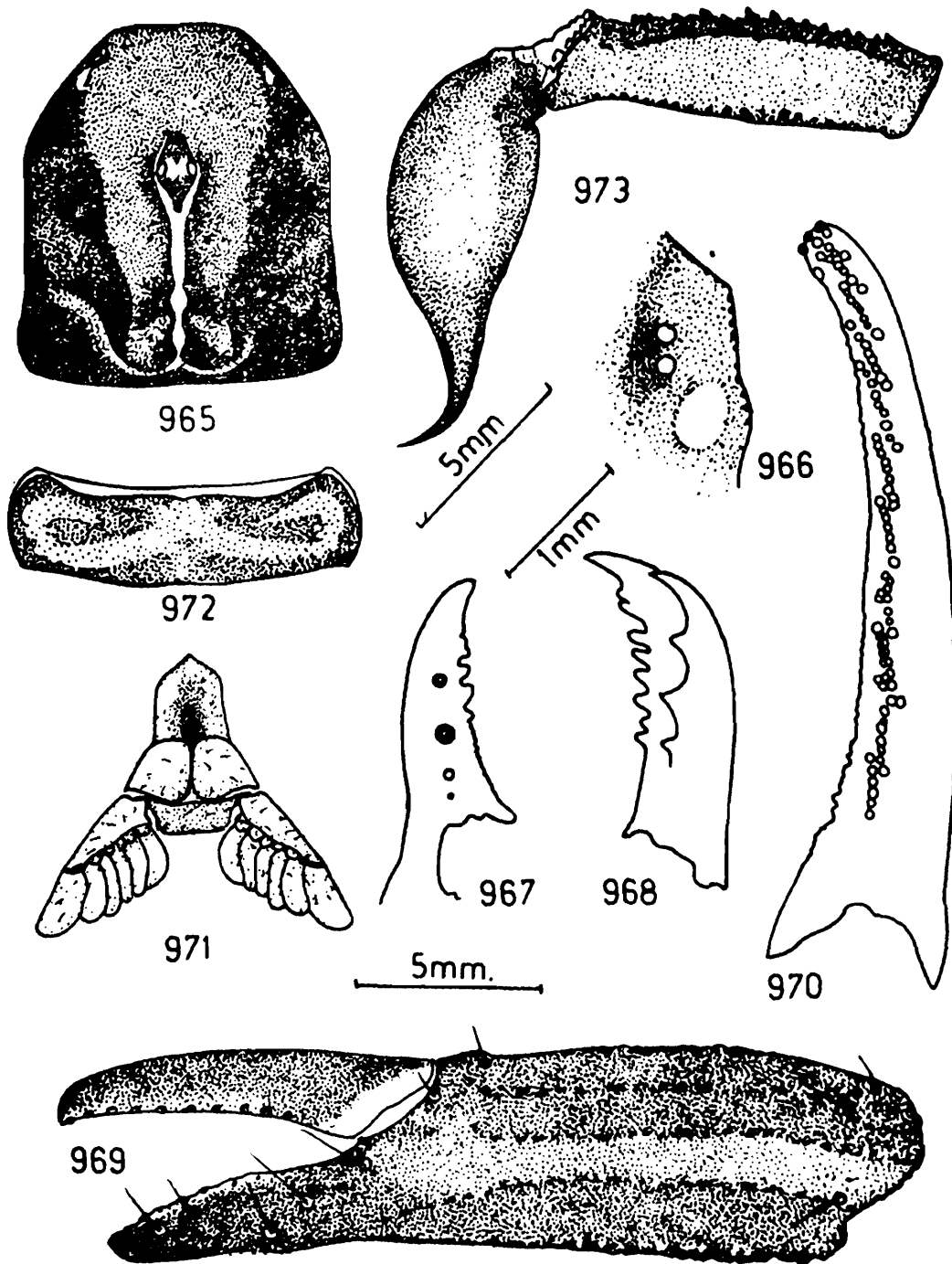
Body colour dark brown to brick reddish. Chelicera light brown but finger more darker. Pedipalp brown but blackish on carinae and fingers. Legs dark brown and slightly paler on distal portion. Pectines light yellowish brown. Mesosoma dark brown to blackish but sternite brown. Metasoma blackish brown but aculeus slightly light brown at the base.

Measurements : Total length 61.00 mm. Carapace 9.00 mm. long; Mesosoma 17.25 mm. long; Metasoma 34.75 mm. long.

Carapace : Surface finely granular but more granular on lateral portions and few granules bigger in size. Middle portion flat and bordered with strong, weakly granular lateral carinae, granules on carinae obsolete and extend upto lateral ocular tubercles. Middle portion flat, almost smooth but interocular

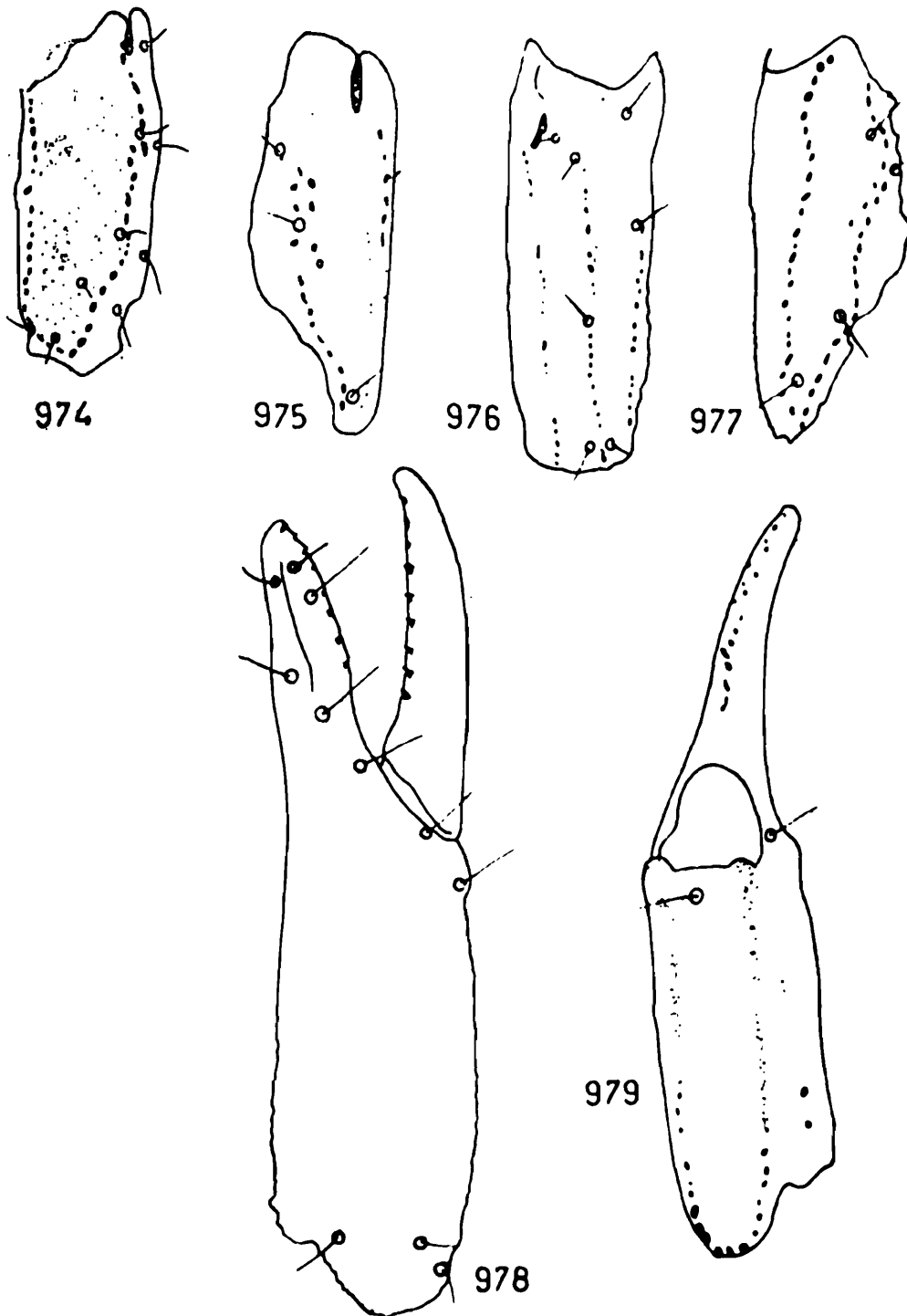
Figs. 965-973. *Chaerilus insignis* Pocock

965. Carapace of female, dorsal view.
 966. Lateral eyes, lateral view.
 967. Immobile finger of chelicera, inner view.
 968. Movable finger of chelicera, inner view.
 969. Manus and fingers of pedipalp, exterior view.



- 970. Movable finger, dorsal view.
- 971. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 972. Tergite, dorsal view.
- 973. Metasomal segment V and telson, lateral view.

area almost evenly granular on anterior portion. Lateral ocular tubercles prominent, much elevated, finely granular and each provided with a pair of lateral eyes and an amber coloured circular spot below eyes as in text-fig. 966. Median ocular tubercles not much elevated, smooth and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.5 as in text-fig. 965. All furrows deep except lateral ocular furrows, posterior median furrow deep and bifid on posterior portion. Lateral, posterior and lateral median furrows also distinct. Anterior margin granular. Lateral margins finely crenulated for a short distance on anterior portion but posteriorly smooth and provided with a finely but thickly granular submarginal ridge. Posterior margin almost straight, smooth but granular above. Chelicera granular on dorsal surface of basal segment and smooth on ventral surface, clothed fully with white short silky hairs extending on fingers. Finger elongated but movable more longer than fixed and provided with sharp pointed dentition. Dentition as characterised in the family and genus. Inner ventral edges of movable and immovable fingers provided with twelve and eleven minute teeth respectively as in text-figs. 967 and 968. Pedipalp thin, elongated and carinated on all digits. Femur longer than carapace, carinae granular but outer ventral carina sparsely and irregularly granular. Only outer carinae smooth. Anterior surface provided with subtuberculate carina. Posterior surface smooth on proximal and middle portion but weakly granular distal portion, other intercarinal space granular but upper surface with bigger granules. Patella longer than femur, carinated and all carinae granular. Dorsal median carina granular on proximal portion, outer dorsal carinae turning on dorsal surface on distal portion. Anterior or inner surface granular and three to four granules on its proximal portion denticulate. Posterior or exterior portion granular but more coarse on distal portion. Ventral surface irregularly granular but ventral inner portion more granular. Manus narrow, slender, elongated and about two and a half times longer than wide, provided with seven granular carinae and each carina consisting of many granular rows as in text-fig. 969. Intercarinal space granular but more closely granular on outer portion and



FIGS. 974-979. *Chaerilus insignis* Pocock

- 974. Femur, dorsal and exterior views.
- 975. Patella, dorsal view.
- 976. Patella, exterior view.
- 977. Patella, ventral view.
- 978. Manus and fingers, exterior view.
- 979. Manus and immovable finger, ventral view.

considerably less on ventral portion. Fingers granular and immovable finger carinated but carinae not much distinct. Movable finger as long as femur but immovable finger shorter than carapace. Dentition on finger irregular and movable finger consists of many minute teeth as in text-fig. 970. Femur, patella and manus equally wide and clothed with many microscopic hairs. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 974-979. Legs granular on femur but smooth on patella, tibia and tarsomere. Femur carinated and carinae granular but patella, tibia and tarsomere I without carinae. Tarsomere I provided with minute spines on distal portion, distal edge and a pair of pedal spur. Tarsomere II smooth and provided with a row of long paired bristles on ventral side and a median row of small spinules. All digits clothed with a few microscopic setae. A pair of claws normal. Pectines weakly developed and three times longer than wide. Lamellae fused to form a single lamella. Fulcra well distinguished and semi-circular to triangular in shape. Lamellae and fulcra covered with many microscopic hairs. Pectinal teeth very well developed, broad, elongated and 6/6 in number. Basal piece with straight anterior margin, smooth on entire surface clothed with few microscopic setae. Genital operculum always wider than long and sclerites slightly apart from each other on posterior portion and from under which a pair of conspicuous male genital papillae visible. Sclerites weakly and sparsely clothed with few microscopic setae. Cephalothoracic sternum pentagonal but longer than wide, smooth and provided with a deep median depression on posterior portion as in text-fig. 971.

Mesosoma : All tergites finely granular but more granular on lateral portion of each tergite. Tergites I-VI without carinae but a pair of obsolete granules on posterior portion represent lateral carinae. Tergites V and VI provided with short, smooth and obsolete lateral carinae on posterior portion. Lateral and posterior margins finely granular. Pretergal portion smooth with weakly granular margin as in text-fig. 972. Tergites VII provided with two pairs of lateral carinae but inner lateral pair short, sparsely granular and developed only on posterior portion. Lateral margins finely granular. Posterior margin smooth

but granular above. Sternites I-IV smooth, each provided with a pair of circular stigmata for book lungs. Lateral and posterior margins of each sternite smooth. Presternal portion not much distinct. Sternite V smooth, without carinae. Lateral margins weakly crenulated but posterior margin smooth. Presternal portion smooth with smooth posterior margin.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment about one and a half times as long. Segment II as long as wide. Segments I-IV carinated and all carinae granular and crenulated. Lateral carinae distinct only on segment I but on other segments represented by a bigger granules on posterior margin of each segment. Dorsal surface slightly furrowed on segments I & II and almost flat and smooth on segments III & IV. Anterior peduncle very finely granular, posterior margin granular on dorsal and ventral portion while smooth on lateral portions. Segment V as long as carapace, not as wide or deep as preceding segments. Dorsal surface flat, granular but granules obsolete. Dorsal carinae granular, granules obsolete and placed very sparsely. Dorsolateral carinae granular, distinct on $2/3$ anterior portion. Inferior lateral and single inferior median carinae very strongly developed, serrated but serration sparse. Inferior median carina bifid on posterior portion. Anal rim of this segment strongly serrated as in text-fig. 973. Intercarinal space irregularly granular. Telson slightly longer than femur but shorter than patella. Vesicle elongate, not as long as but more than as wide or deep as caudal segment V. Dorsal surface smooth while sparsely granular on lateral and ventral surface. Ventral and lateral bands not prominent, ventral median crest weak and obsolete. Aculeus short, almost one fourth of the vesicular length, broad at base, not much curved, sharp and reddish on distal portion as in text-fig. 973.

Distribution : INDIA : Ladak, Kashmir (*Type-locality*); Nainital, Almora, Tehri, Uttar Pradesh.

Remarks : We have examined, described and illustrated on the basis of a male *Holotype* received from B.M. (N.H.) London, Regd. No. 1893.10.29.15. We have also identified 3 ♂♂ and 1 ♀ from the collections of Northern Regional Station, ZSI, Dehra Dun, and found that females have slightly shorter pedipalp; more thin on metasoma and pectines with 5/5 teeth.

50 *Chaerilus gemmifer* Pocock
(Figs. 980-995)

1894. *Chaerilus gemmifer* Pocock, *Ann. Mag. nat. Hist.*, 13(6) : 81.
1899. *Chaerilus gemmifer* : Kraepelin, *Tierr. Scorp. etc.*, : 159.
1900. *Chaerilus gemmifer* : Pocock, *Fauna Brit. India, Arachn.*, : 61.

General: Female smaller in size. Carapace coarsely but sparsely granular. Chelicera small with elongated fingers. Pedipalp short, stout with more robust on manus, all digits carinated. Legs smooth with smooth carinae. Pectines weakly developed. Genital operculum fused, cephalothoracic sternum pentagonal. All mesosomal tergites coarsely but sparsely granular, tergites I-VI without carinae, VII with two pairs of lateral carinae. Sternites smooth. Metasoma comparatively short with elongated telson and very short aculeus. All segments granular, carinated and almost flat on dorsal surface.

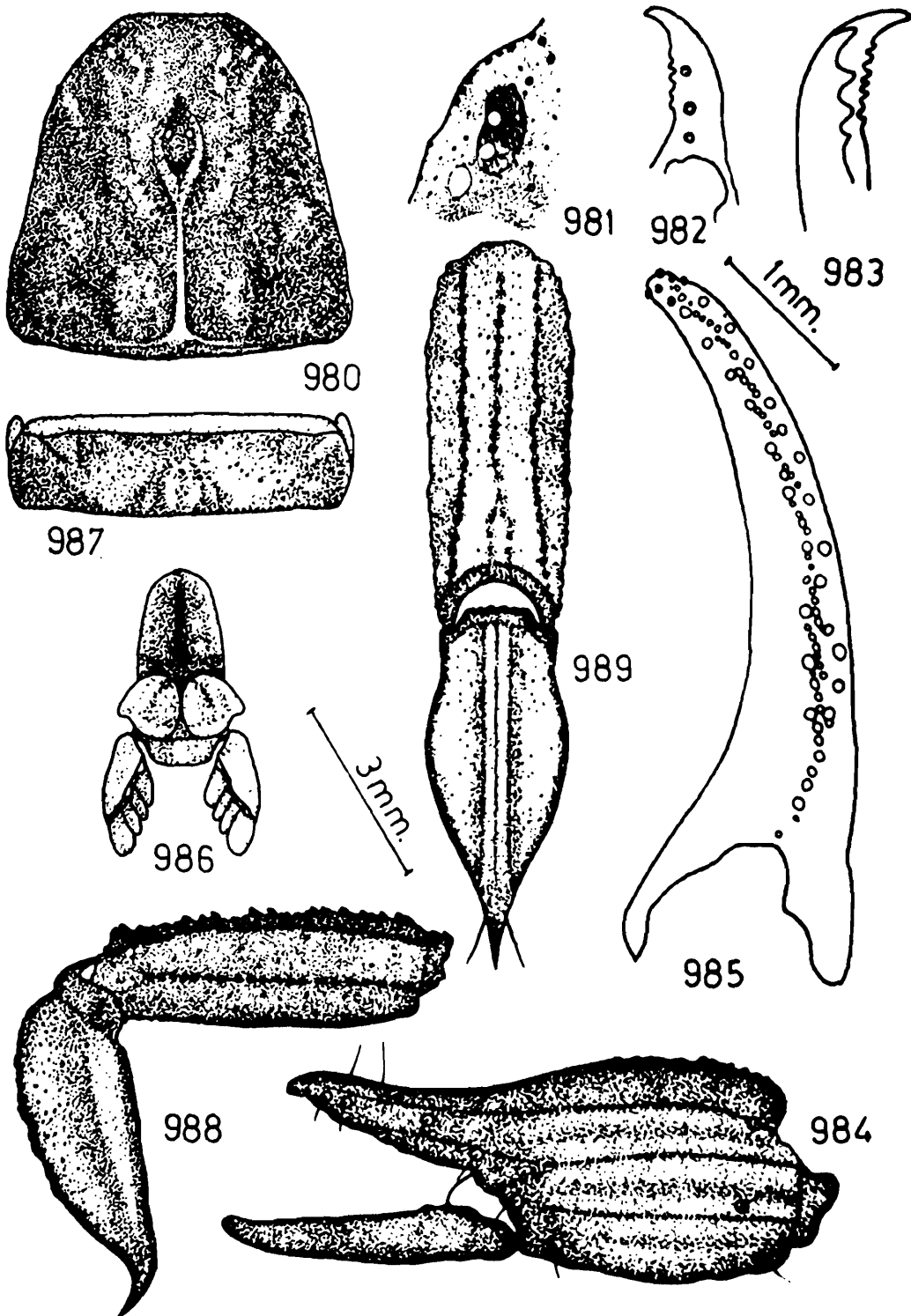
Body colour dark brown to black. Ventral side of body light brown to yellow. Cauda dark except light on vesicle, aculeus reddish. Chelicera light brown but reddish on fingers. Pedipalp dark brown to black but more darker on carinae. Legs light brown to brown.

Measurements: Total length 38.25 mm. Carapace 6.00 mm. long; Mesosoma 11.25 mm. long; Metasoma 21.00 mm. long.

Carapace: Surface coarsely but sparsely granular and granulation more coarse and close on posterior lateral portions. Interocular portion less coarsely as well as weakly granular and granulation still less on posterior portion near to median ocular tubercles. Lateral carinae granular but granules obsolete and

FIGS. 980-989. *Chaerilus gemmifer* Pocock

980. Carapace of female, dorsal view.
981. Lateral eyes, lateral view.
982. Immovable finger of chelicera, inner view.
983. Movable finger of chelicera, inner view.
984. Manus and fingers of pedipalp, exterior view.
985. Movable finger, dorsal view.



- 986. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 987. Tergite, dorsal view.
- 988. Metasomal segment V and telson, lateral view
- 989. Metasomal segment V and telson, ventral view.

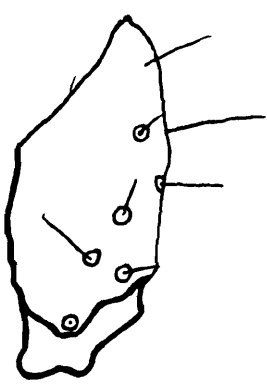
bordering the median flat portion. Median ocular furrows not distinct, lateral median furrows also less distinct and shallow, posterior lateral furrows distinct and smooth, posterior median furrow narrow, distinct, deep and bifid posteriorly. Lateral ocular tubercles small, smooth, each provided with two lateral eyes and an ventrolateral amber coloured circular spot as in the text-fig. 981. Median ocular tubercles smooth, not much elevated, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.9 as in the text-fig. 980. Anterior margin straight and smooth. Lateral margins smooth and provided with a finely granular, weak submarginal ridge. Posterior margin smooth. Chelicera with basal segment granular on dorsal surface but smooth on ventral and clothed thickly with many short, silky hairs, extending on ventral and dorsal portions of both the fingers. Fingers long, slender and dentition on fingers as in the family but ventral inner edge of movable and immovable fingers provided with eight and four minute teeth respectively as in text-figs. 982 and 983. Pedipalp short, stout and with robust manus as in text-fig. 984. Femur much shorter than carapace, carinated but dorsal inner carina granular and more distinct than dorsal outer carina. Ventral carinae absent. Anterior or outer surface granular and two to three granules tuberculate. Posterior or inner surface smooth. Dorsal and ventral surface finely but weakly granular. Patella longer than femur but shorter than carapace except inner carinae with distinct granular, outer carinae smooth and obsolete. Anterior or inner surface very finely granular and few granules tuberculate. Intercarinal space very weakly and finely granular. Manus much robust almost as wide as long, length of under hand more than as long as patella but shorter than carapace, seven carinae developed but less distinct and each carina comprising of many granules, inner carinae with few coarse granules but all granules obsolete as in text-fig. 984. Intercarinal space finely

FIGS. 990-995. *Chaerilus gemmifer* Pocock

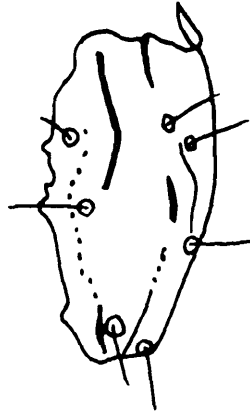
990. Femur, dorsal and exterior views.

991. Patella, dorsal view.

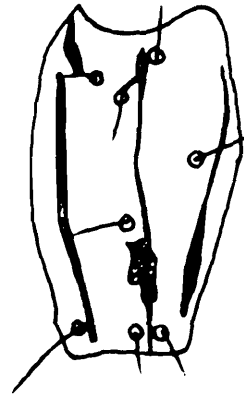
992. Patella, exterior view.



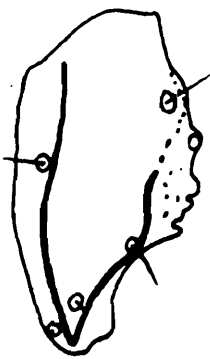
990



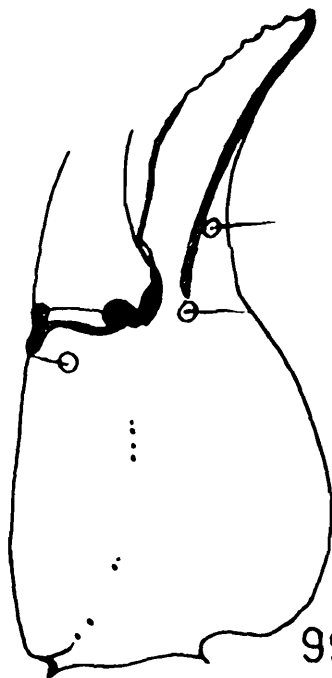
991



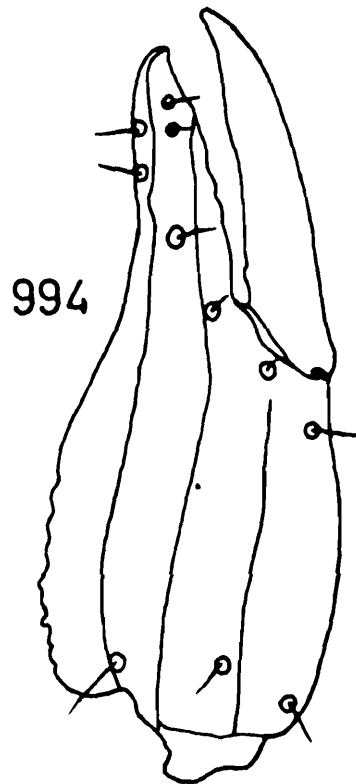
992



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995



994

993. Patella, ventral view.

994. Manus and fingers, exterior view.

995. Manus and immovable finger, ventral view.

granular but granules arranged in ridges and granules very closely present on distal portion at the base of fingers. Fingers granular and immovable finger carinated but the carinae obsolete. Immovable finger as long as patella. Movable finger longer than patella but shorter than carapace. Dentition on fingers irregular as in text-fig. 985. Trichobothrial pattern on femur, patella, manus and immovable fingers as in text-figs. 990-995. Legs smooth on all digits, except on III and IV legs, femur and patella weakly granular on outer or dorsal portion with outer carinae weakly and sparsely granular. Tarsomere I smooth, distally provided with a pair of pedal spur. Tarsomere II smooth, provided with a row of paired bristles on ventral surface and a median row of small spinules. A pair of normal claws. Pectines weakly developed two and a half times longer than wide. Lamellae fused. Fulcra well distinguished almost triangular and proximal fulcra bigger in size. Lamellae and fulcra clothed with few microscopic hairs. Pectinal teeth long, tapering except distal broad tooth, and 4/4 in number as in text-fig. 986. Basal piece smooth with straight anterior margin. Genital operculum wider than long, a pair of sclerites fused in the middle, smooth and clothed with few microscopic hairs. Cephalothoracic sternum pentagonal, longer than wide, smooth surface with a deep notch in the middle as in text-fig. 986.

Mesosoma : All tergites coarsely but sparsely granular, space between the granules very irregular. Tergites I-VI without distinct carinae as in text-fig. 987 but a pair of lateral granules representing lateral carinae on tergite IV-VI. Lateral margins smooth, posterior margin smooth but granular on dorsal portion. Pretergal portion very finely granular with finely granular posterior margin. Tergite VII provided with two pairs of granular lateral carinae, inner pair short and developed only on middle portion. Lateral margins smooth, posterior margin smooth but finely granular on dorsal surface. Pretergal portion finely granular with granular posterior margin. Sternite I-IV smooth, each provided with a pair of circular stigmata for book lungs. Posterior and lateral margins smooth. Presternal portion not distinct. Sternite V smooth, posterior and lateral margins smooth, presternal portion poorly distinguished and smooth.

Metasoma : Cauda three and a half times as long as carapace. Basal segment slightly less than twice as long as Segment II slightly wider than long. Segments III and IV equally wide but both always longer than wide. Segment V about three times longer than wide. All segments carinated, lateral carinae distinct and granular only on segment I and on segments II-IV, representing on posterior margin by only few granules. Segments I and II inferior lateral and inferior carinae smooth or weakly granular, all other carinae weakly granular on segments I-IV. Intercarinal space granular but more coarsely granular on posterior portion of each segment. Anterior peduncle of each segment very finely and closely granular, posterior margins granular. Segment V shorter than carapace and less than as wide or deep as preceding segment; dorsoventrally not compressed. Dorsal surface flat and granular. Dorsal carinae distinct and sparsely granular. Dorsolateral carinae granular but granules not much sparsely situated and distinctly developed on $2/3$ of anterior portion. Inferior lateral and inferior carinae serrated and single inferior carina bifid on posterior portion. Anal rim of this segment serrated but serration strong on ventral portion while weak on lateral portions as in text-figs. 988 and 989. Intercarinal space granular but more coarsely and closely granular on posterior portion. Anterior peduncle smooth, posterior margin also smooth on dorsal portion. Telson longer than fifth caudal segment but shorter than carapace. Vesicle dorsoventrally compressed, elongated and less than as long but more than as wide and deep as fifth caudal segment. Entire vesicular surface granular but only few granules coarse. Ventral and lateral bands shallow, prominent and smooth. Ventral median crest granular but obsolete on distal portion. Aculeus short, less curved, almost one fourth of vesicular length, broad at the base, sharp, entirely reddish as in text-figs. 988 and 989.

Distribution : BANGLADESH : Sylhet (*Type-locality*)

Remarks : We have examined, described and illustrated on the basis of 2 ♀♀ Syntypes received from B.M. (N.H.), London, Regd. No. Nil. Our studies are based on these syntypes only.

51. *Chaerilus granosus* Pocock

(Figs. 996-1011)

1900. *Chaerilus granosus* Pocock, *Fauna Birt. India, Arachn.*, : 56-57.

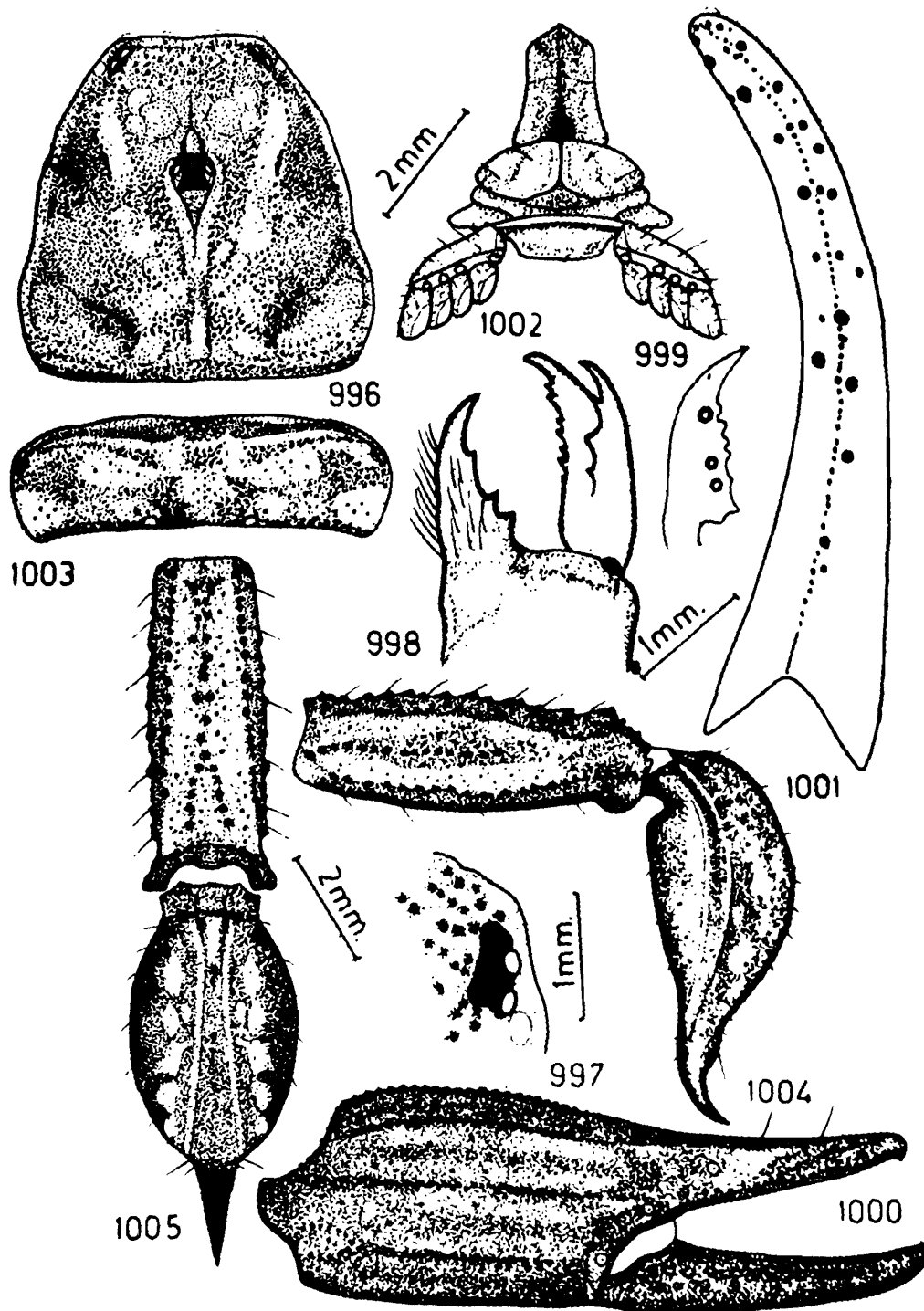
General: Female of medium size. Body colour dark brick red to chocolate variegated with few yellowish brown spots on carapace and tergites I-VI with >>-<< marks on lateral portions. Pretergal portion of each tergite more darker and almost of chocolate colour. Tergites VII with few yellowish spots. Caudal segments more darker with few yellowish spots. Telson light brown and yellowish on dorsal surface. Carapace and mesosomal tergites coarsely granular. Sternites smooth and light brown. Chelicera light brown to yellowish with dentition as in family and genus. Pedipalp strong with well developed granular carinae. Legs light brown in colour, weakly granular on femur. Pectines poorly developed.

Measurements: Total length 45.00 mm. Carapace 6.50 mm. long; Mesosoma 13.00 mm. long; Metasoma 25.50 mm. long.

Carapace: Nearly the entire surface coarsely granular but more closely granular on middle portion of lateral sides and posterior lateral portions. Median portion elevated, flat and weakly granular. Interocular portion coarsely but sparsely granular on anterior portion and smooth on posterior portion. Only lateral carinae developed but not strong and granular, extending almost upto lateral ocular tubercles. Lateral ocular tubercles granular provided with a pair of lateral eyes and an amber coloured spot as in the text-fig. 997. Median ocular

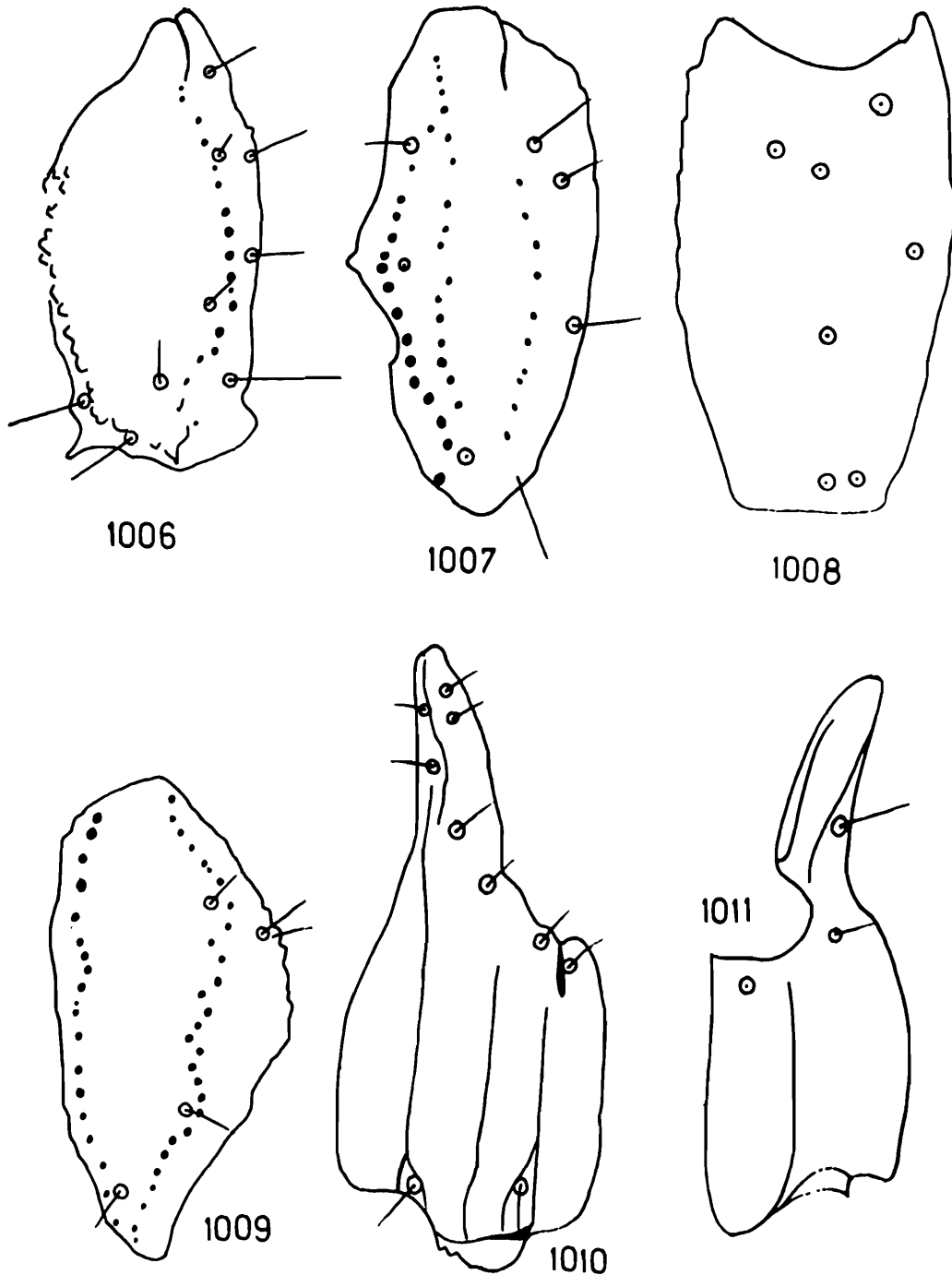
FIGS. 996-1005. *Chaerilus granosus* Pocock

- 996. Carapace of female, dorsal view.
- 997. Lateral eyes, lateral view.
- 998. Chelicera, dorsal view showing ventral inner dentition on movable finger.
- 999. Immovable finger of chelicera, inner view.
- 1000. Manus and fingers of pedipalp, exterior view.
- 1001. Movable finger, dorsal view.



1002. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1003. Tergite, dorsal view.
 1004. Metasomal segment V and telson, lateral view.
 1005. Metasomal segment V and telson, ventral view.

tubercles smooth, not much elevated, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.6 as in text-fig. 996. Anterior margin smooth, almost straight with few microscopic setae. Lateral margins weakly crenulated on anterior portion but smooth on posterior portion. Posterior margin granular and straight. Chelicera granular on basal segment but more granular on anterior portion. Ventral surface smooth and thickly covered with white silky hairs, extending on fingers. Fingers reddish brown with sharp teeth. Dentition on fingers as characterised in family and genus. Inner edges of movable and immovable fingers provided with eight and five minute teeth respectively as in text-figs. 998 and 999. Pedipalp strong, stout with robust manus as in text-fig. 1000. Femur shorter than carapace, entire surface coarsely granular, some granules tuberculate. All carinae granular. Exterior carinae slightly weak and sparsely granular. Patella slightly longer than femur but shorter than carapace. Entire surface granular but weakly granular and granules smaller in size. Carinae weakly developed and granular but outer or exterior carinae almost smooth. Inner surface granular and provided with few tuberculated granules. Manus robust more than as wide as patella; entire surface coarsely and finely granular and provided with eight granular carinae. Exterior and dorsal surface more evenly granular than inner and ventral surface. Length of under hand more than femur or patella but shorter than carapace as in text-fig. 1000. Fingers granular and immovable finger carinated but carinae smooth. Movable finger as long as carapace but immovable finger shorter than femur. Dentition on fingers not much clear and regular, obsolete granules on movable finger arranged as in text-fig. 1001. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 1006--1011. Legs with femur granular and weakly developed carinae but carinae almost smooth. Patella smooth with smooth carinae. Tibia smooth. Tarsomere I smooth, with few stout bristles and with a pair of pedal spurs. Tarsomere II smooth, with a row of stout, paired bristles on ventral surface and a median row of small spinules. All segments weakly covered with long reddish bristles. A pair of claws short, curved and dark brown on tips.



Figs. 1006-1011. *Chaerilus granosus* Pocock

- 1006. Femur, dorsal and exterior views.
- 1007. Patella, dorsal view.
- 1008. Patella, exterior view.
- 1009. Patella, ventral view.
- 1010. Manus and immovable finger, exterior view.
- 1011. Manus and immovable finger, ventral view.

Pectines weakly developed and four times longer than wide. Middle lamellae inconspicuous, fused with marginal lamellae. Fulcra well developed and almost triangular in shape as in text-fig. 1002. Teeth tubular, broad and 4/4 in number. Lamellae and teeth covered with microscopic white hairs. Basal piece not much sclerotized, narrowed on posterior portion and straight anterior margin without any median notch. Entire surface smooth and covered with microscopic reddish setae. Genital operculum provided with a pair of well sclerotized operculi, united in the middle and covered with few reddish setae. Cephalothoracic sternum pentagonal, always longer than wide and with a median depression narrowed on posterior portion as in text-fig. 1002.

Mesosoma : All tergites coarsely granular but more closely and evenly granular on lateral portions of each tergite. A pair of yellow median spots on tergites I-VI, almost smooth without carinae as in text-fig. 1003. Lateral and posterior margins of each tergite granular. Pretergal portion smooth with finely granular posterior margin. Tergite VII granular with two pairs of lateral granular carinae. Lateral and posterior margins smooth. Pretergal portion smooth with finely granular on posterior margin. Sternites I-IV smooth, each provided with a pair of circular stigmata for book lungs. Lateral and posterior margins smooth and provided with few white setae. Presternal portion not well developed. Sternite V weakly granular on lateral portions, without carinae. Lateral margins poorly crenulated. Posterior margin smooth. Presternal portion well developed except middle portion, smooth with smooth posterior margin.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment twice as wide as long, all the eight carinae developed and except inferior carinae all carinae granular. Lateral carinae developed only on posterior portion. Inter-carinal portion coarsely granular but granulation very sparsely arranged on dorsal and dorsolateral portions and closely arranged on ventral and ventrolateral portions. Segments II-IV provided with well developed dorsal, dorsolateral, inferior lateral and inferior granular carinae. Inferior carinae more

crenulate on segment IV. Inferior lateral carinae abruptly ending posteriorly before reaching to posterior margin. Lateral carinae represented by few granules on posterior margins of segments II and III. Intercarinal space sparsely granular and less granular on posterior segments. Segment III as wide as long. Segment V as long as carapace, dorsoventrally compressed and slightly more than as deep as caudal segment I. Dorsal carinae poorly developed and weakly granular. Dorsolateral carinae sparsely granular and developed only on $2/3$ of anterior portion. Inferior lateral carinae sparsely granular and strongly serrated. Single inferior median carina strongly serrated and bifid on posterior portion. Intercarinal space sparsely granular. Anal rim of this segment granular and some granules tuberculate as in text-figs. 1004 and 1005. All carinae and posterior margin of each caudal segment provided with many white microscopic and megascopic setae. Telson longer than carapace but vesicle slightly shorter than fifth caudal segment and more than as wide or deep as fifth caudal segment. Entire surface very finely granular and covered with many setae. Lateral and ventral median depressions weak and more brownish. Anterior joint of vesicle provided with a pair of strong denticulate tubercle on ventral side. Aculeus very broad at the base, not much sharp, curved and about half the vesicular length, dark reddish on distal portion. while basal portion covered with many microscopic white hairs as in text-figs. 1004 and 1005.

Distribution : INDIA : Mussooree (*Type-locality*), Uttar Pradesh, (North west of Himalayan ranges)

Remarks : We have examined, described and illustrated on the basis of the female type specimens received from the B.M. (N.H.), London, Regd. No. 1897.9.17, 57-60.

52. *Chaerilus truncatus* Karsch

(Figs. 1012-1027)

1879. *Chaerilus truncatus* Karsch, *Mitt. munch. ent. Ges.*, 3 : 108.
 1894. *Chaerilus margaritatus* : Pocock, *Ann. Mag. nat. Hist.*, 13(6) : 79.
 1900. *Chaerilus margaritatus* : Pocock, *Fauna Brit. India, Arachn.*, : 58.

General : Female of medium size. Entire body surface coarsely granular. Interocular area of carapace less granular. Tergites with a pair of rudimentary lateral carinae. All carinae on metasomal segments granular. Last sternite smooth and without carinae. Chelicera finely granular on dorsal surface. Pedipalp short with more robust manus, fingers short and dentition irregular. Legs smooth, all digits without carinae. Pectines poorly developed.

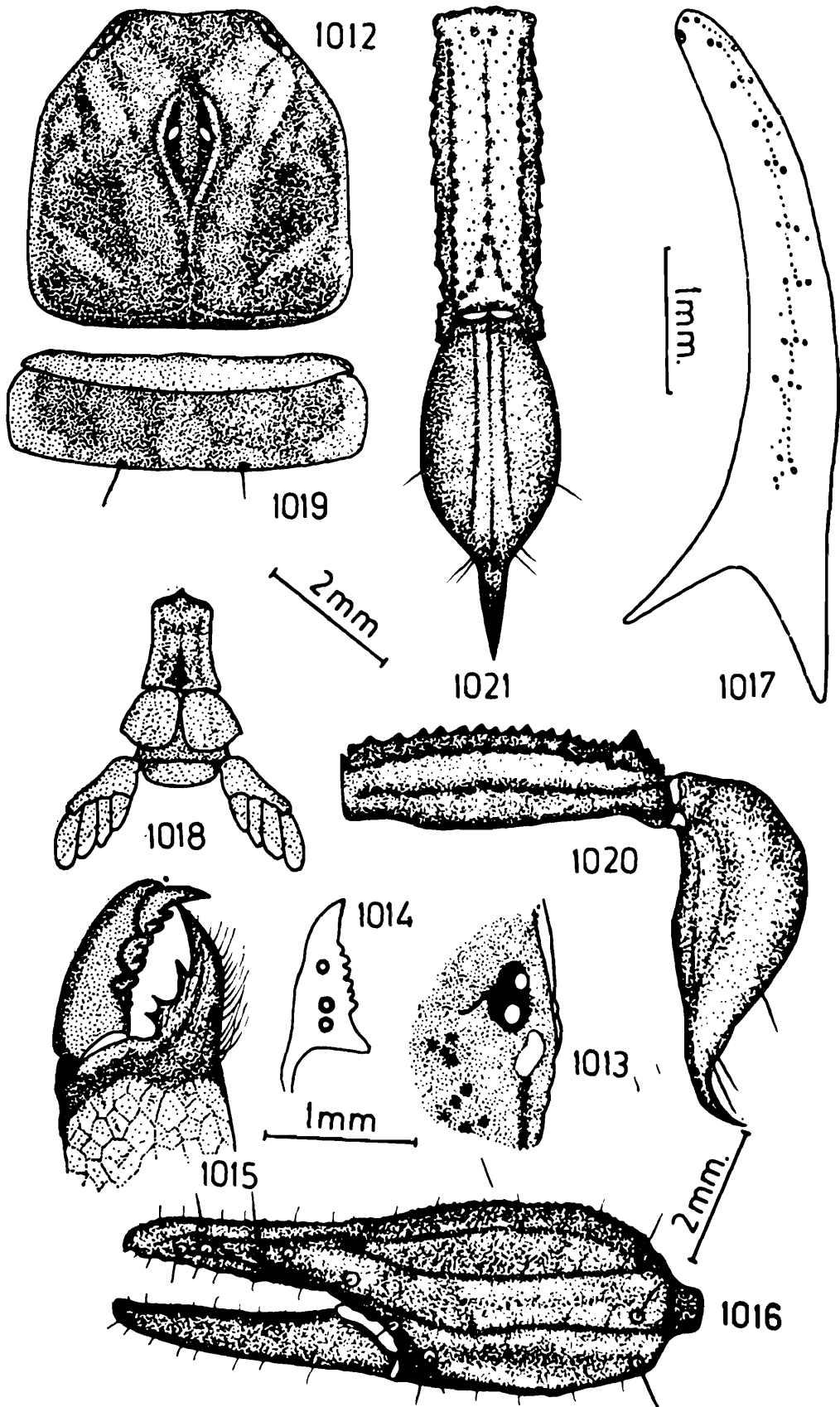
Body colour uniform brownish, slightly darker on mesosomal tergites and fingers of pedipalp. Chelicera and legs light brown to yellowish. Telson also more or less light brown. Ventral surface pale brown.

Measurements : Total length 40.25 mm. Carapace 5.50 mm. long; Mesosoma 13.50 mm. long; Metasoma 21.25 mm. long.

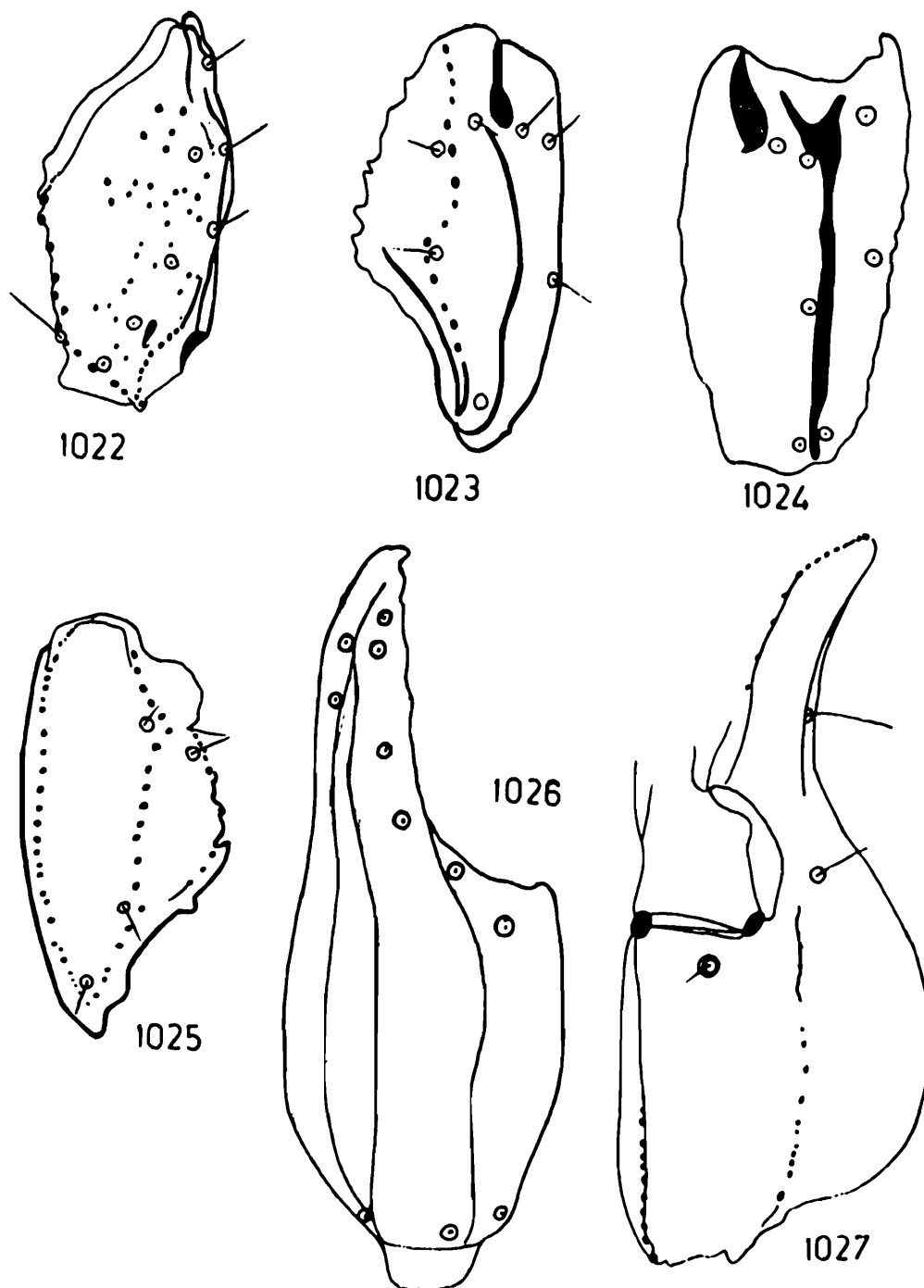
Carapace : Surface covered with coarse granulation but middle portion weakly granular. Interocular area almost smooth

FIGS. 1012-1021. *Chaerilus truncatus* Karsch.

1012. Carapace of female, dorsal view.
 1013. Lateral eyes, lateral view.
 1014. Immovable finger of chelicera, inner view.
 1015. Chelicera, dorsal view showing ventral inner dentition on movable finger.
 1016. Manus and fingers of pedipalp, exterior view.
 1017. Movable finger, dorsal view.
 1018. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1019. Tergite, dorsal view.
 1020. Metasomal segment V and telson, lateral view.
 1021. Metasomal segment V and telson, ventral view.



on posterior portion and very weakly granular on anterior portion. Lateral ocular tubercles weakly developed, granular and provided with two lateral eyes with an amber coloured, small, circular spot on ventrolateral side as in text-fig. 1013. Median ocular tubercle smooth, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.5 as in text-fig. 1012. Middle portion slightly flat and raised. Lateral carinae weakly granular ending before reaching lateral ocular tubercles. Furrows shallow and posterior median furrow granular. Anterior margin smooth. Lateral margins smooth and provided with a finely crenulated submarginal ridge. Posterior margin smooth but granular above. Chelicera granular on dorsal surface of basal segment but smooth on ventral surface and covered with white, short, silky hairs, extending on fingers. Fingers sharp, elongated with dentition as characterised in family and genus but the inner ventral edge of movable and immovable fingers provided with eight and seven minute teeth respectively as in text-figs. 1014 and 1015. Pedipalp short, more stouter and robust on manus. Femur shorter than carapace, carinated and outer carina obsolete. Dorsal and ventral outer, dorsal and ventral inner carinae granular. Ventral inner carina with a strong dentiform tubercle. Inner surface granular and some granules tuberculate. Intercarinal space poorly but slightly more coarsely granular on dorsal portion, ventral surface granular on distal portion, while outer surface almost smooth. Patella slightly longer than femur but shorter than carapace, carinated, inner carinae granular. Outer carinae almost obsolete. Intercarinal space weakly and irregularly granular but inner surface more granular and provided with a pair of strong dentiform tubercles on upper portion. Manus robust, carinated and all seven carinae granular but inner carina more granular as in text-fig. 1016. Intercarinal space finely but weakly and irregularly granular. Length of under hand longer than patella but shorter than carapace. Fingers granular and carinated movable finger as long as carapace. Immobile finger shorter than femur. Dentition on fingers irregular and as in text-fig. 1017. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 1022-1027. Legs smooth, without carinae or at the most inner



FIGS. 1022-1027. *Chaerilus truncatus* Karsch.

- 1022. Femur, dorsal and exterior views.
- 1023. Patella, dorsal view.
- 1024. Patella, exterior view.
- 1025. Patella, ventral view.
- 1026. Manus and immovable finger, exterior view.
- 1027. Manus and immovable finger, ventral view.

carina on femur very weakly granular. Tibia short and smooth. Tarsomere I smooth, provided with a row of long setae on inner surface and distal margin covered with small spicules and a pair of pedal spur. Tarsomere II smooth, with a row of paired, long, reddish bristles on ventral side and a row of small spinules. All digits of each legs clothed with few reddish setae. A pair of claws normal. Pectines weakly developed and two times longer than wide as in text-fig. 1018. Lamellae fused to form a single lamella. Only four fulcra developed and the last fulcrum bigger in size. Lamellae and fulcra covered with few reddish microscopic hairs. Teeth tubular and 3/3 in number. Basal piece almost rectangular, surface smooth, anterior margin with a very weak invagination in the middle. Genital operculum always wider than long, a pair of sclerites united in middle portion. Cephalothoracic sternum pentagonal, entire surface smooth and provided with a deep median notch on posterior portion as in text-fig. 1018.

Mesosoma: All tergites coarsely granular throughout but unevenly placed. Lateral portions of each tergite smooth. Tergites I-VI without carinae but lateral carinae represent a pair of setae as in text-fig. 1019. Posterior and lateral margins of each tergite smooth. Pretergal portion smooth with weakly granular posterior margin. Tergite VII provided with two pairs of lateral carinae, outer lateral carinae more distinct than inner laterals. Lateral margins almost smooth but very weakly granular above. Pretergal portion weakly granular with granular posterior margin. Sternites I-IV smooth, covered with few whitish and reddish setae without presternal portion and each provided with a pair of circular stigmata for book lungs. Lateral and posterior margins smooth. Sternite V very weakly granular but more granular on posterior portion. A pair of outer lateral carinae obsolete. Lateral margins smooth. Posterior margin smooth. Presternal portion not well distinguished.

Metasoma: Cauda slightly shorter than four times as long as carapace. Basal segment one and half times as wide as long. Segment III as long as wide while segment V as wide as deep. Segments I-IV with all carinae granular except very poorly deve-

loped on segment I, while rudimentary on segments II-IV. Each carina provided with few microscopic setae on both sides. Intercarinal space very irregularly granular. Anterior and posterior margins granular and also the peduncles finely granular. Segment V longer than femur or patella but as long as carapace, dorsal surface flat almost smooth except few granules on lateral portions. Dorsal carinae indistinctly granular on anterior portion but distinct granulation on posterior portion. Dorso-lateral carinae developed on $2/3$ anterior portion and granular. Inferior lateral and inferior median carinae sparsely serrated and the serration more sharp on posterior portion. Single inferior median carina bifid on posterior portion. Intercarinal space irregularly granular, each carina provided on both sides with few setae. Anal rim of this segment serrated as in text-figs. 1020 and 1021. Telson longer than carapace or last caudal segment. Entire surface of vesicle smooth, lateral and ventral bands not much clear and prominent. Ventral median crest obsolete. Setation on vesicle not clear. Few setae present at the base of aculeus. Aculeus broad at the base, not much curved, sharp, pointed, deep brown to reddish on distal portion and less than half the vesicular length as in text-figs. 1020 and 1021.

Distribution : INDIA : Dehra Dun (*Type-locality*), Tehri, Nainital, Garhwal, Uttar Kashi, Uttar Pradesh; Kasauli near Simla, Himachal Pradesh.

Remarks : We have studied the type specimen of *Chaerilus margaitatus* Pocock (1900) received from B.M. (N.H.), London, Regd. No. Nil and authenticated named specimens of *Chaerilus truncatus* Karsch (1879) received from National Collections, ZSI, Calcutta, Regd. No. 1622/17. We found that these two lots of specimens are belonging to the same species and according to law of priority the species described by Karsch (1879) becomes a valid species. So we have considered the species *Chaerilus margaritatus* Pocock as a synonym of *Chaerilus truncatus* Karsch.

53. *Chaerilus anthracinus* Pocock

(Figs. 1028-1043)

1900. *Chaerilus anthracinus* Pocock, *Fauna Brit. India, Arachn.*, : 57

General : Male and female of medium size, female slightly bigger than male. Body colour dark brick red to blackish red and female slight paler and more brownish. Chelicera light brown, pedipalp more darker and almost black. Manus of pedipalp more wider but shorter in female than in male. Legs dark brown to black. Tergites with >>-<< shaped marks of lateral portions. Metasoma dark brown to black but telson pale brown in female while blackish in male. Ventral surface dark brown to black on coxal endites of appendages; cephalothoracic sternum, genital operculum and basal piece. Pectines weakly developed but comparatively well developed in male. Sternites smooth and brownish in colour but last sternite dark brown to blackish.

Measurements : Male total length 45.50 mm. Carapace 6.50 mm. long; Mesosoma 14.50 mm. long; Metasoma 24.50 mm. long. Female total length 47.75 mm. Carapace 7.00 mm. long; Mesosoma 13.75 mm. long; Metasoma 27.00 mm. long.

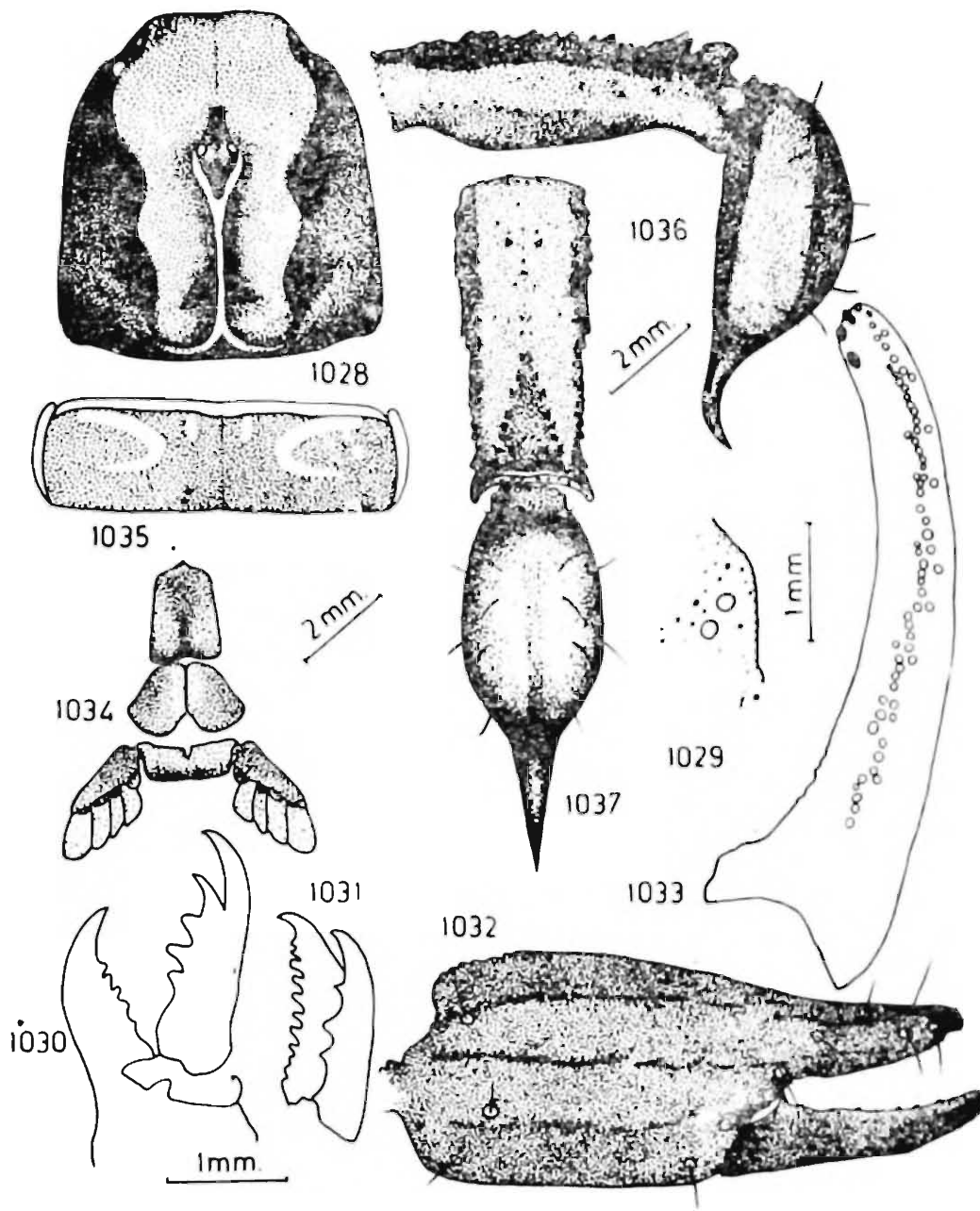
Carapace : Entire surface coarsely and almost evenly granular except posterior portion of interocular area and some median portion. Middle portion flat and elevated and margined by granular lateral carinae. Lateral furrows more prominent. Median furrows shallow at ocular region, deep and bifid posteriorly. Posterior lateral furrows more prominent. Lateral ocular tubercles granular, elevated and provided with a pair of lateral eyes and an ventrolateral amber coloured circular spot as in text-fig. 1029. Median ocular tubercles smooth but

FIGS. 1028-1037 *Chaerilus anthracinus* Pocock

1028. Carapace of female, dorsal view.

1029. Lateral eyes, lateral view.

1030. Chelicera, dorsal view showing ventral inner dentition on immovable finger.

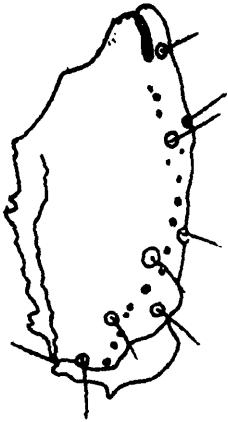


1031. Movable finger of chelicera, inner view.
 1032. Manus and fingers, exterior view.
 1033. Movable finger, dorsal view.
 1034. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1035. Tergite, dorsal view.
 1036. Metasomal segment V and telson, lateral view.
 1037. Metasomal segment V and telson, ventral view.

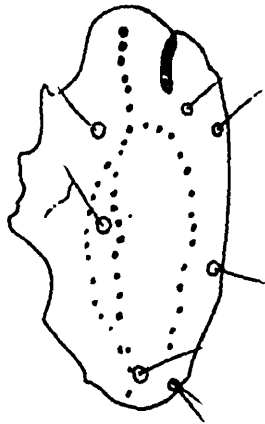
weakly granular on posterior portion and provided with a pair of median eyes, situated anteriorly in the ratio 1:1.6 as in text-fig. 1028. Anterior margin straight, smooth in male but weakly crenulated in female. Lateral margins smooth and provided with a granular submarginal ridge. Posterior margin smooth but granular above. Chelicera strong with basal segment granular on dorsal surface and ventral surface fully covered with white silky hairs which extend on fingers. Fingers with usual dentition as in the family and genus but ventral fang on movable and immovable fingers provided on inner edge with seven to eight and five to six minute teeth respectively as in text-figs. 1030 & 1031. Pedipalp strong and manus more robust but short in female. Femur shorter than carapace. All carinae granular but inner carinae more granular and granules in tuberculate form. Intercarinal space evenly granular but more closely granular on inner surface. Outer surface almost smooth or very poorly granular. Patella longer than femur but as long as carapace in male and shorter than carapace in female. All carinae granular but outer carinae very poorly granular, dorsal carinae not much granular but uneven granulation present throughout the length. Ventral carinae very evenly and regularly granular. Anterior or inner surface provided with few upper and lower tuberculate granules. Intercarinal space granular but slightly weakly and unevenly granular. Manus more shorter and robust in female. Length of under hand more than carapace in male but less in female, with seven granular carinae and many small granules arranged thickly in each carina as in text-fig. 1032. Intercarinal space granular in mosaic reticulation. Fingers granular and immovable fingers carinated. Movable fingers always shorter than carapace but almost as long as femur. Dentition on fingers not clear but movable finger comprises dentition as in text-fig. 1033. All segments covered sparsely with white microscopic and reddish megascopic setae.

FIGS. 1038-1043. *Chaerilus anthracinus* Pocock

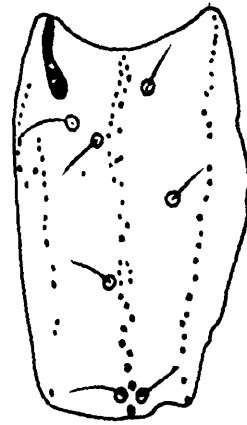
- 1038. Femur, dorsal and exterior views.
- 1039. Patella, dorsal view.
- 1040. Patella, exterior view.



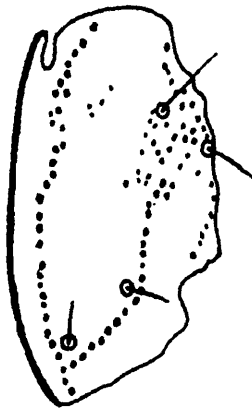
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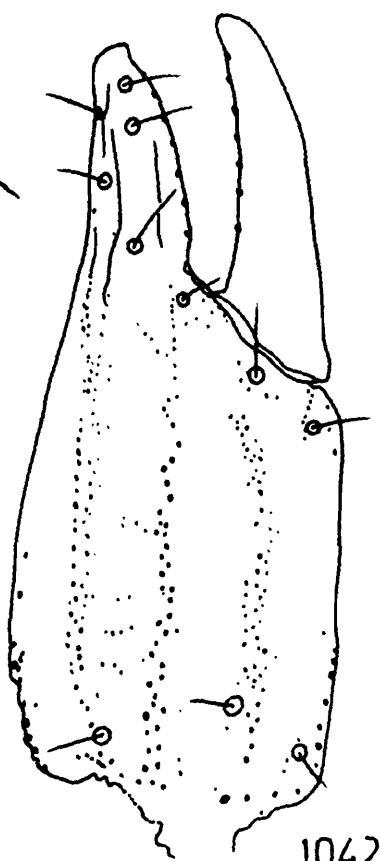
1039



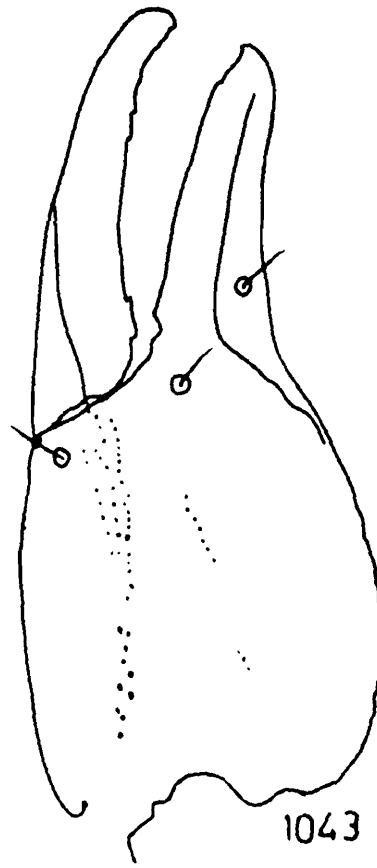
1040



1041



1042



1043

- 1041. Patella, ventral view.
- 1042. Manus and fingers, exterior view.
- 1043. Manus and fingers, ventral view.

Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 1038-1043. Legs weakly granular on femur and without carinae. Patella smooth and without carinae. Tibia smooth. Tarsomere II smooth with few outer and inner rows of short and long setae, spicules and provided with a pair of pedal spur on distal end. Tarsomere III smooth, provided with a row of median spicules and long paired setae on ventral surface. A pair of claws normal, curved and dark on distal portion. All segments sparsely covered with a few reddish setae. Pectines weakly developed in male and almost three times longer than wide. Marginal and middle lamellae fused. Fulcra well developed and triangular. Lamella and fulcra covered with microscopic red and white setae. Pectinal teeth longer in male than in female. Number of teeth 6/6 in male whereas 4/4 in female. Basal piece well sclerotized, smooth, narrowing posteriorly and straight on anterior margin, sparsely covered with few setae. Genital operculum always wider than long, a pair of sclerites united in the middle. Male genital papillae visible only after lifting the sclerites. Sclerites smooth, sparsely clothed with few reddish setae. Cephalothoracic sternum longer than wide, surface smooth with a very deep median depression on posterior portion as in text-fig. 1034.

Mesosoma : All tergites coarsely granular but more granular in female. A pair of lateral carinae represented by a large granules on posterior margins of tergites I-III and lateral carinae well developed with four to five granules on posterior margin of tergites IV-VI as in text-fig. 1035. Pretergal portion finely and weakly granular with evenly and finely granular posterior margin. Lateral and posterior margins of each tergite granular. Tergite VII with median portion more closely granular, submedian portion sparsely granular, lateral portions slightly more granular but all granules coarse; provided with two pairs of sparsely granular lateral carinae. Pretergal portion weakly and finely granular with evenly and finely granular posterior margin. Lateral and posterior margins granular. Sternites I-IV smooth, each provided with a pair of circular stigmata for book lungs. Presternal portion granular but more granular on lateral por-

tions provided with a pair of obsolete carinae, developed on posterior portion and prominent in male.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment always wider than long, provided with dorsal, dorsolateral, lateral and inferior lateral granular carinae. Inferior carinae smooth but not much obsolete and three granules prominent. Intercarinal space more granular on lateral portion than on ventral surface. Posterior margin granular. Anterior peduncle finely granular. Segments II & III provided with dorsal, dorsolateral, inferior lateral carinae granular. Inferior carinae more granular than in preceding segments. Lateral carinae granular but present on 1/3 posterior portion. Posterior margin granular but more clear on dorsal surface. Anterior peduncle finely and closely granular. Intercarinal space less granular than preceding segment. Segment IV with dorsal and dorsolateral carinae granular, lateral carinae with only three to four granules on posterior margin. Inferior lateral carinae granular and some granules tuberculate. Inferior carinae granular but granules tuberculated and serrated. Intercarinal space irregularly granular. Posterior margin granular but more on dorsal surface. Anterior peduncle finely but sparsely granular. Last or fifth segment slightly shorter than carapace, dorso-laterally compressed, dorsal carinae granular and more well developed on anterior portion. Dorsolateral carinae sparsely granular but developed only on half of anterior portion. Inferior lateral carinae strongly but sparsely serrated. Single inferior median carina also strongly serrated and bifid on posterior portion as in text-fig. 1037. Anal rim of this segment serrated. Intercarinal space irregularly granular as in text-figs. 1036 and 1037. Anterior peduncle smooth on dorsal surface while finely and closely granular on ventral surface. All carinae on all segments sparsely provided with white and reddish setae. Telson longer than carapace but vesicle always shorter than last or fifth caudal segment. Entire surface of vesicle covered with fine granules but granules on dorsal surface more fine than on ventral and lateral surface. Ventral median crest smooth but granular only on proximal portion. Aculeus short, almost half the vesicular length, broad at the

base, not much curved, dark reddish brown to black on distal portion as in text-figs. 1036 & 1037.

Distribution : INDIA : Dalhousie (*Type-locality*), Punjab.

Remarks : We have examined one male and one female type specimens received from B.M. (N.H.) London, Regd. No. Nil. Present description and illustrations are based on the same types.

54. *Chaerilus anthracinus rufescens* Pocock

(Figs. 1044-1059)

1900. *Chaerilus anthracinus rufescens* Pocock, *Fauna Brit. India*,
Arachn., : 57-58.

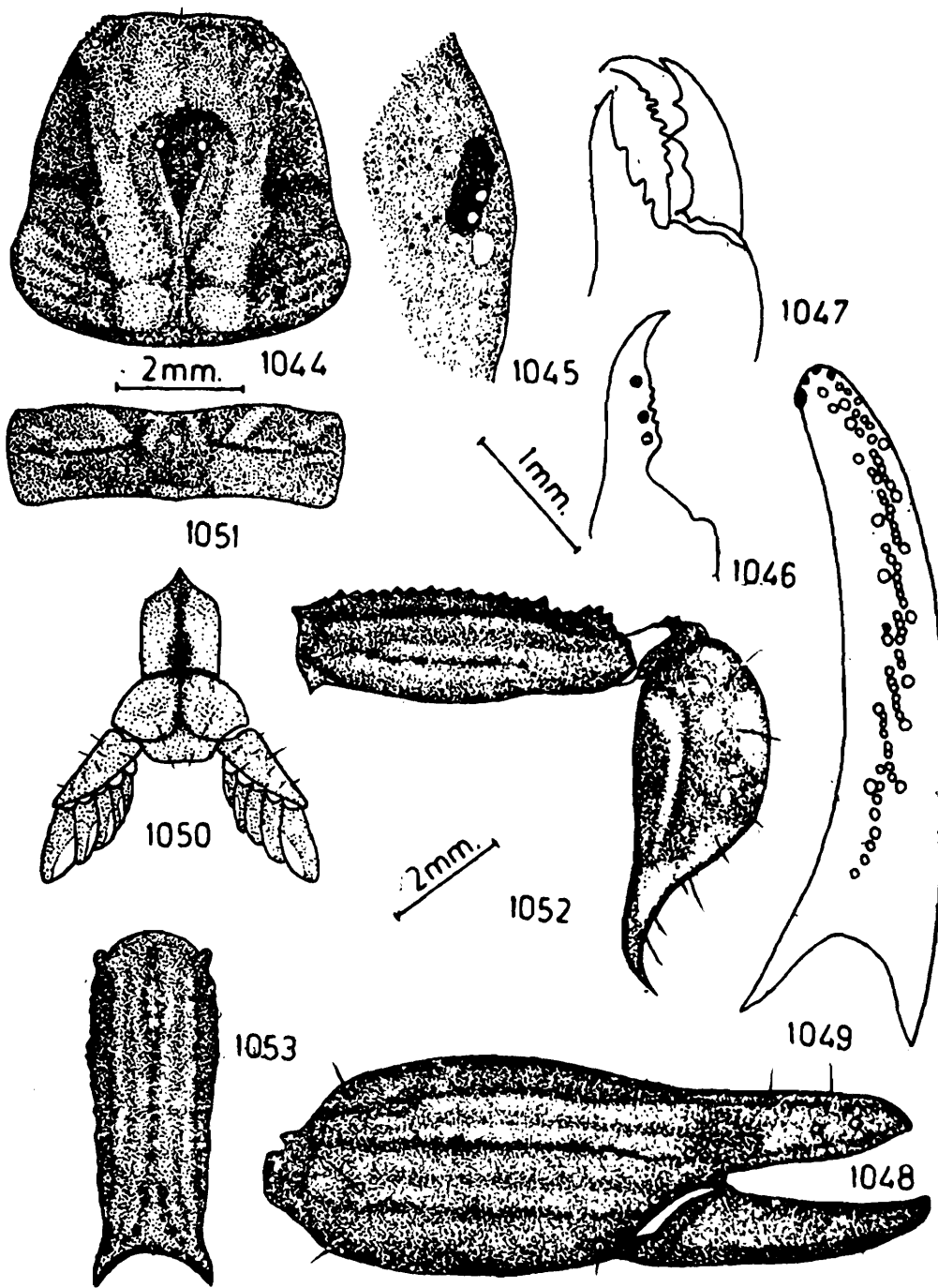
General : Female of medium size. Body colour brick reddish to dark brown but appendages light brown in colour, darker on carinae. Mesosomal tergites II-VI carinated with a pair of median circular spots and >>-<< pale brown spots. Carapace sparsely granular. All sternites smooth and last without carinae. Metasomal segments comparatively less granular and carinae, less granular on proximal segments. Telson with very finely and weakly granular on vesicle. Pectines moderately developed. Chelicera finely granular on dorsal surface. Pedipalp granular on all digits and manus with seven granular carinae. Legs almost smooth.

Measurements : Total length 42.25 mm. Carapace 6.50 mm. long; Mesosoma 13.50 mm. long; Metasoma 22.25 mm. long.

Carapace : Entire surface coarsely granular but lateral portions more granular and median elevated portion very poorly

FIGS. 1044-1053. *Chaerilus anthracinus rufescens* Pocock

- 1044. Carapace of female, dorsal view.
- 1045. Lateral eyes, lateral view.
- 1046. Immobile finger of chelicera, inner view.
- 1047. Chelicera, dorsal view showing ventral inner dentition on movable finger.

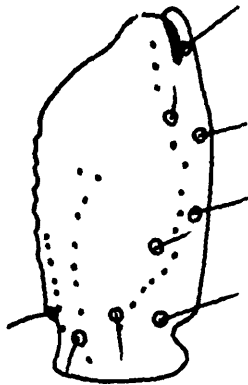


1048. Manus and fingers of pedipalp, exterior view.
 1049. Movable finger, dorsal view.
 1050. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1051. Tergite, dorsal view.
 1052. Metasomal segment V and telson, lateral view.
 1053. Metasomal segment V, ventral view.

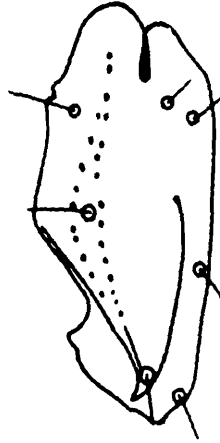
granular with posterior interocular portion smooth. Lateral carinae well developed, granular upto lateral ocular tubercles. Lateral furrow not much prominent but posterior lateral furrows more deep and distinct. Median furrows shallow at median eyes but deep on middle and posterior portion and bifid posteriorly. Lateral ocular tubercles granular and provided with a pair of lateral eyes and an amber coloured ventro-lateral spot as in text-fig. 1045. Median ocular tubercles smooth and provided with a pair of median eyes, situated anteriorly in the ratio 1:1.5 as in text-fig. 1044. Anterior margin granular, straight and with a few microscopic setae. Lateral margins finely crenulated on anterior portion but smooth on middle and posterior portion and supported with a granular submarginal ridge. Posterior margin granular, chelicera with basal segment granular on dorsal surface while smooth ventrally and covered with fine silky hairs, extending on fingers. Fingers sharp, pointed, elongated and movable finger longer than basal segment. Dentition on fingers as characterised in family and genus but ventral inner edge of immovable and movable finger provided with eight and six minute teeth as in text-figs. 1046 & 1047. Pedipalp with narrow chela. Femur shorter than carapace, provided with dorsal inner, dorsal outer and ventral inner granular carinae. Ventral outer carina thickly and evenly granular on short proximal portion while sparsely and unevenly granular on distal portion. Outer or exterior carina smooth. Inner or interior surface provided with many short, dentiform tubercles. Intercarinal space granular but granulation bigger in size and very sparsely scattered on dorsal surface while granules slightly smaller in size and less sparsely cover the ventral surface. Exterior surface very finely and weakly granular. Patella slightly shorter than carapace but longer than femur. Dorsal and ventral inner carinae granular but outer carinae poorly developed. Exterior carina obsolete, intercarinal space granular but more granular on distal and inner portion. Anterior or inner surface covered with small

FIGS. 1054-1059. *Chaerilus anthracinus rufescens* Pocock

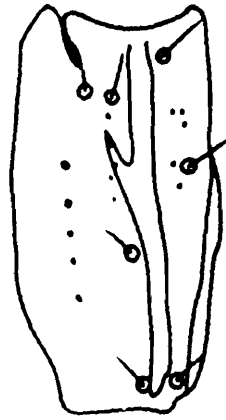
- 1054. Femur, dorsal and exterior views.
- 1055. Patella, dorsal view.
- 1056. Patella, exterior view.



1054



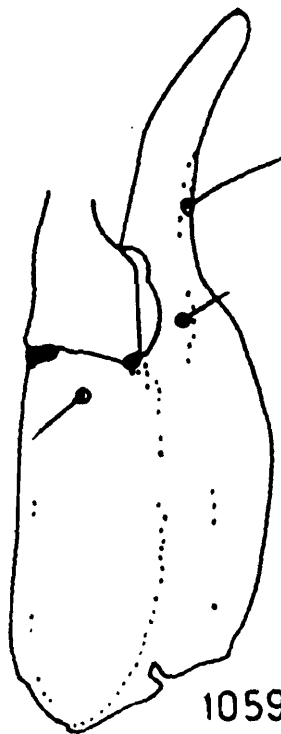
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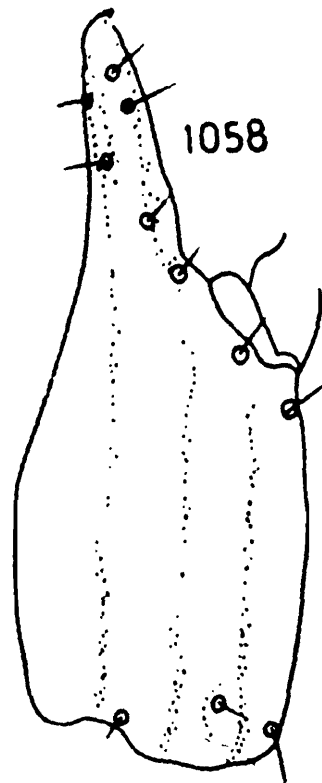
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1057



1059



1058

1057. Patella, ventral view.
 1058. Manus and immovable finger, exterior view.
 1059. Manus and immovable finger, ventral view.

dentiform granules and a pair of tuberculate granules situated on upper portion. Manus or hand narrow, elongated and length of under hand more than as long as patella but as long as carapace. Seven granular and a short granular inner carinae developed and each carina comprising of many granules throughout its length as in text-fig. 1048. Intercarinal space finely and almost irregularly granular. Fingers granular and carinated. Movable finger shorter than patella but as long as femur. Immobile finger shorter than movable finger. Dentition on fingers irregular and as in text-fig. 1049. Trichobothrial pattern on femur, patella, manus and immovable finger as in text-figs. 1054-1059. Legs without carinae, femur smooth on I-III, but granular on IV. Anterior margin more granular. Patella, tibia smooth, tarsomere I smooth but inner margin provided with stiff bristles and a pair of pedal spur on distal end. Tarsomere II smooth, provided below with a row of long paired bristles and a median row of small spinules. Pectines weakly developed and 2.25 times longer than wide. Lamellae fused into a single lamella. Fulcra well distinguished and triangular. Lamellae and fulcra clothed with microscopic reddish and whitish setae. Pectinal teeth broad, tapering distally and 5/5 in number. Basal piece sclerotized with straight anterior margin, clothed with few reddish setae. Genital operculum always wider than long, sclerites fused in the middle and clothed with few reddish setae. Cephalothoracic sternum pentagonal but always narrowed in front, longer than wide and posterior portion with a deep depression in the middle as in text-fig. 1050.

Mesosoma : All tergites coarsely and evenly granular. Tergites, I-VI each with a pair of obsolete granular carinae on posterior margin as in text-fig. 1051. Lateral and posterior margins granular. Pretergal portion finely granular with granular posterior margin. Tergite VII more granular on anterior portion and provided with two pairs of granular carinae developed only on posterior portion. Lateral margins less granular than preceding tergites. Posterior margin smooth but granular above. Pretergal portion finely granular with granular posterior margin. Sternites smooth. Sternites I-IV, each provided with a pair of circular stigmata for book lungs. Lateral and posterior

margins smooth. Presternal portion not clearly distinguished but smooth. All sternites sparsely clothed with microscopic reddish setae. Sternite V smooth, without carinae and margins also smooth.

Metasoma : Cauda about three and a half times as long as carapace. Basal segment always wider than long; segment III as long as wide. Segments I-III with dorsal, dorsolateral carinae granular. Lateral carinae granular on segment I but developed only on posterior half portion of segment II and represented only one third posterior portion of segment III. Inferior lateral carinae weakly granular while inferior carinae obsolete. Segment IV with dorsal and dorsolateral carinae granular. Inferior lateral and inferior carinae crenulated. Intercarinal space irregularly granular, Anterior peduncle finely granular on ventral side while almost smooth on dorsal portion. Each carina provided on both sides with microscopic setae. Segment V as long as femur but shorter than patella, dorsal surface flat and finely granular on middle portion while slightly coarse granulation present on anterior lateral portions. Dorsolateral carinae granular and present on 2/3 of anterior portion. Inferior lateral and single inferior carinae serrated and inferior carinae bifid on posterior end as in text-fig. 1053. Anal rim of this segment also serrated but serration comparatively weak and smaller in size as in text-fig. 1052 & 1053. Intercarinal space granular. Anterior and posterior peduncles very finely granular on dorsal portion. Telson more than as long as carapace. Vesicle more than as wide or deep as last caudal segment but slightly shorter than femur or twice as long as second caudal segment. Entire surface finely granular and covered sparsely with many microscopic whitish hairs. Lateral and ventral median bands not prominent. Ventral median crest obsolete. Aculeus not much curved, pointed, sharp, dark reddish on distal portion and slightly longer than half the length of vesicle or as long as caudal segment III as in text-fig. 1052.

Distribution : INDIA : Dharmsala (*Type-locality*), Punjab.

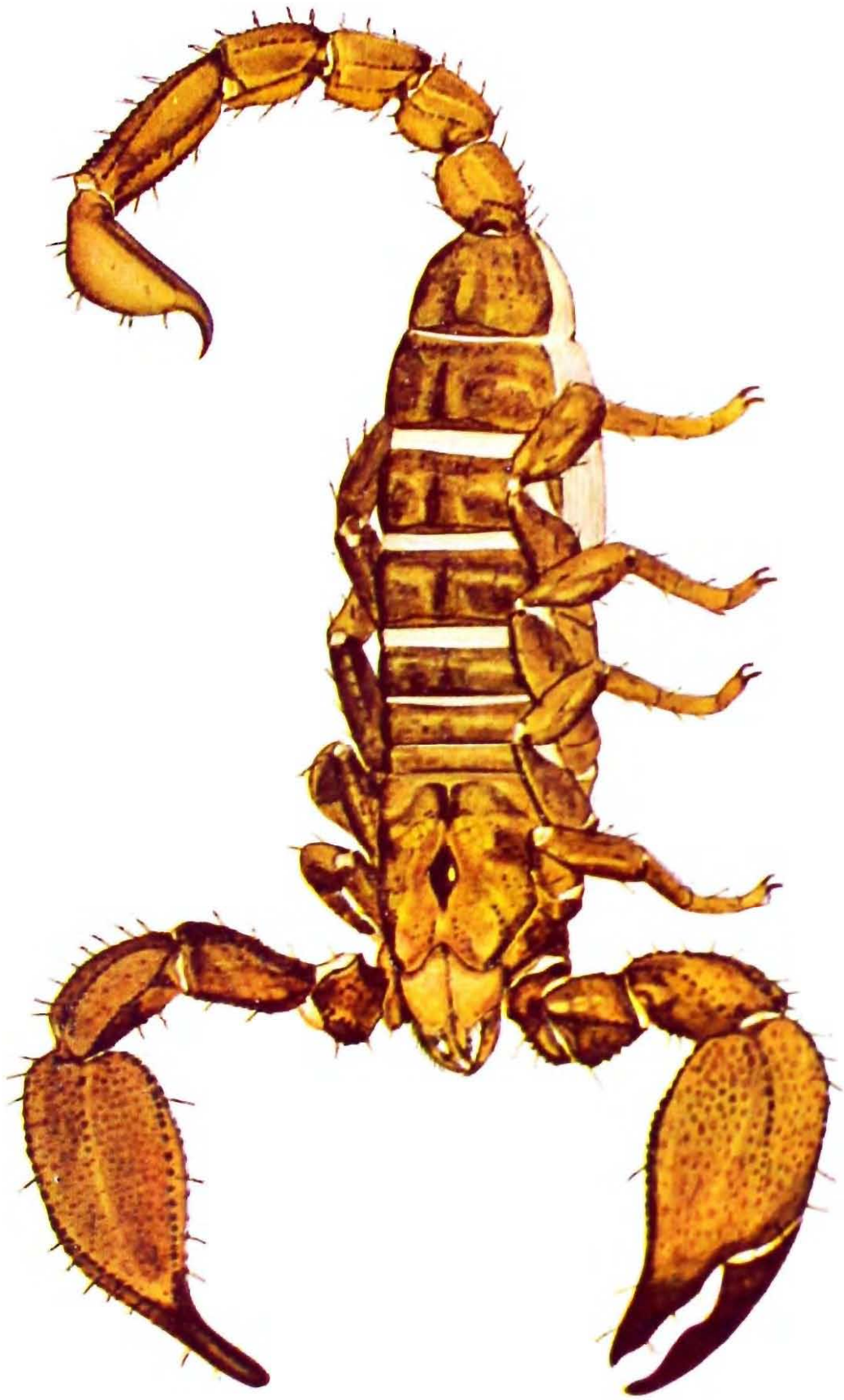
Remarks : We have examined, described and illustrated on the basis of a female type received from B.M. (N.H.) London, Regd. No. 1897.9.5.34.

Family III. VAEJOVIDAE

1876. Vejovidae Thorell, *Ann. Mag. nat. Hist.*, 17 : 10.
 1899. Vaejovidae : Pocock, *J. Bombay nat. Hist. Soc.*, 12 : 266.
 1900. Vejovidae : Pocock, *Fauna Brit. India, Arachn.*, : 64.
 1939. Vejovidae : Stahnke, *Scorp. Arizona Iowa State Univ.*, : 67.
 1973. *Vaejovidae* : Vachon, *Bull. Mus. natn. Hist. nat., Paris, 3^e ser., Zool.* 104 (140) : 857.
 1974. Vejovidae : Stahnke, *J. Arachnol.*, 1(2) : 107.
 1977. Vaejovidae : Francke, *J. Arachnol.*, 4 : 125.
 1980. Vaejovidae : Vachon, *Bull. Mus. natn. Hist. nat., Paris, 4^e ser., 2 sect. A, (1)* : 143.

Remarks : The correct spellings are Vaejovidae, Vaejovinae, and *Vaejovis* for the family, subfamily and genus respectively. Because the type genus for the family was erected by C. L. Koch (1836) when his description of *Vaejovis mexicanus* Koch was published. The generic name was subsequently used by its author with the same spelling, i.e., *Vaejovis* (Koch 1841, 1843) leaving no doubts about his intentions. However, Thorell (1876) discovered that the original spelling was grammatically incorrect, amending it to "*Vejovis*"; and since then both spellings have been used in the taxonomic literature though the amended spelling appearing more frequently. The first attempt to rectify the situation was by Williams (1971), who concluded correctly that Thorell's emendation was unjustified in the meaning of the code because Koch had used the spelling *Vaejovis* consistently.

Finally, the 17th International Congress of Zoology held in Monaco during September 1972 approved amended versions of Article 23 (a-b) and Article 79 (b) 1972; ICZN. Accordingly an application has to be made to the Commission to suppress an unused senior synonym, and a case that nomenclatorial stability is threatened can be made by showing that the senior name is not known to have been used once during the immediately preceding fifty years. Therefore, Stahnke (1974) had no reason nor right to suppress *Vaejovis* without getting a ruling from the



Family VAEJOVIDAE
Scorpiops (Scorpiops) hardwikei (Gervais) ♀

Commission, and he does not have a case for that because we are not dealing with an unused senior synonym, and because *Vaejovis* has been used several times in the last fifty years. (Francke 1977)

In conclusion, the amended version of Article 32, and Article 33 in the code clearly states that the spelling *Vaejovis* is to be maintained as the correct original spelling. Accordingly, the family, subfamily and genus names are to be spelt Vaejoidea, Vaejovinae and *Vaejovis* respectively.

Characters : Cephalothoracic sternum pentagonal and always wider than long. Coxa (maxillary lobes) of first pair of legs narrowed on anterior margin (Fig. 39b) Pectines weakly developed with fused or poorly segmented lamellae. Carapace generally provided with three pairs of lateral eyes. Movable finger of chelicera forked, superior fang with four teeth on inner margin and sometimes inner margin of inferior fang provided with 4-8 minute teeth. Pedipalp strong robust on manus, carinated on femur, patella and manus. Legs without tibial spur but furnished with a pair of pedal spurs and tarsomere II provided with a paired row of spines on ventral surface. Stigmata for book lungs slit like and elliptical. Metasoma sometimes with strong dorsal carinae, telson globular or elongate, occasionally with an annular ring at the base of aculeus.

Trichobothrial pattern on pedipalp of 'C' type in which femur bears 3 trichobothries as *1e* (exterior), *1d* (dorsal) and *1i* (interior); patella bears very important pattern of trichobothries, vary from 28-47 in number, as *2d* (dorsal), *1i* (interior), 18-25 *e* (exterior) which are again sub-divided into as *5eb* (exterior basal), *2esb* (exterior sub-basal), *2em* (exterior median), 4-9 *est* (exterior sub-terminal), 4-6 *et* (exterior terminal); ventral surface provided with 7-19 *V* (ventral) trichobothries. The group *est* and *V* are very important sub-generic characters; Manus with 16-24 trichobothries as *1Db* (Digital basal), *3Esb* (Exterior sub-basal), *1Eb* (Exterior basal), *1Dt* (Digital terminal), *1Est* (Exterior sub-terminal), *5Et* (Exterior terminal), 4-12 *V* (Ventral); immovable finger possess 8 trichobothries as *1eb* (exterior basal), *1 esb* (exterior

sub-basal), *lest* (exterior sub-terminal), *let* (exterior terminal), *ldb* (digital basal), *ldsb* (digital sub-basal), *ldst* (digital sub-terminal) and *ldt* (digital terminal)

Type-genus : *Vaejovis* Koch (1836)

Distribution : Principally Neartic and Neotropical forms. They range from Southwestern Canada to Northern South America. Numerous species are found in Southwestern United States and Northern Mexico. In the United States the greatest number of species exist in California and Arizona but decreasing eastward and northward. Few species are recorded from as north as Kentucky and Virginia. Relatively few species are known from South America and specially from Peru, Chile, Bolivia, Galapagos and Brazil. Only one sub-family is found in Meridional Europe and Asia Minor. The subfamily Scorpionsinae is found in Afghanistan, Pakistan, India, Bangladesh, Burma and Borneo.

Key to the sub-families of the family Vaejovidae

- | | | |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| 1. | Metasomal segments I-IV furnished with single inferior carinae. | SYNTROPINAE |
| | Metasomal segments I-IV furnished with paired inferior carinae or remnants of such carinae. | . . . 2 |
| 2. | Median claw on pretarsus not well developed; ventral surface of tarsomere I furnished with a row of papilla like pads or setaceous tufts which fork distally in Y-like manner and cover area of median claw. . . . | CARABOCTONINAE |
| | Median claw of pretarsus distinct and well developed | . 3 |

3. Inner edge of movable finger of pedipalp provided with many imbricated oblique rows of denticles, Inner inferior margin of movable finger of chelicera with very large, curved tooth. . IURINAE
 Inner edge movable finger of pedipalp without imbricated rows of denticles. .4
4. Median rows of small denticles of inner edge of movable finger of pedipalp furnished with large interior and exterior lateral granules; Movable finger of chelicera forked, dorsal and ventral fangs subequal in length. . SCORPIOPSINAE*
 Inner edge of movable finger of pedipalp furnished only interior large lateral denticles; Movable finger of chelicera forked but dorsal fang always distinctly shorter than ventral fang. .5
5. Trichobothries on inferior and exterior surface of patella of pedipalp exceed 12 and 30 respectively; Exterior surface of manus bears more than 16 trichobothries. . HADRURINAE
 Trichobothries never exceed 3 on inferior surface and 16 on exterior surface of patella of pedipalp; Exterior surface of manus also do not possess more than 5 trichobothries. VAEJOVINAE

* The only sub-family has so far been reported from India.

Subfamily 3. SCORPIOPSINAE

1905. Scorpiopsinae Kraepelin, *Zool. Jb. (Syst.)*, 22 : 331.
 1917. Scorpiopsinae : Birula, *Fauna Russia, Arachn. Scorp.*, 1(1) : 57.
 1934. Scorpiopsinae : Mello-Leitao, *Ann. Acad. Brasil Sci.*, 6(4) : 193.
 1945. Scorpiopsinae : Stahnke, *Acta arachn., Tokyo*, 9(3-4) : 71.
 1974. Scorpiopsinae : Stahnke, *J. Arachnol.*, 1(2) : 107.

Characters : Carapace with a deep median notch on anterior margin. Two or three pairs of lateral eyes. Metasomal segments I-IV with paired inferior carinae. Dorsal fang of movable finger of chelicera with four teeth on inner margin and ventral fang with four to eight minute teeth on inner margin, dorsal and ventral distal teeth almost sub-equal. Patella and manus of pedipalp strongly carinate and exterior median carina on patella and digital carina on manus, strong though sometimes obsolete. Patella of pedipalp provided with 7 to 19 ventral (V) trichobothries on exterior margin of ventral surface. Legs provided with a pair of pedal spur and tarsomere II furnished with a paired row of stout spines on ventral side. Pectines simple, weakly developed, lamellae distinct or fused, fulcra absent or distinct, pectinal teeth 5 to 11. Stigmata for book lungs elliptical.

Type-genus : *Scorpiops* Peters.

Distribution : ASIA : AFGHANISTAN, INDIA (Himalayan ranges from Punjab to Assam and in Deccan), PAKISTAN, BANGLADESH, BURMA and BORNEO.

Remarks : So far only two genera have been recorded as *Scorpiops* Peters and *Parascorpiops* Bank, these two genera have been distinguished on the number of lateral eyes. Only the genus *Scorpiops* has been recorded from India.

Key to the genera of the subfamily Scorpiopsinae

1. Three pairs of lateral eyes**Scorpiops**
 Two pairs of lateral eyes **Parascorpiops**

Genus 14. *Scorpiops* Peters

1861. *Scorpiops* Peters, *Mon. Akad. Berl.* : 510.
 1900. *Scorpiops* : Pocock, *Fauna Brit. India, Arachn.*, : 64.
 1973. *Scorpiops* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 3 ser.,
Zool. 104 (140) : 857.
 1974. *Scorpiops* : Stahnke, *J. Arachnol.*, 1(2) : 107.
 1978. *Scorpiops* : Tikader & Bastawade, *J. Bombay nat. Hist. Soc.*,
 74(1) : 140.
 1977. *Scorpiops* : Francke, *J. Arachnol.*, 4 : 125.
 1980. *Scorpiops* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 4^e Ser.,
 2, sect. A, (1) : 143.

Characters: Carapace with deep median notch on anterior margin and provided with three pairs of lateral eyes. Patella of pedipalp furnished with 7-19 ventral trichobothries along inferior exterior margin. Dorsal carinae of metasomal segments generally ending into two sub-denticulate spine. Pectines simple, weakly developed and with 5-11 teeth.

Type-species: *Scorpiops hardwickei* (Gervais)

Distribution: INDIA: Himalayan ranges from Panjab to Assam and in Deccan; PAKISTAN; BANGLADESH; Upper and lower BURMA.

Remarks: This genus has recently been studied by Vachon (1980) and he has divided this genus into four sub-genera namely *Alloscorpiops*, *Scorpiops*, *Neoscorpiops* and *Euscorpiops*. Among these except *Alloscorpiops*, remaining three sub-genera have been recorded from India.

Key to the subgenus of the genus Scorpiops

1. Manus of pedipalp provided with 10 to 12
 trichobothries on ventral surface *Alloscorpiops*
 Manus of pedipalp provided with only 4
 trichobothries on ventral surface.2

2. External surface of patella provided *eb*, with 22-26 trichobothries; 5 *eb*, 2 *esb*, 2 *em*, 7-10 *est*, and 5-7 *et* (Fig. 1069).*Neoscorpiops* *
- External surface of patella provided with 17-20 trichobothries (Fig. 1134). 3
3. External surface of patella provided with not more than 17 trichobothries : 5 *eb*, 2 *esb*, 2 *em*, 4 *est*, 4 *est*, 4 *et*. (Fig. 1134)*Scorpiops* *
- External surface of patella provided with 18, 19 or 20 trichobothries : 5 *eb*, 2 *esb*, 2 *em*, 4-6 *est*, 5-6 *et*. (Fig. 1268).....*Euscorpiops* *

* So far these subgenera have been reported from India.

Subgenus (i). *Neoscorpiops* Vachon

1980. *Neoscorpiops* Vachon, *Bull. Mus. natn. Hist. nat., Paris, 4^e ser., 2, Sect. A, (1) : 143.*

Characters : Ventral surface of manus provided with four trichobothries. Patella furnished with 22-26 trichobothries on external surface as 5 *eb*, 2 *esb*, 2 *em*, 7-10 *est* and 5-7 *et*. Trichobothria *Eb3* is almost at the level of *Esb* and the trichobothria *Dt* is placed on distal portion. Trichobothries on fixed finger of manus are arranged in gradation and *db* being at the base but slightly distal to *eb*. Pincer relatively thin. Telson without constriction at the base of aculeus.

Type-species : *Scorpiops satarensis* Pocock.

Key to the species of the subgenus Neoscorpiops

1. Patella furnished with 9-10 *est* trichobothries and 4 trichobothries are placed on dorsal portion of exterior median carina; 15 to 18 ventral (*V*) trichobothries.*deccanensis*

- Patella furnished with 7-9 *est* trichobothries and 3 trichobothries are placed on dorsal portion of exterior median carina; 12-15 ventral (*V*) trichobothries.2
2. Patella furnished with 13-14 trichobothries on ventral side; Trichobothries *Dt* is placed close to *Db* or *Eb3*.*satarensis*
 Patella furnished with 15 trichobothries on ventral side; Trichobothries *Dt* is placed much distally from *Db* or *Eb3*.....*tenuicauda*

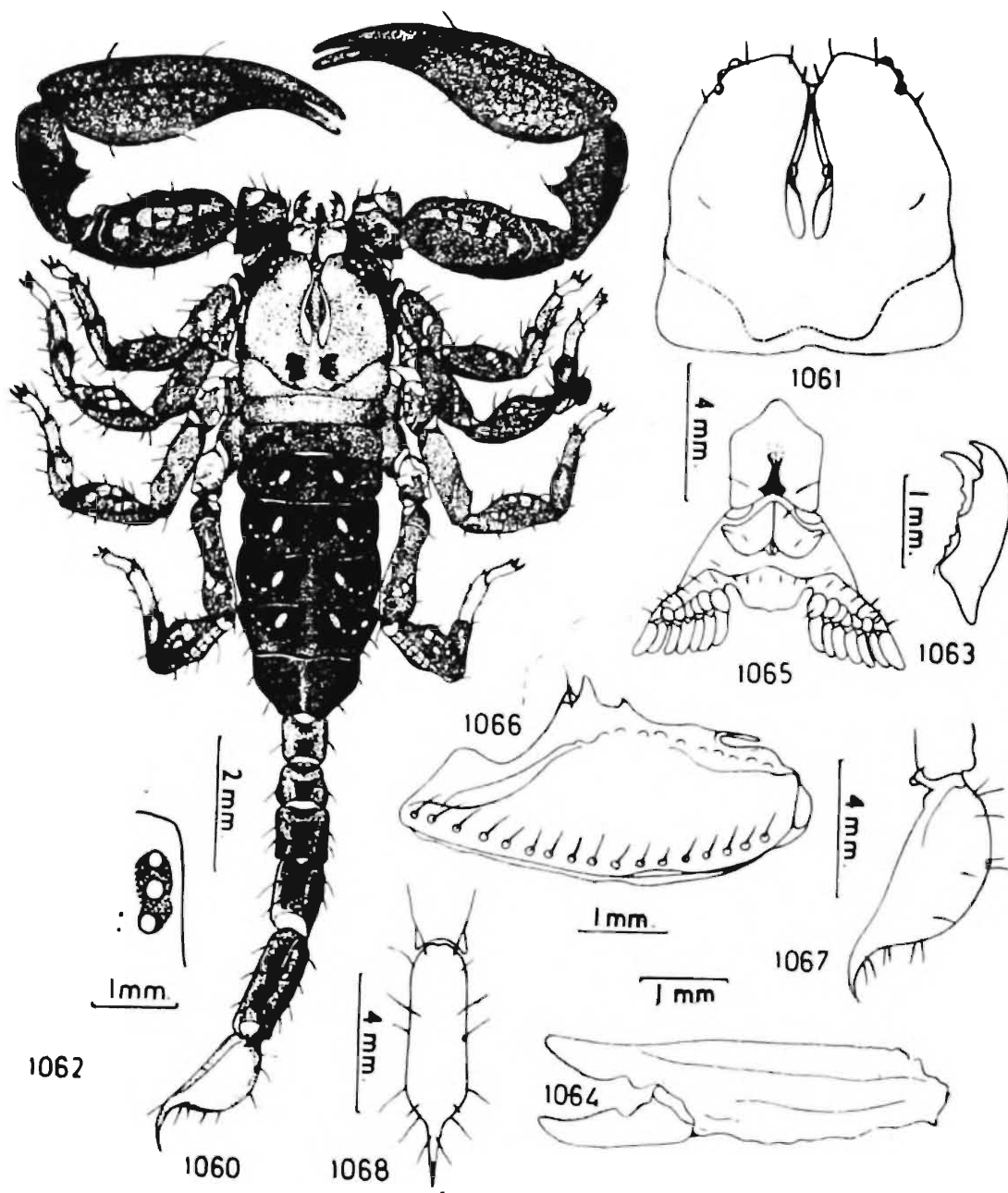
55. Scorpiops (Neoscorpiops) deccanensis Tikader & Bastawade
 (Figs. 1060-1074)

1978. *Scorpiops deccanensis* Tikader & Bastawade, *J. Bombay nat., Hist. Soc.*, 74(1) : 140.
1980. *Scorpiop, (Neoscorpiops) deccanensis* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 4^e ser, 2, sect. A, (1) : 143.

General : Male large with big elongated chela and the patella of pedipalp bearing sixteen to seventeen trichobothries on ventral side as in text-fig. 1066. General coloration of entire scorpion dark-brown to black but the carapace and first two tergites variegated with yellowish tint. Lateral ocular region dark. Pedipalp uniform brown but carinae and fingers dark. Tips of the legs pale. Caudal region dark; telson yellow and the aculeus brown. Ventral side pale yellowish brown to dark as in text-fig. 1060.

Measurements : Total length 55.00 mm. Carapace 8.00 mm. long; Mesosoma 22.50 mm. long; Metasoma 24.50 mm. long.

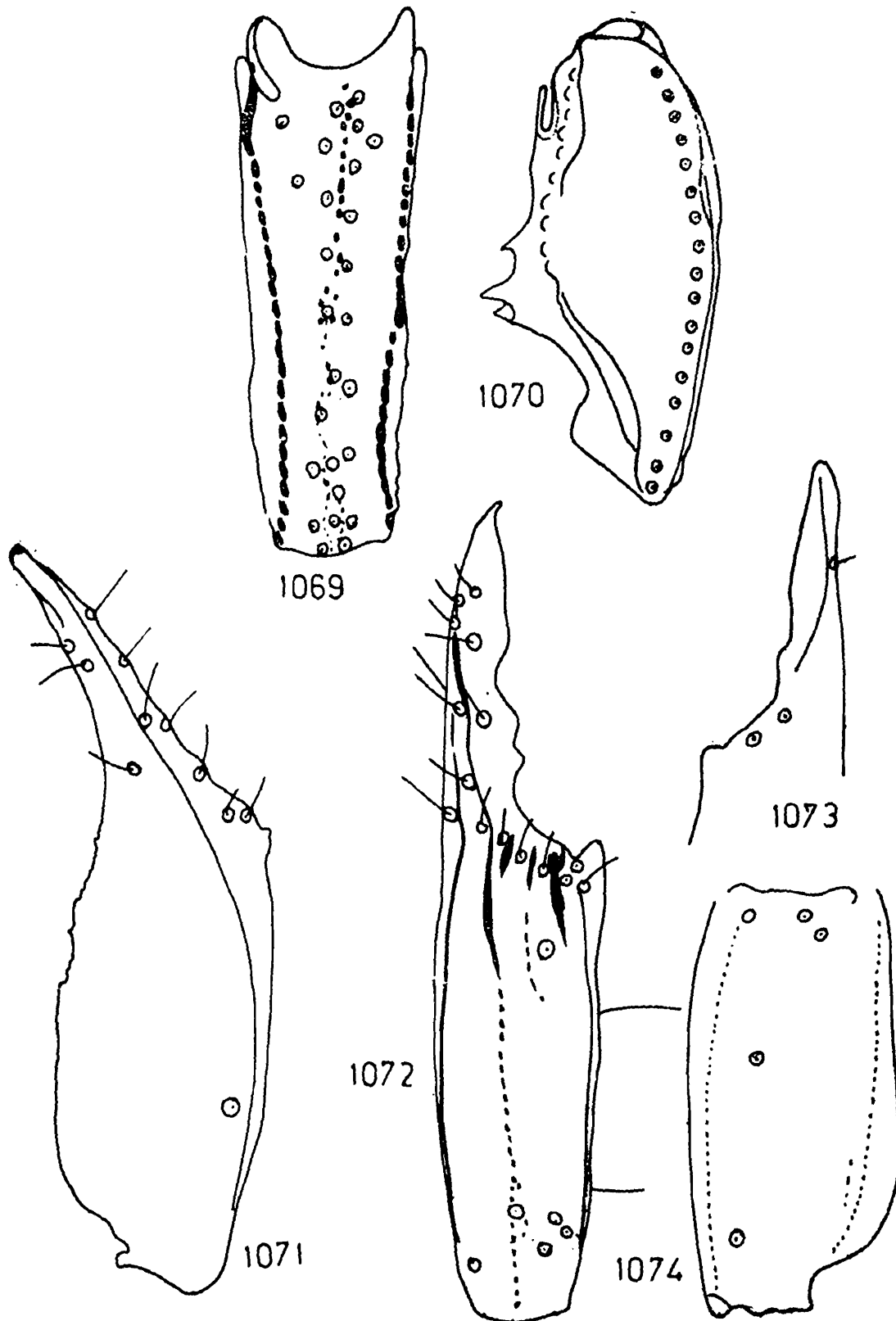
Carapace : Entire surface smooth, without carinae but lateral ocular tubercles slightly raised. Median ocular tubercles smooth armed with a pair of short setae on posterior side of median eyes and provided with two yellowish bands, which extend upto the notch on anterior margin. Anterior margin armed with six



FIGS. 1060-1068. *Scorpiops (Neoscorpions) deccanensis* Tikader & Bastawade

- 1060. Dorsal view of male.
- 1061. Carapace, dorsal view.
- 1062. Lateral eyes, lateral view.
- 1063. Movable finger of chelicera, inner view.
- 1064. Manus and fingers, exterior view.
- 1065. Cephalothoracic sternum, genital operculum and pectines, ventral view.
- 1066. Patella of pedipalp, ventral view.
- 1067. Telson, lateral view.
- 1068. Telson and distal portion of segment V, ventral view.

setae. Three contiguous lateral eyes, posterior eyes small as in text-fig. 1062. Lateral margins slightly crenulated on anterior part and armed with single seta. Posterior margin smooth and nearly straight. Median eyes situated anteriorly in the ratio 1 : 2 as in text-fig. 1061. Chelicera with dorsal surface of basal segment smooth with black reticulations and more dark on anterior end. Ventral side pale yellow, smooth and covered with thin short silky hairs. Fingers more dark and brownish at the tips. Immobile finger much shorter than movable finger and armed with a double and a single teeth. Ventral arm provided with six small, triangular, sharp teeth, grouped in 3, 2, 1 as in text-fig. 1063. Femur of pedipalp slightly longer than carapace, dorso-ventrally flat, intercarinal space granular, inner surface with five large tubercles on crenular carina. Patella shorter than femur but longer than carapace with dorsal posterior carinae smooth and anterior carina granular; carinae on exterior or outer surface smooth, inner surface armed with two strong tubercles. ventral surface slightly crenulate on inner side than on outer side and outer carina provided with a row of sixteen to seventeen setal pores and from each pore a long thin seta arises as in text-fig. 1066. Hand of pedipalp large, elongated and longer than patella or femur. Fingers short, nearly half the length of hand. Dentition on fingers double dentate, scalloped, and scallops near the base and deep. Nine teeth on fixed finger and eight teeth on movable finger as in text-fig. 1064. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1069-1074. Legs brownish, carinae on femur and patella crenulated on inner side and carinae on tibia crenulated on outer side. A row of five stout sharp spinules on ventral side of tarsomere II. Spine formula on legs I-V : : $\frac{3}{4}$, $\frac{4}{4}$, $\frac{4}{5}$, $\frac{4}{5}$. Pectines well developed and of medium size, twice as long as wide. Middle lamellae separated into 6 sub-circular digits as in text-fig. 1065. Triangular fulcra well distinguished between the adjacent teeth. Teeth long and 7/7 in number. Basal piece simple. Lamellae and basal piece sparsely clothed with microscopic red setae. Genital operculum completely divided and a pair of conspicuous genital papillae protruding from the posterior edge of sclerites as in text-fig. 1065.



FIGS. 1069-1074. *Scorpiops (Neoscorpiops) deccanensis* Tikader & Bastawade
 1069. Patella, exterior view. 1070. Patella, ventral view. 1071. Manus and
 immovable finger, dorsal view. 1072. Manus and immovable finger, exterior
 view. 1073. Immobile finger, inner view. 1074. Manus, ventral view.

Mesosoma : All tergites smooth with a pair of yellow elliptical spots on middle portion except on tergite VII as in text-fig. 1060. Single median carina smooth and poorly developed; no lateral carina developed. Tergite VII with a pair of smooth lateral carinae. Sternites I-IV smooth, pale but dark on lateral and posterior margins and armed with black setae. Stigmata of book lungs slit-like. Sternite V more black than rest of the sternites, smooth and without carina.

Metasoma : Cauda three times as long as carapace. Basal segment as wide as long. Segments I-IV provided with dorsal carinae slightly serrated but more spiniform on segment IV. Dorsolateral carinae smooth and visible upto half of the anterior portion of segment IV. Lateral carinae smooth. Inferior laterals and inferior carinae weakly crenulated on I, noticeably serrated on II and III than on segment IV. Segment V as long as width of under hand, dorsal carinae serrated, lateral carinae weakly crenulated posteriorly, inferior lateral and single inferior median carinae more serrated. Anal rim of this segment provided with serrated tubercles. Intercarinal space provided with fine granules. Telson smooth and without annular ring at the base of aculeus, vesicle conspicuous yellow in colour and as long as caudal segment V. Setation sparse and a pair of setae on aculeus as in text-figs. 1067 & 1068. Aculeus less curved and almost half of the length of telson.

Distribution : INDIA : Sinhagad (*Type-locality*), Karla, Dist. Poona, Maharashtra.

Remarks : We have studied type specimens as well as many male and female specimens collected from type locality.

56. *Scorpiops* (*Neoscorpiops*) *satarensis* (Pocock)

(Figs. 1075-1102)

1900. *Scorpiops montanus satarensis* Pocock, *Fauna Brit. India, Arachn.*, : 71.
1980. *Scorpiops* (*Neoscorpiops*) *satarensis* : Vachon, *Bull. Mus. natn, Hist. nat., Paris, 4^e Ser. 2, Sect. A, (1)* : 143.

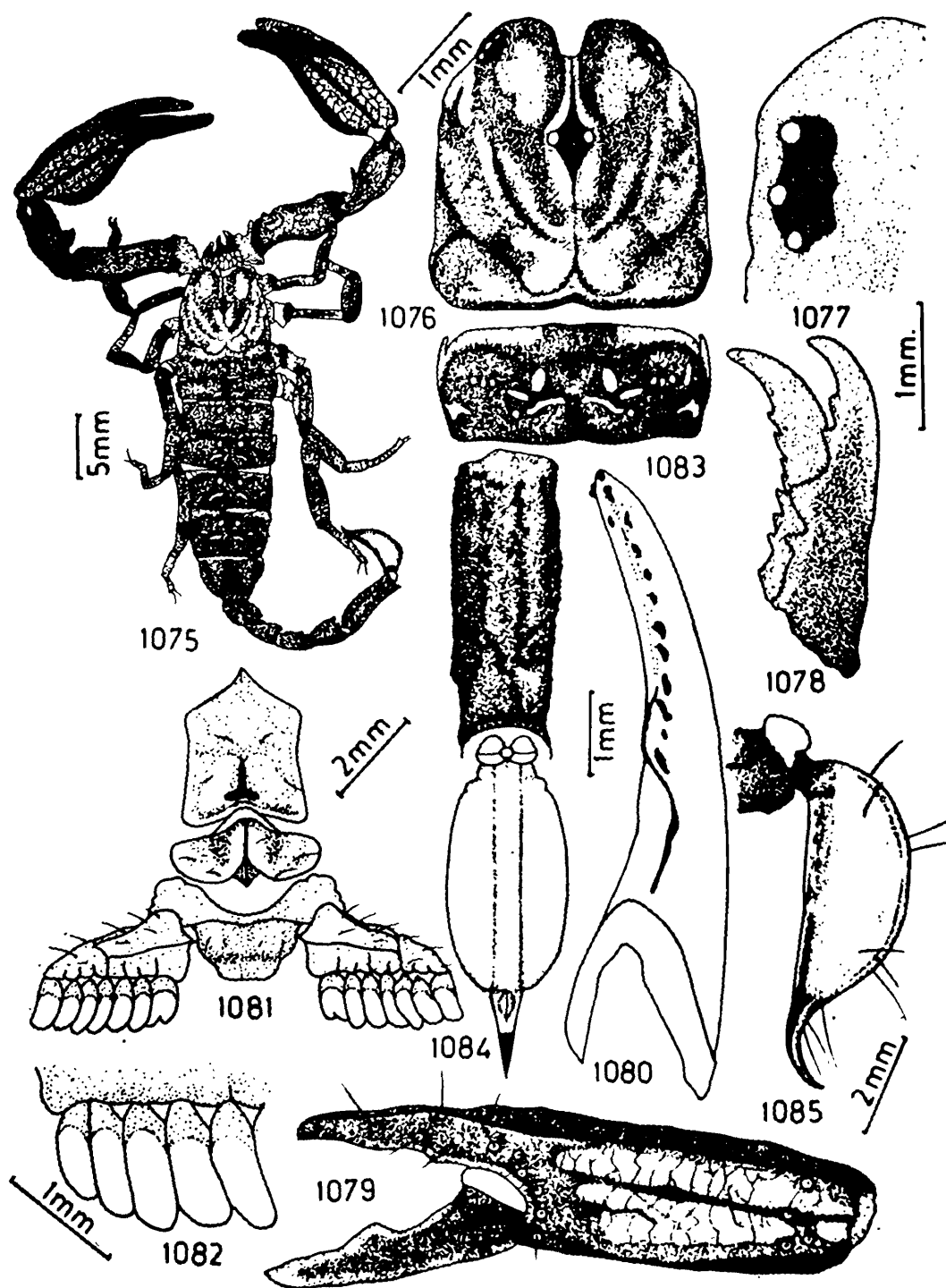
General : Bigger scorpion with yellowish brown body colour, chelicera pale yellowish but brownish on fingers. Pedipalp dark brown but male darker on carinae, finger blackish. Ocular tubercles black. Mesosomal tergites brownish with a pair of yellow spot in the middle. Sternites yellowish except last sternite brownish. Metasoma slightly dark brown but telson yellow, aculeus darker. Legs pale yellow but still paler on tips. Claws dark brown. Pectines well developed, pale yellow. Entire body surface almost smooth or weakly granular. Carinae on pedipalp granular and intercarinal space poorly and irregularly granular as in text-figs. 1075 & 1080. Last mesosomal sternite smooth and with four very poorly developed, smooth carinae in male but carinae smooth and obsolete in female.

Measurements : Male total length 51.00 mm. Carapace 8.25 mm. long; Mesosoma 21.25 mm. long; Metasoma 21.50 mm. long. Female total length 51.75 mm. Carapace 8.75 mm. long; Mesosoma 23.00 mm. long; Metasoma 20.00 mm. long.

Carapace : Entire surface finely granular. Central median furrow more prominent just posterior to median eyes and continues anteriorly surrounding median eyes upto median notch on

 FIGS. 1075-1085. *Scorpiops* (*Neoscorpiops*) *satarensis* (Pocock)

1075. Dorsal view of male.
 1076. Carapace, dorsal view.
 1077. Lateral eyes, lateral view.
 1078. Movable finger of chelicera, inner view.
 1079. Manus and fingers, exterior view.
 1080. Movable finger of pedipalp, dorsal view.

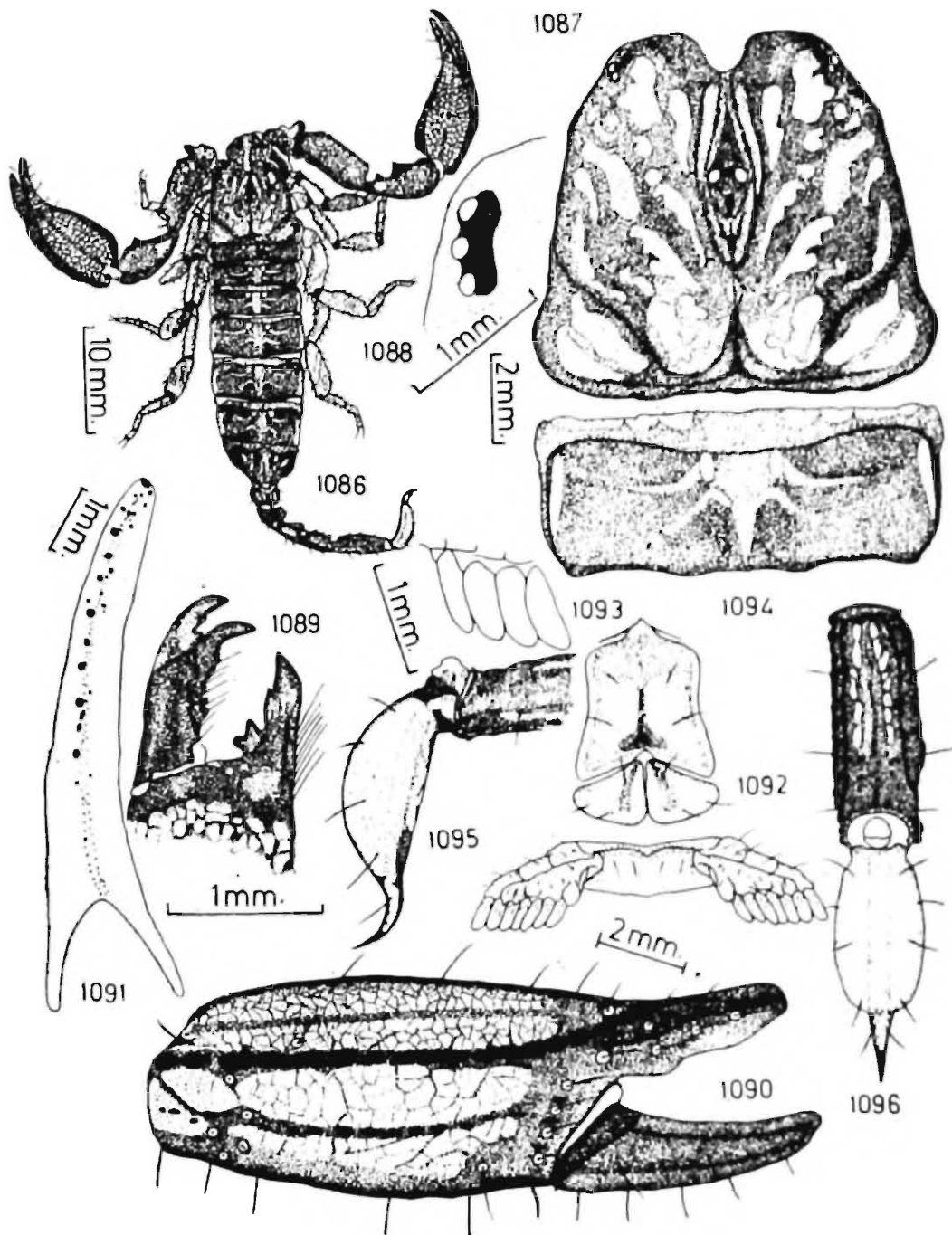


- 1081. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1082. Pectinal teeth, ventral view.
- 1083. Tergite, dorsal view.
- 1084. Telson and segment V, ventral view.
- 1085. Telson and distal portion of segment V, lateral view.

anterior margin and posteriorly bifurcating just before the posterior margin. Lateral depressions prominent on lateral portions. Ocular tubercles smooth, black and lateral tubercles provided with three contiguous lateral eyes as in text-figs. 1077 & 1088. A pair of median eyes situated anteriorly in the ratio 1 : 2 as in text-figs. 1076 & 1087. Anterior margin very smooth with a deep median notch and provided with few reddish setae. Lateral margins very finely granular but smooth on posterior portion. Posterior margin smooth and slightly invaginated in the middle portion. Chelicera yellowish on basal segment slightly brownish on anterior portion. Entire surface smooth and ventral surface thickly covered with short, silky hairs, extending on ventral surface of fingers. Fingers brownish but more darker on dentition. Dentition as characterised in family and genus but ventral fang provided with seven to nine very minute teeth on inner margin as in text-figs. 1078 & 1089. Dorsal distal tooth slightly shorter than ventral distal tooth. Pedipalp dorso-ventrally flat, more brownish and carinated. Femur slightly longer than carapace in male but shorter in female. All carinae granular but posterior carinae less granular than anterior. Posterior ventral carina granular and developed only on 1/3 proximal portion. Anterior or outer surface provided with a crenulated carina with three to four strong denticular tubercles. Intercarinal space finely granular at the base. Patella shorter than femur or carapace. Carinae granular but inner carinae more distinctly granular than posterior or outer carinae. Anterior or inner surface provided with a pair of strong and few very small denticular tubercles. Outer surface with well developed, granular carina. Intercarinal space finely and less coarsely

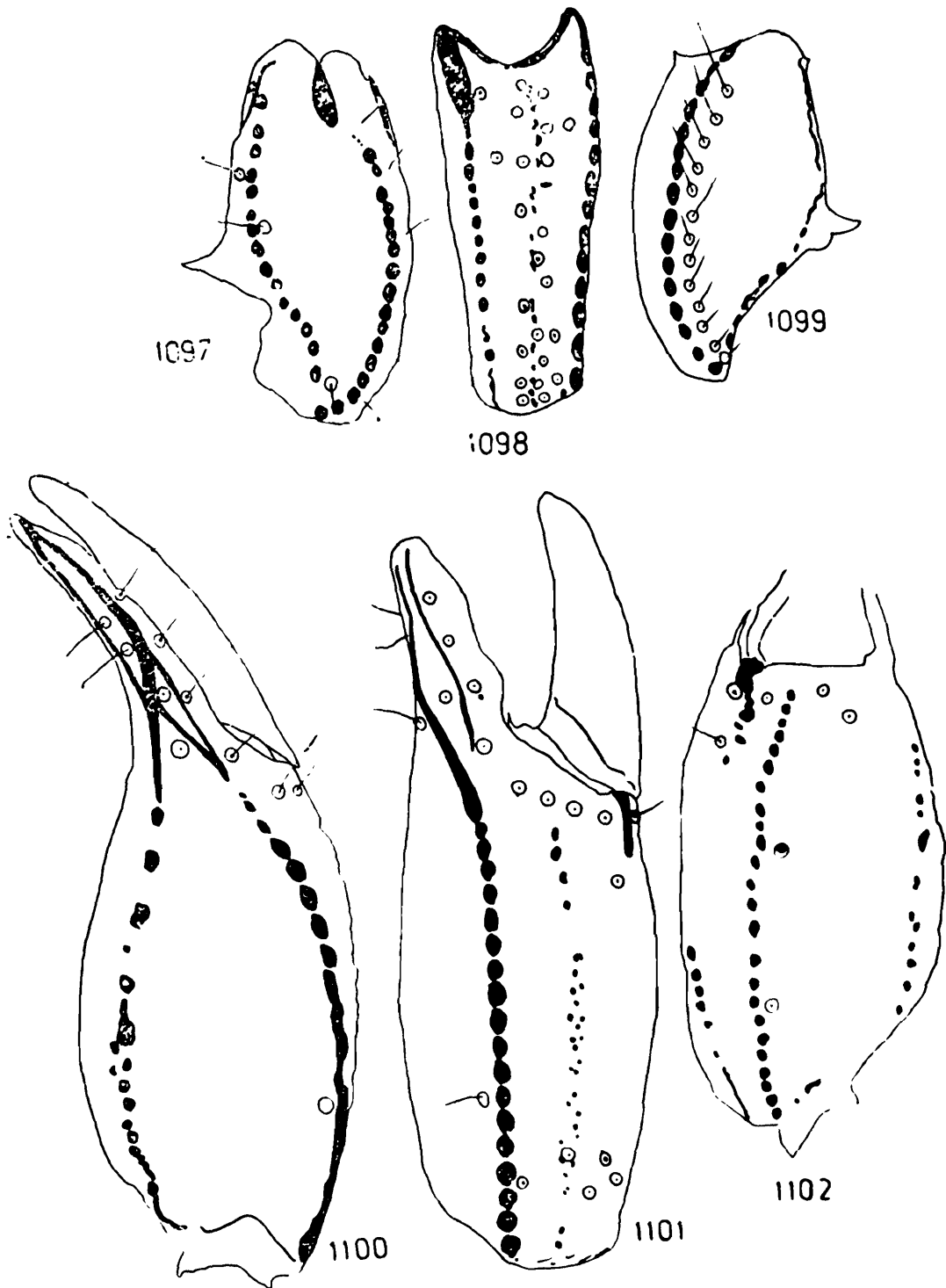
FIGS. 1086-1096. *Scorpiops (Neoscorpiops) satarensis* (Pocock)

- 1086. Dorsal view of female.
- 1087. Carapace, dorsal view.
- 1088. Lateral eyes, lateral view.
- 1089. Movable and immovable finger of chelicera, dorsal view.
- 1090. Manus and finger, exterior view.
- 1091. Movable finger of pedipalp, dorsal view,



- 1092. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1093. Pectinal teeth, ventral view.
- 1094. Tergite, dorsal view.
- 1095. Telson and distal portion of segment V, lateral view.
- 1096. Telson and segment V, Ventral view.

granular than preceding segment. Manus or hand elongated and length of under hand more than the length of carapace or femur. All carinae granular. Exterior marginal carina granular but granules mixed on distal portion. Secondary accessory short, almost smooth, more elevated. External secondary sparsely granular and granules almost of same size to surrounding granules but traceable throughout. Digital granular on half proximal portion only, distal portion smooth, continued on immovable finger as in text-fig. 1090. Sub-digital not developed but fine granules exceptionally crowded in this area. Inner secondary well distinguished, sparsely granular in female. Sub-inner secondary not developed. Interior margin granular but granules broad and smooth. Dorsal and ventral intercarinal space very finely granular and granules almost of same size to surrounding granules but ridges granular and these ridges less granular in male. Exterior and interior intercarinal space covered with bigger granules and the granulation irregular. Movable finger as long as carapace in male but shorter in female. Carinated and weakly granular. Immovable finger shorter than patella, carinated but carinae smooth. Dentition double dentate, scalloped but scallops more prominent in male and very weak in female, but outer row consists of eleven to twelve smooth, broad scars as in text-figs. 1080 & 1091. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1097-1102. All segments very rarely clothed with long, stout reddish setae. Legs yellowish but darker on outer and inner surface of femur. Femur very finely granular and inner surface finely granular with granular carina. Patella almost smooth with smooth on inner surface of I & II legs but weakly crenulated carina of III & IV legs. Outer carinae smooth. Tibia smooth with smooth outer carinae. Tarsomere I smooth but posterior surface provided with anterior and posterior rows of small spinules. Tarsomere II smooth, laterally compressed and armed below with a row of small spines and spine formula on legs I-IV : ♂ $\frac{4}{4}, \frac{5}{5}, \frac{5}{5}, \frac{5}{5}$ ♀ $\frac{3}{3}, \frac{4}{4}, \frac{4}{4}, \frac{5}{5}$. A pair of claws brown, curved and pointed. All segments except claws covered very poorly and sparsely with long, reddish brown setae. Genital operculum always wider than long and a pair of operculi united in the middle portion in female but in male, operculi united only on anterior portion and from posterior portion a pair of con-



Figs. 1097-1102. *Scorpiops (Neoscorpiops) satarensis* (Pocock)

- 1097. Patella, dorsal view.
- 1098. Patella, exterior view.
- 1099. Patella, ventral view.
- 1100. Manus and immovable finger, dorsal view.
- 1101. Manus and immovable finger, exterior view.
- 1102. Manus, ventral view.

spicuous male genital papillae protrude from under. Both the operculi clothed with three to four reddish brown long setae. Pectines comparatively less developed in female and twice longer than wide. Middle lamellae subdivided into four small digits. Fulcra not developed but adjacent area between two teeth filled up with connective tissue as in text-figs. 1082 & 1093. Lamellae very poorly and sparsely covered with long reddish brown setae. Pectinal teeth long and well developed in male than in female and 7/7 in number in both male and female. Basal piece slightly well sclerotized in female, almost squarish, anterior margin straight but provided with a very weak median depression or notch and a submarginal row of four reddish brown setae. Cephalothoracic sternum pentagonal, almost as long as wide and surface provided with a deep posterior depression in the middle portion as in text-figs. 1081 & 1092.

Mesosoma : All tergites almost smooth in female but poorly and finely granular in male. Surface finely punctured in both male and female. Tergites I-V without carinae but median portion poorly elevated, smooth, without a trace of median carina as in text-figs. 1083 & 1094. Tergite VI without carina but median elevated portion with a weak trace of median carina. Posterior margin smooth but lateral margins finely crenulated in male. Pretergal portion smooth with smooth posterior margin. Tergite VII more granular than preceding segment but comparatively more granular in male than in female, provided with a pair of poorly developed granular lateral carinae. Posterior margin smooth and lateral margins crenulated in male, smooth in female. Pretergal portion smooth with smooth straight posterior margin in female, while posterior margin 'w' shaped in male. Tergites III-VI with a pair of elliptical yellow median spots. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Sternite I without presternal portion. Sternites II-IV with very weakly separated presternal portion. Posterior and lateral margin of each sternite smooth. Sternite V almost smooth but provided with a pair of smooth lateral carinae developed only on 1/3 posterior portion. Presternal portion weakly distinguished. Posterior and lateral margins smooth.

Metasoma : Cauda two and half times as long as carapace but slightly shorter in female. Basal segment always wider than long. Segment II as long as wide and segment IV as wide as deep. Segment I provided with a very weak dorsal carinae, dorsolateral and lateral carinae granular. Inferior lateral and inferior carinae smooth. Segment II provided with granular dorsal carinae ending posteriorly in a short denticulate tubercle. Dorsolateral carinae almost smooth on anterior portion while poorly granular on posterior portion. Lateral carinae very poorly distinct in granular form and granules very small, sparsely located. Inferior lateral and inferior carinae smooth. Segments III & IV provided with dorsal carinae well developed, crenulated to serrated, elevated posteriorly and ending into strong denticulate tubercles; dorsolateral carinae granular. Inferior lateral and inferior carinae weakly granular and crenulated. Intercarinal space not coarsely granular. Anterior peduncle of each segment finely granular and posterior margin smooth. Segment V comparatively longer in male than in female, dorso-ventrally compressed, provided with dorsal carinae, well developed and smooth in female. Dorsolateral carinae developed on $2/3$ anterior portion almost smooth in female but granular in male. Inferior lateral carinae granular running out on lateral portion on posterior portion. Single inferior median carina finely serrated. Anal rim of this segment granular and crenulated. Dorsal surface flat and smooth. Anterior peduncle smooth. Lateral and ventral surface more granular in male. Telson longer than last caudal segment but always shorter than patella. Vesicle almost as long as wide and deep as last caudal segment. Entire surface smooth and the lateral and ventral bands brownish. Setation on vesicle as in text-figs. 1084, 1085, 1095 & 1096. Aculeus short, sharp not much curved and almost $1/3$ of vesicular length, dark reddish brown on distal portion provided with a pair of strong basal setae as in text-figs. 1084, 1085 & 1095, 1096.

Distribution : INDIA : Mahabaleshwar (*Type-locality*), Dist. Satara, Maharashtra.

Remarks : We have studied the type material received from B.M. (N.H.), London, Regd. No. Nil. The present illustrations

and description are based on the type specimens. We have collected more specimens from type-locality and these specimens are deposited in Western Regional Station, ZSI, Poona.

57. *Scorpiops* (*Neoscorpiops*) *tenuicauda* (Pocock)

(Figs. 1103-1128)

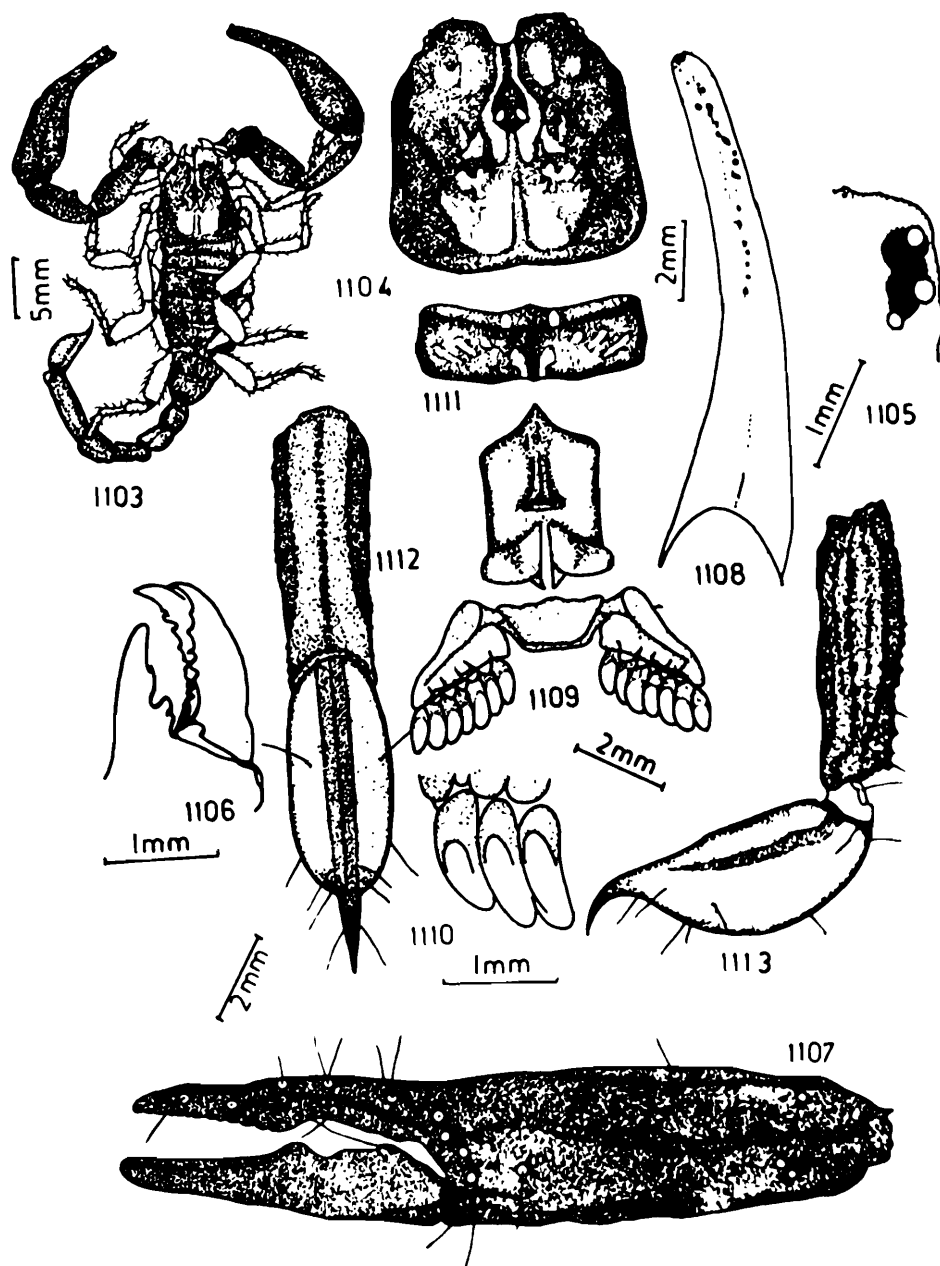
1894. *Scorpiops montanus tenuicauda* Pocock, *Ann. Mag. nat. Hist.*, **16** (6) : 77.
1899. *Scorpiops montanus tenuicauda* : Kraepelin, *Tierr. Scorp. etc.*, : 181.
1900. *Scorpiops montanus tenuicauda* : Pocock, *Fauna Brit. India, Arachn.*, : 72.
1980. *Scorpiops* (*Neoscorpiops*) *tenuicauda* : Vachon, *Bull. Mus. natn. Hist. nat., Paris, 4^e ser.*, **2**, Sect. A, (1) : 143.

General: Medium to bigger in body size. Body surface weakly granular. Male smaller, less granular and paler in colour. Body colour brownish black but more darker on metasoma and pedipalps. Legs paler than body colour but nearly yellowish in male. Telson perfectly yellow but darker on aculeus as in text-figs. 1103 & 1114. Chelicera pale. Ventral surface pale yellow but last sternite darker, with smooth lateral carinae. Pectines not well developed, middle lamellae weakly separated. Dorsal carinae of caudal segments II, III and IV elevated posteriorly and ending into a broad, pointed denticle.

Measurements: Male total length 48.00 mm. Carapace 7.50 mm. long; Mesosoma 18.00 mm. long; Metasoma 22.50 mm. long. Female total length 50.00 mm. Carapace 8.25 mm. long; Mesosoma 20.50 mm. long; Metasoma 21.25 mm. long.

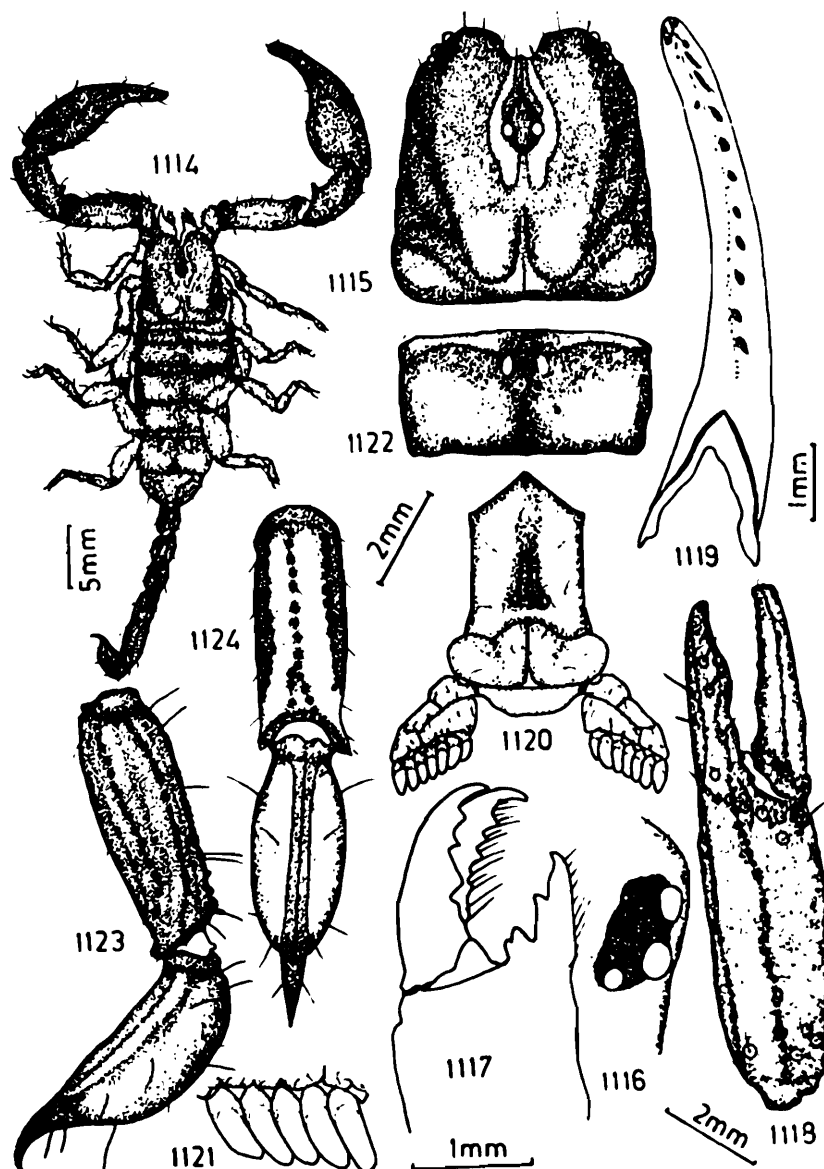
FIGS. 1103-1113. *Scorpiops* (*Neoscorpiops*) *tenuicauda* (Pocock)

1103. Dorsal view of male.
 1104. Carapace, dorsal view.
 1105. Lateral eyes, lateral view.



- 1106. Movable and immovable fingers of chelicera, dorsal view.
- 1107. Manus and fingers, exterior view.
- 1108. Movable finger of pedipalp, dorsal view.
- 1109. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1110. Pectinal teeth, ventral view.
- 1111. Tergite, dorsal view.
- 1112. Telson and segment V, ventral view.
- 1113. Telson and segment V, lateral view.

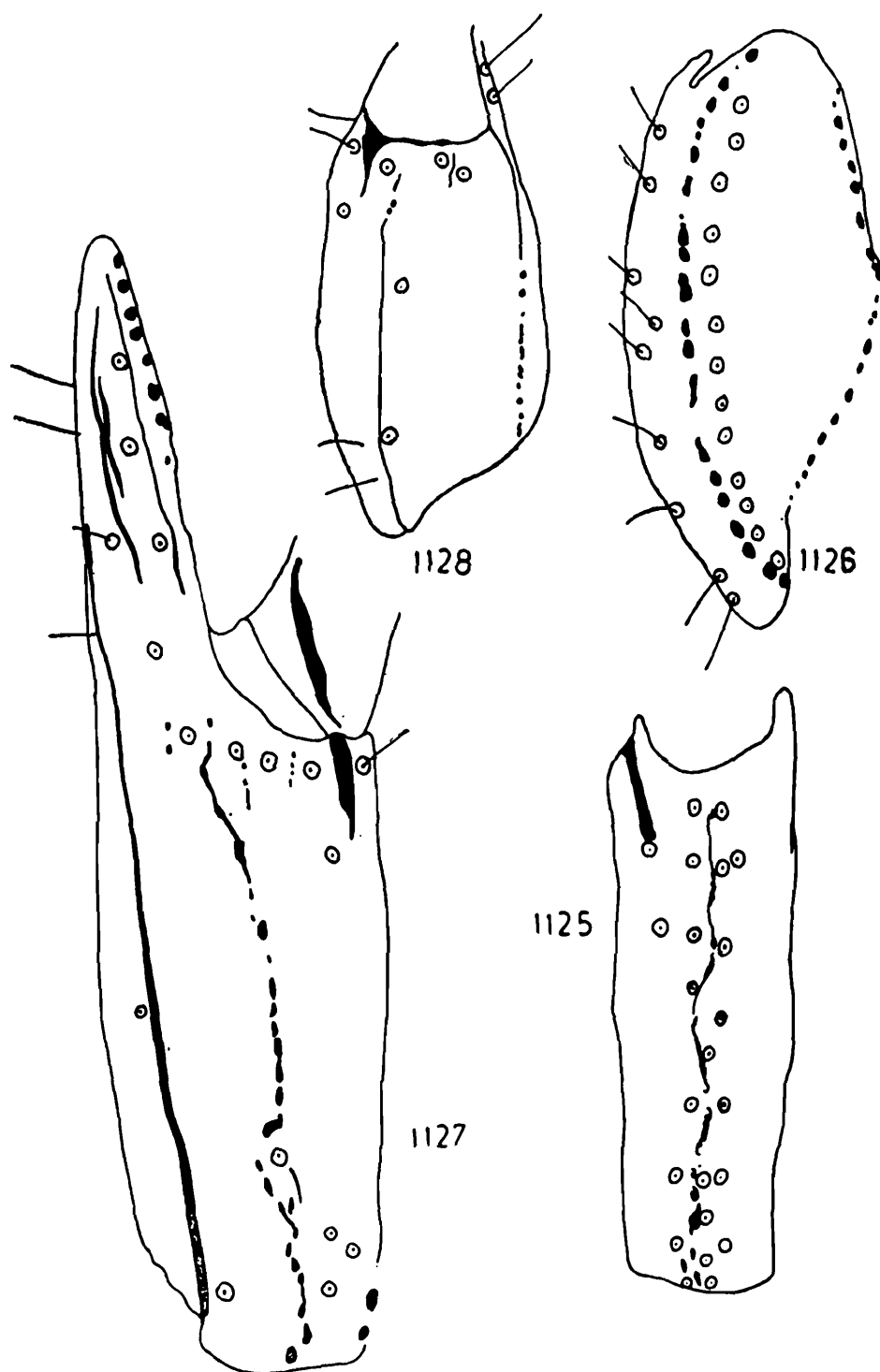
Carapace : Surface finely and very irregularly granular, some areas quite smooth. The granulation on anterior portion of interocular area bigger in size. Central median depression not much prominent and continued anteriorly around the median eyes upto the deep median notch, smooth on anterior margin. Central median depression bifurcated on posterior portion and continued laterally into latero-posterior depression upto lateral margins. Lateral margins almost smooth or very finely and weakly crenulated and supported with a granular submarginal ridge. Posterior margin smooth and slightly invaginated in middle portion. Ocular tubercles black and the lateral tubercles granular provided with three contiguous lateral eyes, posterior eyes small in size as in text-figs. 1105 & 1116. Median ocular tubercles smooth in middle portion and finely granular on anterior and posterior portion, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.25-2.50 as in text-figs. 1104 & 1115. Chelicera with basal segment smooth, black reticulate and dark blackish on anterior portion. Ventral surface thickly covered with short silky hairs, extending on ventral surface of fingers. Fingers darker but reddish brown of dentition. Dentition as characterised in family and genus and inner margin of ventral fang of movable finger provided with five teeth in male as in text-fig. 1106 and six teeth in female as in text-fig. 1117, but all times in single group and arranged in series. Dorsal distal tooth slightly shorter than ventral distal tooth. Pedipalps dark brown to blackish, more darker on carinae, dorso-ventrally flat. Femur longer than carapace in male but shorter in female. All carinae granular except rudimentary, finely granular exterior ventral carina. Inner or anterior surface provided with a pair of very strong pointed tubercles and a single small tubercle. Intercarinal space finely but comparatively less granular to preceding segment. Hand thicker than preceding segment, more wide in female than in male but longer in male than in female. All carinae granular. Exterior marginal almost evenly granular. Secondary accessory short at the base of movable finger, weakly granular. Exterior secondary granular but granules bigger and thickly arranged throughout. Digital granular upto the base of movable finger and smooth on finger. Sub-digital granular and



FIGS. 1114-1124. *Scorpions (Neoscorpions) tenuicauda* (Pocock)

- 1114. Dorsal view of female.
- 1115. Carapace, dorsal view.
- 1116. Lateral eyes, lateral view.
- 1117. Movable and immovable finger, dorsal view.
- 1118. Manus and fingers of pedipalp, exterior view.
- 1119. Movable finger of pedipalp, dorsal view.
- 1120. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1121. Pectinal teeth, ventral view.
- 1122. Tergite, dorsal view.
- 1123. Telson and segment V, lateral view.
- 1124. Telson and segment V, ventral view.

fine granules thickly congregated. Inner secondary granular, granules bigger and slightly sparsely arranged upto the base of immovable finger but smooth on finger and becomes more prominent on tip as in text-figs. 1107 & 1118. Sub-inner secondary sparsely granular, granules bigger in size and running slightly upwards on distal part. Interior marginal evenly granular but granules placed sparsely. Dorsal intercarinal space covered with fine granules in reticulate form. Inner and exterior intercarinal space covered with medium size granules. Movable finger shorter than patella in male but longer in female. Immobile finger always shorter than movable finger carinated but carinae smooth. Dentition on fingers double dentate, scalloped but scallops more stronger in male as in text-fig. 1107 and outer row provided with 10 to 12 prominent scars in female as in text-fig. 1119. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1125-1128. Legs yellowish brown and pale yellow on tips but slightly darker on joints. Femur finely granular in female and granular only on anterior and posterior margins in male. Carinae more crenulated in male than in female. Patella flat and more wider than femur, only inner carinae developed and almost serrated. Outer carinae smooth. Intercarinal space almost smooth. Tibia carinated but smooth with smooth intercarinal space. Tarsomere I smooth, posterior surface provided with a anterior and posterior row of small spinules and a pair of pedal spur. Tarsomere II smooth and provided below with a row of small delicate spines. Spine formula on legs I-IV in male $\frac{5}{8}, \frac{5}{8}, \frac{6}{8}, \frac{6}{8}$ and in female $\frac{5}{8}, \frac{5}{8}, \frac{4}{8}, \frac{5}{9}$. A pair of claws pointed, sharp, curved and dark brown on distal end. All segments very sparsely covered with long reddish brown setae. Pectines not well developed and 1.75 times longer than wide. Middle lamellae sub-divided into four to five small digits in male where as only two small digits in female. Fulcra not developed between the teeth but filled up with connective tissue as in text-figs. 1110 & 1121. Lamellae covered very sparsely with megascopic reddish setae. Teeth 7/7 in number in both male and female and basal portion of teeth covered with very fine microscopic white setae as in text-figs. 1109 & 1120. Teeth short tubular and more pointed on distal end in female. In male teeth



FIGS. 1125-1128. *Scorpiops (Neoscorpiops) tenuicauda* (Pocock)

1125. Patella, exterior view.

1126. Patella, ventral view.

1127. Manus and immovable finger, exterior view.

1128. Manus, ventral view.

broad, more longer and not tapering on distal end. Basal piece almost squarish but slightly narrowed on posterior side. Anterior margin straight without any notch in middle. Surface covered with a curved row of few setae on posterior portion and a pair of setae on anterior portion. Genital operculum always wider than long. A pair of sclerites well sclerotized, united in the middle in female as in text-fig. 1120 but exposed on posterior portion from under which a pair of conspicuous male genital papillae protrude out as in text-fig. 1109. Operculi sparsely covered with few reddish setae. Cephalothoracic sternum pentagonal and longer than wide, surface provided with a deep depression in posterior middle portion.

Mesosoma : Tergites finely granular but more granular in male. Tergites III-VI with a median smooth carina in male and II-VI with a median smooth carina in female as in text-figs. 1111 & 1122. Each tergite more granular on posterior portion. Posterior margins almost smooth but weakly granular in male. Lateral margins smooth. Pretergal portion smooth with smooth posterior margin. Tergite VII more granular than preceding tergites and provided with two pairs of granular carinae, developed only on posterior portion. Posterior margin smooth but granular above. Lateral margins smooth in female but very finely crenulated in male. Pretergal portion smooth with smooth posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Sternite I without presternal portion. Sternite II-IV with smooth presternal portion and with smooth posterior margin. Posterior and lateral margins of each sternite smooth. Sternite V smooth with only very weakly developed lateral smooth scars of lateral carinae. Posterior and lateral margins smooth. Presternal portion smooth with smooth posterior margin.

Metasoma : Cauda almost three times in male but less than three times as long as carapace in female. Basal segment always wider than long. Segment II as wide as long in male but in female as wide or long as deep. Last or fifth caudal segment slightly shorter than immovable finger of pedipalp. Segment I provided with dorsal, dorsolateral and lateral carinae granular.

Inferior lateral and inferior carinae very weakly granular. Segment II-IV dorsal carinae progressively elevated on posterior portion of each segment and ending into a strong, denticulate tubercles. Dorsolateral carinae granular. Lateral carinae represented by only few granules on posterior margin of segments II-III. Inferior lateral carinae weakly granular. Inferior carinae almost smooth but very weakly crenulated on segment IV. Anterior peduncle of each segment smooth but posterior margin smooth on dorsal surface and granular on lateral and ventral portion. Intercarinal space very weakly and irregularly granular. Segment V with weakly crenulated only in middle portion. Dorsolateral carinae granular and developed only 1/2 to 2/3 anterior portion. Inferior lateral and single inferior median finely crenulated or serrated. Inferior median carina bifurcated posteriorly. Dorsal surface smooth, lateral and ventral surface very weakly and irregularly granular. Anal rim of this segment almost evenly serrated. All carinae on all caudal segments sparsely provided on either sides with long stout, reddish setae. Telson dark, conspicuous yellow with brownish aculeus always longer than last segment but shorter than patella. Vesicle shorter than fifth or last segment but as wide or deep as last segment. Entire surface smooth with lateral and ventral median pale bands. Setation on vesicle as in text-figs. 1112, 1113 & 1123, 1124. Aculeus almost 1/3 of vesicular length, less curved, pointed, sharp and dark brown on distal end.

Distribution : INDIA : Matheran (*Type-locality*), Dist. Raigad (Kolaba), Maharashtra.

Remarks : We have studied and illustrated on the basis of type-specimen received from B.M.(N.H.), London, Regd. No. 1879, 9.17.42-43.

Sub-genus (ii) : Scorpiops Vachon

1980 . *Scorpiops* Vachon, *Bull. Mus. natn. Hist. nat., Paris, 4^e Ser., 2, Sect. A, (1)* : 143.

Characters : Four trichobothries present on ventral surface of manus, 17 trichobothries present on external surface of patella :

5 *eb*; 2 *esb*, 2 *em*, 4 *est* and 4 *et*. Trichobothries *Eb*³ on manus is placed basal of *Dt* but both placed almost in its centre; Trichobothries dorsal i.e. *dt*, *dst*, *dsb*, *db* are arranged in gradation and *db* and *eb* placed in same plane. Ventral surface of patella furnished with 6-18 trichobothries. Aculeus provided with broad depression and not with constriction at the base of vesicle.

Type-species : *Scorpiops hardwickei* (Gervais)

Distribution : INDIA : Himalayan ranges from Jammu Kashmir, Punjab, Himachal Pradesh, Hariyana, Uttar Pradesh, Sikkim, West Bengal, Meghalaya to Assam; BANGLADESH and PAKISTAN.

Key to the species of subgenus Scorpiops

1. Pedipalp not dorsoventrally flat on femur and manus; Manus almost as long as wide; Patella furnished with a pair of small tubercles on proximal portion of inner surface.2
 - Pedipalp dorsoventrally flat on femur and manus; Manus always longer than wide; Patella furnished with a pair of more strong, spiniform tubercles on proximal portion of inner surface.5
2. Digital carinae on manus always smooth; Manus generally as wide as long; Trichobothries on ventral side of patella not more than 7 in number3
 - Digital carinae on manus may be smooth or granular; Manus generally wider than long; Trichobothries on ventral side of patella may upto 8 in number.4

3. Angles between trichobothries *est* 1, 2, 3 on patella and *Esb* 1, 2, 3 on manus are acute and *Esb* 2 on manus placed slightly distal from the base of manus; Median eyes situated anteriorly in the ratio 1 : 1.75; Pectines 2.75 times longer than wide.*hardwickei*

Angles between trichobothries *est* 1, 2, 3 on patella and *Esb* 1, 2, 3 manus are wide and *Esb* 2 on manus placed close to the base of manus; Median eyes situated anteriorly in the ratio 1 : 1.90; Pectines 2 times longer than wide. *insculptus*

4. Mesosomal tergites less coarsely granular; Digital carinae on manus entirely smooth; Trichobothries on ventral surface of patella always 7 in number; Aculeus almost half the vesicular length*affinis*

Mesosomal tergites much coarsely granular; Digital carinae on manus coarsely granular on proximal portion and smooth on distal portion; Trichobothries on ventral surface of patella 8 in number. Aculeus less than half the vesicular length.*crassimanus*

5. Trichobothries *Esb*3 placed distal to *Dt*; Vesicle more than two and a half times as long as aculeus; Pectines about 2 times longer than wide; Ventral surface of patella bears 10-11 trichobothries.*montanus*

Trichobothries *Esb*3 placed proximal to *Dt*; Vesicle less than two and half times as long as aculeus; Pectines generally less than two times longer than wide

(except *S. (s) leptochirus*, Ventral surface of patella bears not more than 8 trichobothries.6

6. Mesosomal tergites coarsely granular and II-VI provided with a granular or smooth but distinct median carina; Aculeus about half the vesicular length; Fulcra poorly distinct. Trichobothries *em1* & *em2* on patella placed on same plane or *em1* placed proximal to *em2*.....7

Mesosomal tergites finely and sparsely granular and tergites II-VI without median carina; Aculeus less than half the vesicular length; Fulcra not developed; Trichobothries *em1* placed distal to *em2*.*rohtangnsis*

7. Pectines about 2.5 times longer than wide and with 7-8 pectinal teeth. Trichobothries *em1* & *em2* on patella placed in same plane; Trichobothries *Esb3* placed much distal to *Esb2*; Mesosomal tergites II-VI provided with one median and two lateral granular carinae.*leptochirus*

Pectines about 1.7 times longer than wide; and with 5-6 pectinal teeth; Trichobothria *em2* on patella placed distal to *em1*; Trichobothries *Esb3* not placed much distal to *Esb2*; Mesosomal tergites II-VI provided with only smooth median carina.*petersei*

58. *Scorpiops (Scorpiops) hardwickei* (Gervais)

(Figs. 1129-1141)

1844. *Scorpio hardwickei* Gervais, *Walck. Inst. Apt.*, 3 : 66.
 1893. *Scorpio hardwickei* : Pocock, *Ann. Mag. nat. Hist.*, 7(6) : 325.
 1899. *Scorpiops solidus* : Kraepelin, *Jb. hamb. wiss. Anst.*, 11 : 188.

1900. *Scorpiops hardwickie* : Pocock, *Fauna Brit. India, Arachn.*, : 66.
1959. *Chaerilus pirpunjabus* : Mani, *Agra Univ. J. Res. (Sci.)*, 8 (1) : 11.
1980. *Scorpiops (Scorpiops) hardwickei* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 4^e ser. 2, sect. A, (1) : 143.

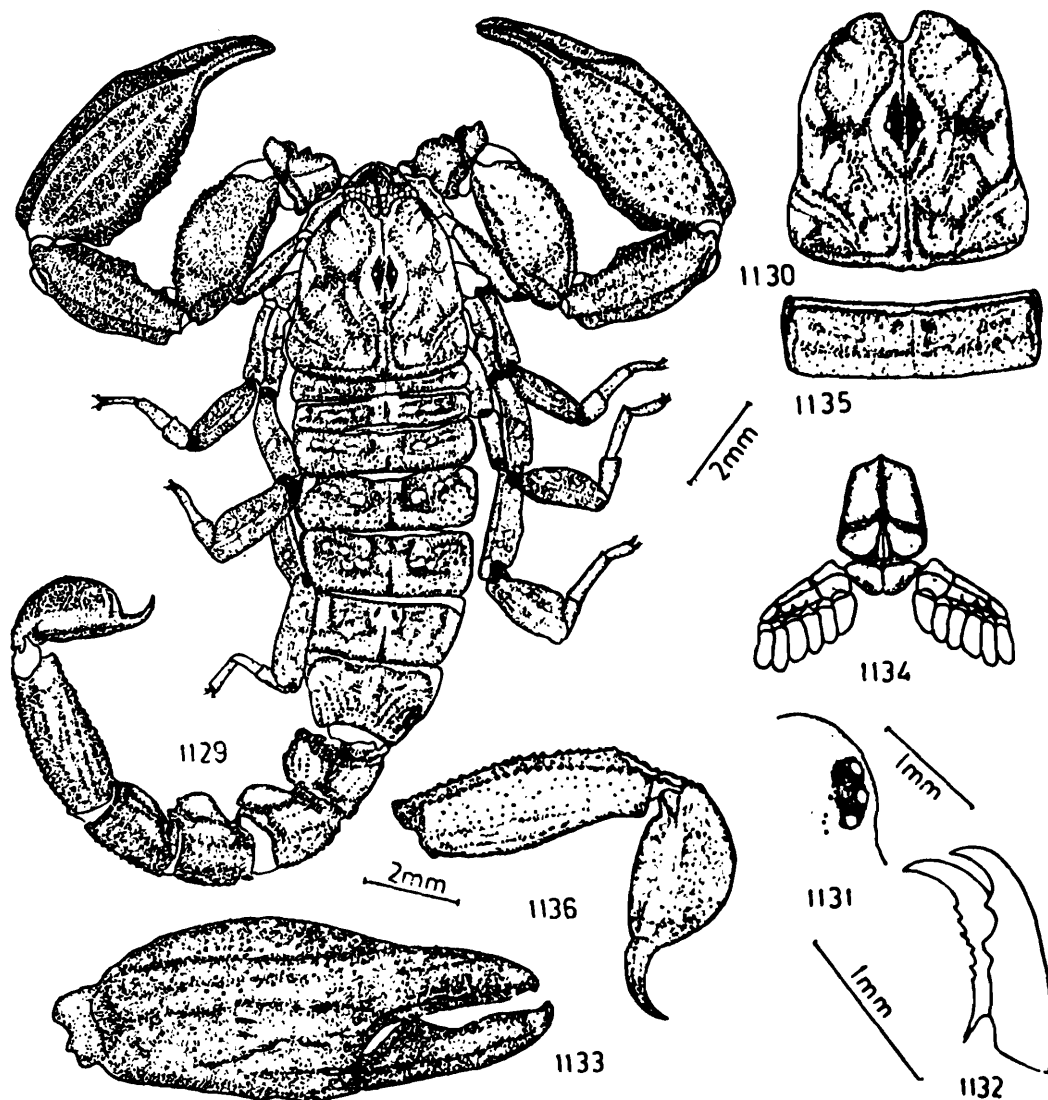
General : Male and female of small to medium size. Entire body thickly granular, some granules coarse. Carapace not flat. Chelicera normal. Pedipalp short, stout, carinated, not flat and manus with convex dorsal surface. Legs normal. Pectines moderately well developed in male. Mesosoma granular with median carina on tergites I-IV. Last sternites granular, provided with two pairs of granular carinae. Metasoma strong with globular vesicle as in text-fig. 1129.

Body colour dull brown with blackish tinge. Carapace slightly more brownish, ocular tubercles black. Chelicera yellowish brown but more brown on fingers. Pedipalp reddish brown but darker on carinae. Legs dull yellowish brown on proximal segments and yellowish on distal segments. Ventral side of mesosoma yellowish brown. Pectines yellow. Metasoma brownish with less blackish tint. Telson with yellowish vesicle.

Measurement : Male total length 36.25 mm. Carapace 4.75 mm. long; mesosoma 11.50 mm. long; metasoma 20.00 mm. long. Female total length 31.00 mm. Carapace 4.50 mm. long; mesosoma 11.25 mm. long; metasoma 15.25 mm. long.

Carapace : Entire surface finely and closely granular, few granules coarse and arranged irregularly. Interocular area covered with coarse granules in middle portion. Lateral ocular tubercles granular, continued posteriorly into short carinae and provided with three contiguous lateral eyes as in text-fig. 1131. Median ocular tubercles smooth, not much elevated and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.6 as in text-fig. 1130. Posterior median, posterior lateral, lateral ocular and anterior median furrows distinct and posterior median bifurcated posteriorly. Anterior margin smooth and provided with a deep median notch. Lateral margins smooth and provided with a short, finely granular submarginal ridge in the middle portion. Posterior margin granular. Chelicera smooth on

basal segment, ventral surface fully covered with many silky hairs. Fingers elongated and thin, sharp on dentition. Dentition as characterised in the family but ventral inner edge of movable finger provided with five to six minute teeth as in text-fig. 1132. Pedipalp short, stout with robust manus and carinated. Femur longer than carapace in male and short in female. All carinae well developed, inner carinae evenly granular, outer carinae granular but granules obsolete. Anterior or outer surface provided with a crenulated carina. Posterior or inner surface provided with weakly granular carina. Intercarinal space granular and few granules coarse. Patella longer than femur or carapace in male but always shorter in female. Inner carinae granular but granules obsolete. Outer carinae smooth and obsolete. Anterior or inner surface provided with a pair of small, dentiform tubercles on proximal portion. Posterior or outer surface provided with small carina. Intercarinal space weakly granular, few granules coarse. Manus robust, wider than femur or patella as in text-fig. 1133. Length of under hand equal to length of femur. Five carinae well developed and except sparsely granular inner secondary, all carinae smooth and obsolete. Intercarinal space granular on ventral and inner surface but granules forming smooth, mosaic ridges on dorsal and dorso-exterior surface. Finger short, movable finger as long as length of under hand. Immobile finger shorter than movable, carinated and digital carina from manus continues upto the tip. Dentition on fingers arranged into two rows of minute granules, very weakly scalloped at the base in male. Trichobothrial pattern as femur, patella, manus and immobile finger as in text-figs. 1137-1141. Legs carinated on femur and patella but carinae weak and less granular. Intercarinal space granular only on outer surface. Tibia smooth. Tarsomere I and II smooth, furnished with a row of small, blackish spicules on ventral surface. Spine formula on tarsomere II of legs I-IV : $\frac{5}{5}, \frac{7}{4}, \frac{6}{7}, \frac{5}{5}$. Pectines moderately developed but more developed in male, 2.75 times longer than wide in female. Middle lamellae poorly separated into small digits. Fulcra not well developed. Lamellae sparsely clothed with reddish microscopic setae. Pectinal teeth well developed, tubular and 6/6 in male as in text-fig. 1134, but short, pointed distally and 6/5 in female. Basal



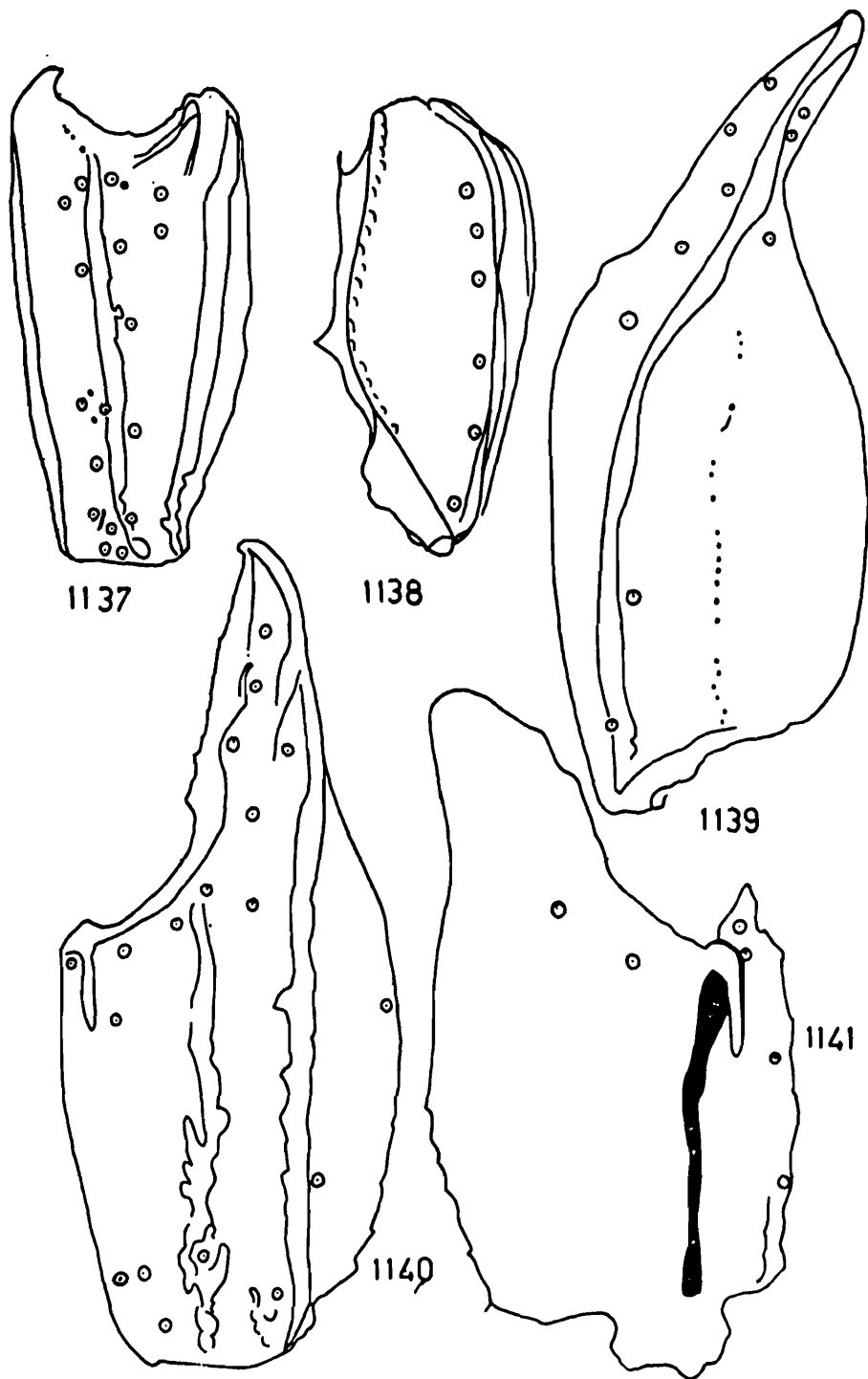
FIGS. 1129-1136. *Scorpiops (Scorpiops) hardwickei* (Gervais)

- 1129. Dorsal view of male.
- 1130. Carapace, dorsal view.
- 1131. Lateral eyes, lateral view.
- 1132. Movable finger of chelicera, inner view.
- 1133. Manus and fingers, exterior view.
- 1134. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1135. Tergite, dorsal view.
- 1136. Telson and segment V, lateral view.

piece sclerotized, anterior margin provided with a weak notch in the middle. Genital operculum wider than long, sclerites united in the middle in female whereas in male, sclerites separated on posterior portion, from which a pair of conspicuous male genital papillae protruding out as in text-fig. 1134. Cephalothoracic sternum pentagonal and wider than long provided with a median longitudinal depression. Genital operculum and cephalothoracic sternum poorly clothed with few reddish setae.

Mesosoma : All tergites coarsely granular on posterior portion and finely granular on anterior portion. Lateral and posterior margins granular. Pretergal portion smooth to very finely granular with granular posterior margin. Tergites II-VI provided with a median carina, developed on posterior portion and granular as in text-fig. 1135. Tergite VII coarsely but irregularly granular, provided with two pairs of lateral granular carinae and broad, elevated median carina. Lateral and posterior margins granular. Pretergal portion granular with granular posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal segment smooth. Sternite V granular, provided with two pairs of granular carinae. Lateral and posterior margins weakly granular. Presternal portion smooth but weakly granular on posterior margin.

Metasoma : Cauda four times as long as carapace in male and three and half times as long as carapace in female. Basal segment always wider than long and provided with dorsal, dorso-lateral, lateral, inferior lateral and inferior carinae. Segments II-IV provided with dorsal, dorsolateral, inferior lateral and inferior carinae. All carinae on segments I-IV evenly granular but inferior lateral and inferior carinae weakly granular. Intercarinal space coarsely but irregularly granular. Anterior peduncle finely and thickly granular. Posterior margin granular. Segment V provided with dorsal, dorsolateral, inferior lateral and single inferior median carinae. All carinae almost evenly granular but dorsolateral carinae developed on $2/3$ anterior portion while inferior lateral slightly more crenulated on posterior portion.



Figs. 1137-1141. *Scorpiops (Scorpiops) hardwickei* (Gervais)

- 1137. Patella, exterior view.
- 1138. Patella, ventral view.
- 1139. Manus and immovable finger, dorsal view.
- 1140. Manus and immovable finger, exterior view.
- 1141. Manus and immovable finger, ventral view.

Intercarinal space less coarsely granular. Anterior peduncle finely and thickly granular. Anal rim of this segment evenly granular in female. Vesicle slightly shorter than segment V in male but longer than segment V in female. Entire surface weakly and sparsely granular. Lateral and ventral depressions prominent and smooth. Aculeus not much curved, short, less than as long as half the vesicular length, broad at the base but pointed sharply and reddish brown on distal portion as in text-fig. 1136.

Distribution : INDIA : Dehra Dun (*Type-locality*), Uttar Kashi, Tehri, Almora, Chamoli, Pauri, Uttar Pradesh.

Remarks : We have examined, described and illustrated on the basis of type specimens received from B.M. (N.H.) London, Regd. No. 1896.2.2.12-20. We have also studied some identified specimens received from Northern Regional Station, ZSI, Dehra Dun. Some identified specimens are kept in Western Regional Station, ZSI, Poona.

59. *Scorpiops (Scorpiops) insculptus* Pocock

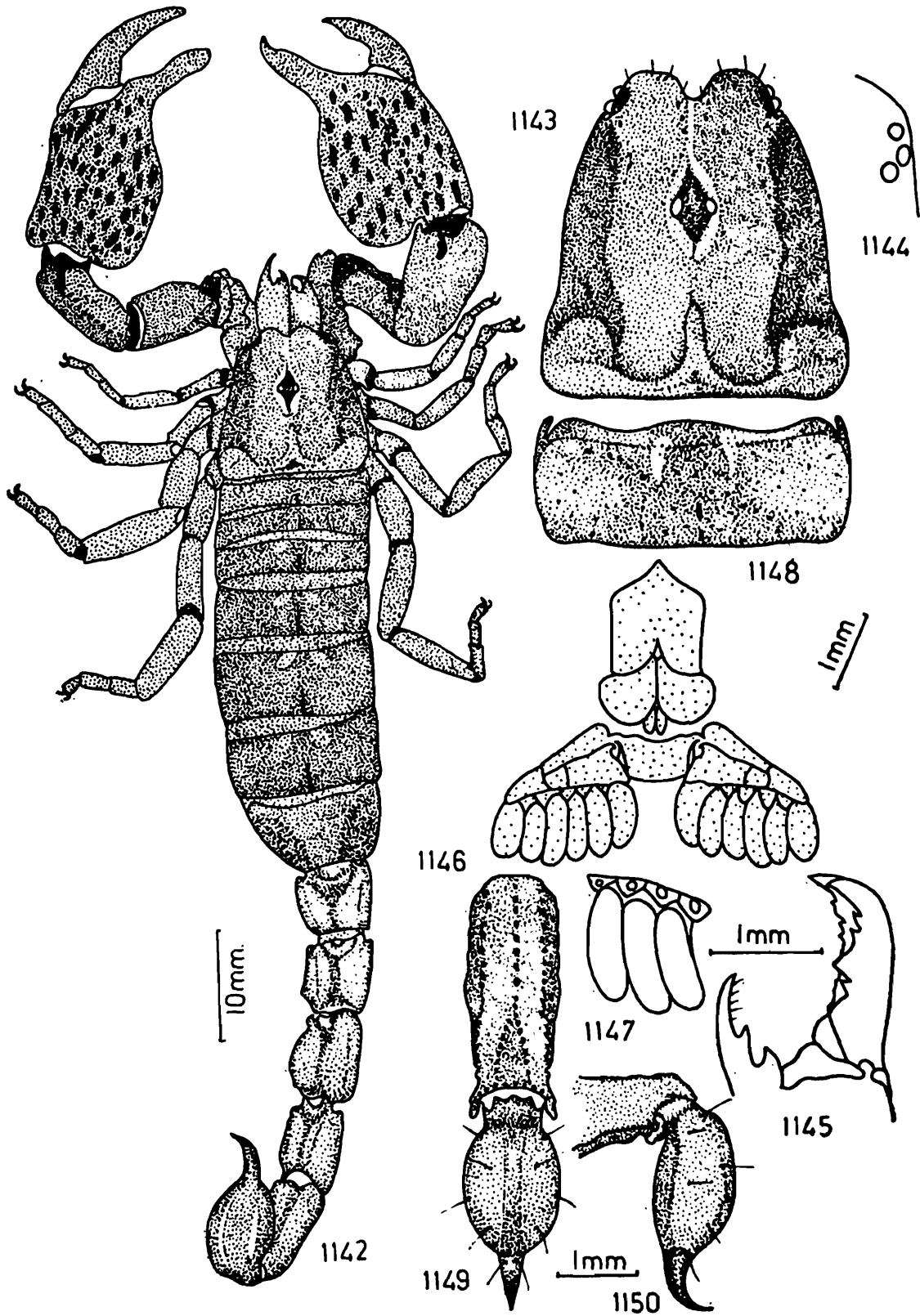
(Figs. 1142-1156)

1900. *Scorpiops insculptus* Pocock, *Fauna Brit. India, Arachn.*, : 68.
 1980. *Scorpiops (Scorpiops) hardwickei insculptus* : Vachon, (*Bull. Mus. natn. Hist nat.*, Paris, 4^e ser. 2, Sect. A, (1) : 143.

General : Body size medium, both male and female of almost of same body size. Body colour dark yellowish brown but more darker and brownish on pedipalp. Chelicera yellow with darker fingers. Carapace and tergites yellowish with slight dark tint.

FIGS. 1142-1150. *Scorpiops (Scorpiops) insculptus* Pocock

1142. Dorsal view of male.
 1143. Carapace, dorsal view.
 1144. Lateral eyes, lateral view.
 1145. Movable and immovable fingers of chelicera, dorsal view.
 1146. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1147. Pectinal teeth, ventral view.



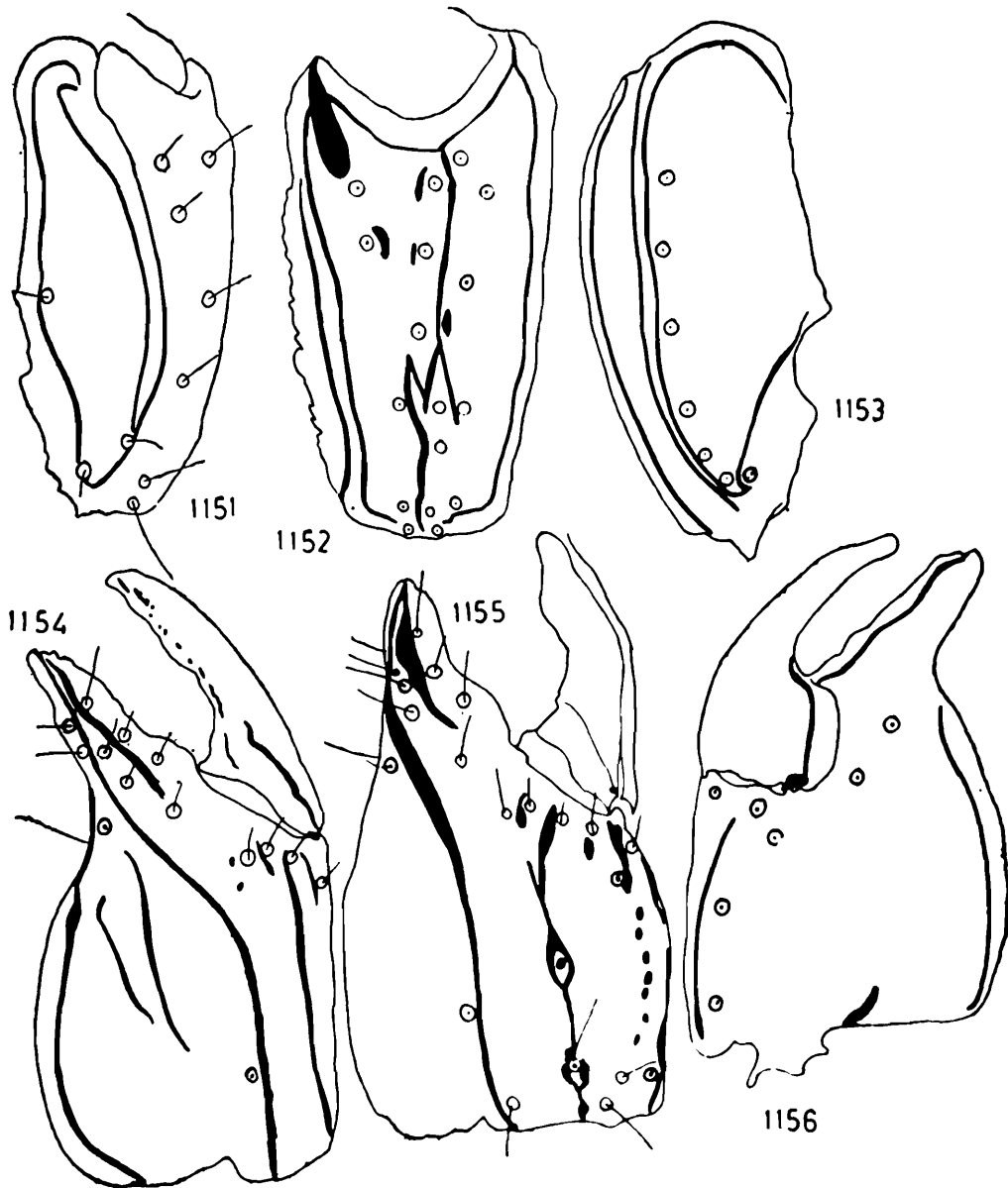
1148. Tergite, dorsal view.
 1149. Telson and segment V, ventral view.
 1150. Telson, lateral view.

Sternites yellow. Mesosomal segments darker and slightly brownish. Legs yellow. Female more darker and granular than male but granulation bigger in size. Carapace and tergites finely granular. Last sternite provided with four granular carinae. All caudal segments carinated and all carinae granular. Telson with globular and weakly granular vesicle as in text-fig. 1142. Pectines small. Cephalothoracic sternum broad and pentagonal.

Measurements : Male total length 35.25 mm. Carapace 4.50 mm. long; Mesosoma 12.00 mm. long; Metasoma 18.75 mm. long. Female total length 32.25 mm. Carapace 5.50 mm. long; Mesosoma 12.50 mm. long; Metasoma 14.25 mm. long, (except Telson (Broken))

Carapace : Almost entire surface very finely granular but frontal lobes covered with bigger granules. Ocular tubular black, lateral tubercles weakly granular and provided with three contiguous lateral eyes as in text-fig. 1144. Median tubercles smooth, much more elevated, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.9 as in text-fig. 1143. Posterior margin smooth and almost straight. Lateral margins finely crenulated and provided with a finely granular sub-marginal ridge. Anterior margin smooth with deep median notch and provided with few, long brownish hairs. Chelicera with smooth elongated basal segment but slightly darker on anterior portion. Ventral surface thickly covered with white silky hairs. Fingers brownish on dentition. Dentition as in text-fig. 1145. Dorsal and ventral distal teeth on movable finger subequal. Pedipalp strong with broad hand. Femur shorter than carapace, all carinae granular but outer carinae sparsely granular. Carinae on inner surface more closely granular, inner surface provided with a granular carina. Intercarinal surface unevenly granular. Patella as long as femur with outer carinae smooth, inner carinae weakly granular. Inner surface provided with two anterior denticular tubercles. Intercarinal space almost smooth but at the most very few granules present on dorsal or anterior surface. Hand broad and surface consists of smooth, shining tubercles, sometimes forming irregular network of ridges as in text-fig. 1142. Six to seven carinae developed and almost smooth but Ex-

terior marginal, Exterior secondary, Digital and Inner secondary carinae well developed but only digital and inner secondary extend on immovable finger. Fingers short and movable finger as long as carapace, immovable finger always shorter than either



FIGS. 1151-1156. *Scorpiops (Scorpiops) insculptus* Pocock

- 1151. Patella, dorso-exterior view.
- 1152. Patella, exterior view.
- 1153. Patella, ventral view.
- 1154. Manus and immovable finger, dorsal view.
- 1155. Manus and immovable finger, dorso-exterior view.
- 1156. Manus and immovable finger, ventral view.

femur or patella. Dentition on fingers well developed and distinct. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1151-1156. Legs light yellow and paler than body. Femur carinated and inner or anterior carinae more granular than outer. Intercarinal space weakly granular. Patella almost smooth or very weakly granular, carinae poorly developed with weak granulation, outer carinae smooth. Tibia almost smooth. Tarsomere I longer than tibia, smooth and provided with a row of strong spines below and a pair of strong pedal spurs. Tarsomere II smooth and provided below with a single row of short, small, delicate, brownish spicules and spine formula on legs I-IV : $\frac{4}{4}, \frac{6}{8}, \frac{5}{8}, \frac{7}{8}$. All segments poorly and sparsely clothed with long brown stout hairs. A pair of claws strong, elongated and brownish at the tips. Pectines pale yellow, not well developed and two times longer than wide. Middle lamellae very poorly subdivided and sometimes occasionally recognised. Fulcra well distinguished, somewhat elongated. Lamellae and fulcra clothed sparsely with brown stout and white setae. Pectinal teeth well developed, tubular, distal tooth very broad and 6/6 in number. Basal piece broad, always wider than long, anterior margin with weak median notch, surface covered sparsely with few hairs. Genital operculum wider than long, sclerotized and united on anterior portion and in the middle while a pair of genital papillae protruding out from posterior margin. In female the genital operculum united throughout. Cephalothoracic sternum pentagonal, broad and almost as wide as long with deep median posterior depression as in text-fig. 1146. Anterior portion covered with few brown setae.

Mesosoma : All tergites coarsely granular but granulation on posterior portion more bigger and slightly sparse. Tergite I without carinae. Tergites II-VI provided with a smooth median carina as in text-figs. 1142 & 1148. Posterior margin of each tergite smooth. Lateral margins finely granular. Pretergal portion smooth with smooth posterior margin but occasionally weakly granular on lateral portion. Tergite VII more granular and granules in tuberculate form, provided with four crenulated carinae. Median carina in the form of elevated portion, covered with few granules. Posterior margin granular. Lateral margins

crenulated. Pretergal portion smooth with smooth posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Presternal portion absent for sternite I, traceable only on lateral portions for sternite II, smooth with smooth posterior margin for sternites III & IV. Sternite V granular throughout and provided with two pairs of granular carinae. Posterior margin granular. Lateral margin weakly granular. Presternal portion smooth, with smooth posterior margin.

Metasoma : Cauda not so weak and more than four times as long as carapace. Basal segment always wider than long. Segments I-IV provided with dorsal, dorsolateral, inferior lateral and inferior granular carinae. Lateral carinae only present on segment I and sparsely granular. Intercarinal space sparsely granular. Anterior peduncle of each segment almost smooth. Posterior margin of each segment smooth above but granular below. Segment V as long as carapace and provided with dorsolateral, inferior lateral and single inferior median carinae. Dorsolateral carinae granular on half anterior portion. Lateral carinae granular developed only on half anterior portion. Inferior lateral and single inferior median carinae crenulated to serrated. Inferior median carina forked on posterior portion. Intercarinal space granular, granulation of mixed type of fine and bigger granules. Anterior peduncle smooth on dorsal portion while finely granular below. Anal rim crenulated. Telson longer than carapace or segment V. Vesicle shorter but wider than fifth caudal segment but as long as femur or patella but also wider than femur or patella. Entire surface smooth, provided with a weak depression at the ventral base of aculeus. Ventral median and lateral depressions not prominent. Aculeus slightly shorter than half the length of vesicle, sharp, not much curved, dark brown on distal portion. Setation on vesicle as in text-figs. 1149 & 1150.

Distribution : INDIA : Jaushar (*Type-locality*), Himachal Pradesh.

Remarks : We have studied the type specimen received from B.M. (N.H.), London, Regd. No. 1896.8.15 and 1899.8. 16.42.-43. The present illustrations and description based on the basis of above type specimens.

60. *Scorpiops (Scorpiops) affinis* Kraepelin

(Figs. 1157-1170)

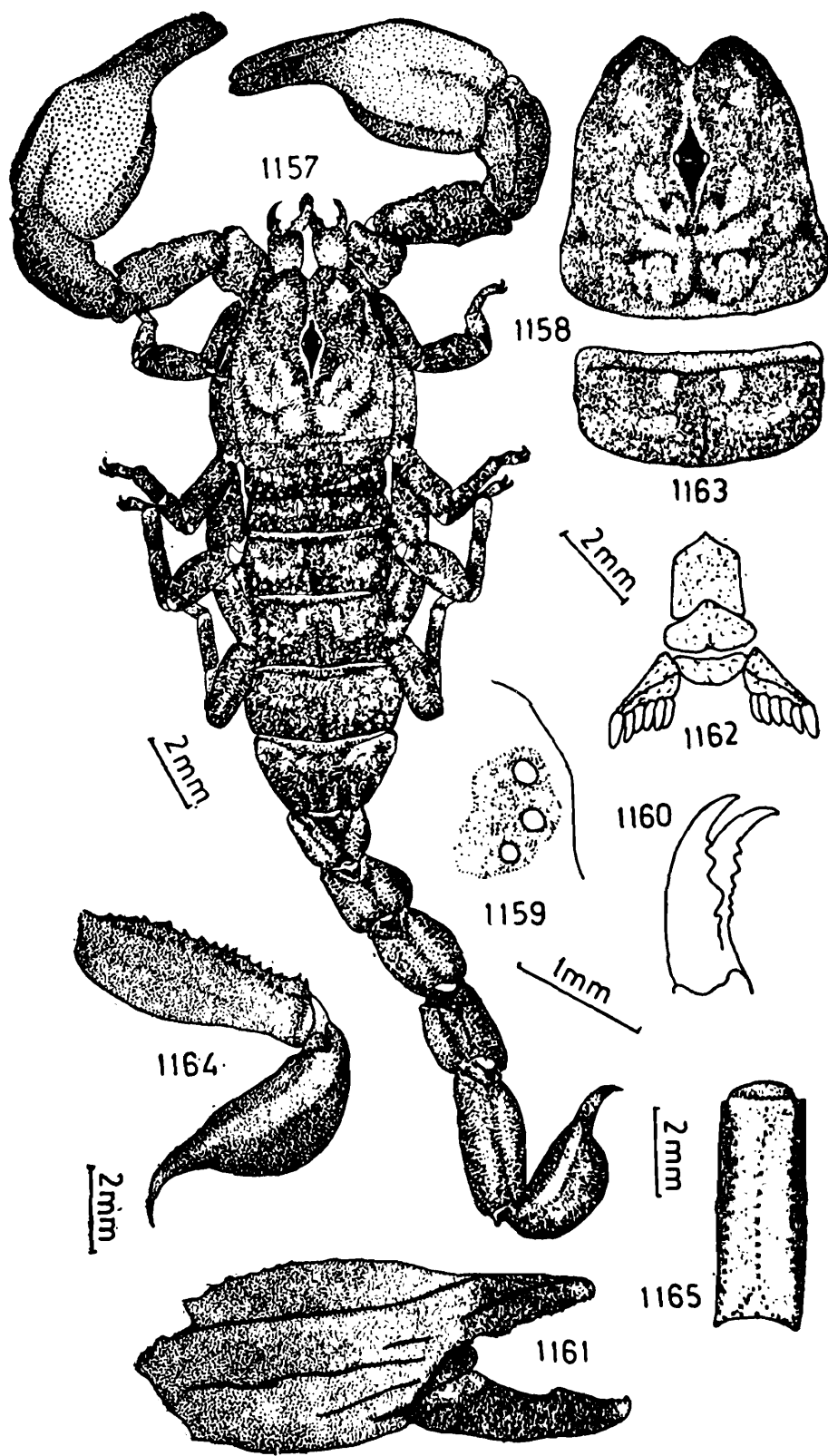
1998. *Scorpiops affinis* Kraepelin, *Jb. hamb. wiss. Aust.*, **15** : 44.
 1900. *Scorpiops affinis* : Pocock, *Fauna Brit. India, Arachn.*, : 75.
 1911. *Scorpiops austerus* : Hirst. *Ann. Mag. nat. Hist.*, **8(8)** : 462.
 1980. *Scorpiops (Scorpiops) austerus* : Vachon, *Bull. Mus. natn. Hist. nat.*, Paris, 4^e ser., **2**, sect. A, (1) : 143.

General : Male and female of medium size. Male less granular, smooth and slightly smaller than female. Carapace with granular ocular tubercles. Chelicera normal. Pedipalp short, stout with much flattened manus. Legs normal. Pectines moderately developed. Metasoma with all segments carinated and granular. Telson with globular vesicle as in text-fig. 1157. Mesosomal tergites monocarinated and carinae more developed in female.

Body colour almost black brown in female and dark brown with slight reddish tint in male. Carapace with black ocular tubercles. Chelicera light brown on basal segment and reddish

FIGS. 1157-1165. *Scorpiops (Scorpiops) affinis* Kraepelin

1157. Dorsal view of male.
 1158. Carapace, dorsal view.
 1159. Lateral eyes, lateral view.
 1160. Movable finger of chelicera, inner view.
 1161. Manus and fingers of pedipalp, exterior view.
 1162. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1163. Tergite, dorsal view.



1164. Telson and segment V, lateral view.

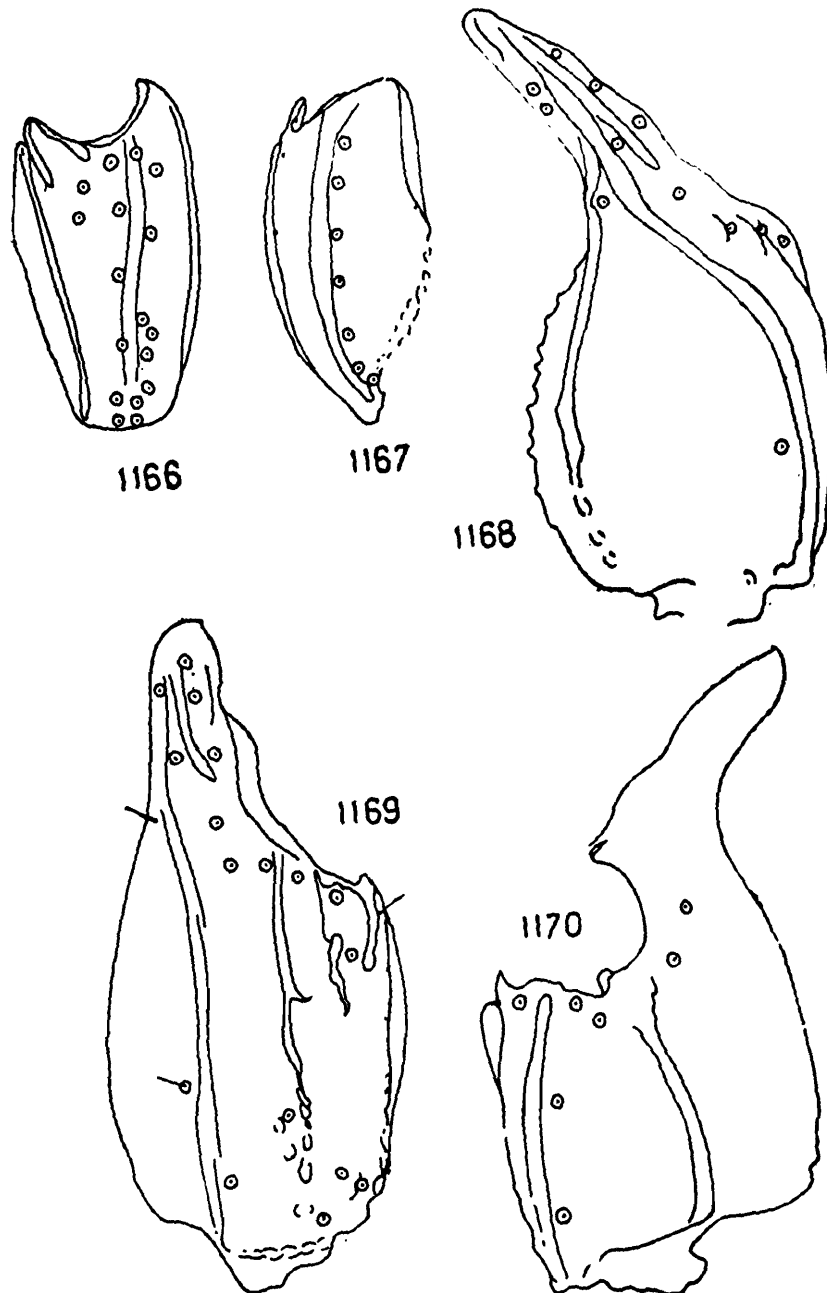
1165. Segment V, ventral view.

brown on fingers. Pedipalp dark brown except light brown manus, all carinae blackish. Legs blackish brown. Pectines yellowish brown. Mesosoma dark brown on tergites and slightly light on sternites but last sternite more darker. Metasoma brownish with vesicle light brown in colour but slightly more darker in female.

Measurements : Male total length 39.25 mm. Carapace 5.25 mm. long; Mesosoma 12.50 mm. long; Metasoma 21.50 mm. long. Female total length 42.50 mm. Carapace 6.50 mm. long; Mesosoma 15.25 mm. long; Metasoma 20.75 mm. long.

Carapace : Entire surface closely granular, granulation of very irregular type but coarse granulation rare and less. Interocular area coarsely granular on middle and anterior portion and granules obsolete. Posterior median furrow shallow and bifurcated posteriorly. Posterior lateral, lateral ocular and anterior median furrows not much distinct. Lateral ocular tubercles granular, continued posteriorly into short, granular carina and furnished with three contiguous lateral eyes as in text-fig. 1159. Median ocular tubercles also granular but obsolete in middle portion and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.75 as in text-fig. 1158. Anterior margin smooth with deep median notch in the middle portion. Lateral margins finely crenulated and provided with finely granular submarginal ridges in the middle portion. Posterior margin smooth. Chelicera smooth on basal segment and ventral surface clothed with many short silky hairs. Fingers thin elongated and sharp on dentition. Dentition on fingers as characterised in family and ventral inner edge furnished with five to six minute teeth as in text-fig. 1160. Pedipalp short, stout with much flattened manus as in text-fig. 1157. Femur shorter than carapace, carinated and dorsal outer, dorsal inner and ventral inner carinae almost evenly granular but granules obsolete but ventral outer carina coarsely granular and granules arranged in very irregular fashion. Anterior or outer surface furnished with a carina strongly crenulated and provided with five to eight sub-denticular granules. Posterior or inner surface furnished with obsolete carina on distal portion. Intercarinal space coarsely but irregularly granular. Patella

slightly longer than femur but shorter than carapace, carinated and except dorsal inner evenly granular, all carinae smooth and obsolete. Intercarinal space irregularly granular and some



FIGS. 1166-1170. *Scorpiops (Scorpiops) affinis* Kraepelin

- 1166. Patella, exterior view.
- 1167. Patella, ventral view.
- 1168. Manus and immovable finger, dorsal view.
- 1169. Manus and immovable finger, dorso-exterior view.
- 1170. Manus and immovable finger, ventro-interior view.

granules coarse. Anterior or inner surface provided with a sub-denticular small tubercle. Posterior of outer surface provided with a smooth, obsolete carina. Manus dorso-ventrally flat, length of under hand more than as long as femur or patella but shorter than carapace and manus wider than long. Five carinae well developed, smooth and obsolete. Digital carina smooth and continues distally upto the top of immovable finger. Exterior secondary slightly weak but smooth. Secondary accessory very short and smooth. Exterior marginal and exterior carinae well developed and smooth as in text-fig. 1161. Inner secondary weakly developed. Intercarinal space granular on distal portion while granules become ridges to form mosaic structure on proximal portion. Fingers carinated but carinae smooth and obsolete. Movable finger longer than carapace and immovable finger almost as long as femur. Dentition on fingers arranged in two finely granular rows, weakly scalloped on distal portion in male. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1166-1170. Legs carinated on femur and patella, all carinae almost granular. Tibia smooth. Tarsomere I and II smooth and furnished with a row of small blackish spicules on ventral side. Spine formula on legs I-IV : $\frac{4}{5}$, $\frac{5}{5}$ $\frac{5}{6}$, $\frac{7}{7}$. Pectines moderately developed, weakly developed in female 1.75 times longer than wide. Middle lamellae completely fused. Fulcra very poorly distinguished. Lamellae sparsely covered with reddish microscopic setae. Basal piece narrowed posteriorly while anterior margin straight. Genital operculum always wider than long, sclerites completely fused in female but separated on posterior portion in male and from which a pair of conspicuous male genital papillae protruding out. Cephalothoracic sternum pentagonal, as long as wide and provided with a longitudinal median depression as in text-fig. 1162.

Mesosoma : All tergites granular but more coarsely and evenly granular in female and coarse granulation more on posterior portion of each tergite. Lateral and posterior margins granular. Pretergal portion finely granular with finely granular posterior margin. Tergites I-VI monocarinated and median carina granular as in text-fig. 1163 but more distinct in female. Tergite VII

more granular than preceding tergites and provided with two pairs of granular lateral carinae and median broad carina. Lateral carinae sparsely granular. Pretergal portion finely granular with granular posterior margin. Lateral and posterior margins granular. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion not visible. Sternite V coarsely and closely granular, furnished with two pairs of granular carinae. Lateral and posterior margins granular. Presternal portion not visible.

Metasoma : Cauda about four times as long as carapace. Basal segment always wider than long and furnished with ten carinae, all carinae evenly granular. Segments II-IV furnished with eight carinae and except lateral carinae all carinae sparsely but evenly granular. Dorsal carinae not elevated and spiniform. Intercarinal space thickly granular but granulation of uneven type. Anterior peduncle finely and closely granular. Posterior margin evenly granular. Segment V shorter than carapace but longer than femur or patella. Dorsal carinae weakly developed, dorsolateral sparsely granular and developed only on $2/3$ anterior portion. Inferior lateral carinae sparsely granular but crenulated on posterior portion. Single inferior median carina evenly crenulated. Intercarinal space unevenly granular. Anterior peduncle finely and closely granular. Anal rim of this segment evenly granular as in text-figs. 1164 & 1165. Telson longer than carapace but vesicle longer than segment III and shorter than segment V. Entire surface finely granular. Ventral and lateral furrows smooth and narrow. Aculeus broad at the base, curved on distal portion, about half the vesicular length, sharp and reddish brown on the distal portion as in text-fig. 1164.

Distribution : INDIA : Kulu (*Type-locality*), Himachal Pradesh and Punjab.

Remarks : We have studied, described and illustrated on the basis of authenticated named specimens received from B.M. (N:H.), London. Regd. No. nil. Subsequently we have received the type specimens of *Scorpiops austerus* Hirst from

B.M. (N.H.), London, Regd. No. 1905.3.31.1-10. After thorough studies of these specimens we found that both specimens belong to the same species. According to law of priority the species *scorpiops affinis* Kraepelin 1898, which was described much earlier than the species *Scorpiops austerus* Hirst 1911. Therefore we have decided to retain the species *Scorpiops affinis* Kraepelin as valid species and *Scorpiops austerus* Hirst as synonym.

61. *Scorpiops (Scorpiops) crassimanus* Pocock

(Figs. 1171-1185)

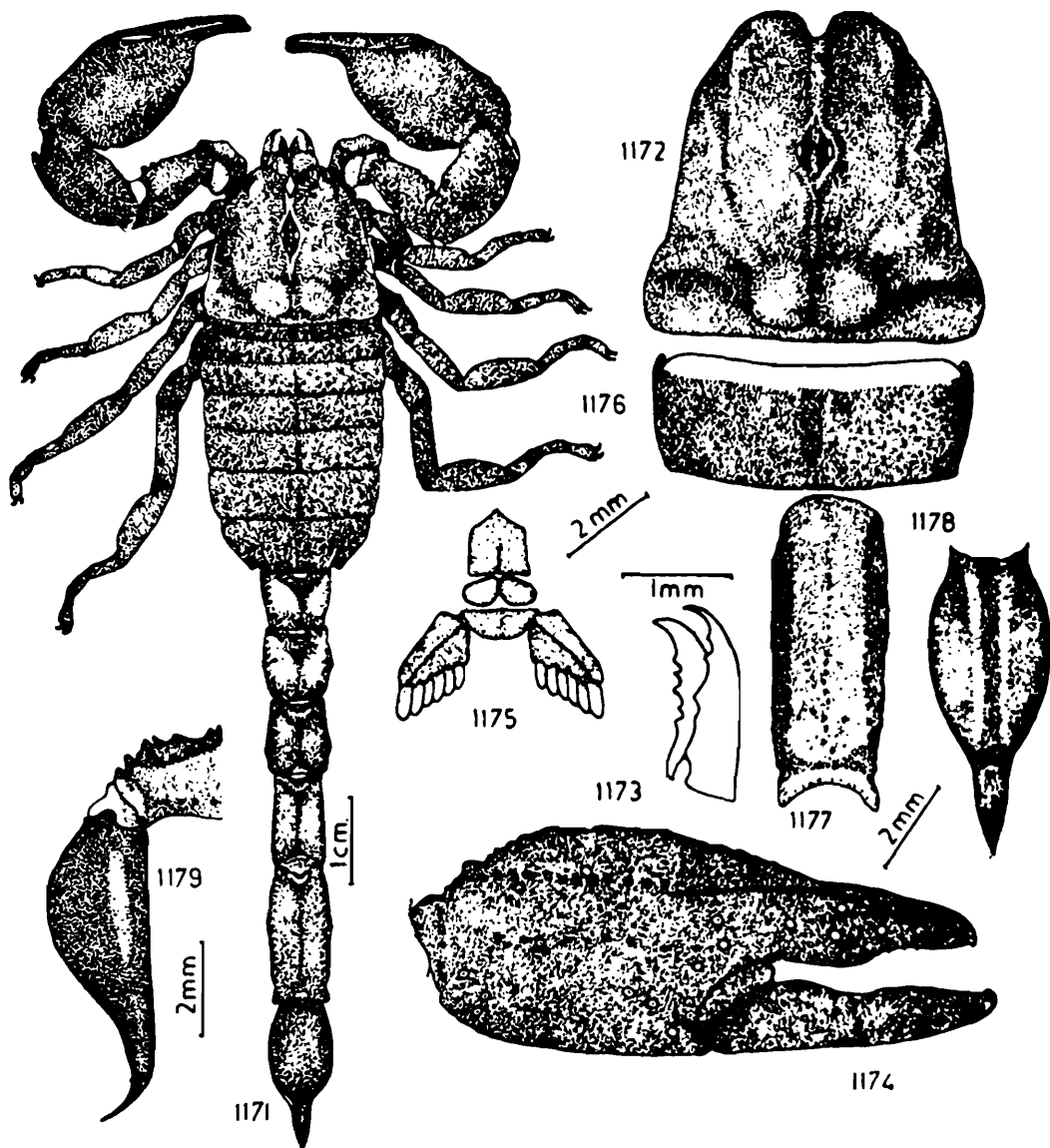
1899. *Scorpiops crassimanus* Pocock, *J. Bombay nat. Hist. Soc.*, 12 : 267.
 1900. *Scorpiops crassimanus* : Pocock, *Fauna Brit. India, Arachn.*, : 68.
 1980. *Scorpiops (Scorpiops) crassimanus* : Vachon, *Bull. Mus. natn., Hist. nat., Paris., 4^e ser. 2, Sect. A, (1)* : 143.

General : Female of medium size. Entire surface coarsely as well as finely granular, ocular tubercles smooth. Chelicera smooth on basal segment. Pedipalp short, stout with flattened manus as in text-fig. 1171. Legs weakly granular on femur and patella. Pectines moderately developed. Mesosomal tergites coarsely and closely granular. Last mesosomal sternite carinated. Metasoma granular and carinated on all segment. Telson more globular and granular on entire surface.

Body colour almost entirely black. Chelicera dark brown on basal segment while reddish black on fingers. Pedipalp blackish brown, carinae black. Legs dark brown with blackish tinge. Mesosoma black. Metasoma black with dark brown telson.

Measurements : Female total length 48.00 mm. Carapace 8.00 mm. long; Mesosoma 14.25 mm. long; Metasoma 25.75 mm. long.

Carapace : Entire surface granular and few granules coarse. Interocular area more granular on anterior portion. Lateral ocular tubercle granular, continued on posterior portion into a short granular carinae and provided with three contiguous lateral eyes as in text-fig. 1172. Median ocular tubercles smooth,

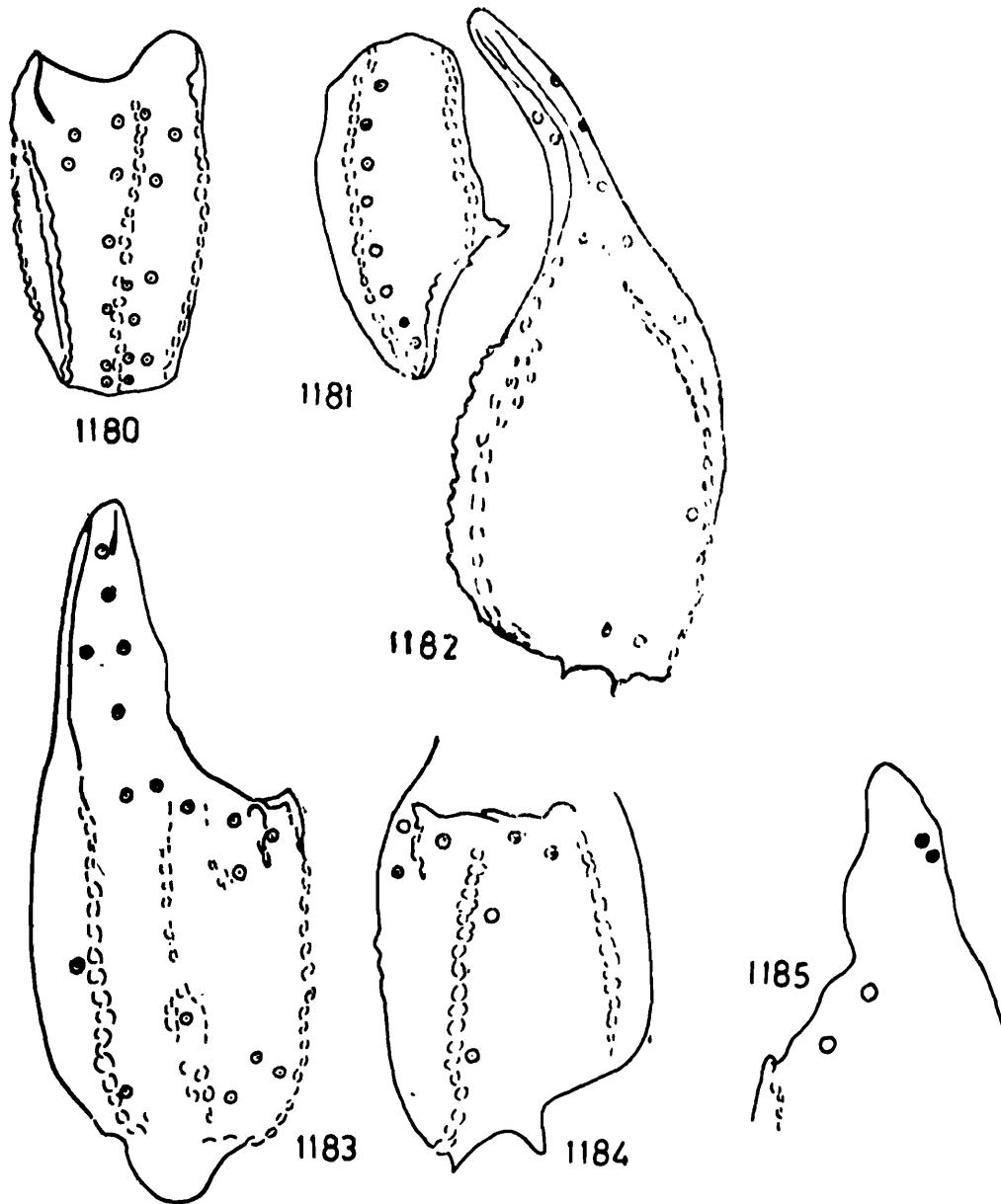


FIGS. 1171-1179. *Scorpiops (Scorpiops) crassimanus* Pocock

- 1171. Dorsal view of female.
- 1172. Carapace, dorsal view.
- 1173. Movable finger of chelicera, inner view.
- 1174. Manus and fingers of pedipalp, exterior view.
- 1175. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1176. Tergite, dorsal view.
- 1177. Segment V, ventral view.
- 1178. Telson, ventral view.
- 1179. Telson and distal portion of segment V, lateral view.

not much elevated, provided with a pair of median eyes, situated anteriorly in the ratio of 1.80 as in text-fig. 1172. Posterior median, posterior lateral, lateral ocular and anterior median furrows distinct. Anterior margin smooth and provided with a deep median notch. Lateral margin smooth and provided with a finely granular submarginal ridge in middle portion. Posterior margin smooth. Chelicera smooth on basal segment and thickly clothed with many silky hairs on ventral portion. Fingers thin and elongated, dentition as characterised in family and ventral inner margin of movable finger furnished with six to seven minute teeth as in text-fig. 1173. Pedipalp stout with much flattened manus. Femur much shorter than carapace, carinated and all carinae coarsely and sparsely granular. Anterior or outer surface furnished with a crenulated carinae. Posterior or inner surface provided with weakly crenulated carina. Intercarinal space less coarsely and sparsely granular. Patella longer than femur but shorter than carapace. All carinae granular but outer carinae with obsolete granules. Anterior or inner surface furnished with a pair of small, weak, sub-denticular tubercles. Posterior or outer surface furnished with a granular carinae but granules obsolete. Intercarinal space much sparsely granular. Manus much flattened, length of under hand more than patella but shorter than carapace. Five carinae well developed, sparsely granular. Digital continues upto the tip of immovable finger as in text-fig. 1174. Exterior marginal evenly granular. Inner secondary carina granular and some granules obsolete. Exterior secondary carina weakly and sparsely granular. Intercarinal space unevenly and sparsely granular as in text-fig. 1174. Movable finger as long as carapace, carinated. Immobile finger shorter than movable finger and carinated. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1180-1185. Legs granular and carinated on femur and patella but carinae with obsolete granules. Tibia smooth. Tarsomere I and II smooth and furnished with a row of small blackish spinules on ventral surface. Spine formula on tarsomere II of legs I-IV : $\frac{4}{4}$, $\frac{4}{5}$, $\frac{6}{8}$, $\frac{7}{8}$. Pectines moderately developed and 1.70 times longer than wide. Middle lamellae fused. Fulcra

poorly distinguished. Lamellae and fulcra clothed with microscopic setae. Pectinal teeth short, pointed distally and 5/5 in



FIGS. 1180-1185. *Scorpiops (Scorpiops) crassimanus* Pocock

- 1180. Patella, exterior view.
- 1181. Patella, ventral view.
- 1182. Manus and immovable finger, dorsal view.
- 1183. Manus and immovable finger, exterior view.
- 1184. Manus, ventral view.
- 1185. Immobile finger, interior view.

number. Basal piece sclerotized, with straight anterior margin. Genital operculum wider than long and sclerites fused on middle portion. Cephalothoracic sternum pentagonal and provided with a median longitudinal depression as in text-fig. 1175.

Mesosoma : Tergites I and II not much granular but tergites III-VI thickly granular and coarsely granular on posterior portion of each tergite. Tergites II-VI provided with a median granular carina as in text-figs. 1171 & 1176. Lateral and posterior margins smooth. Pretergal portion not visible. Tergite VII entirely granular and provided with two pairs of granular lateral carinae and a median carina broad and granular on anterior portion. Lateral and posterior margin granular. Pretergal portion not visible. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion not visible. Sternite V granular and carinae not well distinguished. Lateral and posterior margins granular. Presternal portion not visible.

Metasoma : Cauda about three and half times as long as carapace. Basal segment always wider than long and provided with ten granular carinae. Segments II-IV with dorsal, dorsolateral, inferior lateral and inferior carinae granular and some granules obsolete. Dorsal carinae not much elevated and spiniform posteriorly. Intercarinal space irregularly granular. Anterior peduncle finely and closely granular. Posterior margin granular. Segment V shorter than carapace but longer than patella. Dorsal, dorsolateral, inferior lateral and single inferior median carinae well developed, granular. Inferior lateral carinae more crenulated on posterior portion. Single inferior median carina sparsely granular and bifurcated on posterior portion. Intercarinal space weakly granular. Anterior peduncle finely granular on ventral side. Anal rim of this segment evenly crenulated as in text-figs. 1177 & 1179. Telson as long as carapace but vesicle longer than segment IV but shorter than segment V, entire surface finely and weakly granular. Ventral and lateral bands not much distinct. Aculeus not much curved, broad at the base, reddish brown at the tip, more than as long as half the vesicular length as in text-figs. 1178 & 1179.

Distribution : INDIA : The type locality of female type is not precise, probably India (Pocock 1899), Kraepelin 1913 gave some stations of capture, this species found in Western Himalaya, Dists. Kumaon, Nainital, Uttar Pradesh.

Remarks : We have examined, described and illustrated on the basis of type specimen received from B.M. (N.H.), London, Regd. No. Nil. The label with the specimen do not indicate any exact locality. *Fauna Brit. India, Arachn.* Pocock 1900 indicates that probably India, exact locality unknown.

62. *Scorpiops (Scorpiops) montanus* Karsch

(Figs. 1186-1201)

1879. *Scorpiops montanus* Karsch, *Mitt. much. ent. Ges.*, 3 : 107.
 1893. *Scorpiops montanus* : Kraepelin, *Jb. hamb. wisrs. Anst.*, 11 : 192.
 1900. *Scorpiops montanus* : Pocock, *Fauna. Brit. India, Arachn.*, : 70.
 1974. *Scorpiops montanus* : Stahnke, *J. Arachnol.*, 1 : 107.
 1980. *Scorpiops (Scorpiops) montanus* : Vachon, *Bull. Mus. natn. Hist. nat., Paris.*, 4^e ser. 2, sect. A, (1) : 143.

General : Male and female of small to medium size. Body surface weakly granular in male but more granular on carapace in female. Male smaller than female. Chelicera elongated and with sharp dentition. Pedipalp stout with elongated manus. Legs normal. Pectines more developed in male. Mesosomal tergites weakly granular. Metasoma weak and segments II-IV with more elevated and strongly spiniform posteriorly. Telson more elongated as in text-fig. 1186.

Body colour brown but slightly light on mesosoma. Metasoma brown but telson clear yellow. Pedipalp dark brown and blackish on carinae and fingers. Legs light brown to yellow.

Measurements : Male total length 38.75 mm. Carapace 6.00 mm. long; Mesosomal 15.00 mm. long; Metasoma 17.75 mm. long. Female total length 48.25 mm. Carapace 8.00 mm. long; Mesosoma 19.75 mm. long; Metasoma 20.50 mm. long.

Carapace : Coarsely granular on lateral portion but sparsely granular in middle portion where as very finely and weakly granular on anterior median portion. Ocular tubercles black, lateral ocular tubercles granular but median ocular tubercles smooth and elevated. Posterior median, posteroir lateral, median ocular and anterior median furrows slightly prominent. Lateral ocular tubercles provided with three contiguous lateral eyes as in text-fig. 1188. A pair of median eyes situated anteriorly in the ratio 1 : 2 as in text-fig. 1187. Anterior margin smooth with deep median notch as in text-fig. 1187. Lateral margins smooth except finely crenulated anterior portion and provided with a submarginal ridges. Posterior margin smooth. Chelicera smooth on basal segment and thickly covered with many silky hairs on ventral portion. Fingers thin and sharp on dentition. Dentition as characterised in family but ventral inner edge provided with six to seven minute teeth as in text-fig. 1189. Pedipalp dorso-ventrally flat, strongly carinated. Femur longer than carapace in female. All carinae almost evenly crenulated. Anterior or outer margin provided with crenulated carina and three to four granules dentiform. Posterior or inner surface provided with weakly crenulated carinae. Intercarinal space finely and evenly granular. Patella shorter than femur but longer than carapace in male and always shorter in female. All carinae evenly granular. Anterior or inner surface provided with a pair of strong dentiform tubercle. Posterior or outer surface provided with evenly crenulated carina. Intercarinal space more sparsely granular but weakly granular on ventral surface. Manus flat and length of under hand always longer than femur in male or carapace in female. Only five carinae well developed and granular. Digital carina evenly granular. Exterior secondary carina finely and sparsely granular. Secondary accessory short and smooth on proximal port.on but granular on distal portion. Exterior marginal carina also evenly granular. Interior marginal carina

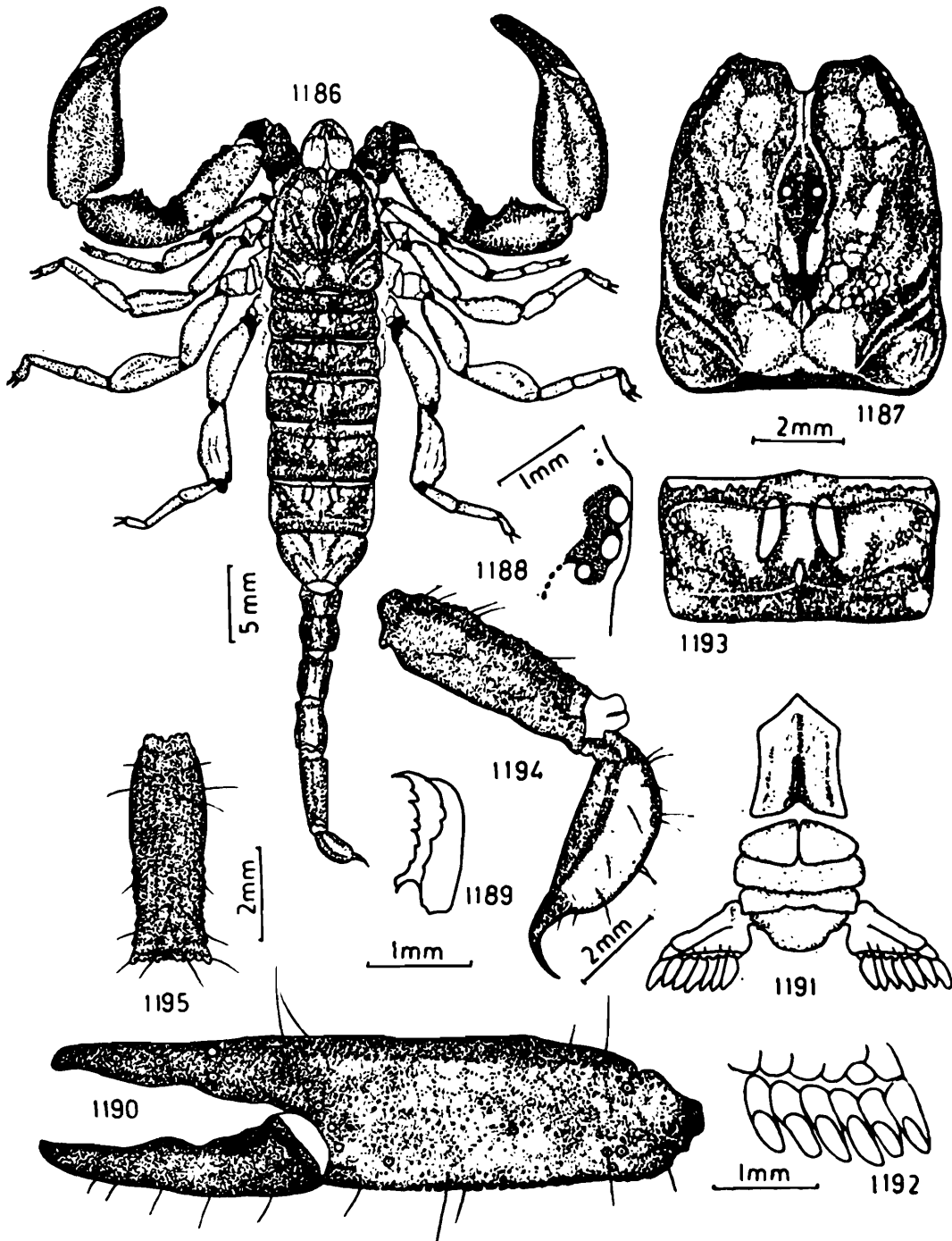
FIGS. 1186-1195. *Scorpiops (Scorpiops) montanus* Karsch

1186. Dorsal view of female.

1187. Carapace, dorsal view.

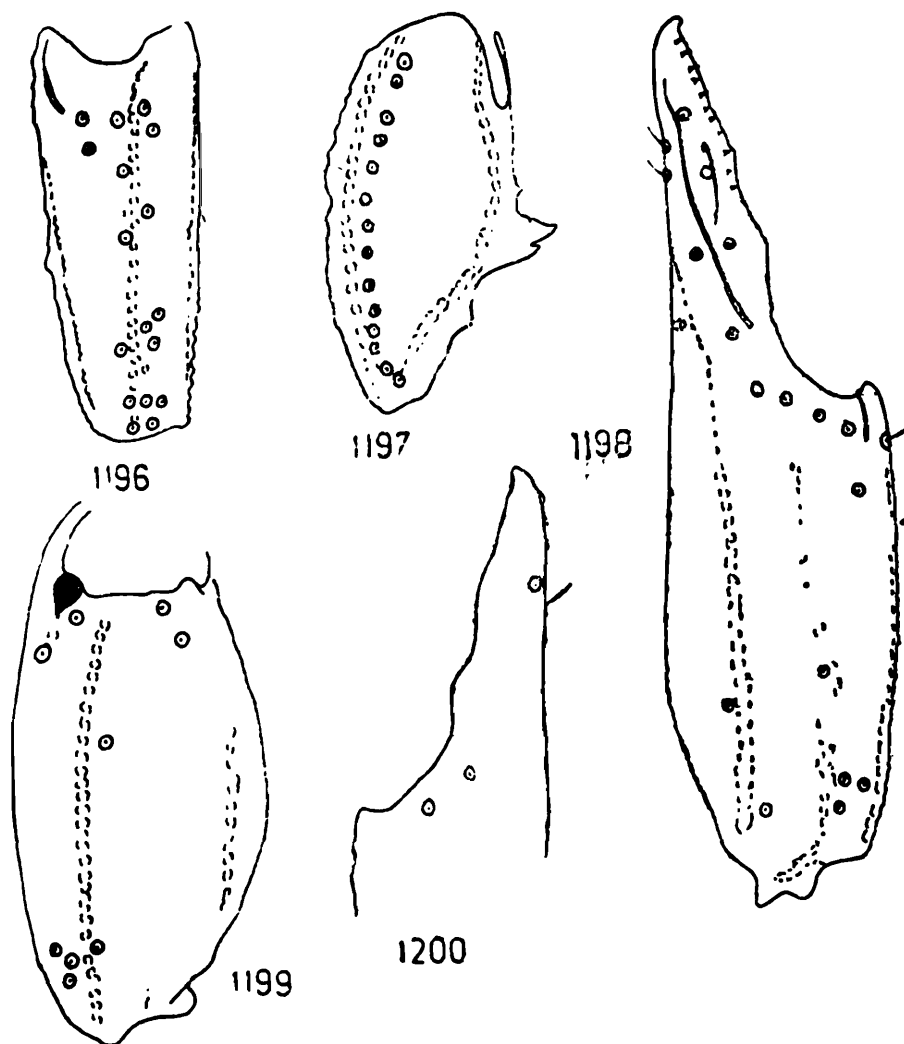
1188. Lateral eyes, lateral view.

1189. Movable finger of chelicera, interior view.



- 1190. Manus and fingers of pedipalp, exterior view.
- 1191. Pectines genital operculum and cephalothoracic sternum, ventral view.
- 1192. Pectinal teeth, ventral view.
- 1193. Tergite, dorsal view.
- 1194. Telson and segment V, lateral view.
- 1195. Segment V, ventral view.

irregularly granular. Inner secondary sparsely but coarsely granular. Sub-inner secondary and sub-marginal carinae poorly developed. Intercarinal space granular but granules arranged in mosaic fashion and more coarsely, irregularly granular on inner portion. Finger carinated and carinae granular on proximal portion but smooth on distal portion. Movable finger longer than carapace in male but shorter in female. Immovable finger shorter than patella. Dentition on fingers very fine and arranged in two



FIGS. 1196-1200. *Scorpiops (scorpiops) montanus* Karsch

- 1196. Patella, exterior view.
- 1197. Patella, ventral view.
- 1198. Manus and immovable finger, exterior view.
- 1199. Manus, ventral view.
- 1200. Immovable finger, ventral view.

rows, scalloped at the base and scallops very deep in male. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1196-1200. Legs normal, thickly granular on femur but finely and weakly granular on patella. Inner carinae on femur and patella crenulated. Outer carinae on femur weakly crenulated and smooth on patella. Tibia and tarsomere I carinated but smooth. Tarsomere II smooth without carinae and provided below with a row of minute reddish spicules. Spine formula on legs I-IV : $\frac{6}{6}$, $\frac{6}{6}$, $\frac{7}{7}$, $\frac{8}{7}$. Pectines not well developed, short but stout and 1.9 times longer than wide. Lamellae distinct but middle lamellae weakly divided into five to six small digits. Fulcra not well developed. Lamellae covered with microscopic setae. Pectinal teeth tubular, more tapering as in text-fig. 1192 and 8/8 in male as in text-fig. 1191 and 6/6 in female. Basal piece well sclerotized. Genital operculum always wider than long. Sclerites slightly separated on posterior portion in male, from which a pair of conspicuous male genital papillae protruding out. Cephalothoracic sternum pentagonal, longer than wide and provided with a longitudinal depression on posterior portion as in text-fig. 1191.

Mesosoma : All tergites granular but more granular on lateral portion of each tergite. Granulation more thick, close and distinct in female than in male. Tergites II-VI provided with a weak, obsolete median carina in female. Median carina absent in male as in text-fig. 1193. Posterior and lateral margins of each tergite smooth. Pretergal portion smooth with smooth posterior margin. Tergite VII provided with two pairs of granular carinae in female and developed only on posterior portion. Tergite VII provided with two pairs of weakly developed, obsolete carinae in male. Posterior and lateral margins finely crenulated. Pretergal portion finely granular on lateral portions, with smooth posterior margin. Sternites I-IV smooth with smooth and weakly distinct presternal portion. Posterior and lateral margins also smooth. Each sternite provided with a pair of slit like stigmata for book lungs. Sternite V weakly granular in female and smooth in male, provided with obsolete carinae in female but without carinae in male.

Metasoma : Cauda about three times as long as carapace in male and two and a half times in female. Basal segment always wider than long and provided with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae, weakly granular. Segments II-IV provided with dorsal, dorsolateral, inferior lateral and inferior carinae, but dorsal carinae on each segment strongly elevated and spiniform posteriorly. Intercarinal space very weakly and irregularly granular. Anterior peduncle of each segment smooth. Each carina provided with reddish setae on either sides. Segment V always shorter than carapace but longer than total length of segments II and III, provided with dorsal carinae almost evenly granular. Inferior lateral carinae evenly crenulated. Single inferior median carina evenly crenulated but bifurcated on posterior portion. All carinae provided on either sides with few reddish setae. Intercarinal space weakly and irregularly granular. Anal rim of this segment evenly crenulated as in text-figs. 1194 & 1195. Telson longer than caudal segment V but shorter than carapace. Vesicle elongated and as long as caudal segment IV, weakly and finely granular on ventral and lateral surface. Aculeus less curved, sharp, reddish on distal portion, short, almost half as long as vesicular length and provided with depression at the base. Setation on vesicle as in text-fig. 1195.

Distribution : INDIA : Jaunsar, Kasauli, Dharmasala (*Type-locality*) Punjab; Dehra Dun, Nainital, Uttar Kashi, Pauri, Tehri, Almora, Uttar Pradesh.

Remarks : We have examined, described and illustrated on the basis of male and female from the type series received from B.M. (N.H.) London, Regd. No. 1897.9.5.35-36. We have also examined and studied many specimens received from Northern Regional Station, Dehra Dun. Some identified specimens are deposited in the Western Regional Station, ZSI, Poona.

63. *Scorpiops (Scorpiops) rohtangensis* Mani

(Figs. 1201-1216)

1959. *Scorpiops rohtangensis* Mani, *Agra. Univ. J. Res. (Sci.)*, 8(1) : 11.
1980. *Scorpiops (Scorpiops) rohtangensis* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 4^e ser. 2, sect. A, (1) : 143.

General : Male of medium size. Carapace and mesosomal tergites finely granular. Ocular tubercles not prominent. Tergites without carinae. Sternites smooth except last. Stigmata elliptical. Chelicera small, ventral fang furnished with 6 minute teeth. Pedipalp robust on manus, carinated. Legs carinated. Pectines weakly developed. Metasoma carinated and all carinae weakly crenulated.

Body colour yellowish with slight brownish tint. Ocular tubercles black. Chelicera light yellow. Pedipalp more brownish on carinae and fingers. Metasoma yellowish but more yellowish on telson.

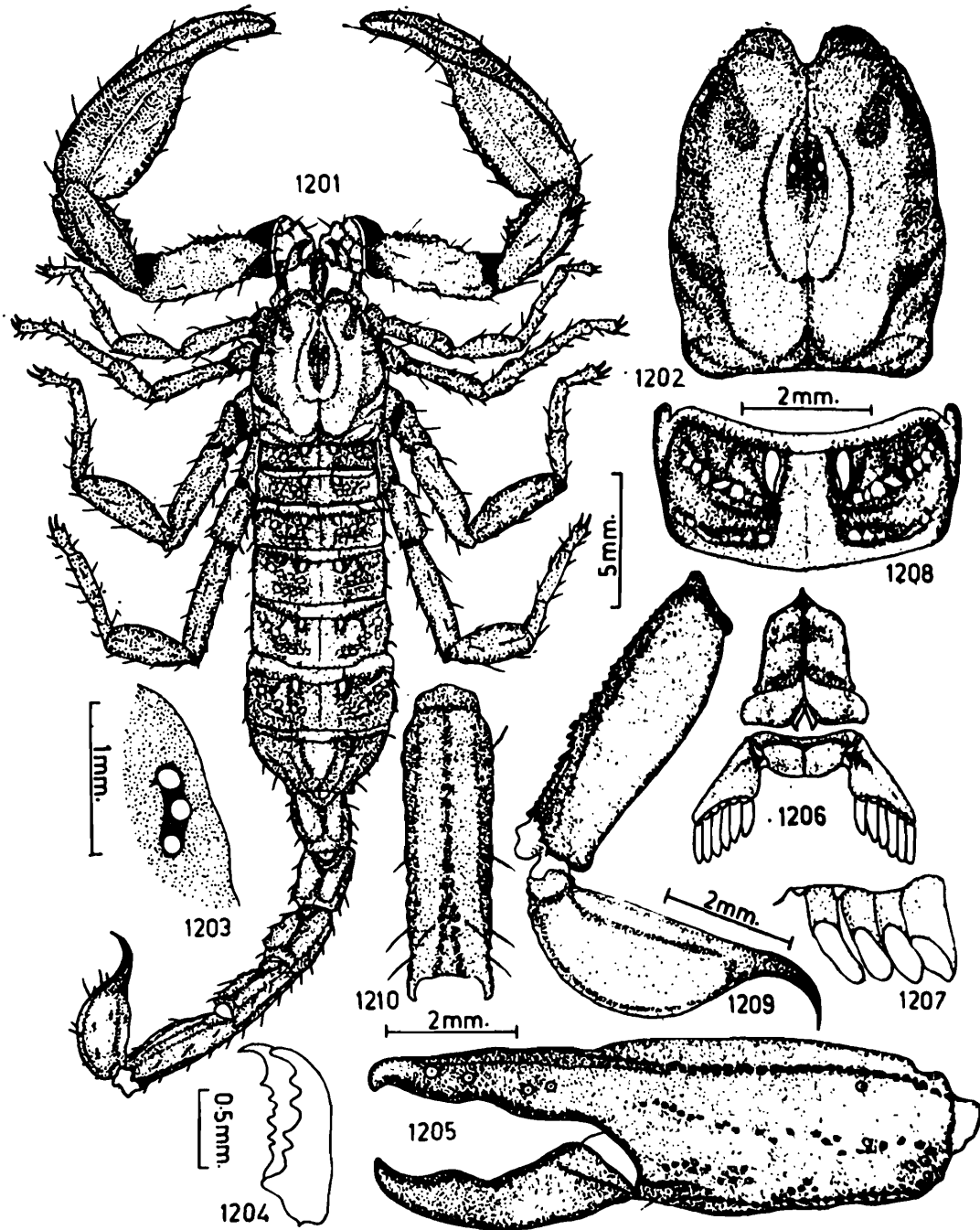
Measurement : Total length 37.75 mm. Carapace 5.25 mm. long; Mesosoma 13.50 mm. long; Metasoma 19.00 mm. long.

Carapace : Entire surface finely and slightly sparsely granular. Lateral ocular tubercles granular and provided with three contiguous eyes as in text-fig. 1203. Median ocular tubercles smooth, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2 as in text-fig. 1202. Anterior margin smooth and deeply notched in the middle. Lateral margins finely crenulated. Posterior margins almost smooth and straight. Only posterior median and posterior lateral furrows slightly distinct. Chelicera smooth on basal segment and thickly clothed with silky hair on ventral portion. Fingers short, stout and provided with dentition as characterised in family. Ventral distal and dorsal distal teeth almost subequal but ventral fang provided with six minute teeth on inner margin as in text-fig. 1204. Pedipalp stout and robust on manus. Femur flat, carinated and shorter than carapace, all carinae crenulated. Anterior or outer surface provided with a crenulated carina. Posterior or inner surface furnished

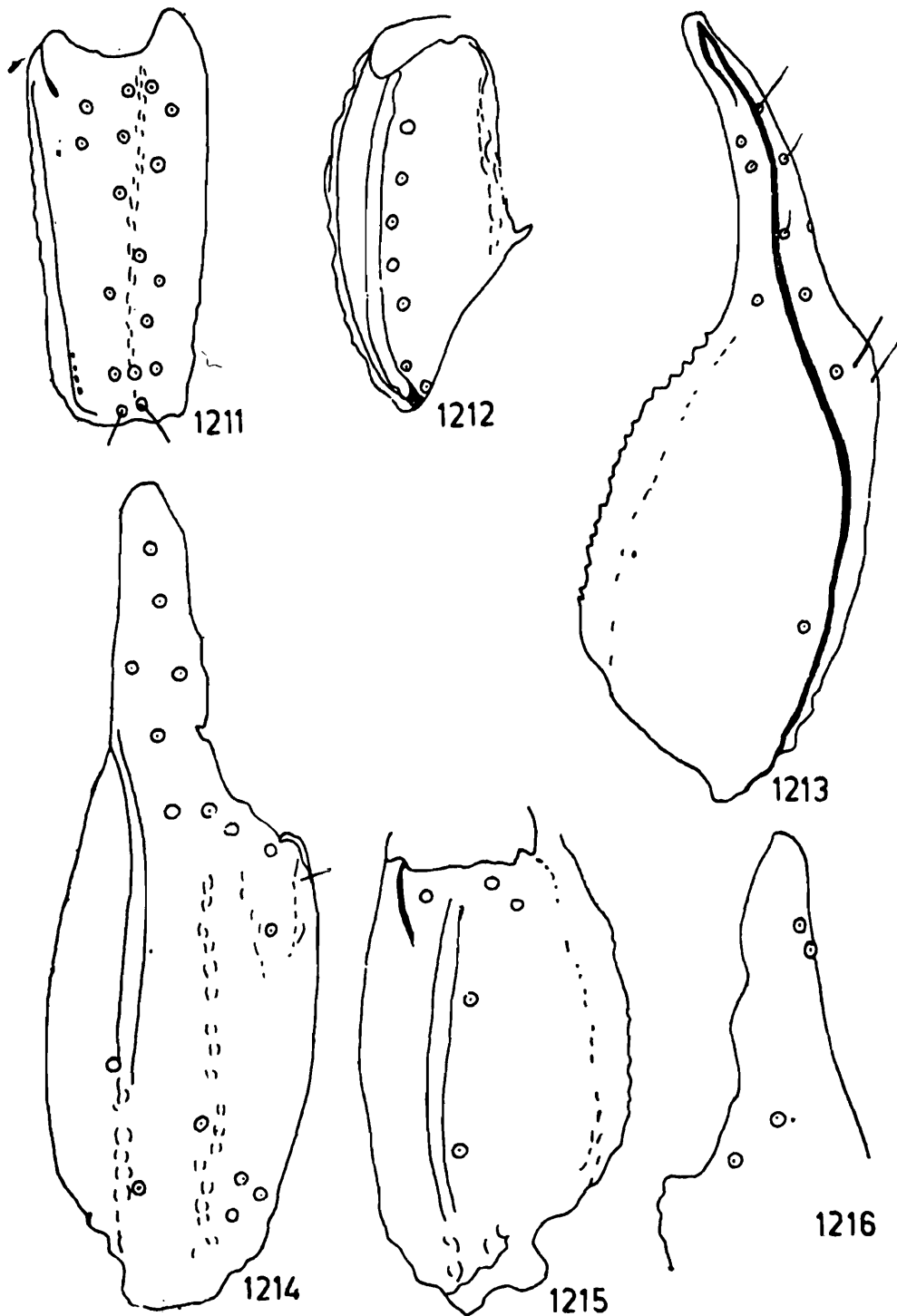
with weakly crenulated carina. Intercarinal space finely and sparsely granular. Patella not as flat as femur but longer than femur and shorter than carapace, carinated, all carinae evenly and coarsely granular. Anterior or inner surface armed with a pair of small denticulate tubercles on proximal portion. Posterior or outer surface provided with granular exterior median carina. Manus robust but slightly shorter than twice the width, dorso-ventrally flat and carinated. Digital carina granular on proximal portion but granules obsolete and smooth on distal portion and continued on immovable finger. Exterior secondary and secondary accessory sparsely granular and weakly distinct. Exterior marginal carina strong, granular but granules obsolete. Exterior, interior marginal and inner secondary carinae closely granular as in text-fig. 1205. Intercarinal space sparsely granular but more coarsely granular on interior portion. Fingers shorter than the length of under hand but immovable finger shorter than movable finger. Digital carinae continued on inner portion of immovable finger upto the tip as in text-fig. 1205. Dentition on fingers minute and arranged in double rows, scalloped in the middle portion but scallops not much deep as in text-fig. 1205. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1211-1216. Legs carinated on femur and patella but carinae on posterior side almost smooth and carinae on inner margin finely crenulated. Intercarinal space almost smooth. Tibia carinated but smooth. Tarsomere I smooth and provided distally with two rows of small, reddish spinules on ventral portion. Tarsomere II smooth and furnished with a ventral row of small spines and spine formula on legs I-IV : $\frac{6}{8}$, $\frac{8}{8}, \frac{8}{8}, \frac{9}{4}$. A pair of claws normal. All segments clothed sparsely with long as well as short microscopic setae. Pectines weakly developed and 1.75 times longer than wide. Lamellae fully fused to form single, broad lamella. Fulcra totally absent. Lamellae clothed with short, microscopic setae. Teeth tubular, tapering

FIGS. 1201-1210. *Scorpiops (Scorpiops) rohtangensis* Mani

1201. Dorsal view of male.
 1202. Carapace, dorsal view.
 1203. Lateral eyes, lateral view.
 1204. Movable finger of chelicera, interior view.



- 1205. Manus and finger of pedipalp, exterior view.
- 1206. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1207. Pectinal teeth, ventral view.
- 1208. Tergite, dorsal view.
- 1209. Telson and segment V, lateral view.
- 1210. Segment V, ventral view.



Figs. 1211-1216. *Scorpiops (Scorpiops) rohtangensis* Mani

- 1211. Patella, exterior view.
- 1212. Patella, ventral view.
- 1213. Manus and immovable finger, dorsal view.
- 1214. Manus and immovable finger, exterior view.
- 1215. Manus, ventral view.
- 1216. Immovable finger, interior view.

distally as in text-fig. 1207 and 6/6 in number as in text-fig. 1206. Basal piece smooth with slightly invaginated anterior margin. Genital operculum always wider than long, sclerites slightly separated on posterior portion from which a pair of conspicuous male genital papillae as in text-fig. 1206. Cephalothoracic sternum pentagonal, almost as long as wide, smooth on entire surface and provided with a depression on posterior portion.

Mesosoma : All tergites finely and weakly granular. Tergites I-VI without carinae, lateral and posterior margins smooth as in text-fig. 1208. Pretergal portion also smooth. Tergite VII slightly more granular on lateral portions and provided with two pairs of lateral, weakly crenulated carinae. Lateral margins almost smooth but posterior margin weakly granular. Pretergal portion smooth. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion also smooth. Sternite V very weakly granular and provided with two pairs of weakly granular carinae. Lateral margins almost smooth but posterior margin poorly granular.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment wider than long. Segment II slightly longer than wide. Segments III and IV always longer than wide. Segment V shorter than carapace. Segments I-IV provided with dorsal, dorsolateral, inferior lateral and inferior carinae. Lateral carinae present only on segment I. Dorsal carinae weakly granular, not elevated and also not spiniform posteriorly. Intercarinal space granular but more granular on dorsal portion. Anterior peduncle also granular. Posterior margin weakly granular. Segment V not as long as carapace, only inferior lateral and single inferior median carinae well developed, sparsely and strongly serrated. Intercarinal space more granular than preceding segments. Anterior peduncle finely granular. Anal rim of this segment strongly serrated as in text-figs. 1209 & 1210. Telson longer than caudal segment V as well as carapace. Vesicle smooth and shorter than caudal segment V. Lateral and ventral bands inconspicuous. Ventral median crest obscure. Aculeus short, not much curved, less than half the length of

vesicle, reddish brown on distal portion and sharply pointed as in text-fig. 1209.

Distribution : INDIA : Rohtak (*Type-locality*) Punjab.

Remarks : We have studied the male *Holotype* received from National Collection, ZSI, Calcutta, Regd. No. 3087/18.

The present description and illustrations are based on the same specimen.

64. *Scorpiops (Scorpiops) leptochirus* Pocock

(Figs. 1217-1230)

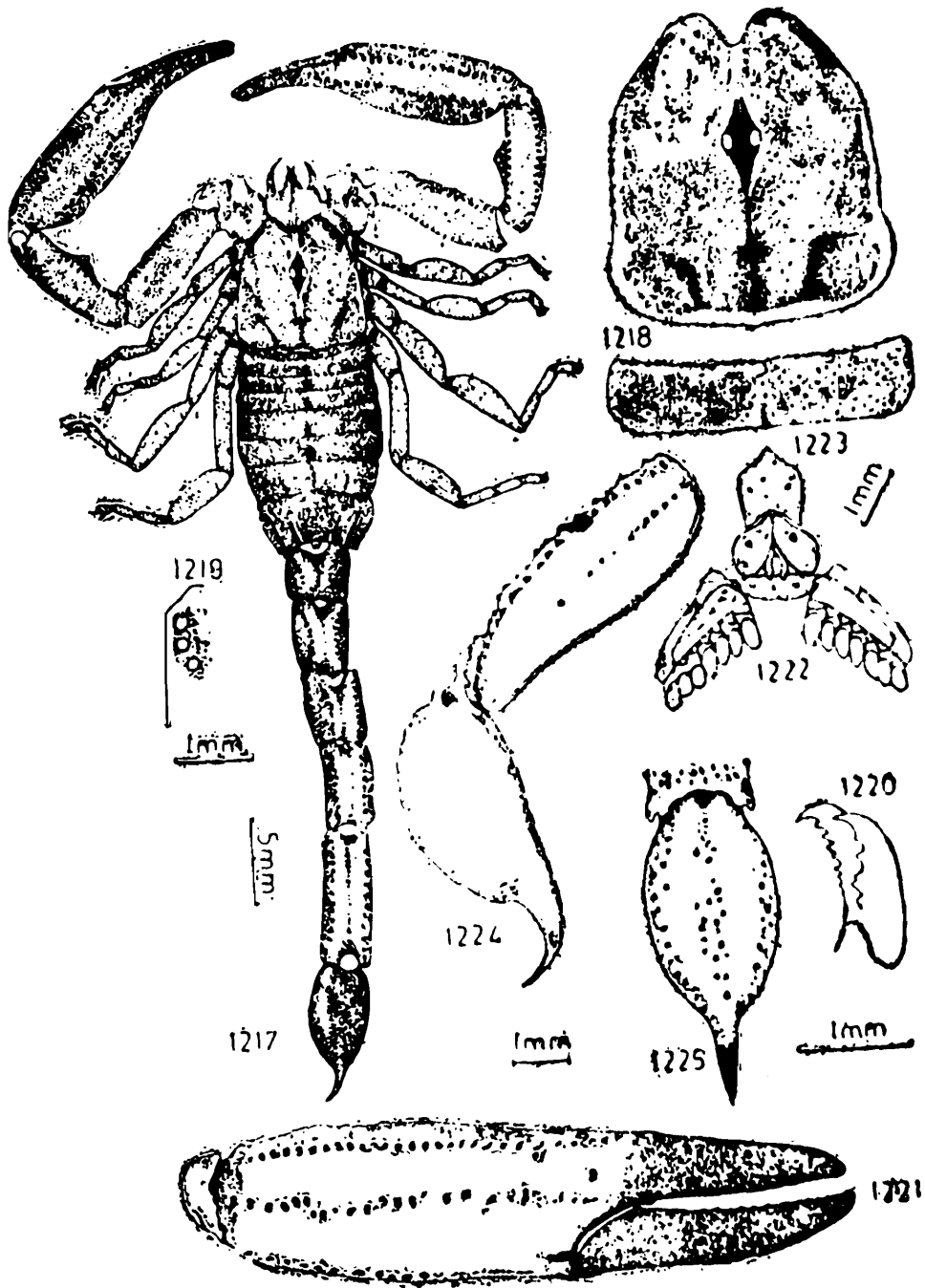
1894. *Scorpiops leptochirus* Pocock, *Ann. Mag. nat. Hist.*, 12(6) : 79.
 1899. *Scorpiops leptochirus* : Kraepelin, *Trerr. Scorp. etc.*, : 181.
 1900. *Scorpiops leptochirus* : Pocock, *Fauna Brit. India, Arachn.*, : 69.
 1980. *Scorpiops (Scorpiops) leptochirus* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 4^e ser, 2, Sect. A, (1) : 143.

General : Male of medium size. Entire body surface coarsely granular. Carapace not flat and middle portion more elevated, interocular area more coarsely granular. Chelicera smooth and fingers elongated. Pedipalp thin, elongated, manus much narrowed as in text-fig. 1217. Legs normal. Pectines moderately developed but teeth exceptionally long and tubular. Mesosomal tergites thickly granular and II-VI monocarinated. Last sternites provided with two pairs of granular carinae. Metasoma carinated and thickly granular. Vesicle of telson more than as wide or deep as segment V.

Body colour deep brown to reddish brown. Carapace slightly pale. Chelicera yellowish brown but reddish on fingers. Pedipalp dark brown with blackish carinae but fingers more darker.

FIGS. 1217-1225. *Scorpiops (Scorpiops) leptochirus* Pocock

1217. Dorsal view of male.
 1218. Carapace, dorsal view.
 1219. Lateral eyes, lateral view.

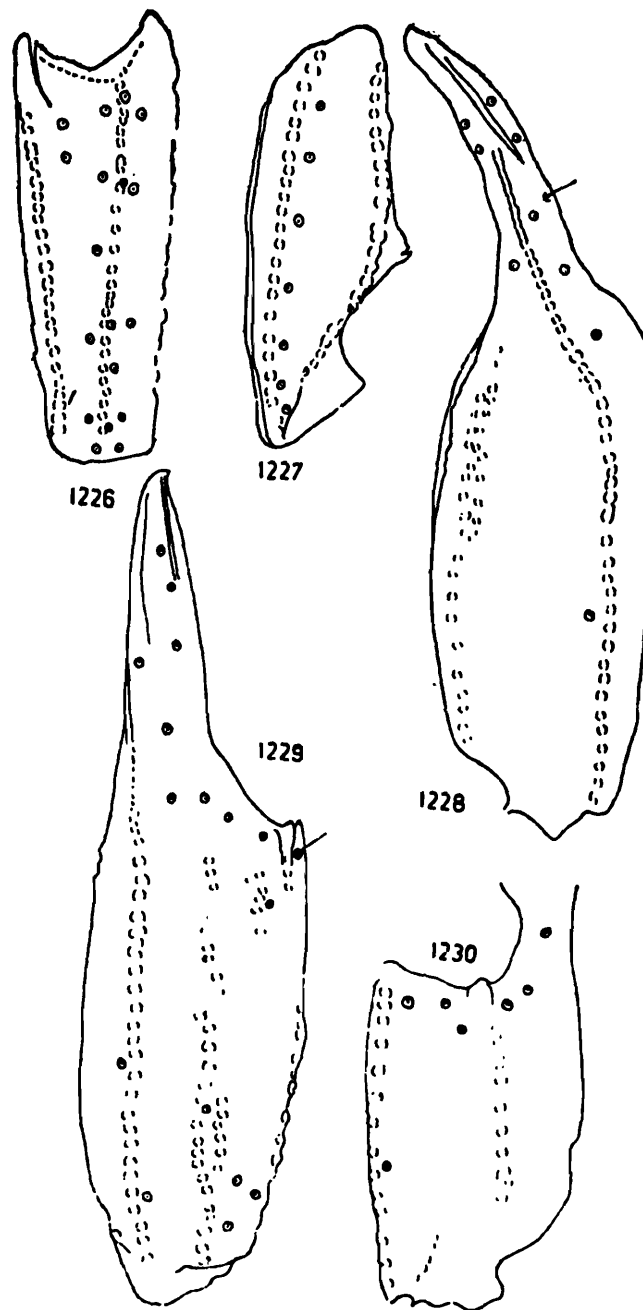


- 1220. Movable finger of chelicera, interior view.
- 1221. Manus and fingers of pedipalp, exterior view.
- 1222. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1223. Tergite, dorsal view.
- 1224. Telson and segment V, lateral view.
- 1225. Telson and distal portion of segment V, ventral view.

Legs yellowish. Ventral side of mesosoma yellowish. Pectines yellowish. Metasoma dark reddish brown but slightly brown on telson.

Measurements : Total length 41.75 mm. Carapace 5.75 mm. long; Mesosoma 12.50 mm. long; Metasoma 23.50 mm. long.

Carapace : Entire surface thickly granular except a pair of small round patches interior to lateral ocular tubercles. Interocular area coarsely granular. Lateral ocular tubercles granular and continued posteriorly into short granular carina, tubercles provided with three contiguous lateral eyes as in text-fig. 1219. Median ocular tubercles granular but granules obsolete, elevated and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2 as in text-fig. 1218. Posterior median, posterior lateral, lateral ocular, anterior lateral and anterior median furrows distinct. Anterior margin smooth and deeply notched in the middle portion. Lateral margins finely crenulated and furnished with a fine granular submarginal ridge in the middle portion. Posterior margin smooth. Chelicera smooth on dorsal surface of basal segment while ventral surface clothed with short silky hairs. Fingers more elongated and sharp on dentition. Dentition as characterised in the family and ventral inner margin of movable finger provided with six to seven minute teeth as in text-fig. 1220. Pedipalp more elongated and thin, carinated on all segments. Femur longer than carapace and carinated. Dorsal anterior carina granular, only dorsal posterior or inner carina well developed and sparsely granular. Anterior or outer surface provided with evenly crenulated carina but situated on lower portion. Posterior or inner surface provided with weakly developed carina, distinct only on distal portion. Intercarinal space finely but thickly granular and few granules coarse. Patella longer than carapace but as long as femur. Dorsal and ventral carinae coarsely granular and distinct but outer carinae with obsolete granules. Anterior or inner surface provided with pair of small dentiform tubercles on proximal portion. Posterior or outer surface provided with a median granular carina but granules obsolete. Intercarinal space finely granular. Manus thin, elongated, longer than femur or patella, carinated and seven carinae



Figs. 1226-1230. *Scorplops (Scorplops) leptochirus* Pocock

- 1226. Patella, exterior view.
- 1227. Patella, ventral view.
- 1228. Manus and immovable finger, dorsal view.
- 1229. Manus and immovable finger, exterior view.
- 1230. Manus, ventrointerior view.

distinct. Digital, exterior marginal and inner secondary carinae evenly granular but only digital carina continues distally on immovable finger as in text-figs. 1221 & 1228. Submarginal and exterior secondary carinae weakly developed and carinae comprise of many granules. Secondary accessory carina short and granular. Intercarinal space finely granular, granules arranged in ridges but thickly granular on distal portion. Movable finger longer than carapace but shorter than femur or patella. Immovable finger slightly shorter than carapace, carinated. Dentition minute, arranged in two rows, straight and without scallops as in text-fig. 1221. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1226-1230. Legs finely granular and carinated on femur and patella. Tibia carinated but smooth. Tarsomere I and II smooth and furnished with a row of small, reddish spinules. Spine formula on legs I-IV : $\frac{4}{4}$, $\frac{5}{5}$, $\frac{6}{6}$, $\frac{7}{6}$. Pectines moderately developed and 2.5 times longer than wide. Middle lamellae poorly separated into small digits. Fulcra very poorly distinguished. Lamellae covered sparsely with few reddish setae. Pectinal teeth exceptionally elongated, tubercular and 7/7 in number. Basal piece smooth with straight anterior margin. Genital operculum wider than long, sclerites separated on posterior portion from which a pair of conspicuous male genital papillae protruding out. Cephalothoracic sternum almost as long as wide, finely granular and provided with a longitudinal furrow as in text-fig. 1222.

Mesosoma : All tergites granular but very sparsely and irregularly granular. Tergites II-VI monocarinated and median carinae granular as in text-figs. 1217 & 1223. Lateral and posterior margins granular. Presternal not visible. Tergite VII granular, two pairs of lateral carinae and a median carinae granular. Lateral and posterior margins granular. Presternal not visible. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion not visible. Sternite V very sparsely, weakly granular and provided with two pairs of granular carinae. Lateral and posterior margins granular. Presternal portion not visible.

Metasoma : Cauda almost four times as long as carapace. Basal segment wider than long. Segment I provided with ten carinae and all carinae evenly granular. Segments II-IV provided with eight carinae, all carinae granular and only dorsal carinae on segments I-IV slightly elevated and weakly spiniform posteriorly. Intercarinal space sparsely granular and some granules coarse. Anterior peduncle finely and thickly granular. Posterior margin coarsely granular. Segment V as long as carapace and with dorsal, dorsolateral, inferior lateral and single inferior median carinae. Dorsal and dorsolateral evenly granular but dorsolateral carinae developed on 2/3 anterior portion. Inferior lateral and inferior median carinae sparsely serrated; serration increases posteriorly and bifurcated on posterior portion. Intercarinal space irregularly granular. Anterior peduncle smooth. Anal rim of this segment serrated as in text-figs. 1224 & 1225. Telson longer than last segment but shorter than femur or patella. Vesicle globular more than as wide or deep as last segment but shorter than segment IV. Surface entirely finely granular. Ventral and lateral depression smooth and distinct. Aculeus short, not as long as half the vesicular length, broad at the base, sharp, reddish brown at the distal portion as in text-figs. 1224 & 1225.

Distribution : INDIA : Tura in the Gairo Hills, Meghalaya and Sadia (*Type-locality*) ; BANGLADESH.

Remarks : We have examined, described and illustrated on the basis of one male type specimen received from B.M. (N.H.), London, Regd. No. 1893. 10.29.11.

65. *Scorpiops (Scorpiops) petersi* Pocock

(Figs. 1231-1246)

1893. *Scorpiops petersii* Pocock, *Ann. Mag. nat. Hist.*, 12(6) : 323
 1899. *Scorpiops hardwickii* : Kraepelin, *Tierr. Scorp. etc.*, : 181.
 1900. *Scorpiops petersii* : Pocock, *Fauna. Brit. India, Arachn.*, : 70.
 1974. *Scorpiops petersi* : Stahnke, *J. Arachnol.*, 1(2) : 107.
 1980. *Scorpiops (Scorpiops) petersi petersi* : Vachon, *Bull. Mus. natn. Hist. nat., Paris, 4^e Ser., 2 Sect. A, (1)* : 143.

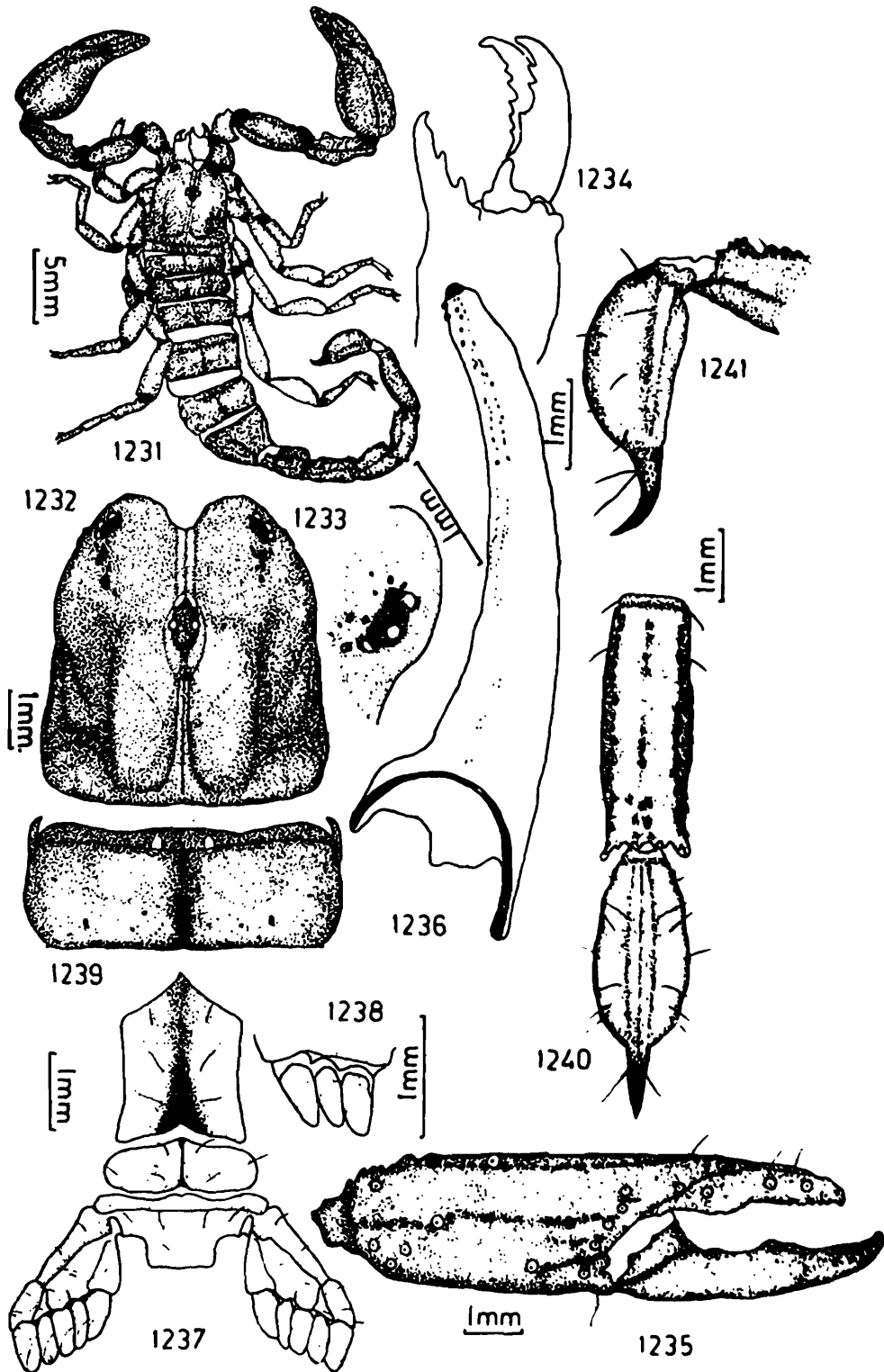
General : Female of medium to bigger body size. Body colour brownish and slightly darker on pedipalp and carapace as in text-fig. 1231. Chelicera pale yellow, slightly brown on fingers. Legs paler than body colour. Cauda brownish with slightly paler telson but aculeus brownish. Sternites brownish but pale. Last sternite provided with two pairs of granular carinae. Pectines not well developed.

Measurements : Total length 41.00 mm. Carapace 6.50 mm. long; Mesosoma 14.50 mm. long; Metasoma 20.00 mm. long.

Carapace : Entire surface finely and coarsely granular. Median central depression extend anteriorly around median eyes upto the median notch on anterior margin. Posterior lateral depression prominent. Anterior margin exactly half as wide as posterior margin and smooth, with deep median notch, provided with few, short, setae. Lateral margins granular or finely

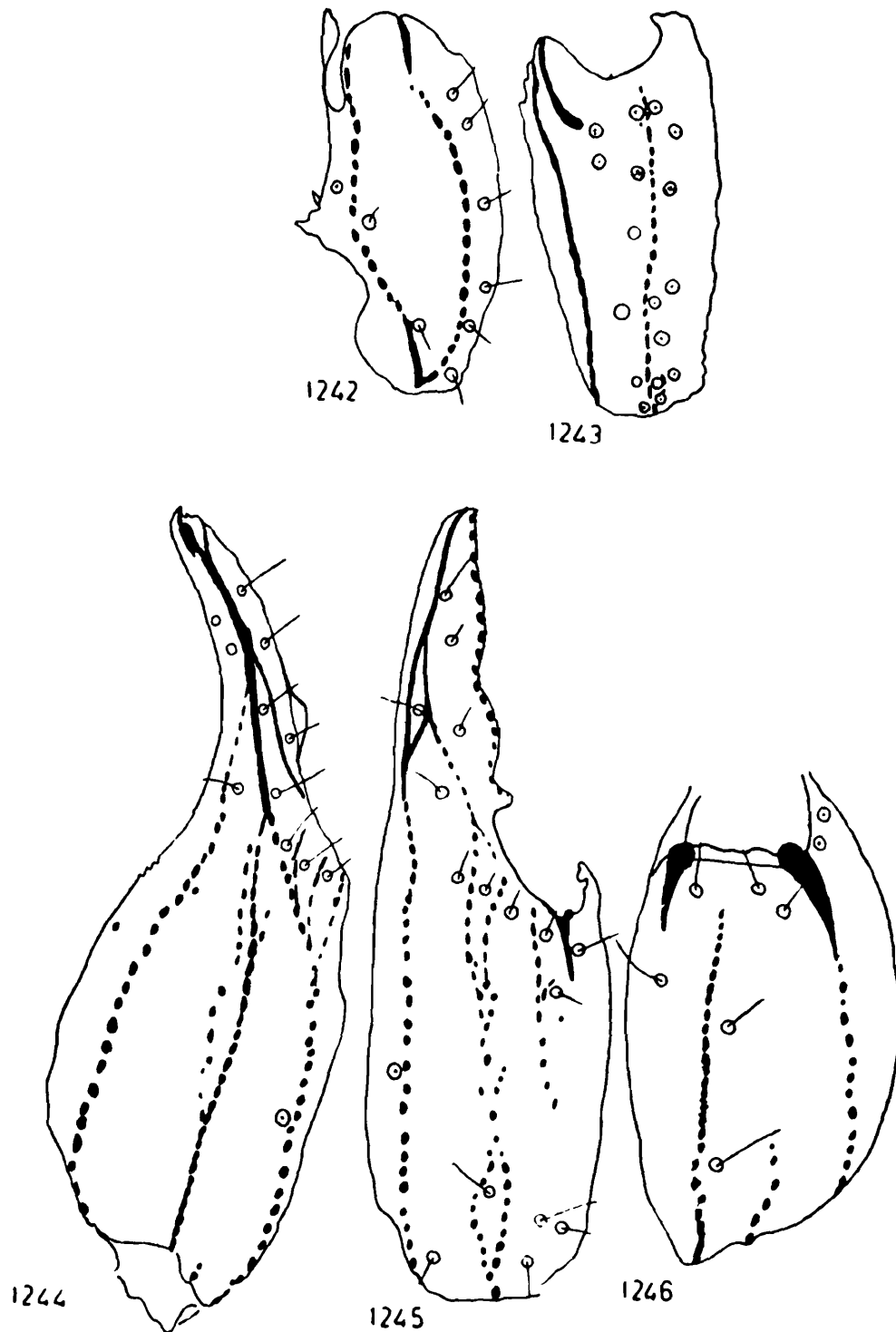
 FIGS. 1231-1241. *Scorpiops (Scorpiops) petersi* Pocock

1231. Dorsal view of female.
 1232. Carapace, dorsal view.
 1233. Lateral eyes, lateral view.
 1234. Movable and immovable fingers of chelicera, dorsal view.
 1235. Manus and fingers of pedipalp, exterior view.
 1236. Movable finger of pedipalp, dorsal view.
 1237. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1238. Pectines, ventral view.



- 1239. Tergite, dorsal view.
- 1240. Telson and segment V, ventral view.
- 1241. Telson and distal portion of segment V, lateral view.

crenulated and provided with submarginal granular ridge. Posterior margin smooth and almost straight. Lateral ocular tubercles granular and extended posteriorly by few granules as in text-fig. 1233 and provided with three contiguous lateral eyes. Median ocular tubercles smooth, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.9 as in text-fig. 1232. Chelicera with pale yellow basal segment, smooth on dorsal surface, ventral surface smooth but anterior portion thickly covered with short, silky hairs, extending on ventral surface of fingers. Fingers darker but dark brown on dentition. Dentition on fingers as characterised in family. Ventral arm of movable finger armed on inner margin with a series of five minute teeth as in text-fig. 1234. Dorsal and ventral distal teeth of movable finger almost subequal in length. Pedipalp more brownish but darker on carinae and dorso-ventrally flat. Femur shorter than carapace, all carinae granular but inner carinae more granular than outer. Anterior or outer surface provided with well crenulated carinae developed only on proximal half portion. Intercarinal space granular. Patella as long as femur, carinated and carinae granular but outer carinae less granular. Inner or anterior surface provided with two strong, pointed, denticular tubercles. Intercarinal space finely granular but less granular than preceding segment. Manus dorso-ventrally flat, length of under hand slightly shorter than carapace. Entire surface covered with large and fine granular. Seven carinae well developed and granular. Exterior marginal well developed and granulation less distinguished. Secondary accessory granular but very short. Exterior secondary granular and granulation very distinct. Digital strong, well developed, granular, clearly granular on proximal portion, less distinctly granular on distal portion, very smooth on digital portion and continues upto the tip of finger as in text-fig. 1235. Sub-digital granular, represented by very few sparse granules but prominent at the base. Inner secondary well developed, granular and granules distinct, never continued on finger. Sub-inner secondary granular and less distinct. Interior marginal well developed and granules bigger and distinct. Movable finger as long as the length of under hand. Immobile finger carinated as long as half the length of cara-



FIGS. 1242-1246. *Scorplops (Scorplops) petersi* Pocock

1242. Patella, dorsal view.

1243. Patella, exterior view.

1244. Manus and immovable finger, dorsal view.

1245. Manus and immovable finger, exterior view.

1246. Manus, ventral view.

pace. Carinae smooth. Dentition on fingers in double row, scalloped in the middle but scallops not much deep as in text-fig. 1235. Movable finger at the base provided with strong sub-basal suture as in text-fig. 1236. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1242-1246. Legs yellowish and more pale yellow on tips. Femur and patella weakly granular and carinated, outer carinae smooth and inner carinae weakly carinated. Tibia smooth and not carinated. Tarsomere I longer than tibia, smooth, non-carinated and provided with a pair of pedal spur. Tarsomere II not much compressed on lateral sides and armed below with a row of short, minute spines. Spine formula on legs I-IV : $\frac{8}{8}, \frac{8}{8}, \frac{10}{10}, \frac{10}{10}$. Claws not much strong, pointed and darker on distal portion. All segments sparsely clothed with reddish long setae. Pectines not well developed and 1.70 times longer than wide. Middle lamellae not divided into small digits. Fulcra not developed. Lamellae sparsely clothed with short reddish setae. Pectinal teeth short, not much tapering as in text-fig. 1238 and 5/5 in number. Basal piece well sclerotized, anterior margin almost straight, clothed sparsely with few short reddish setae. Genital operculum always wider than long; almost thrice as long and operculi united in the middle portion. Cephalothoracic sternum pentagonal, longer than wide and posterior portion deeply depressed in middle as in text-fig. 1237.

Mesosoma : All tergites granular but more granular on posterior portion, granules smooth and bigger. Tergites I-II with no carinae. Tergites III-VI provided with a median smooth carina and very inconspicuous, short lateral carinae as in text-fig. 1239. Posterior margin almost smooth but granular above. Lateral margins finely crenulated. Pretergal portion smooth with smooth posterior margin. Tergite VII provided with two pairs of weakly crenulated carinae, single median carina broad, covered with many granules. Intercarinal space more granular than preceding tergites. Posterior margin granular above, lateral margins granular. Pretergal portion smooth with smooth posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Sternite I without presternal portion. Sternites II-IV with smooth presternal por-

tion with smooth posterior margins. Posterior and lateral margins smooth. Sternite V weakly granular, provided with two pairs of weakly granular carinae. Presternal portion smooth. Posterior and lateral margins weakly granular.

Metasoma : Cauda short and less than three and a half times as long as carapace. Basal segment always wider than long. Segment I provided with dorsal crenulated carinae, dorso-lateral weakly granular, laterals well developed and granular. Inferior lateral and inferior carinae almost smooth. Segments II-IV provided with dorsal carinae crenulated, slightly spiniform on posterior end but more spiniform on segment IV than preceding. Dorsolateral carinae weakly granular. Lateral carinae represented only on segments II-IV but only on 1/3 or 1/4 posterior portion by few granules. Inferior lateral and inferior carinae granular. Intercarinal space very sparsely, poorly granular. Anterior peduncle of each segment finely granular. Posterior margin of each segment granular. Segment V shorter than carapace but as long as patella, dorso-ventrally flat. Dorsal carinae marked but almost smooth except few crenulated granules. Lateral carinae granular, developed on 2/3 anterior portion. Inferior lateral carinae well developed and serrated progressively on posterior portion. Single inferior median carina serrated throughout the length. Anal rim of this segment very sparsely serrated as in text-figs. 1240 & 1241. Intercarinal space weakly or poorly granular. All carinae provided with few sparse, reddish setae on outer sides. Telson more than as long as fifth caudal segment but shorter than carapace and as long as the length of under hand. Vesicle slightly shorter than last caudal segment but always wider and deeper than last caudal segment. Entire surface of vesicle smooth and lateral and ventral depressions brown. Aculeus exactly half the length of vesicle, dark brown on distal portion, not much curved and sharp as in text-figs. 1240 & 1241.

Distribution: INDIA : Simla (*Type-locality*), Himachal Pradesh.

Remarks : We have studied the type specimens received

from B.M. (N.H.), London, Regd. No. 60-15. Present illustrations and description are based on the type specimens.

Subgenus (iii) : **Euscorpiops** Vachon

1980 *Euscorpiops* Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 4^e ser. 2, sect. A, (1) : 143

Characters : Ventral surface of manus provided with 4 trichobothries; External surface of patella furnished with 18-20 trichobothries as : 5 *eb*; 2 *esb*, 2 *em*, 4-6 *est*, and 5-6 *et*. Trichobothries *Eb* 3 placed distal to *Dt* on manus. 8-13 trichobothries present on ventral surface of patella. Vesicle with a constriction at the base of aculeus.

Type-species : *Scorpiops asthenurus* Pocock.

Distribution : INDIA : Assam, Meghalaya, West Bengal and Sikkim; BHUTAN; PAKISTAN; AFGHANISTAN and THAILAND.

Key to the species of the subgenus Euscorpiops

1. Trichobothries on ventral surface of patella of pedipalp never excide than 10 in number. 2
 Trichobothries on ventral surface of patella of pedipalp always more than 10 in number. 3

2. Manus of pedipalp narrow, slender and more than four times longer than wide; *Esb* 3 placed more distally to *Esb*2; Trichobothria *Dt* on manus placed almost in the middle portion, Ventral (v) trichobothries on patella 8 in numbur; Trichobothries *est* of patella only 3 in number. *.bhutanensis*

Manus of pedipalp robust and about twice as long as wide; *Esb 3* not placed much distally to *Esb 2*, Trichobothria *Dt* on manus placed on proximal portion. Ventral (*v*) trichobothries on patella 9 in number; Trichobothries *est* on patella 4 in number.

.*asthenurus*

3. Trichobothria *est3* close to *est 2* and ventral surface of patella of pedipalp bears 10-11 (*v*) ventral trichobothries; *Esb 3* placed more distally to *Esb2* or *Dt* on manus; Pectinal teeth 7/7 in number

.*longimanus*

Trichobothria *est3* placed close to *est2* and ventral surface of patella bears 13-14 (*v*) trichobothries; *Esb3* placed not much distally to *Esb 2* or *Dt* on manus; Pectinal teeth 9/9 in number

.*binghami*

66. *Scorpiops (Euscorpiops) bhutanensis* sp. nov.

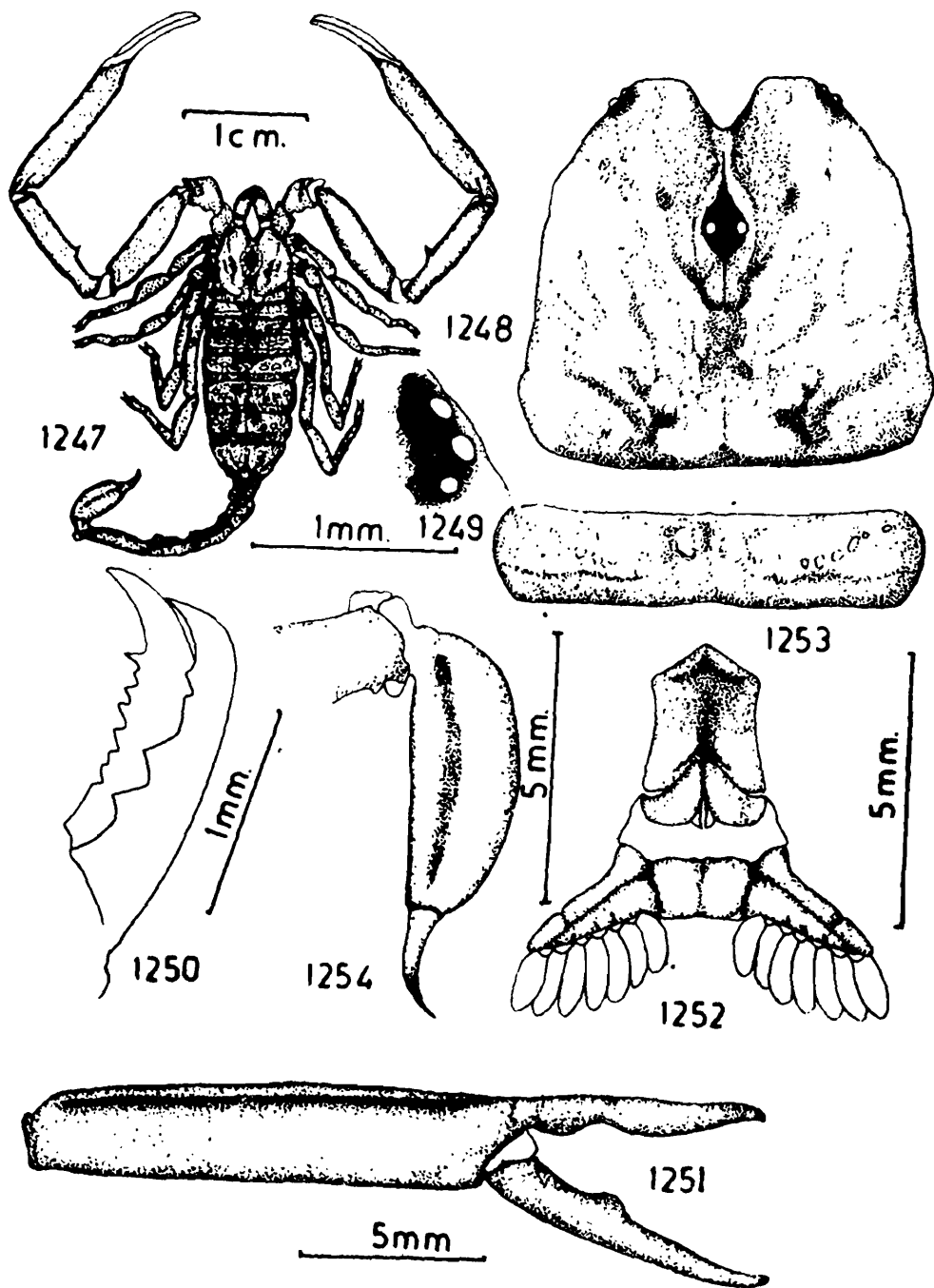
(Figs. 1247-1260)

General: Male of medium size. Entire body weakly granular. Carapace broad and anterior margin deeply notched in the middle. Chelicera smooth on basal segment. Pedipalp thin, slender, elongated on femur, patella and manus as in text-fig. 1247. Legs almost smooth on femur and patella. Pectines weakly developed. Mesosomal tergites weakly granular and last sternite furnished with two pairs of weakly granular carinae. Metasoma weak with elongated telson with an annular ring at the base.

Body colour yellowish and variegated with dark brown to blackish. Chelicera pale yellow. Pedipalp yellowish but dark brown to blackish on carinae and fingers.

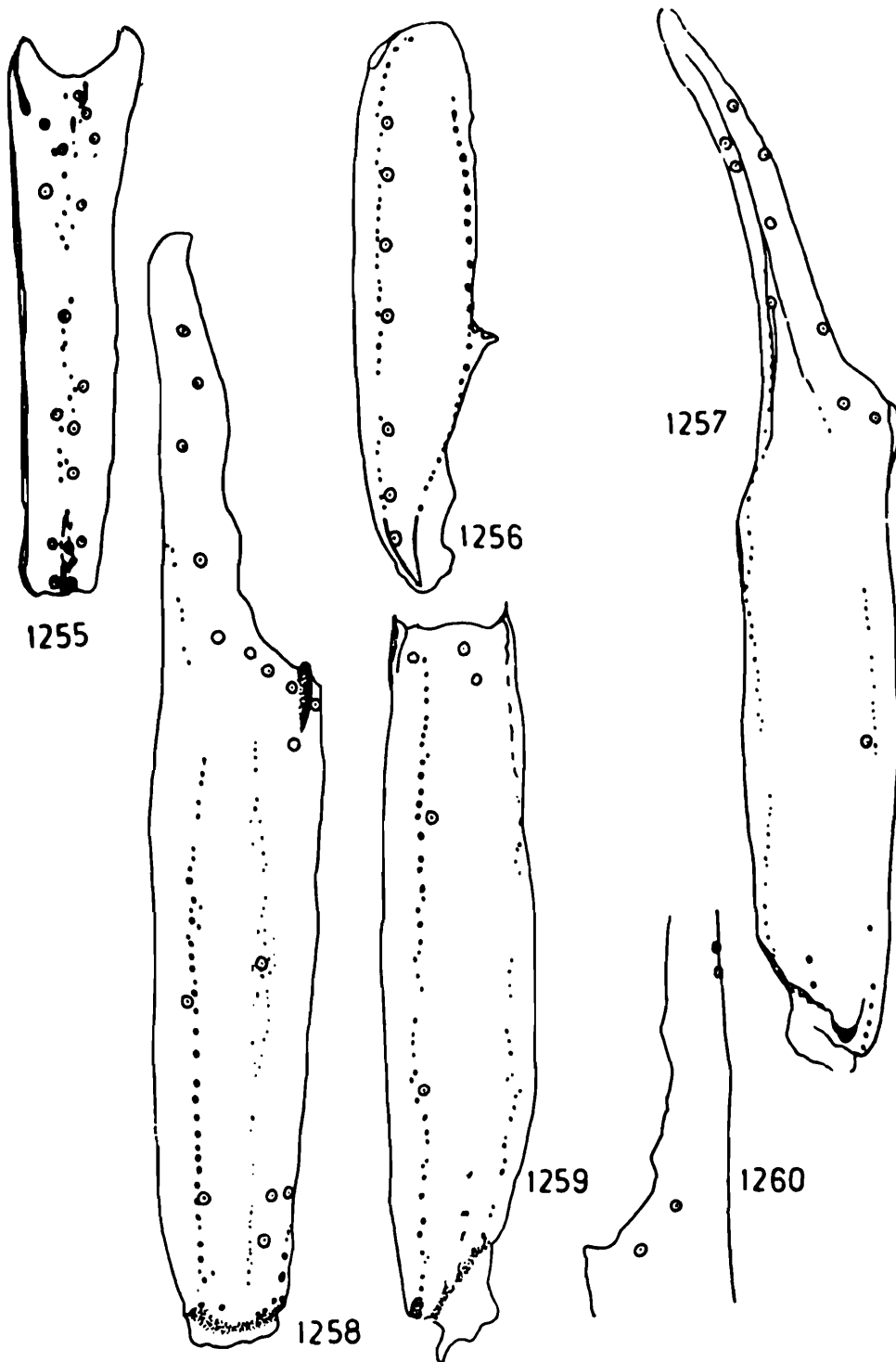
Measurements: Total length 49.50 mm. Carapace 6.25 mm. long; Mesosoma 20.00 mm. long; Metasoma 23.25 mm. long.

Carapace: Entire surface weakly granular. Interocular area also granular but more granular on anterior portion. Anterior



FIGS. 1247-1254. *Scorpions (Euscorpions) bhutanensis* sp. nov.

- 1247. Dorsal view of male.
- 1248. Carapace, dorsal view.
- 1249. Lateral eyes, lateral view.
- 1250. Movable finger of chelicera, interior view.
- 1251. Manus and fingers of pedipalp, exterior view.
- 1252. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1253. Tergite, dorsal view.
- 1254. Telson, lateral view.



FIGS. 1255-1260. *Scorpiops (Euscorpiops) bhutanensis* sp. nov.

1255. Patella, exerior view.

1256. Patella, ventral view.

1257. Manus and immovable finger, dorsal view.

1258. Manus and immovable finger, exterior view.

1259. Manus, ventral view.

1260. Distal portion of manus and immovable finger, interior view.

margin smooth, deeply notched in the middle. Lateral margins crenulated but slightly more crenulated on anterior portion. Posterior margin nearly smooth and straight. Lateral ocular tubercles granular and provided with three contiguous lateral eyes as in text-fig. 1249. Median ocular tubercles smooth, elevated and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.5 as in text-fig. 1248. Chelicera smooth on basal segment, ventral surface fully clothed with fine hairs. Finger thin and sharp on dentition. Dentition as characterised in family and ventral fang of movable finger armed with a series of six to seven small teeth on inner margin as in text-fig. 1250. Pedipalp exceptionally long, slender and length of pedipalp approximately equal to the body length. Femur twice as long as carapace and carinated. Inner or posterior carinae granular. Outer or anterior carinae almost smooth. Anterior surface without carina. Intercarinal space finely granular. Patella shorter than femur but longer than carapace. Outer carinae weakly granular and inner carinae almost smooth. Intercarinal space finely granular. Inner or anterior surface furnished with two to three short tubercles. Ventral exterior carina smooth and provided with seven trichobothries. Manus thin, elongated and length of under hand about four times as long as wide, carinated, six carinae distinct and all carinae weakly granular. Digital, secondary accessory, exterior inner, exterior, inner secondary and inner marginal carinae well developed. Intercarinal space smooth to weakly granular. Digital weakly continued on immovable finger as in text-fig. 1251. Fingers shorter than patella and immovable finger shorter than movable finger. Dentition on fingers arranged in double row of minute granules, scalloped at the base but scallops not much deep as in text-fig. 1251. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1255-1260. Legs carinated on femur and patella but carinae crenulated on femur and smooth on patella. Intercarinal space finely granular. Tibia smooth but carinated. Tarsomere I smooth and furnished on ventral surface with a row of minute spinules and a pair of pedal spurs on distal portion. Tarsomere II smooth and furnished on ventral side with a row of spicules and spine formula on legs

I-IV : $\frac{6}{8}$, $\frac{4}{8}$, $\frac{8}{7}$, $\frac{8}{8}$. Pectines moderately developed and 1.9 times longer than wide. Middle lamellae not clearly divided into small digits. Fulcra distinct. Lamellae and fulcra clothed with white to reddish microscopic setae. Pectinal teeth tubular, not much tapering and 7/7 in number as in text-fig. 1252. Basal piece smooth, notched on anterior margin. Genital operculum always wider than long and sclerites separated on posterior portion, from under which a pair of conspicuous male genital papillae protruding out. Cephalothoracic sternum pentagonal, almost as long as wide, posterior median portion provided with small depression on posterior portion as in text-fig. 1252.

Mesosoma : All tergites weakly granular. Tergites I-VI without any carina but more granular on lateral portion as in text-fig. 1253. Pretergal portion smooth. Tergites VII granular and more granular on lateral portion and provided with two pairs of weakly granular carinae. Lateral margins and posterior margins smooth to finely granular or crenulated. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Presternal portion not much distinct but always smooth. Sternite V weakly granular and two pairs of carinae weakly granular. Lateral and posterior margins smooth.

Metasoma : Cauda three and a half times as long as carapace. Basal segment wider than long. Segments I-IV carinated and dorsal carinae weakly crenulated, elevated and spiniform posteriorly on segments I & II but much elevated, more crenulated and spiniform posteriorly on segments III & IV. Dorso-lateral carinae granular on segments I-IV. Lateral carinae distinct only on segment I. Inferior lateral and inferior carinae weakly crenulated on segments I & II and serrated on segments III & IV. Intercarinal space finely and weakly granular. Segment V almost as long as carapace but shorter than femur, carinated and only inferior lateral and single inferior median carinae strongly serrated. Intercarinal space more granular than preceding segments. Anal rim of this segment crenulated as in text-fig. 1254. Telson longer than segment V. Vesicle elongated, finely granular and provided with sub-vesicular annular ring at the base of aculeus. Vesicle slightly more than as wide as segment V. Aculeus not much curved, less than half the vesi-

cular length, reddish on distal portion. Setation on vesicle as in text-fig. 1254.

Type-specimens: *Holotype* male, in spirit, deposited in National Collection, ZSI, Calcutta, Regd. No. 5094/18.

Type-locality: Gomchu (7,600), Eastern Bhutan. Coll. B. Biswas, 9.iv.1966.

Discussion: This species closely resembles with *Scorpiops* (*Euscorpiops*) *asthenurus* Pocock, but it can be separated as follows: (1) Manus very thin, slender elongated and about four times as long as wide where as in *S. (E.) asthenurus* it is only about two and half times as long as wide. (2) Ventral surface of patella of pedipalp provided with only 8 trichobothries where as in *S. (E.) asthenurus* it is provided with 9 trichobothries. (3) Trichobothries *est* on patella 3 in number where as in *S. (E.) asthanurus est* are 4 in number.

67. *Scorpiops* (*Euscorpiops*) *asthenurus* Pocock

(Figs. 1261-1274)

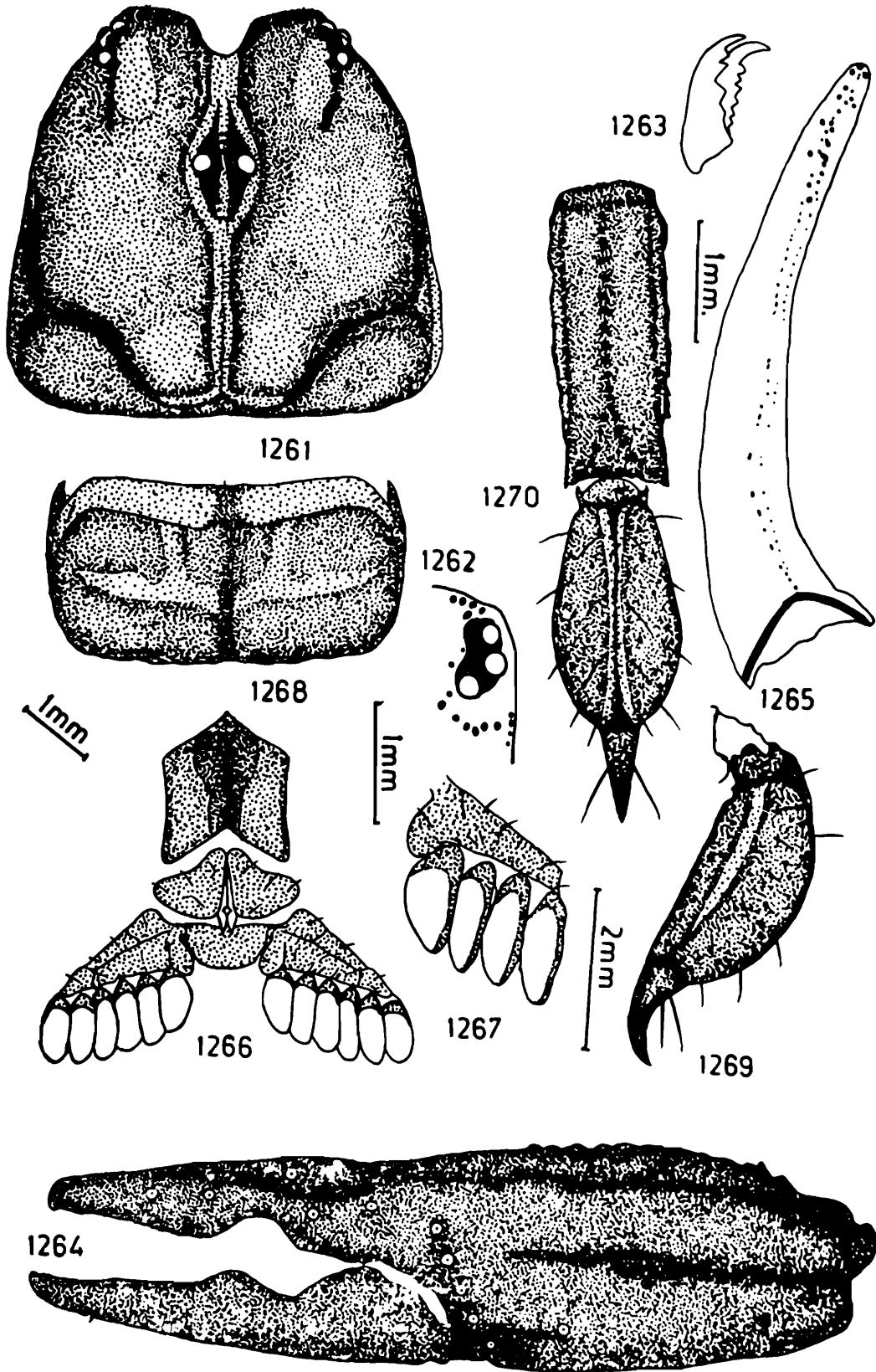
1900. *Scorpiops asthenurus* Pocock, *Fauna Brit. India, Arachn.*, : 73.

1980. *Scorpiops (Euscorpiops) asthenurus* : Vachon, *Bull. Mus. natn. Hist. nat., Paris, 4^e ser. 2, sect. A, (1)* : 143.

General: Male slightly bigger and dark blackish with slight pale but dark brownish on chelicera, mesosomal tergites and telson. Pedipalp dark black. Carapace and tergites sparsely granular. Metasoma weak, segments carinated and granular. Telson elongated with an annular ring at the base. Mesosomal sternites yellowish, smooth but last sternite blackish with weakly

FIGS. 1261-1270. *Scorpiops (Euscorpiops) asthenurus* Pocock

- 1261. Carapace of male, dorsal view.
- 1262. Lateral eyes, lateral view.
- 1263. Movable finger of chelicera, dorsal view.
- 1264. Manus and fingers of pedipalp, exterior view.
- 1265. Movable finger of pedipalp, dorsal view.
- 1266. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1267. Pectinal teeth and middle lamella, ventral view.
- 1268. Tergite, dorsal view.



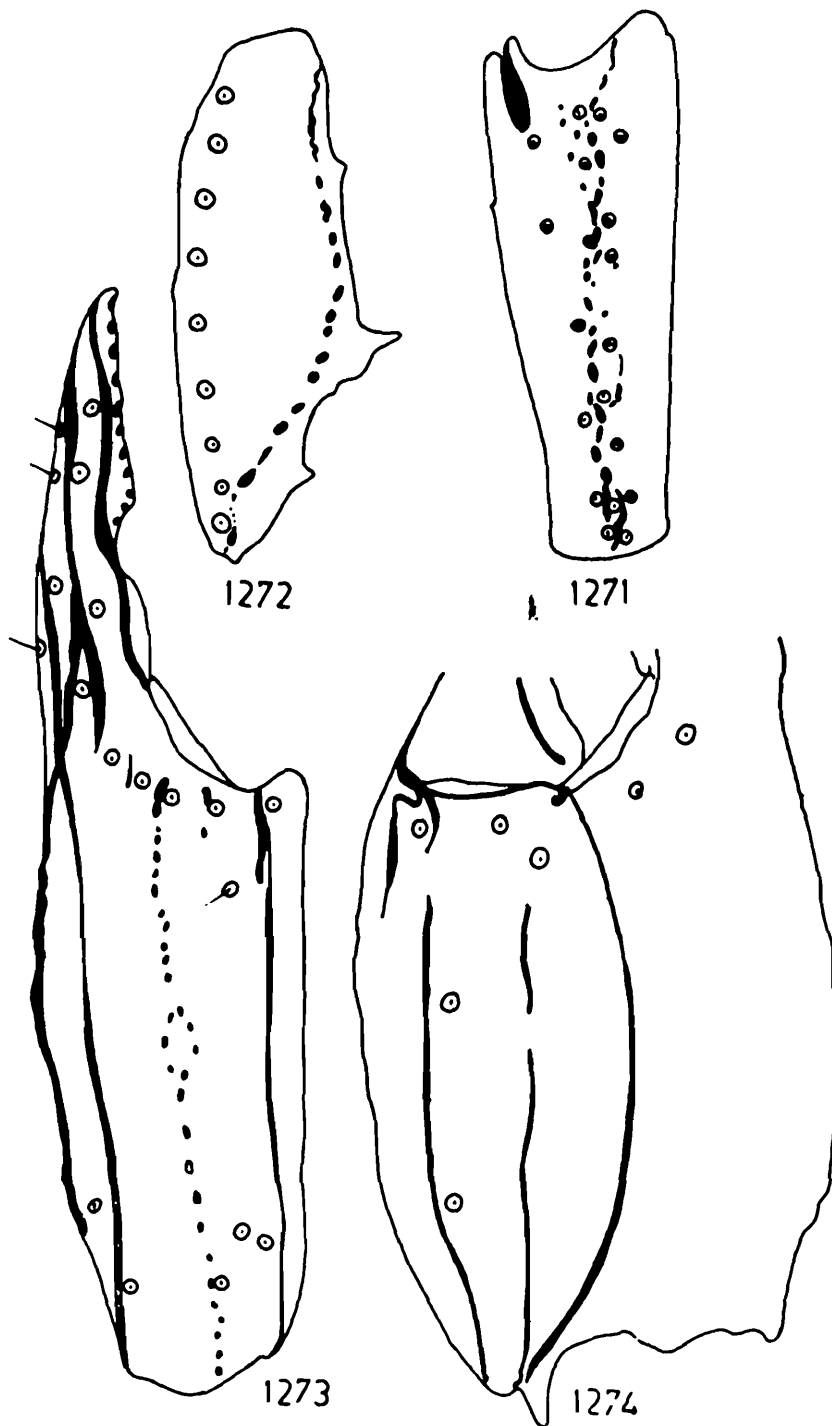
1269. Telson, lateral view.

1270. Telson and segment V, ventral view.

developed, two smooth carinae. Pectines weakly developed. Legs dark blackish brown but pale brown on tips.

Measurements : Total length 33.50 mm. Carapace 5.50 mm. long; Mesosoma 12.50 mm. long; Metasoma 15.50 mm. long.

Carapace : Entire surface granular except smooth at some spots, granulation almost coarse. Median depression bifurcating just posterior to median tubercles and surrounding median eyes, ending into anterior median notch. Lateral ocular tubercles granular and provided with three contiguous lateral eyes as in text-fig. 1262. Median ocular tubercles smooth above but finely granular on anterior and posterior portions and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.25 as in text-fig. 1261. Anterior margin smooth in front but granular above and deeply notched in the middle portion. Lateral margins almost smooth and with a submarginal granular ridge. Posterior margin almost straight, smooth posteriorly but granular above. Chelicera with basal segment smooth and pale brownish to yellow at the base but dark brownish on anterior portions. Ventral surface pale yellow and clothed thickly with long silky hairs, extending on ventral side of both the fingers. Finger dark brown and still darken on dentition. Dentition on fingers as standard in family and ventral fang of movable finger provided with six minute teeth as in text-fig. 1263 and except last tooth in the series all of same size. Dorsal distal tooth on movable finger shorter than ventral distal tooth. Pedipalp with femur slightly longer than carapace, all carinae granular but dorsal carinae more granular than ventral carinae. Anterior or inner surface provided with two to three denticulate tubercles but short in size and not so pointed. Intercarinal space almost coarsely granular. Patella less coarsely granular and slightly shorter than femur but longer than carapace. All carinae coarsely granular and anterior ventral surface more smoother. Anterior or inner surface provided with two very strong and a weak short denticulate tubercles. Length of under hand more than the length of femur, surface granular but not coarsely, ventral surface less granular than dorsal. All eight carinae traceable but superior and inferior exterior marginal carinae granular. Superior and inferior secondary accessory smooth.



FIGS. 1271-1274. *Scorplops (Euscorplops) asthenurus* Pocock

- 1271. Patella, exterior view.
- 1272. Patella, ventral view.
- 1273. Manus and fingers, exterior view.
- 1274. Manus, ventral and interior view.

Exterior secondary carina granular but sparsely. Digital carina granular but becoming smooth on finger. Subdigital traceable with few granules only at the base of the manus. Inner secondary carina not much granular becoming smooth on finger as in text-fig. 1264. Movable finger slightly shorter than the length of under hand but as long as femur. Immobile finger shorter than patella and slightly longer than as wide as hand. Dentition on the fingers in double row and outer row provided with 10-11 broad smooth teeth and 4-5 teeth in inner row as in text-fig. 1265. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1271-1274. Legs slightly pale brown. Femur and patella carinated and carinae on outer or anterior surface crenulated and carinae on posterior, dorsal and ventral surface weakly and sparsely granular or crenulated. Patella less granular than femur. Tibia weakly carinated and smooth. Tarsomere I longer than tibia, smooth, provided with a pair of pedal spurs. Tarsomere II smooth, compressed laterally and provided below with a row of minute delicate spines. Spine formula on legs I-IV : $\frac{8}{8}, \frac{8}{8}, \frac{10}{10}, \frac{10}{10}$. A pair of claws normal reddish brown in colour, much curved and sharp. Pectines not well developed, short and 1.75 times longer than wide. Middle lamellae not divided into subdigits. Fulcra not at all developed. Teeth elongated, tubular and at the base, the area between adjacent teeth filled up with connective tissue as in text-fig. 1267. Lamellae sparsely covered with reddish setae. Basal segment sclerotized with straight anterior margin, surface sparsely clothed with few reddish setae. Genital operculum always wider than long, two operculi united in the middle but a pair of conspicuous male genital papillae protruding out from under posterior side. Cephalothoracic sternum pentagonal, almost as wide as long and provided with a deep depression on middle posterior portion as in text-fig. 1266.

Mesosoma : All tergites granular but more granular on posterior portion. Tergites I-VI provided with a very weakly and almost smooth or finely granular median carina as in text-fig. 1268. Posterior margin smooth but granular above. Lateral margins weakly and sparsely granular. Pretergal portion smooth with finely granular posterior margin. Tergite VII provided with

four granular carinae, developed only on posterior portion. Surface granular but granules bigger in size on lateral portion and fine granulation in middle portion. Posterior margin granular above. Lateral margins crenulated. Pretergal portion not straight and granular. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Sternite I with no presternal portion. Sternites II-IV with poorly distinguished presternal portion and with smooth posterior margin. Posterior and lateral margins of each sternite smooth. Sternite V smooth, except small, granular area on posterior lateral portions and provided with a pair of smooth median carinae and a pair of poorly granular lateral carinae. All four carinae developed only on posterior portion. Posterior margin granular. Lateral margins granular. Presternal portion smooth with smooth posterior margin.

Metasoma : Cauda almost three times as long as carapace. Basal segment always wider than long. Segment II as long as deep but slightly wider than long. Segments II-IV equal in length and depth. Segment V always less than as wide or deep as preceding segment. All segments carinated and segment I provided with dorsal, dorsolateral, lateral, inferior lateral and inferior carinae, but except inferior carinae all carinae weakly granular, inferior carinae smooth. Segment II with dorsal, dorsolateral, inferior lateral and inferior granular carinae but inferior carinae smooth. Segments III & IV with dorsal, dorsolateral, inferior lateral and inferior carinae crenulated. Dorsal carinae of segments II, III and IV not much elevated and ending abruptly. Intercarinal space very weakly granular. Anterior peduncle of each segment smooth. Posterior peduncle of each segment granular. Segment V shorter than carapace, some what depressed; dorsal carinae representing few granules on anterior portion. Dorsolateral carinae granular upto posterior margin. Inferior lateral granular and slightly serrated but ending abruptly before, reaching posterior margin. Single inferior median carina granular but serrated and forked on posterior end. Intercarinal space more granular than preceding segments. Anal rim of this segment evenly granular as in text-fig. 1270. Each carina provided with few setae on either side. Telson always longer

than segment V but slightly shorter than carapace. Vesicular length more than caudal segment V but shorter than carapace. Dorsal surface smooth but ventral and lateral surfaces sparsely granular and ventral and lateral depression not so prominent. Aculeus very short, only half as wide or deep as the vesicle and provided with a prominent annular ring at the base, dark brown not much curved. Setation on the vesicle clear as in text-figs. 1269 & 1270.

Distribution : INDIA : Kalimpong, Darjeeling (*Type-locality*); West Bengal.

Remarks : We have studied the *Holotype* received from B.M. (N.H.), London, Regd. No. 1896.9.26.83. The present descriptions and illustrations are on the basis of same type.

68. *Scorpiops (Euscorpiops) longimanus* Pocock

(Figs. 1275-1289)

1893. *Scorpiops longimanus* Pocock, *Ann. Mag. nat. Hist.*, 12 (6) : 326.

1894. *Scorpiops longimanus* : Kraepelin, *Jb. hamb. wiss. Anst.*, 11 : 191.

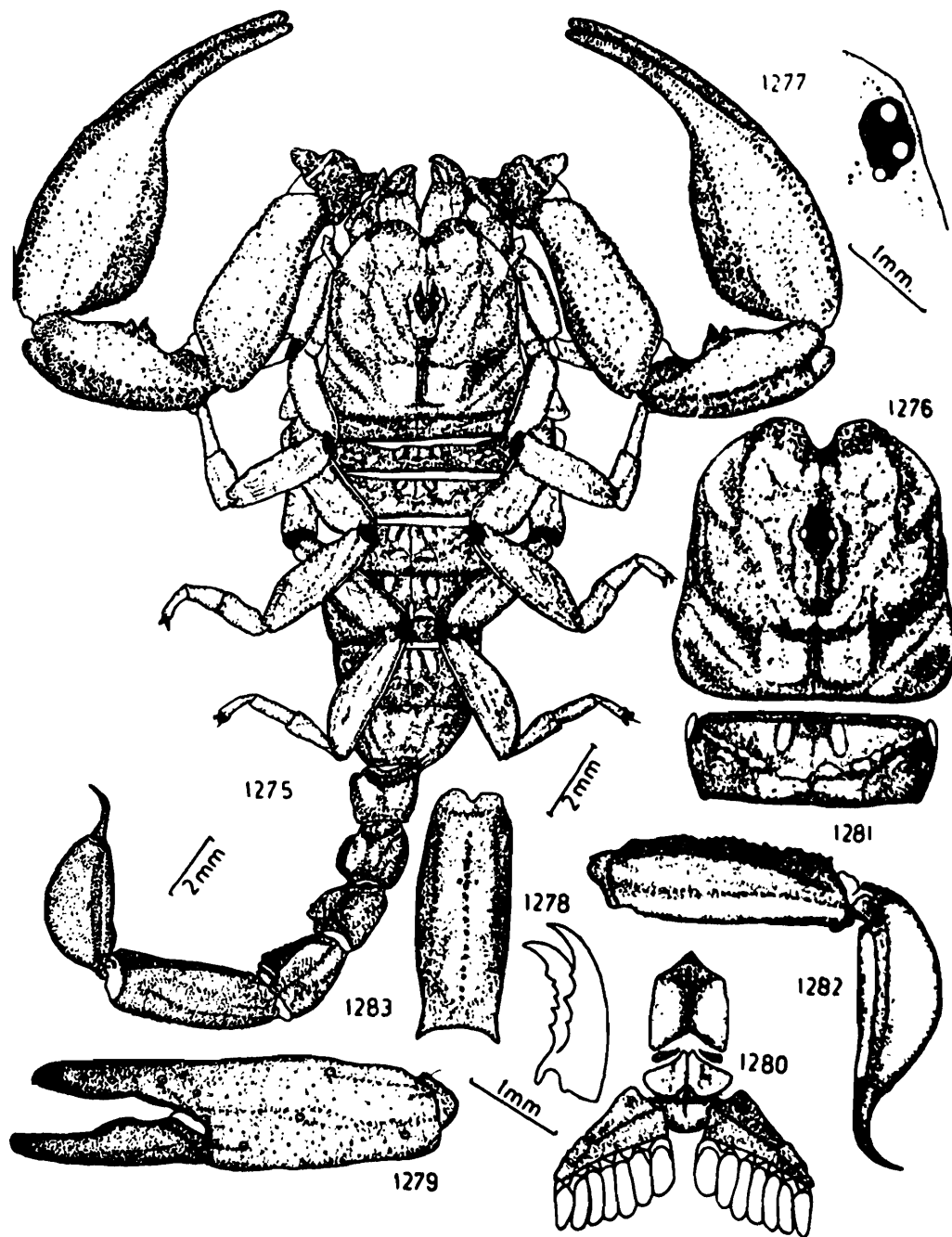
1903. *Scorpiops longimanus* : Pocock, *Fanna Brit. India, Arachn.*, : 72.

1974. *Scorpiops longimnaus* : Stahnke, *J. Arachnol.*, 1 (2) : 107.

1980. *Scorpiops (Euscorpiops) longimanus* : Vachon, *Bull. Mus. natn. Hist. nat., Paris, 4^e ser., 2 sect. A*, (1) : 143.

General : Male and female of medium to small in size. Body surface more granular in female than in male. Carapace less flat and depressed. Chelicera normal. Pedipalp stout with long manus but less flattened. Legs granular on femur and patella. Pectines weak but slightly well developed in male. Mesosoma granular in female and almost smooth in male. Dorsal carinae spiniform on segments II-IV. Telson elongated and with an annular ring at the base of aculeus as in text-fig. 1275.

Body colour dark brown. Ocular tubercles black. Chelicera yellow on basal segment but dark reddish brown on fingers. Pedipalp dark brown and blackish on carinae. Legs light brown.



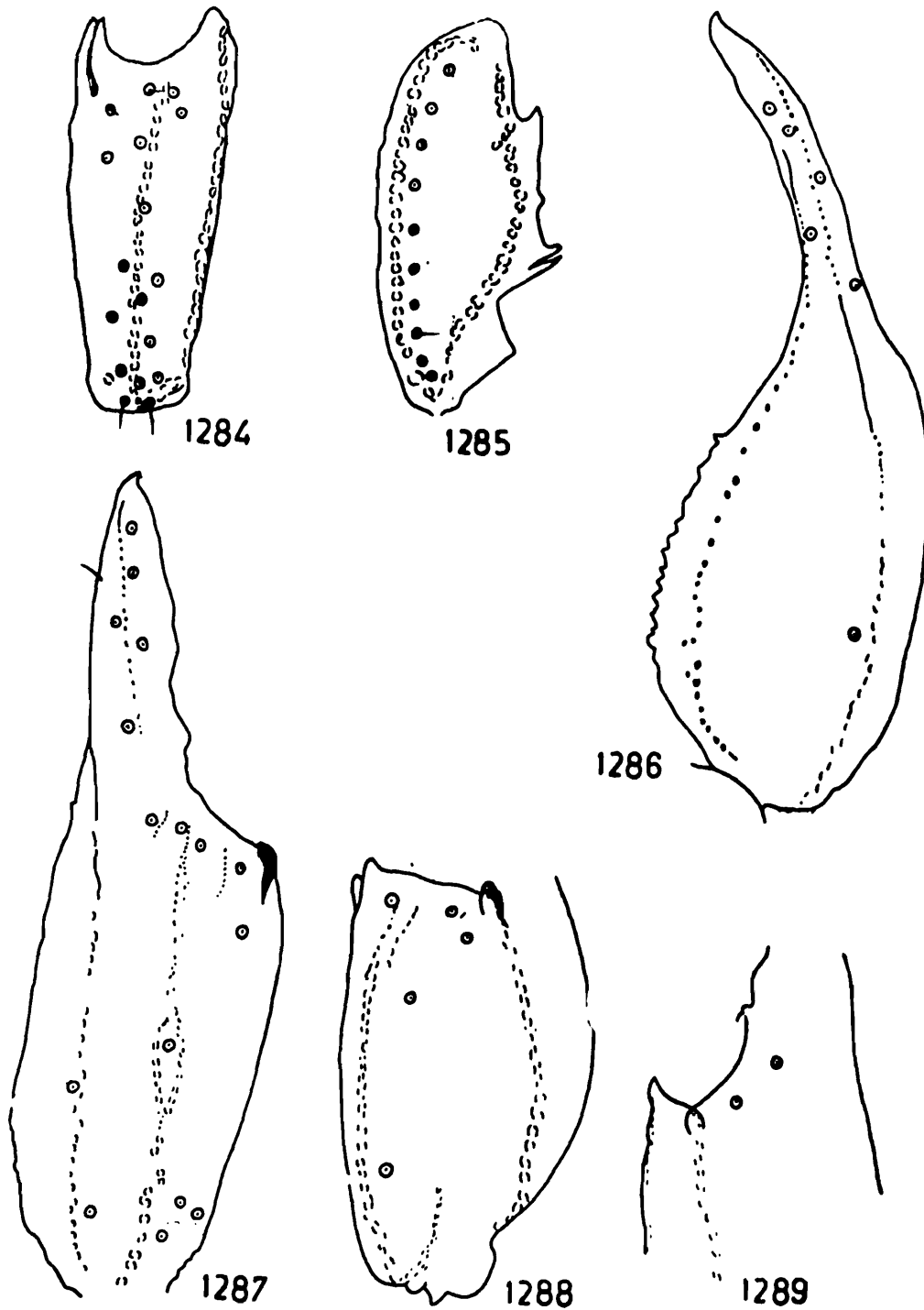
FIGS. 1275-1283. *Scorpions (Euscorpions) longimanus* Pocock

- 1275. Dorsal view of male.
- 1276. Carapace, dorsal view.
- 1277. Lateral eyes, lateral view.
- 1278. Movable finger of chelicera, dorsal view.
- 1279. Manus and finger of pedipalp, exterior view.
- 1280. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1281. Tergite, dorsal view.
- 1282. Telson and segment V, lateral view.
- 1283. Segment V, ventral view.

Mesosoma and metasoma brown but telson with yellowish vesicle.

Measurements : Male total length 47.25 mm. Carapace 6.75 mm. long; Mesosoma 17.00 mm. long; Metasoma 23.50 mm. long. Female total length 35.25 mm. Carapace 5.75 mm. long; Mesosoma 12.50 mm. long; Metasoma 17.00 mm. long.

Carapace : Entire surface granular but thickly granular on anterior lobes and lateral portions. Median portion finely granular on anterior part. Lateral ocular tubercles granular, continues posteriorly into a lateral carinae. Lateral tubercles provided with three contiguous lateral eyes as in text-fig. 1277. Median ocular tubercles small, smooth, not much elevated, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2 as in text-fig. 1276. Posterior median, posterior lateral, lateral ocular and anterior median furrows more distinct. Anterior margin smooth, provided with a deep median notch. Lateral margins smooth and provided with finely granular submarginal ridge. Posterior margin finely granular. Chelicera normal with smooth basal segment. Fingers elongated and sharp on dentition. Dentition on fingers as characterised in family but ventral inner margin of movable finger provided with five to six minute teeth as in text-fig. 1278. Pedipalp dorso-ventrally flat and stout with elongated manus. Femur longer than carapace in male but shorter in female. All carinae almost evenly granular but inner carinae with obsolete granules, outer carinae crenulated. Anterior or outer surface provided with three to four dentiform tubercles. Posterior or inner surface provided with irregularly granular carina. Intercarinal space almost coarsely granular. Patella slightly shorter than femur but as wide as femur. All carinae evenly granular. Anterior or inner surface provided with a pair of stout, pointed but short dentiform tubercles. Posterior or outer surface provided with evenly granular carina but granules obsolete. Intercarinal space weakly and slightly finely granular. Manus always longer than femur or carapace and more than as wide or deep as patella. Manus provided with five well developed carinae. Inner secondary, digital, exterior marginal, exterior and inner secondary carinae almost evenly granular and some times granules obsolete. Subinner secondary, sub-



FIGS. 1284-1289. *Scorpiops (Euscorpiops) longimanus* Pocock

- 1284. Patella, exterior view.
- 1285. Patella, ventral view.
- 1286. Manus and immovable finger, dorsal view.
- 1287. Manus and immovable finger, exterior view.
- 1288. Manus, ventral view.
- 1289. Manus, interior view.

marginal and secondary accessory carinae granular and short. Digital continued upto the tip of immovable finger where as inner secondary continues for a short distance on immovable finger. Submarginal carina weakly developed and comprises of many granules as in text-fig. 1279. Intercarinal space finely granular and arranged in mosaic fashion on posterior portion and irregularly granular on anterior portion. Movable finger shorter than the length of under hand but as long as femur in male and longer than femur but as long as under hand in female. Immovable finger shorter than movable finger. Dentition on fingers very minute and arranged in two rows, weakly scalloped at the base but scallops more deep in male as in text-fig. 1279. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1284-1289. Legs normal, smooth on femur and patella of I and II pairs but finely granular on III and IV pairs and granules obsolete. Patella of legs IV carinated and all carinae granular. Tibia carinated but carinae smooth and intercarinal space also smooth. Tarsomere I and II also smooth but without carinae and provided below with a row of minute reddish spinules and spine formula on legs I-IV : $\frac{6}{8}$, $\frac{7}{7}$, $\frac{8}{7}$, $\frac{9}{8}$. Pectines moderately developed and two times longer than wide in male. Middle lamellae fused. Fulcra distinguished and almost round. Lamellae and fulcra sparsely covered with white and reddish microscopic setae. Pectinal teeth long, well developed and 7/7 in male as in text-fig. 1280. Basal piece thickly sclerotized, anterior margin with weak median notch. Genital operculum always wider than long and sclerites united in the middle portion in female where as partly separated on posterior portion in male from which a pair of conspicuous male genital papillae protruding out. Cephalothoracic sternum pentagonal, longer than wide and provided with a longitudinal median depression on posterior portion. Cephalothoracic sternum, sclerites and basal piece covered sparsely with reddish megascopic setae as in text-fig. 1280.

Mesosoma : All tergites granular but more granular on posterior portion of each tergite, granules almost obsolete in male but in female granules more closely placed and less obsolete. Median carina weakly developed on tergites II-VI as in text-

fig. 1281. Pretergal portion very finely granular with finely granular posterior margin. Lateral margin and posterior margin of each tergite also granular. Tergite VII more granular than preceding tergites, provided with two pairs of granular lateral carinae. Lateral and posterior margins granular. Pretergal portion granular with granular posterior margin. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Posterior and lateral margins smooth. Presternal portion also smooth. Sternite V granular and provided with two pairs of carinae. Carinae granular in female and obsolete in male. Granulation obsolete in male. Lateral and posterior margins weakly granular in female and smooth in male. Presternal portion also smooth.

Metasoma : Cauda three and half times as long as carapace. Basal segment always wider than long. Segment I provided with eight carinae, all carinae granular but sparsely granular. Segments II-IV provided with six carinae; dorsal carinae crenulated, elevated and spiniform posteriorly. Dorsolateral, inferior lateral and inferior carinae very sparsely granular, inferior lateral and inferior carinae weakly developed. Lateral carinae very weakly developed on segment II. Intercarinal space irregularly granular. Anterior peduncles finely granular. Segment V shorter than carapace but slightly longer than sum total lengths of segments II and III. Dorsal carinae granular, dorsolateral carinae granular and developed on $\frac{3}{4}$ anterior portion. Inferior lateral carinae granular, slightly crenulated on posterior portion. Single inferior median carina weakly crenulated. Intercarinal space weakly granular. Anterior peduncle smooth. Anal rim of this segment evenly crenulated as in text-figs. 1282 & 1283. Telson longer than carapace in male but shorter than carapace in female. Vesicle elongated, longer than segment IV but shorter than segment V. Entire surface smooth in male but finely granular in female. Ventral and lateral depressions distinct. Ventral median crest poorly developed and granular in female. Aculeus less curved, broad at the base with distinct subaculear annular ring as in text-fig. 1282, sharp, reddish on distal portion, shorter than half the vesicular length in male and slightly longer than half the vesicular length in female.

Distribution : INDIA : Assam, North East India and Sylhet (Type-locality), BANGLADESH.

Remarks : We have examined, described and illustrated on the basis of type specimens received from B.M. (N.H.), London, Regd. No. 1897.5.10. 198-215.

69. *Scorpiops (Euscorpiops) binghamii* Pocock

(Figs. 1290-1305)

1893. *Scorpiops binghamii* Pocock, *Ann. Mag. nat. Hist.*, 12 (6) : 327.
 1900. *Scorpiops binghamii* Pocock, *Fauna Brit. India, Arachn.*, : 74.
 1980. *Scorpiops (Euscorpiops) binghamii* : Vachon, *Bull. Mus. natn. Hist. nat.*, Paris, 4^e ser. 2, sect. A, (1) : 143.

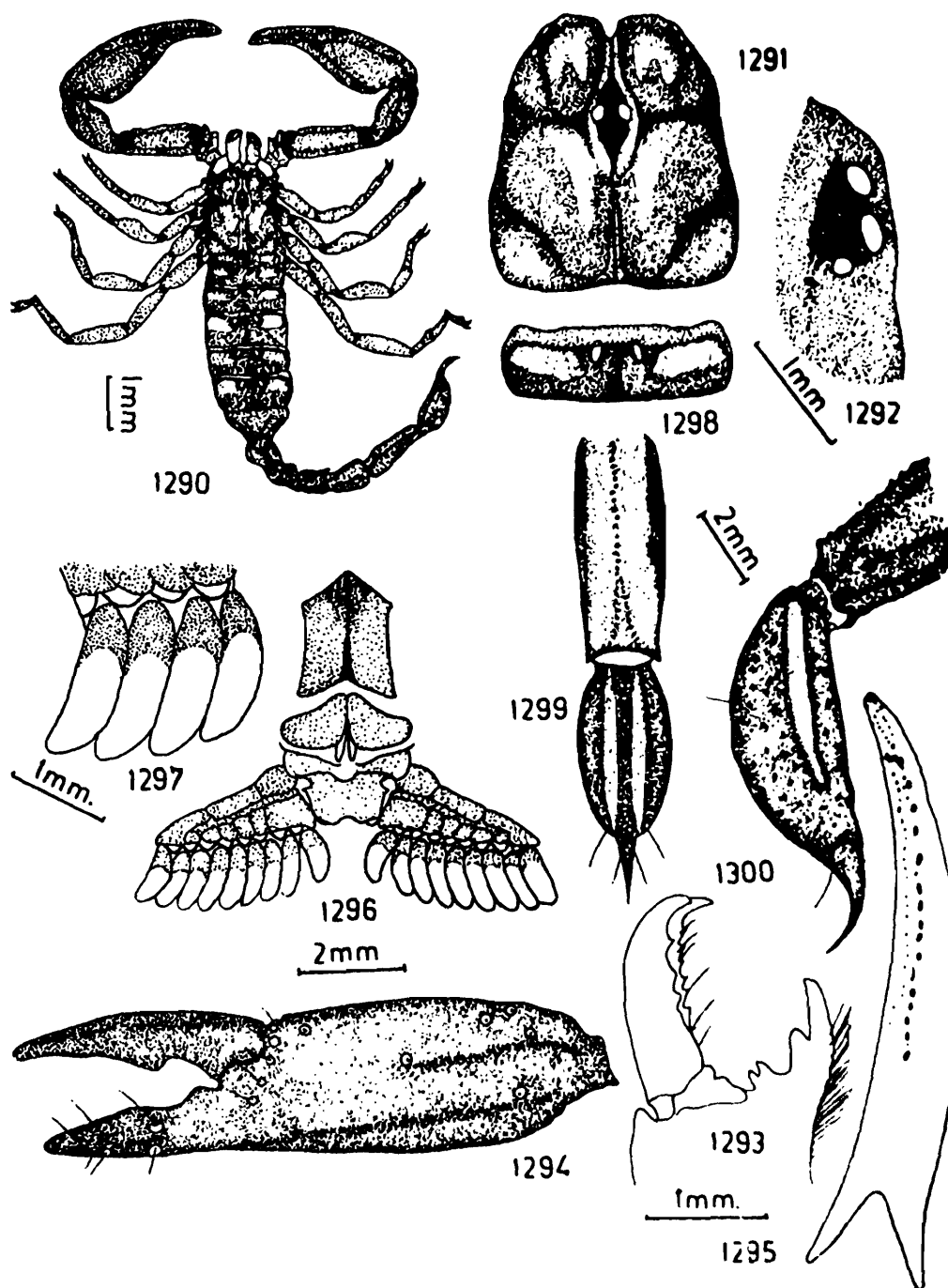
General : Male medium to bigger in body size. Entire body surface finely and coarsely granular. Carapace more granular than mesosomal tergites as in text-fig. 1290. Body colour brown in colour, more darker on pedipalp but brown, carinae blackish. Chelicera pale but brown on fingers. Metasoma slightly darker brownish but telson yellowish brown and aculeus dark brown with an annular ring at the base. Legs pale brown to yellow, light yellow on tips. Ventral surface yellowish, last sternite darker granular and provided with two pairs of granular carinae. Pectines comparatively well developed with long, tubular well developed nine teeth.

Measurement : Total length 50.00 mm. Carapace 8.25 mm. long; Mesosoma 17.25 mm. long; Metasoma 24.50 mm. long.

Carapace : Entire surface finely as well as coarsely granular but granules slightly bigger in size on anterior lateral portion.

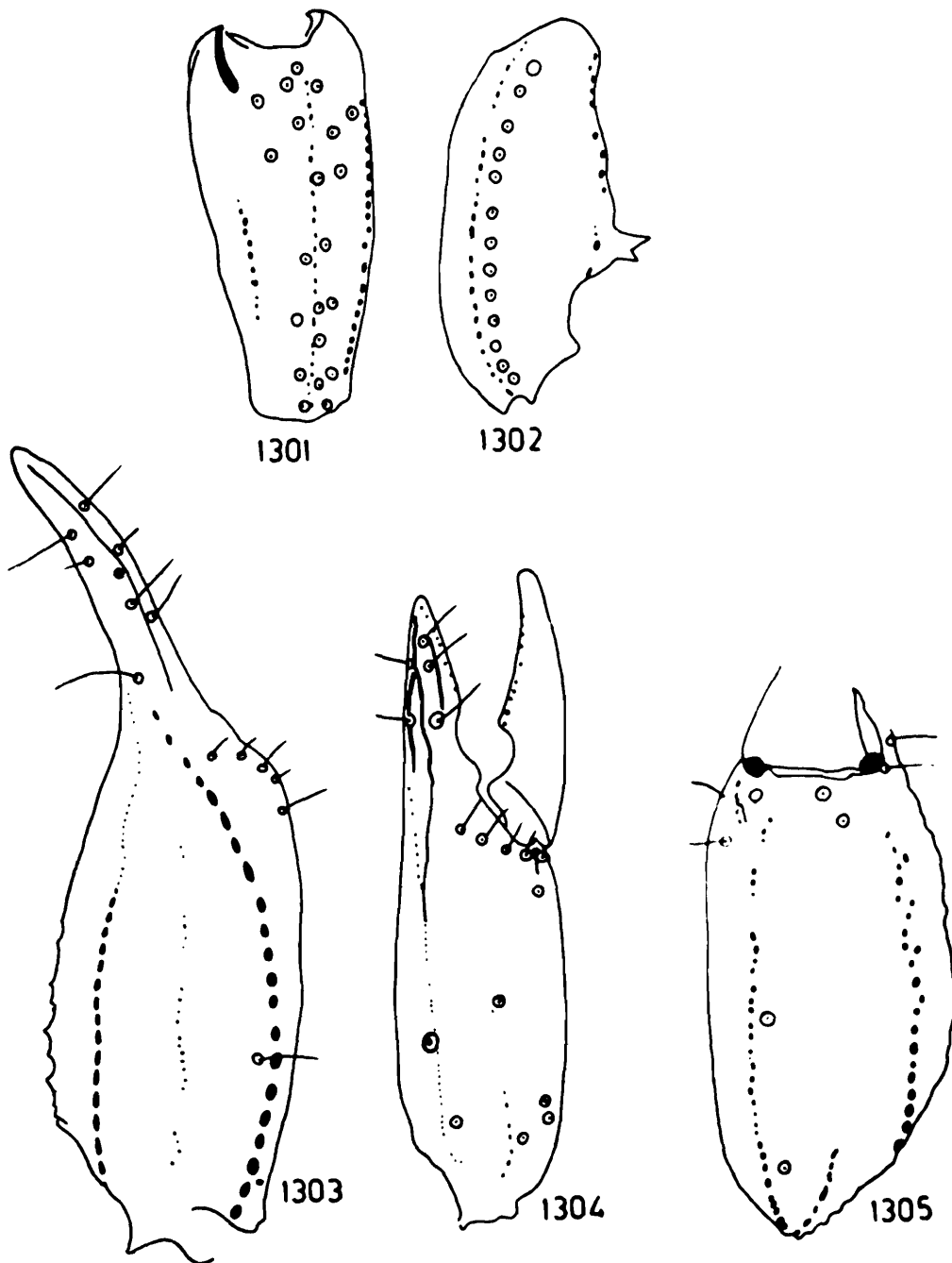
FIGS. 1290-1300. *Scorpiops (Euscorpiops) binghamii* Pocock

1290. Dorsal view of male.
 1291. Carapace, dorsal view.
 1292. Lateral eyes, lateral view.
 1293. Movable and immovable finger of chelicera, dorsal view.
 1294. Manus and fingers of pedipalp, exterior view.



- 1295. Movable finger of pedipalp, dorsal view.
- 1296. Pectines, genital oeperculum and cephalothoracic sternum, ventral view.
- 1297. Pectinal teeth and fulcra, ventral view.
- 1298. Tergite, dorsal view.
- 1299. Telson and segment V, ventral view.
- 1300. Telson and distal portion of segment V, lateral view.

Lateral ocular tubercles granular continued on posterior side and provided with three contiguous lateral eyes as in text-fig. 1292. Median ocular tubercles smooth but its anterior and posterior portions finely granular and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 2.5 as in text-fig. 1291. Anterior margin crenulated but weakly, with a deep median notch, provided with few setae. Lateral margins finely crenulated and supported with a sub-marginal granular ridges. Posterior margin smooth, granular above and slightly invaginated in the middle as in text-fig. 1291. Chelicera with smooth basal segment, slightly dark brown on anterior portion. Ventral surface pale yellow, covered thickly with short, silky hairs, extending on ventral side of fingers. Fingers dark brown, dentition on fingers as characterised in the family and ventral fang of movable finger provided with five to six minute teeth and ventral distal tooth longer than dorsal distal tooth as in text-fig. 1293. Pedipalp dorso-ventrally flat, with elongated manus, almost all carinae granular. Femur slightly longer than carapace. All carinae granular. Anterior or outer surface provided with short, crenulated carina on proximal portion and few denticulate tubercles. Intercarinal space coarsely granular. Patella slightly shorter than femur as well as carapace. All carinae well developed and evenly granular. Anterior or inner surface provided with two strong denticulate tubercles and few granules. Intercarinal space less granular than preceding segments. Manus narrow, elongated and always longer than carapace as well as femur. All carinae granular. Exterior marginal carina granular, granules smooth, partially mixed and carina slightly elevated from the surface. Secondary accessory traceable but evenly granular. Exterior secondary carina granular, present throughout length. Digital carina evenly granular except on distal 1/3 smooth portion on immovable digit. Sub-digital carina granular, clearly noted only on basal portion, distal granulation same in size to the other granular portion. Inner secondary carina granular on proximal portion, distal portion irregularly granular but granules bigger in size, developed and continued on inner margin of immovable finger as single granular carina. Sub-inner secondary very sparsely granular but granules bigger in size. Interior marginal granules bigger in size but smooth, extending from base to the joint of



Figs. 1301-1305. *Scorpiops (Euscorpiops) binghamii* Pocock

- 1301. Patella, exterior view.
- 1302. Patella, ventral view.
- 1303. Manus and immovable finger, dorsal view.
- 1304. Manus and fingers, exterior view.
- 1305. Manus, ventral and interior view.

movable finger. Intercarinal space granular. Movable finger as long as carapace. Dentition on finger double dentate, scalloped near the base but scallopes not much deep as in text-fig. 1294. Outer row of minute teeth supported with 12-13 scars on outer side as in text-fig. 1295. Immobile finger shorter than patella but slightly longer than fifth caudal segment. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1301-1305. Legs slightly pale, yellowish brown. Femur and patella carinated and anterior carinae more crenulated. Intercarinal space granular. Other carinae of patella granular. Tibia carinated, carinae granular. Tarsomere I carinated, carinae finely granular and provided with a pair of short pedal spur. Tarsomere II pale yellow, smooth, laterally pressed and armed below with a row of small spicules and spine formula on legs I-IV : $\frac{6}{8}, \frac{5}{5}, \frac{5}{7}, \frac{5}{5}$. All segments sparsely covered with red stout setae. Claws strong, curved, sharp. Pectines 2.25 times longer than wide. Middle lamellae sub-divided, sometimes partially divided into five small digits. Fulcra well developed and almost triangular in shape. Lamellae and fulcra covered sparsely with white setae. Pectinal teeth broad, not pointed at the apex as in text-fig. 1297 and 9/9 in number as in text-fig. 1296. Last tooth more broad. Basal piece sclerotized and poorly covered with few white setae. Anterior margin provided with a shallow notch in the middle. Genital operculum always wider than long. A pair of opercula not fused posteriorly and from under which a pair of conspicuous male genital papillae visible. Cephalothoracic sternum pentagonal, longer than wide with a deep median depression in the posterior median portion as in text-fig. 1296 and anterior surface covered in middle portion with few fine granules.

Mesosoma : All tergites coarsely as well as finely granular. Tergite I with no carina. Tergites II-VI provided with a granular median carina but developed only on half posterior portion of each tergite as in text-fig. 1298. Posterior margin, smooth but granular above. Lateral margins granular. Pretergal portion finely granular with finely granular posterior margin. Tergite VII more granular than preceding tergites provided with two pairs of granular lateral carinae. Median carina represented

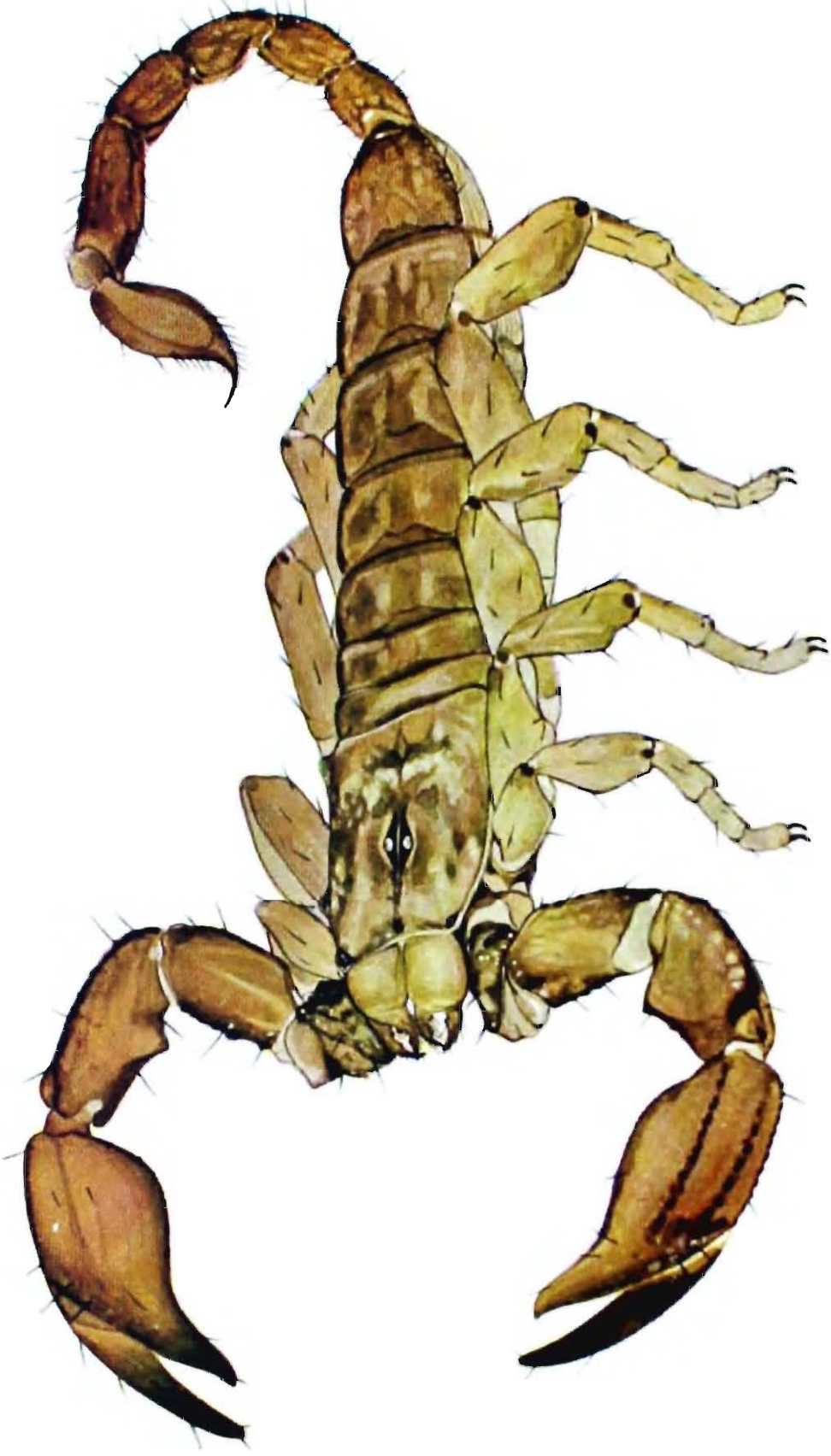
with weak median elevation covered with many fine granules. Posterior margin smooth but granular above. Lateral margins crenulated. Pretergal portion finely granular with distinct granular posterior margin. Sternites I-IV smooth, I with no pre-sternal portion. Sternites II-IV with smooth presternal portion and smooth posterior margin. Sternites I-IV each provided with a pair of slit like stigmata for book lung. Posterior and lateral margin smooth. Sternite V granular but more granular on posterior portion and provided with two pairs of granular carinae, developed only on posterior portion. Posterior and lateral margins smooth but granular below. Presternal portion very finely granular with finely granular posterior margin.

Metasoma : Cauda three times as long as carapace. Basal segment more than as wide and deep as long. Segment I provided with dorsal, dorsolateral carinae granular, laterals weakly granular, inferior lateral and inferior carinae poorly granular. Segments II-IV provided with dorsal carinae granular and elevated, posteriorly ending into denticular tubercle; dorsolateral carinae granular. Lateral carinae represented only on posterior portion with few granules. Inferior lateral carinae weakly granular. Inferior carinae poorly granular or almost smooth. Intercarinal space weakly and irregularly granular. Anterior peduncle of each segment finely granular. Posterior margin of each segment granular. Segment V always shorter than carapace, femur as well as patella provided with irregularly granular dorsal carine. Dorsolateral carinae granular and developed on $2/3$ anterior portion. Inferior lateral carinae almost evenly granular. Single inferior median carina granular, bifurcated on posterior portion but not much widely forked. Intercarinal space irregularly granular. Anterior peduncle finely granular. Intercarinal space irregularly granular. Anal rim broad at inferior lateral carinal portion as in text-figs. 1299 & 1300. Telson longer than patella but vesicle exactly as long as fifth caudal segment and almost as wide or deep as fifth caudal segment. Entire vesicular surface finely granular except at lateral and ventral bands. Aculeus very short, not much curved, sharp, dark brown on distal portion and $1/3$ as long as vesi-

cular length, provided at the base with prominent annular ring and a pair of basal setae as in text-figs. 1299 & 1300.

Distribution : BURMA : Central Tenasserim (*Type-locality*).

Remarks : We have studied, illustrated and described on the basis of one male and one immature female type specimens received from B.M.(N.H.), London, Regd. No. 1893.1.11.63-64.



Family ISCHNURIDAE

Iomachus punctulatus Pocock ♀

Family IV ISCHNURIDAE

1900. *Ischnuridae* Pocock, *Fauna Brit. India, Arachn.*, : 76.
1973. *Ischnurinae* : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 3^e ser, Zool.
104 (140) : 914.

Characters : Carapace, mesosoma and pedipalp flat and depressed. Manus and fingers with strong and complete carina, cutting edges of fingers of chela of pedipalp evenly granular, dentate and not produced into sharp triangular teeth. Trichobothria *Est* on manus always distal to trichobothria *Dt*. Tarsomere I always provided with only one Pedal spur. Tarsomere II generally without ventral spines and lateral distal margins truncate forming almost a right angle with the base of the claw-lobe and not overlapping the claws on sides. Metasomal segments thin, compressed and almost without carinae, telson also small, much tapering distally and with much shorter, weak aculeus. Movable and immovable fingers of chelicera smooth, without teeth on ventral surface.

Type genus : *Ischnurus* C. Koch.

Distribution : Ethiopian regions including Madagascar. Oriental regions from India to Papua and northern part of Neotropical region.

Remarks : Ischnuridae was raised to family by Pocock (1900) from a sub-family Ischnurinae. Prof. Vachon (1973) studied the trichobothrial pattern of some species and described it as a sub-family Ischnurinae under the family Scorpionidae. Our studies of type-specimens of sub-families Ischnurinae and Scorpioninae revealed that, though these two sub-families have same number of trichobothries on femur, patella, manus and immovable finger; the sub-family Ischnurinae shows some wide and constant differences in having placed *Est* distal to *Dt* on manus where as in the sub-family Scorpioninae the trichobothria *Dt* on manus is placed distal to *Est* or *Dt* and *Est* are placed in same plane. Dorsal surface of manus is flat and not

Genus 15 : *Iomachus* Pocock

1893. *Iomachus* Pocock, *Ann. Mag. Nat. Hist.*, 6 (7) : 320.
 1899. *Iomachus* : Kraepelin, *Tierr. scorp. etc.*, : 155.
 1900. *Iomachus* : Pocock, *Fauna Brit. India, Arachn.*, : 81.
 1968. *Iomachus* : Sreeniva Reddy, *Bull. Mus. natn. Hist. nat., Paris, 2^e ser.*, 40 (4) : 759.
 1973. *Iomachus* : Vachon, *Bull. Mus. natn. Hist. nat., Paris, 3^e ser, Zool.* 104 (140) : 914.

Characters : Tarsomere II of legs furnished on ventral surface with a few long slender bristles on sides and a median row of small spicules. Genital operculum of female pointed posteriorly and without a median suture. Posterior lateral eyes above the margin of the carapace.

Type-species : *Iomachus laeviceps* (Pocock)

Distribution : INDIA and EASTERN AFRICA.

Key to the species of the genus Iomachus

1. Two trichobothries *dsb* and *dst* present on dorsal surface of immovable finger of manus, trichobothria *Est* on manus placed distal to *Dt* trichobothries *esb* 1 and 2 and *em* 1 and 2 on patella placed closed to each other and in same plane. 2
- Three trichobothries *db*, *dsb* and *dst* present on dorsal surface of immovable finger of manus, trichobothria *Est* on manus placed in a same plane to *Dt*, trichobothries *em* 1 distal to *em* 2, and *est* 1 distal to *est* 2 on patella and placed slightly away from each other. *.punctulatus*
2. Trichobothries *est* 1, 2 and 3 on patella placed in a row and in same plane, trichobothria *Est* on manus placed more distally to *Dt*. .. *.nitidus*

Trichobothria *est* 1 placed distal to *est*
 2 and *est* 3 on patella, trichobothria *Est*
 on manus placed less distally to *Dt.**laeviceps*

70. *Iomachus punctulatus* Pocock

(Figs. 1306-1319)

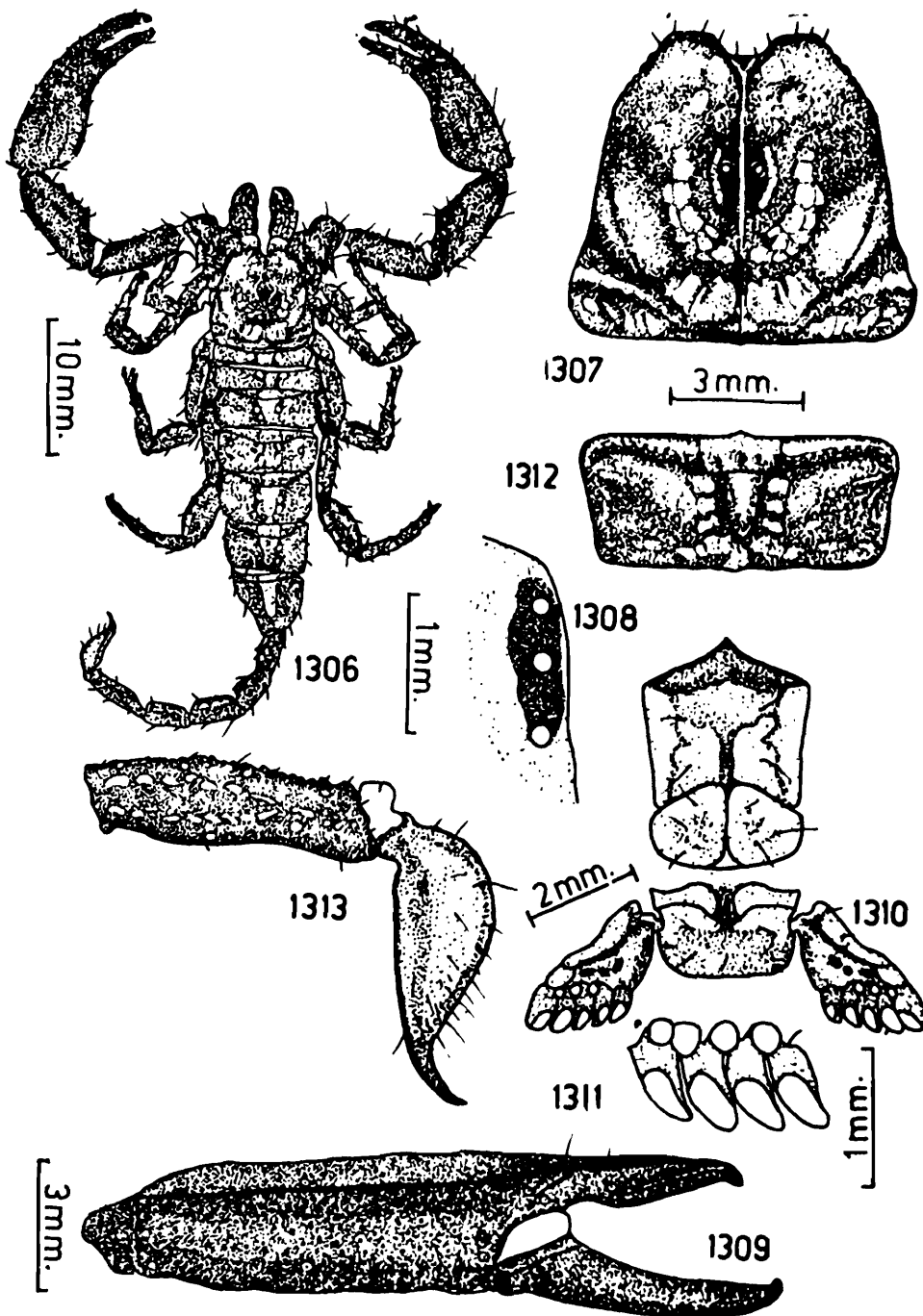
1897. *Iomachus punctulatus* Pocock, *J. Bombay nat. Hist. Sac.*, 11 : 116.
 1899. *Iomachus punctulatus* : Kraepelin, *Tierr. Scorp. etc.*, : 159.
 1900. *Iomachus punctulatus* : Pocock, *Fauna Brit. India, Arachn.*, : 83.
 1968. *Iomachus punctulatus* : Sreenivasa Reddy, *Bull. Mus. natn. Hist. nat.*,
Paris, 2^e ser., 40 (1) : 132.

General : Male and female of bigger size. Body almost entirely smooth. Carapace smooth with weakly developed smooth ocular tubercles. Chelicera smooth, fingers elongated. Pedipalp dorso-ventrally flat and weakly granular on femur and manus. Pectines moderately developed. Mesosoma smooth and finely punctate. Metasoma almost smooth, telson with globular vesicle as in text-fig. 1306.

Body colour brownish black but more black in male. Ocular tubercles blackish. Chelicera light brown. Pedipalp almost blackish in male and dark brown in female but carinae blackish brown. Legs same as body colour. Mesosoma and metasoma dark blackish in male and dark brownish in female but Telson clear yellow in male and female.

Measurements : Male total length 57.50 mm. Carapace 7.50 mm. long; Mesosoma 22.75 mm. long; Metasoma 27.25 mm. long. Female total length 52.25 mm. Carapace 7.25 mm. long; Mesosoma 23.00 mm. long, Metasoma 22.00 mm. long.

Carapace : Entirely smooth and finely punctate. Ocular tubercles weakly developed and smooth. Posterior median furrow not much distinct and bifid posteriorly. Posterior lateral furrow more distinct but shallow. Lateral ocular tubercles smooth and provided with three lateral eyes as in text-fig.



- FIGS. 1306–1313.** *Iomachus punctulatus* Pocock
 1306. Dorsal view of female.
 1307. Carapace, dorsal view.
 1308. Lateral eyes, lateral view.
 1309. Manus and fingers, exterior view.
 1310. Pectines, genital operculum and cephalothoracic sternum; ventral view.
 1311. Pectinal teeth and fulcra, ventral view.
 1312. Tergite, dorsal view.
 1313. Telson and metasomal segment V, lateral view.

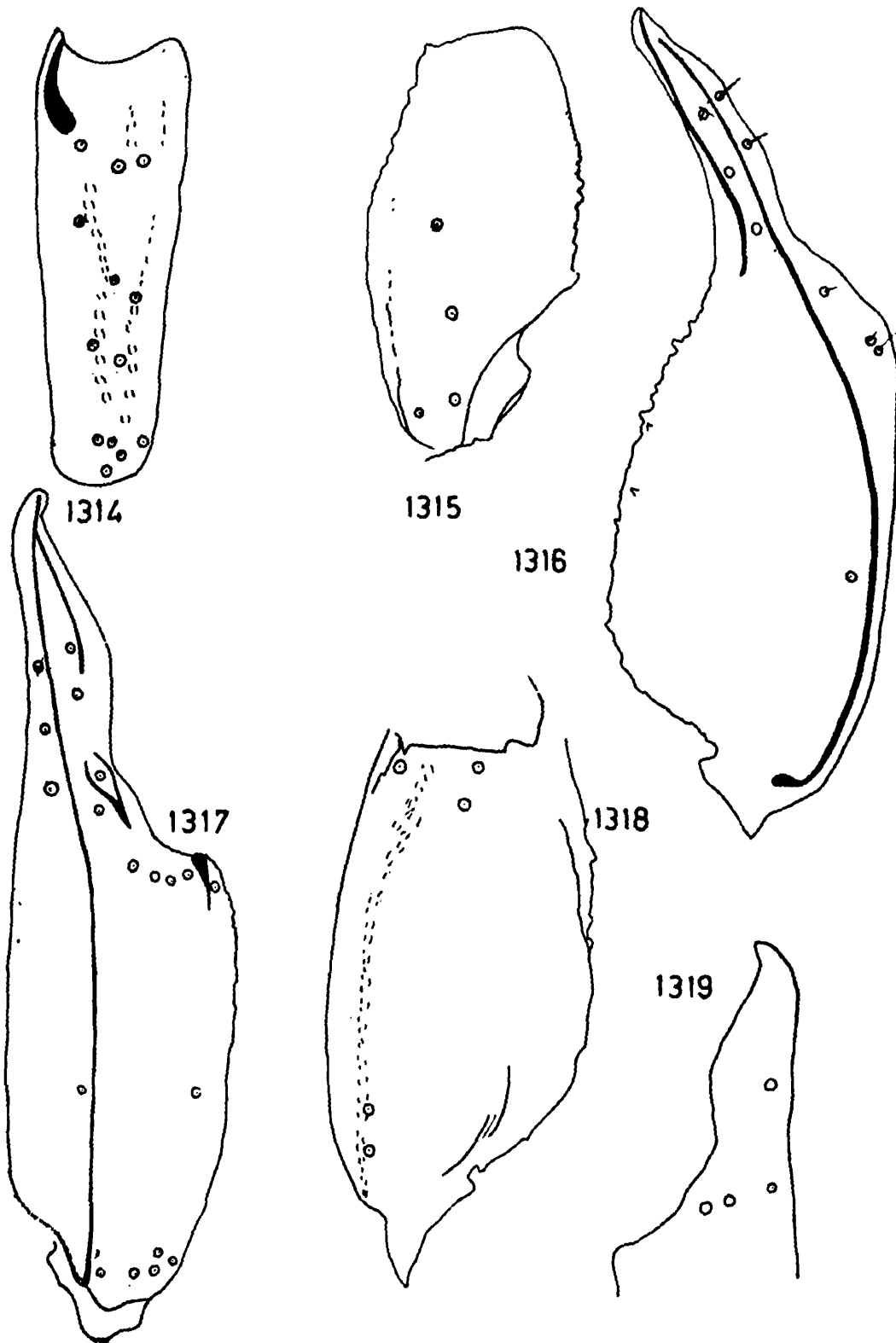
1308. Median ocular tubercles smooth, less elevated, provided with a pair of median eyes and situated anteriorly in the ratio slightly more 1:1.5 as in text-fig. 1307. Anterior margin smooth and notched in middle portion. Lateral and posterior margins smooth. Chelicera smooth on basal segment, fingers elongated, dentition as characterised in family, dorsal distal tooth slightly shorter than ventral distal tooth. Pedipalp strong, dorso-ventrally flat and manus more elongated. Femur shorter than carapace, carinated and outer dorsal and outer ventral carinae sparsely granular, inner dorsal carina obsolete on distal portion. Anterior or outer portion provided with few dentiform granules. Posterior or inner portion irregularly granular. Intercarinal space weakly and sparsely granular. Patella shorter than femur in male and shorter than carapace in female, weakly carinated, only anterior ventral, posterior dorsal and posterior median carinae weakly developed and granular. Anterior and inner surface elevated on proximal portion and provided with few tuberculate granules. Intercarinal space weakly, irregularly granular and finely punctate. Manus longer than femur and always more than as wide as patella, carinated, digital carina weakly granular, exterior marginal carina regularly granular, distinct and evenly crenulated, inner marginal weakly developed but finely granular on exterior portion and irregularly granular on anterior portion and almost obsolete as in text fig. 1309. Intercarinal space closely but finely granular on exterior portion, otherwise smooth and finely punctate. Fingers carinated but carinae smooth and obsolete, movable finger longer than femur but immovable finger shorter than femur, dentition on fingers minute and arranged in two rows. Trichobothrial pattern on patella, manus and immovable finger as in text figs. 1314-1319. Legs weakly, finely granular, finely punctate on femur and carinated only on inner margin, carinae thickly crenulated. Patella entirely smooth except weakly

FIGS. 1314-1319. *Iomachus punctulatus* Pocock

1314. Patella, exterior view.

1315. Patella, ventral view.

1316. Manus and immovable finger, dorsal view.



1317. Manus and immovable finger, exterior view.

1318. Manus, ventral view.

1319. Immovable finger, interior view.

crenulated inner carinae. Tibia and tarsomere I entirely smooth. Tarsomere II smooth, furnished with two rows of long bristles and a median row of minute, reddish spinules on ventral surface. Lateral margins forming right angle with the base of claw lobes. Pectines moderately developed and one and a half times longer than wide. Middle lamellae united to form a single lamella. Fulcra distinct, well developed and round. Lamellae and fulcra sparsely covered with few setae. Pectinal teeth well developed and more elongated, pointed in male as in text-fig. 1311 and 5/5 in number. Basal piece smooth, anterior margin broadly notched in middle portion. Genital operculum wider than long, sclerites united in male but a pair of male genital papillae visible after lifting the sclerites and sclerites fully fused to form a single sclerite and pointed posteriorly in female. Cephalothoracic sternum pentagonal and almost as long as wide as in text-fig. 1310.

Mesosoma : All tergites smooth and finely punctate. Median portion elevated on tergites I-VI as in text fig. 1312. Pretergal portion distinct, smooth and posterior margin also smooth. Lateral and posterior margins smooth. Tergite VII smooth, without carinae, lateral and posterior margins smooth. Prestergal portion distinct, posterior margin smooth. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Presternal portion not distinct. Lateral and posterior margins smooth. Sternite V smooth, posterior and lateral margins also smooth.

Metasoma : Cauda about three and a half times as long as carapace in male and less than three times as long as carapace in female. Basal segment longer than wide, without carina and smooth on entire surface. Segments II & III also smooth and without carinae. Segment IV smooth but inferior lateral and inferior carinae smooth, distinct but obsolete, intercarinal space smooth. Segment V slightly more than half the length of carapace, smooth, inferior lateral and single inferior median carinae distinct, sparsely granular and granules strongly crenulate. Anal rim of this segment sparsely crenulated. Telson longer than segment V but shorter than carapace. Vesicle slightly longer than

segment IV, smooth, lateral and ventral bands darker, tapering distally, thickly covered with long setae. Aculeus short, less than half the length of vesicle, pointed, sharp and dark reddish brown on distal portion as in text-fig. 1313.

Distribution : INDIA : Annamalai hills, Koimattor, Nilgiri hills, Madras, Tamil Nadu.

Remarks : We have studied, described and illustrated on the basis of 1 ♂ and 1 ♀ type specimens (broken) received from B.M. (N.H.) London, Regd. No. 88.16.

71. *Iomachus nitidus* Pocock

(Figs. 1320-1333)

1900. *Iomachus nitidus* Pocock, *Fauna Brit. India, Arachn.*, : 83.

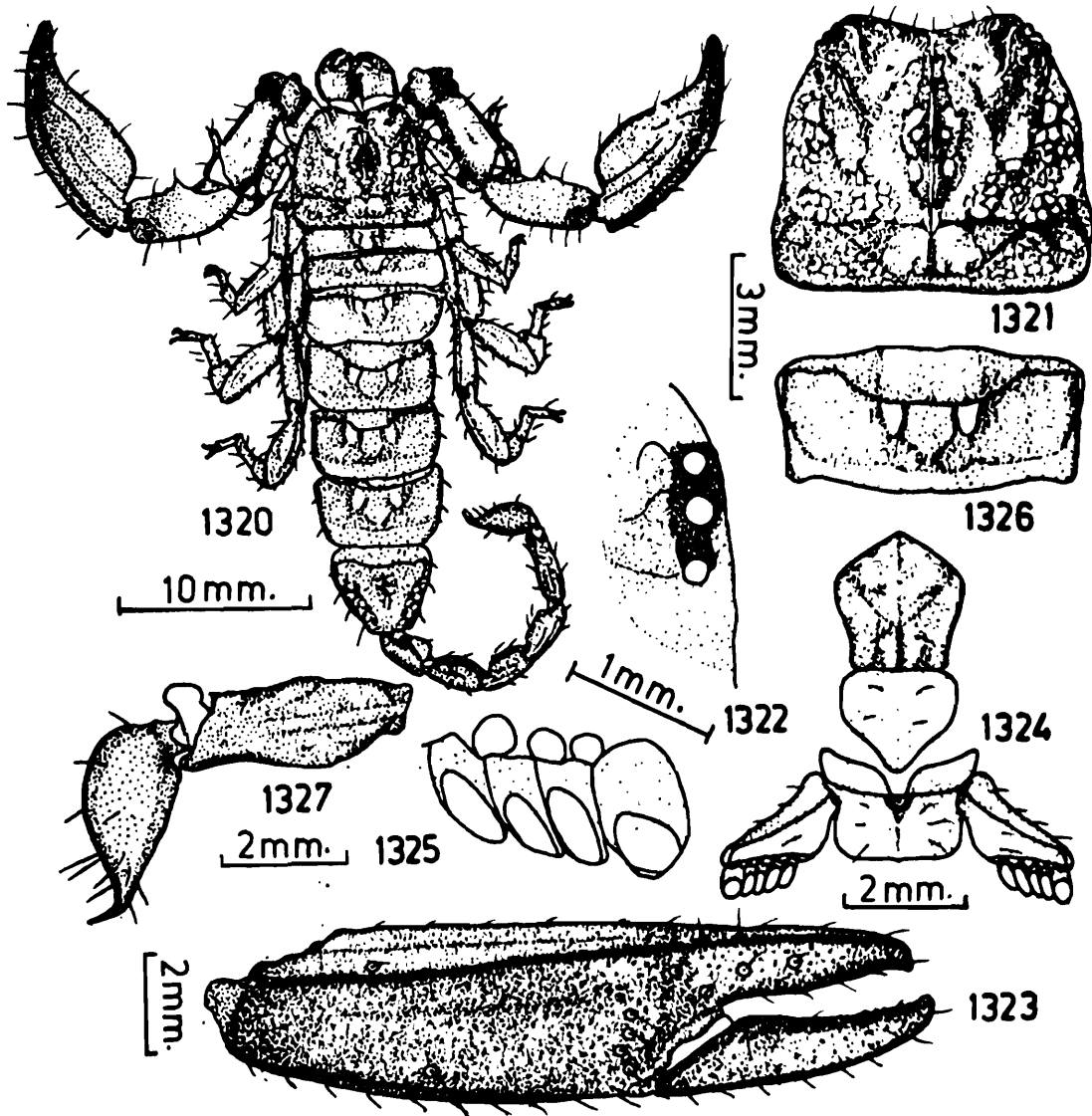
1969. *Iomachus nitidus* : Sreenivasa Reddy, *Bull. Mus. natn. Hist. nat., Paris*, 2^e ser 40 (3) : 518.

General : Female of medium size. Carapace entirely smooth, ocular tubercles smooth. Chelicera smooth, dorsal distal tooth much shorter than ventral distal on movable finger. Pedipalp stout and dorso-ventrally flat. Legs smooth on all digits. Pectines moderately developed. Mesosoma entirely smooth and finely punctate. Metasoma entirely smooth except inferior weakly crenulated carinae on segment V. Telson much globular with short aculeus as in text-fig. 1320.

Body colour yellowish with brownish tint. Carapace little more brown and black on ocular tubercle. Chelicera yellow but reddish brown on fingers. Pedipalp brownish with reddish tint and more brownish on fingers. Legs and pectines entirely light yellow. Mesosoma yellow sh. Metasoma yellowish but slightly brownish except clear yellow telson.

Measurements : Total length 41.50 mm. Carapace 6.00 mm. long; Mesosoma 20.00 mm. long; Metasoma 15.50 mm. long.

Carapace : Entirely smooth and finely punctate. Posterior median furrow less distinct and posteriorly bifid. Central median furrow much distinct. Posterior lateral furrows also distinct. Ocular tubercles weakly developed and smooth. Lateral ocular tubercles provided with three contiguous lateral eyes as in text-fig. 1322. Median ocular tubercles provided with a pair of median eyes, situated anteriorly in the ratio slightly more than 1 : 1.5 as in text-fig. 1321. Anterior margin smooth provided with a weak median notch. Lateral and posterior margins smooth. Chelicera smooth on basal segment and thickly clothed with short silky hairs on ventral surface. Fingers thin and elongated, dentition as characterised in family but dorsal distal tooth much shorter than ventral distal tooth on movable finger. Pedipalp stout and dorso-ventrally flat as in text-fig. 1320. Femur shorter than carapace, carinated and dorsal and ventral outer carinae weakly crenulated and ventral carinae more regularly granular. Anterior or outer surface finely granular. Intercarinal space smooth. Patella longer than femur but shorter than carapace. Anterior or inner surface elevated on proximal portion and armed with few dentiform tubercles. Anterior ventral carina poorly granular. Posterior or outer surface provided with smooth, obsolete carina. Posterior ventral carina also smooth. Intercarinal space except finely granular posterior portion, smooth and finely punctate. Manus much flattened and more than as long as carapace, carinated, digital weakly granular on proximal portion but smooth on distal portion as in text-fig. 1323. Exterior marginal carina almost evenly crenulated. Intercarinal surface except closely granular on exterior and interior portions, smooth and finely punctate. Fingers short and movable finger shorter than femur, almost smooth. Immobile finger shorter than movable, carinated and inner carinae strongly developed but smooth and obsolete. Dentition on fingers very minute and arranged in two rows. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1328-1333. Legs smooth, finely punctate on femur and patella but carinated on femur and inner carinae thick and crenulated. Tibia smooth. Tarsomere I carinated but smooth. Tarsomere II smooth, provided with two rows of long bristles and a median row of very minute reddish spinules on ventral side. Lateral



- FIGS. 1320-1327.** *Iomachus nitidus* Pocock
- 1320. Dorsal view of female.
 - 1321. Carapace, dorsal view.
 - 1322. Lateral eyes, lateral view.
 - 1323. Manus and fingers, exterior view.
 - 1324. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 - 1325. Pectinal teeth and fulcra, ventral view.
 - 1326. Tergite, dorsal view.
 - 1327. Telson and metasomal segment V, lateral view.

margins forming right angle to the base of claw lobes. Pectines moderately developed and one and a half times longer than wide. Middle lamellae fused to form a single lamella. Fulcra very poorly distinguished. Pectinal teeth short, pointed as in text-fig. 1325 and 5/5 in number. Basal piece smooth, anterior margin slightly notched in middle portion. Genital operculum almost as long as wide and sclerites fully fused to form a single sclerite, pointed posteriorly. Cephalothoracic sternum pentagonal and longer than wide as in text-fig. 1324.

Mesosoma : All tergites smooth and finely punctate. Middle portion of tergites III-VI slightly elevated as in text-fig. 1326. Tergite VII entirely smooth. Lateral and posterior margins smooth. Pretergal portion poorly distinct only on middle portion. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion not distinct. Sternite V smooth, lateral and posterior margins smooth, presternal portion not distinct.

Metasoma : Cauda two and a half times as long as carapace. Basal segment longer than wide, entirely smooth, without carinae. Segments II-IV smooth, dorsal surface poorly granular. Segment V exactly half as long as carapace, only inferior and single inferior median carinae very poorly and irregularly developed. Intercarinal space and peduncle smooth. Anal rim of this segment smooth. Telson slightly longer than last segment and vesicle slightly shorter than segment IV, globular, tapering distally, smooth, lateral and ventral bands darker, covered with many long bristles. Aculeus short, not much curved, less than half as long as vesicle, broad at the base, dark reddish brown on distal portion, sharp and pointed as in text-fig. 1327.

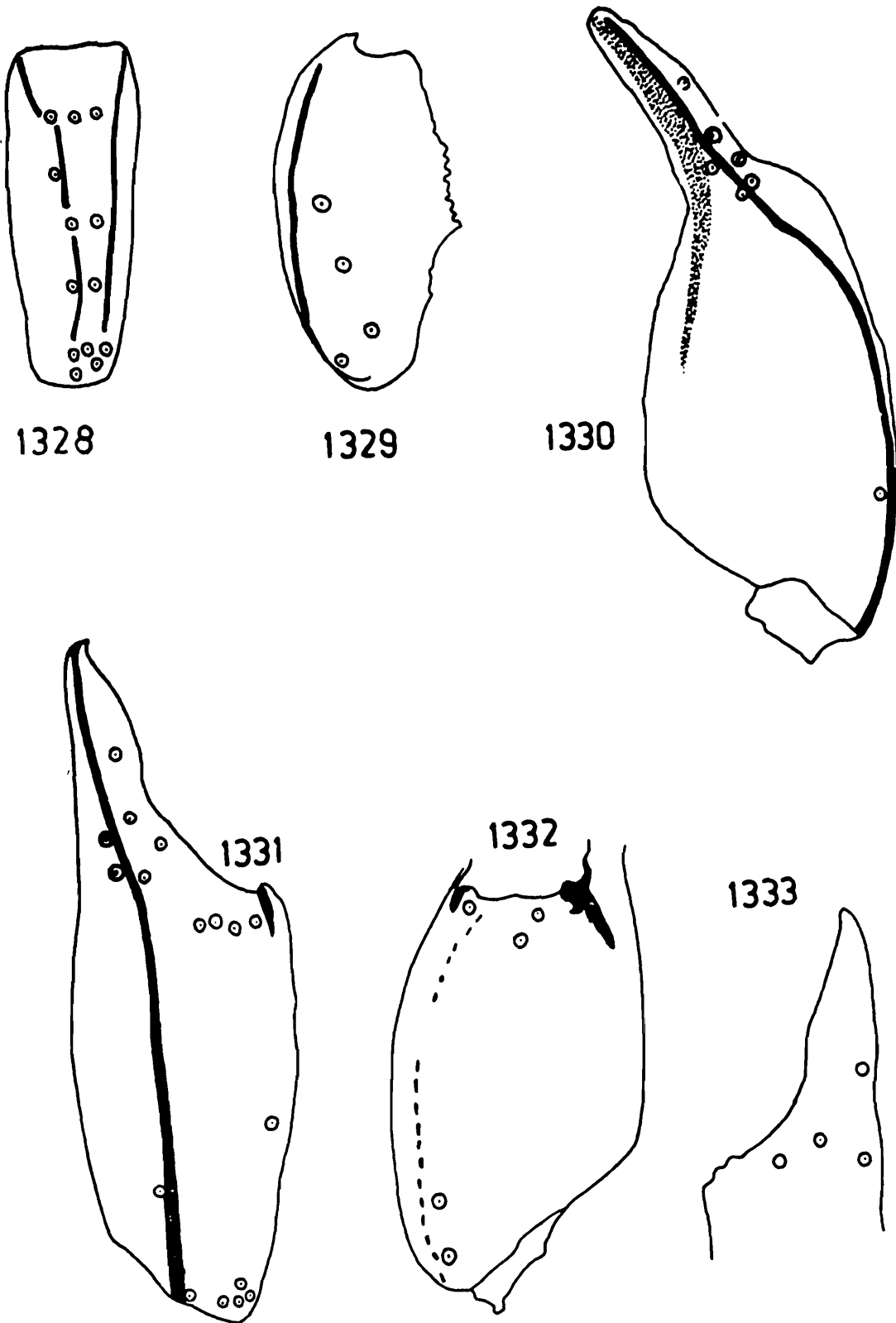
Distribution : INDIA : Nellore, Andhra Pradesh.

Remarks : We have studied, described and illustrated on the basis of 1 ♀ type received from B.M. (N.H.), London, Regd. No. Nil.

FIGS. 1328-1333. *Iomachus nitidus* Pocock

1328. Patella, exterior view.

1329. Patella, ventral view.



1330. Manus and immovable finger, dorsal view.
 1331. Manus and immovable finger, exterior view.
 1332. Manus, ventral view.
 1333. Immovable finger, ventral view.

Key to the sub-species of the species laeviceps

1. Carinae on patella of pedipalp smooth and obsolete, the trichobothria on patella in the group *eb* 1-5 placed more closer. *.laeviceps*
- Carinae on patella of pedipalp distinct and weakly crenulated, the trichobothria on patella in the group *eb* 1-5 placed more sparsely. *.malabarensis.*

72. *Iomachus laeviceps laeviceps* Pocock

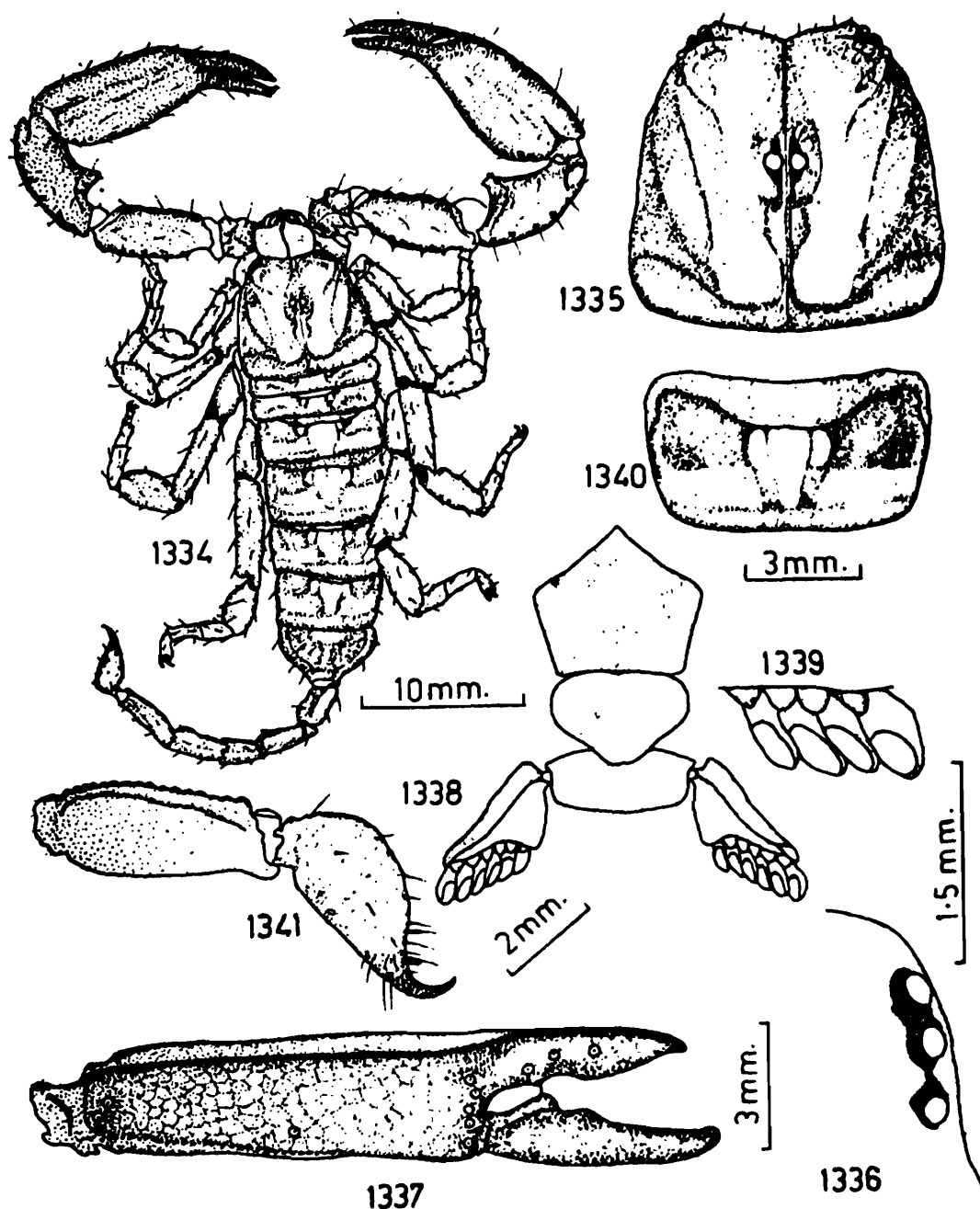
(Figs. 1334-1347)

1890. *Iomachus laeviceps* Pocock, *Ann. Mag. nat. Hist.*, 5 (6) : 242.
 1893. *Hormurus laeviceps* : Pocock, *J. Bombay nat. Hist. Soc.*, 7 : 300.
 1899. *Iomachus laeviceps* : Kraepelin, *Tierr. Scorp. etc.*, : 156.
 1900. *Iomachus laeviceps* : Pocock, *Fauna Brit. India, Arachn.*, : 81-82.
 1968. *Iomachus laeviceps* : Sreenivasa Reddy, *Bull. Mus. natn. Hist. nat.*, Paris, 2^e ser, 39 (6) : 1066.

General : Female of medium to bigger size as in text-fig. 1334. Entire body smooth. Carapace smooth, ocular tubercles smooth. Chelicera smooth. Pedipalp stout and dorso-ventrally flat, carinated but smooth. Legs smooth but carinated on femur and patella. Pectines moderately developed. Mesosoma smooth on all tergites and sternites. Metasoma smooth except weakly granular and carinated on segment V. Telson smooth on vesicle and aculeus short.

Body colour brownish with slight yellowish tint on tergites. Metasoma brownish but anterior segments slightly yellowish. Telson with clear and conspicuous yellow vesicle but reddish brown on aculeus. Chelicera yellowish but brownish on fingers. Pedipalp yellowish brown but darker on carinae and fingers. Legs clear light yellow. Pectines yellowish.

Measurements : Total length 54.00 mm. Carapace 7.75 mm. long; Mesosoma 26.25 mm. long; Metasoma 20.00 mm. long.



FIGS. 1334-1341. *Iomachus laeviceps laeviceps* Pocock

- 1334. Dorsal view of female.
- 1335. Carapace, dorsal view.
- 1336. Lateral eyes, lateral view.
- 1337. Manus and fingers, exterior view.
- 1338. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1339. Pectinal teeth and fulcra, ventral view.
- 1340. Tergite, dorsal view.
- 1341. Telson and metasomal segment V, lateral view.

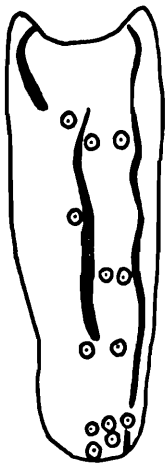
Carapace : Entirely smooth. Posterior median furrow distinct but much shallower and bifid posteriorly. Posterior lateral furrow more distinct. Ocular tubercles weakly developed and smooth. Lateral ocular tubercles provided with three lateral eyes as in text-fig. 1336. Median ocular tubercles provided with a pair of median eyes, situated anteriorly in the ratio slightly less than 1 : 1.5 as in text-fig. 1335. Anterior margin smooth and invaginated as in text-fig. 1335. Lateral and posterior margins smooth. Chelicera smooth on basal segment and thickly clothed with short silky hairs on ventral portion. Fingers thin and long, dentition as characterised in family and distal tooth of dorsal fang shorter than distal tooth of ventral fang. Pedipalp much stout and dorso-ventrally flat. Femur longer than carapace, carinated and carinae irregularly granular. Anterior or outer surface granular, posterior or inner surface provided with granular carina. Intercarinal space smooth and finely punctate. Patella longer than carapace but shorter than femur, carinated but carinae smooth and obsolete. Inner or anterior surface elevated on proximal portion and provided with few dentiform tubercles. Intercarinal space smooth and finely punctate. Manus much flat and wider than preceding segment, carinated, digital and exterior marginal carinae evenly granular, interior marginal carina weakly developed and sparsely granular on proximal portion as in text-fig. 1337. Intercarinal space smooth and finely punctate except coarsely granular exterior surface. Fingers smooth, carinated, movable finger slightly shorter than carapace but immovable finger much shorter than movable finger. Dentition on finger arranged in two rows of small granules, weakly scalloped at the base. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1342-1347. Legs carinated on femur but inner margin of femur provided with a pair of weakly crenulated carinae. Intercarinal space smooth. Patella and tibia entirely smooth and without carinae. Tarsomere I smooth and without carinae. Tarsomere II smooth, provided

FIGS. 1342-1347. *Iomachus laeviceps laeviceps* Pocock

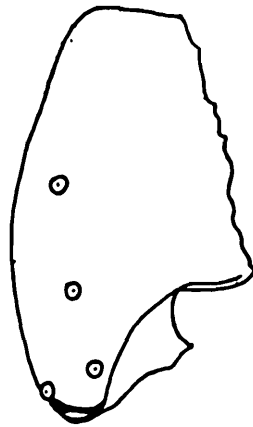
1342. Patella, exterior view.

1343. Patella, ventral view.

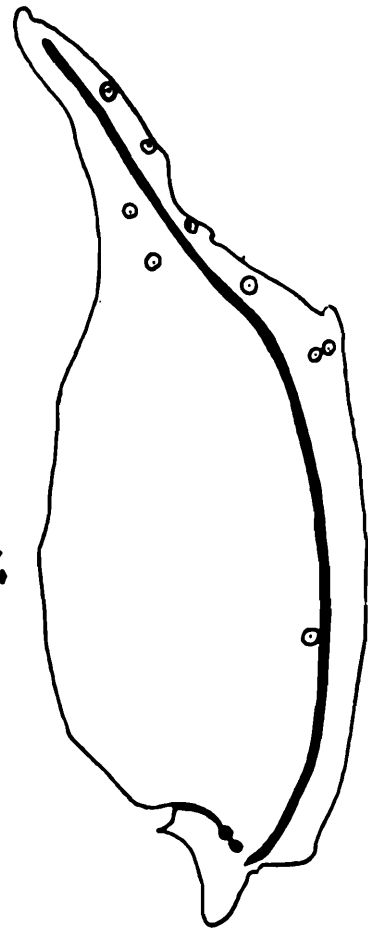
1344. Manus and immovable finger, dorsal view.



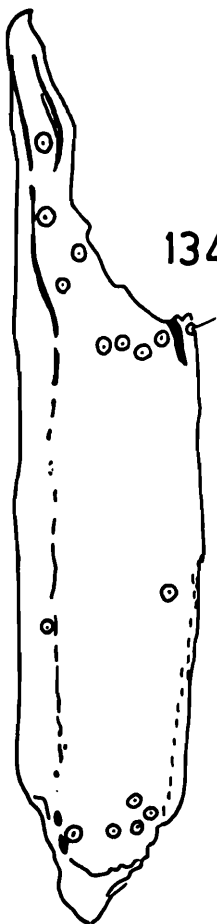
1342



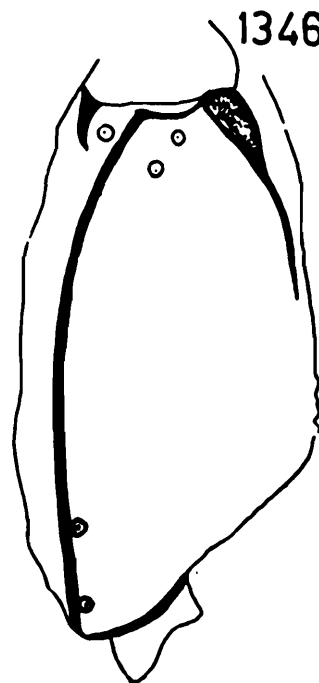
1343



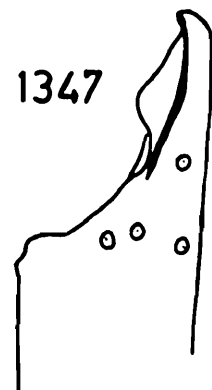
1344



1345



1346



1347

1345. Manus and immovable finger, exterior view.
1346. Manus, ventral view.
1347. Immobile finger, interior view.

with two rows of long, sparsely arranged bristles and a median row of minute reddish spinules on ventral side. Lateral margins form right angle with the base of claw lobes. Pectines moderately developed and one and a half times longer than wide. Middle lamellae united to form a single lamella. Fulcra distinct and almost subtriangular. Lamellae clothed sparsely with megascopic reddish setae. Pectinal teeth small, pointed distally as in text-fig. 1339 and 6/6 in number. Basal piece smooth and almost straight on anterior and posterior margin. Genital operculum wider than long and sclerites fully fused to form a single sclerite, pointed posteriorly as in text-fig. 1338. Cephalothoracic sternum pentagonal and longer than wide as in text-fig. 1338.

Mesosoma : All tergites smooth and finely punctate, median carinal portion slightly elevated on tergites III-VI as in text-fig. 1340. Pretergal portion distinct and much broad in middle portion, smooth and posterior margin also smooth. Lateral and posterior margins of each tergite also smooth. Sternites I-IV smooth, without presternal portion and each provided with a pair of small slit like stigmata for book lungs. Sternite V entirely smooth. Lateral and posterior margins smooth.

Metasoma : Cauda slightly longer than two and a half times as long as carapace. Basal segment always longer than wide. Segments I-IV entirely smooth and without carinae. Segment V almost about half as long as carapace. Inferior lateral and single inferior median carina distinct, sparsely and irregularly crenulated. Intercarinal space and anterior peduncle smooth. Anal rim of this segment smooth. Telson slightly longer than segment V and vesicle as long as segment III, entirely smooth, ventral and lateral bands not much distinct but more darker and clothed with many long hairs, arranged irregularly as in text-fig. 1341. Aculeus less than one third as long as vesicular length, not much curved, sharp and reddish brown on distal portion.

Distribution : INDIA : Yercaud (*Type-locality*) in Shevaroy hills, Kerala; Nilgiri hills, Tamil Nadu.

Remarks : We have studied, described and illustrated on the basis of 1 ♀ type received from B.M. (N.H.), London, Regd. No. 1894. 10.24.13.

73. *Iomachus laeviceps malabarensis* Pocock

(Figs. 1348-1361)

1900. *Iomachus laeviceps malabarensis* Pocock, *Fauna Brit. India, Arachn.*, : 82.

General : Male and female of medium size as in text-fig. 1348. Entire body surface smooth and finely punctate. Chelicera smooth. Pedipalp dorso-ventrally flattened, carinated but smooth. Legs smooth except carinated on femur. Pectines moderately developed. Mesosoma smooth, finely punctate. Metasoma almost smooth except weakly carinated on segment V. Telson much globular on vesicle.

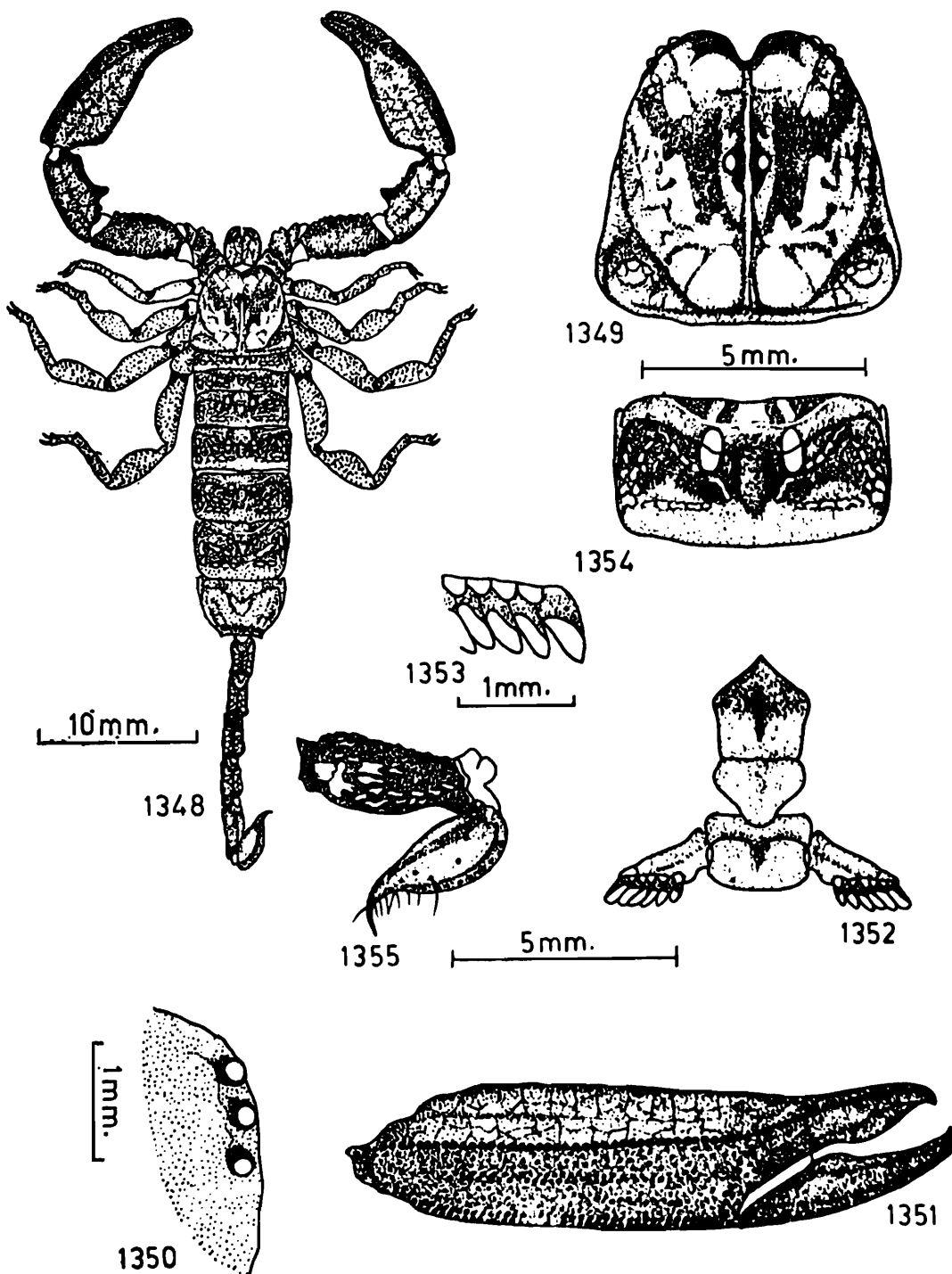
Body colour brownish with slight yellowish tint. Chelicera brownish on fingers. Pedipalp reddish brown but more darker on carinae. Legs light brown. Pectines yellowish. Mesosoma light brown with yellowish tint. Metasoma dark brown with blackish tint. Telson clear yellowish but reddish brown on aculeus.

Measurements : Male total length 43.75 mm. Carapace 6.00 mm. long; Mesosoma 18.25 mm. long; Metasoma 19.50 mm. long. Female total length 45.75 mm. Carapace 6.25 mm. long; Mesosoma 21.00 mm. long; Metasoma 18.50 mm. long.

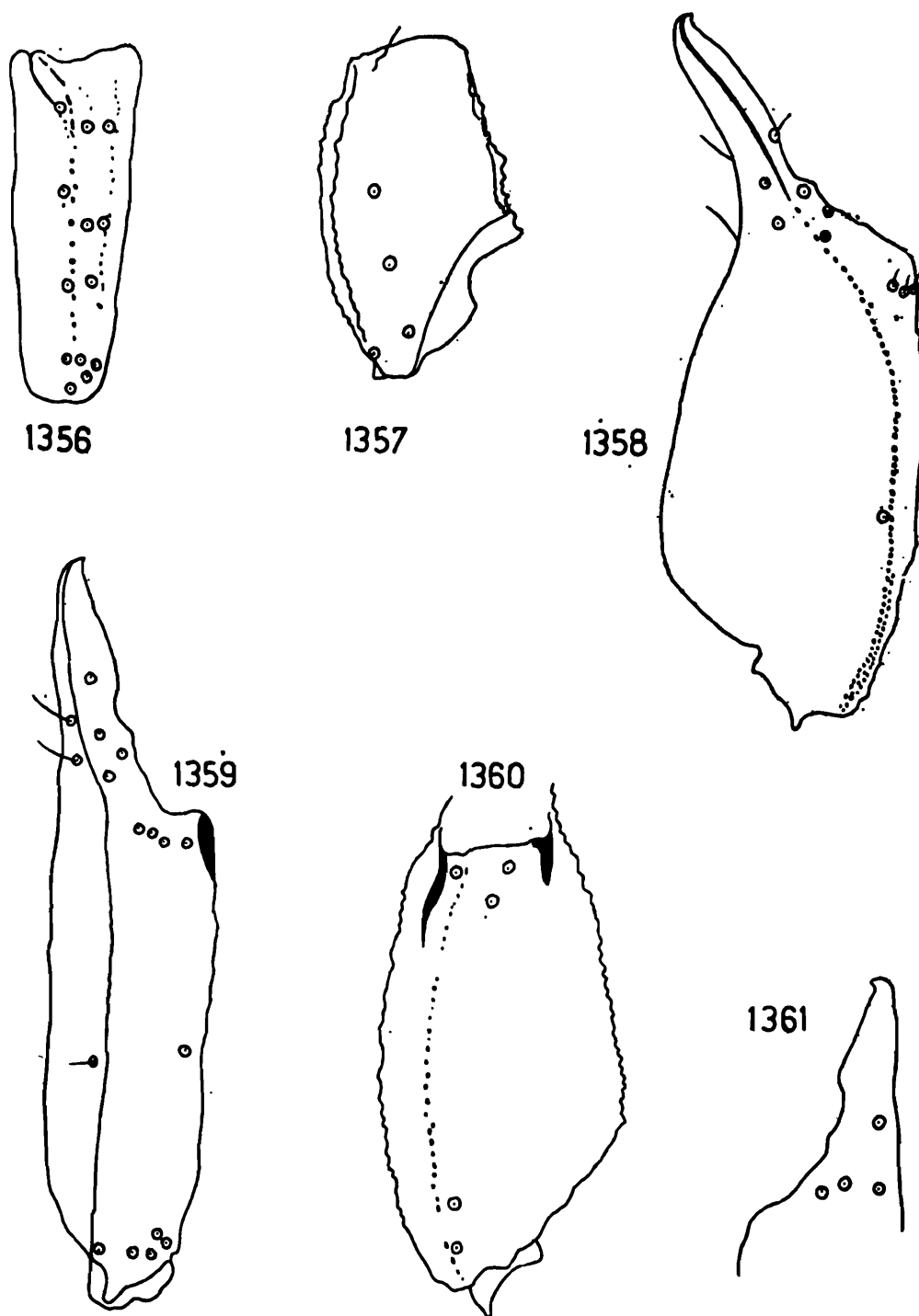
Carapace : Entirely smooth and finely punctate. Ocular tubercles poorly distinct and smooth. Lateral ocular tubercles provided with three contiguous lateral eyes as in text-fig. 1350. Median ocular tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.5 as in text-fig. 1349. Furrows not distinct but median central furrows moderate. Anterior margin smooth, invaginated on middle portion. Lateral and posterior margins also smooth. Chelicera smooth on basal segment, thickly clothed with short, silky hairs on ventral portion, extending on ventral portion of fingers. Fingers elongated, not much sharp on dentition. Dentition as characterised in family. Pedipalp dorso-ventrally flat, slightly more enlarged on manus as in text-fig. 1351. Femur longer than carapace, carinated and

inner dorsal and inner ventral carinae crenulated. Posterior or inner surface irregularly granular. Anterior or outer surface also granular and few granules dentiform. Intercarinal space smooth. Patella as long as femur but more than as wide as femur; carinated and dorsal outer and ventral outer carinae distinct and crenulated. Posterior or outer surface coarsely granular. Anterior or inner surface strongly elevated on proximal portion and armed with a strong but short denticle as in text-fig. 1351. Manus longer than femur, much flattened, wider than patella, carinated and digital and exterior marginal carinae evenly granular. Exterior surface closely and coarsely granular but inferior surface weakly granular. Dorsal and ventral surfaces smooth. Movable finger shorter than femur but as long as carapace and granular. Immobile finger shorter than carapace and half as long as manus, weakly carinated and granular. Dentition on fingers finely granular and moderately scalloped at the base as in text-fig. 1351. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1356-1361. Legs smooth except carinated on femur and patella. Carinae granular on femur but smooth on patella. Tibia and tarsomere I smooth. Tarsomere II smooth and furnished ventrally with a median row of small spinules and row of long paired bristles. Disto-lateral margin not overlapping the base of claw lobes but forming a right angle. A pair of claws normal. Pectines moderately developed and one and a half times longer than wide. Middle lamellae fused to form a single lamella. Fulcra distinct and almost round. Lamellae and fulcra clothed with short microscopic hairs. Pectinal teeth more pointed and tapering distally as in text-fig. 1853 and 6/6 in number. Genital operculum wider than long and a pair of sclerites partially fused in male, from under which a pair of male genital papillae visible but sclerites completely fused in female and pointed posteriorly as in text-fig. 1352. Cephalothoracic sternum broad, pentagonal, smooth and furnished with a small, moderate depression on posterior portion as in text-fig. 1352.

FIGS. 1348-1355. *Iomachus laeviceps malabarensis* Pocock
1348. Dorsal view of female.
1349. Carapace, dorsal view.



- 1350. Lateral eyes, lateral view.
- 1351. Manus and fingers, exterior view.
- 1352. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1353. Pectinal teeth and fulcra, ventral view.
- 1354. Tergite, dorsal view.
- 1355. Telson and metasomal segment V, lateral view.



FIGS. 1356-1361. *Iomachus laeviceps malabarensis* Pocock

- 1356. Patella, exterior view.
- 1357. Patella, ventral view.
- 1358. Manus and immovable finger, dorsal view.
- 1359. Manus and immovable finger, exterior view.
- 1360. Manus, ventral view.
- 1361. Immobile finger, ventral view.

Mesosoma : All tergites entirely smooth. Middle portion slightly elevated on tergites II-VI as in text-fig. 1354. Pretergal portion smooth and also smooth on posterior margin. Lateral and posterior margins smooth. Sternites I-IV smooth, each provided with a pair of small, slit like stigmata for book lungs. Presternal portion not distinct. Lateral and posterior margins smooth. Sternite V entirely smooth. Lateral and posterior margins smooth.

Metasoma : Cauda almost three times as long as carapace but slightly longer in male than in female. Basal segment longer than wide. Segments I-IV entirely smooth. Anterior peduncle and posterior margin also smooth. Segment V shorter than carapace, smooth except weakly developed inferior lateral carinae, more granular in female. Intercarinal portion and anterior peduncle smooth. Anal rim of this segment weakly granular. Telson longer than segment V but shorter than carapace. Vesicle half as long as carapace, smooth, much globular and tapering distally. Lateral and ventral bands brown but not much distinct. Aculeus much curved, one third of vesicular length, sharp and reddish brown as in text-fig. 1355.

Distribution : INDIA : Mangalore, Karnataka.

Remarks : We have studied, described and illustrated on the basis of the type specimens received from B.M. (N.H.), London, Regd. No. 1896.7.30, 75.80.

Genus 16. *Hormurus* Thorell

- 1876. *Hormurus* Thorell, *Ann. Mag. nat. Hist.*, 4 (17) : 14.
- 1893. *Hormurus* : Pocock, *Ann. Mag. nat. Hist.*, 6 (12) : 320.
- 1899. *Hormurus* : Kraepelin, *Tierr. Scorp. etc.*, : 153.
- 1900. *Hormurus* : Pocock, *Fauna Brit. India, Arachn.*, : 78.

Characters : Median eye situated in the ratio 1 : 1, three lateral eyes placed on the edge of carapace. Tarsomere II of the

legs furnished with four pairs of moderately long bristles on sides and median portion smooth, without spicules. Movable finger of pedipalp with two parallel rows of granular teeth. Genital operculum with a median suture and not narrowed and pointed posteriorly.

Type-species : Hormurus australasiae (Fabr.)

Distribution : INDIA : Malabar.

Key to the species of genus Hormurus.

1. Carinae on patella and manus distinct and granular (Figs. 1365), anterior or inner surface of patella armed with a strong tuberculate denticle (Fig. 1362), trichobothria *Est* on manus placed not much distally to *Dt*, trichobothria *dt* on immovable finger placed closer to *it* (Fig. 1373). Single inferior median and inferior lateral carinae regularly crenulate (Fig. 1369). *australasiae.*

Carinae on patella and manus not much distinct, weakly granular to obsolete (Fig. 1379), anterior or inner surface of patella armed with few very weakly tuberculate granules (Fig. 1376), trichobothria *Est* on manus placed much distally to *Dt*, trichobothria *dt* on immovable finger placed away from *it* (Fig. 1387). Single inferior median and inferior lateral carinae irregularly crenulate (Fig. 1383). *nigripes*

74. *Hormurus australasiae* (Fabr.)

(Figs. 1362-1375)

1775. *Scorpio australasiae* Fabr., *Syst. Ent.*, : 399.
1838. *Ischnurus complanatus* : C. L. Koch, *Arachn.*, 4 : 73.
1838. *Ischnurus australasiae* : C. L. Koch, *Arachn.*, 4 : 71.
1887. *Liacheles australasiae* : Simon, *J. Asiatic Soc. Bengal.*, : 113.
1888. *Ischnurus complanatus* : Thorell, *Ann. Mus. Genova*, 26 : 420.
1900. *Hormurus australasiae* : Pocock, *Fauna Brit. India, Arachn.*, : 79.

General : Male small to medium in size as in text-fig. 1362. Almost entirely smooth and punctate on carapace and mesosoma. Metasoma carinated only on segments I, II and V. Chelicera smooth and dorsal fang of movable finger shorter. Pedipalp dorso-ventrally flat and manus more flatter. Legs smooth. Cephalothoracic sternum pentagonal, pectines moderately developed. Telson with globular vesicle, aculeus small and weak.

Body colour dark brown but more darker and blackish on ocular tubercles. Chelicera dark brown but yellowish on basal segment. Pedipalp reddish brown and blackish on carinae. Legs yellowish brown. Pectines yellowish. Mesosoma light brown. Metasoma dark brown to blackish brown, telson clear yellow.

Measurements : Total length 39.25 mm. Carapace 6.50 mm. long; Mesosoma 17.50 mm. long; Metasoma 15.25 mm. long.

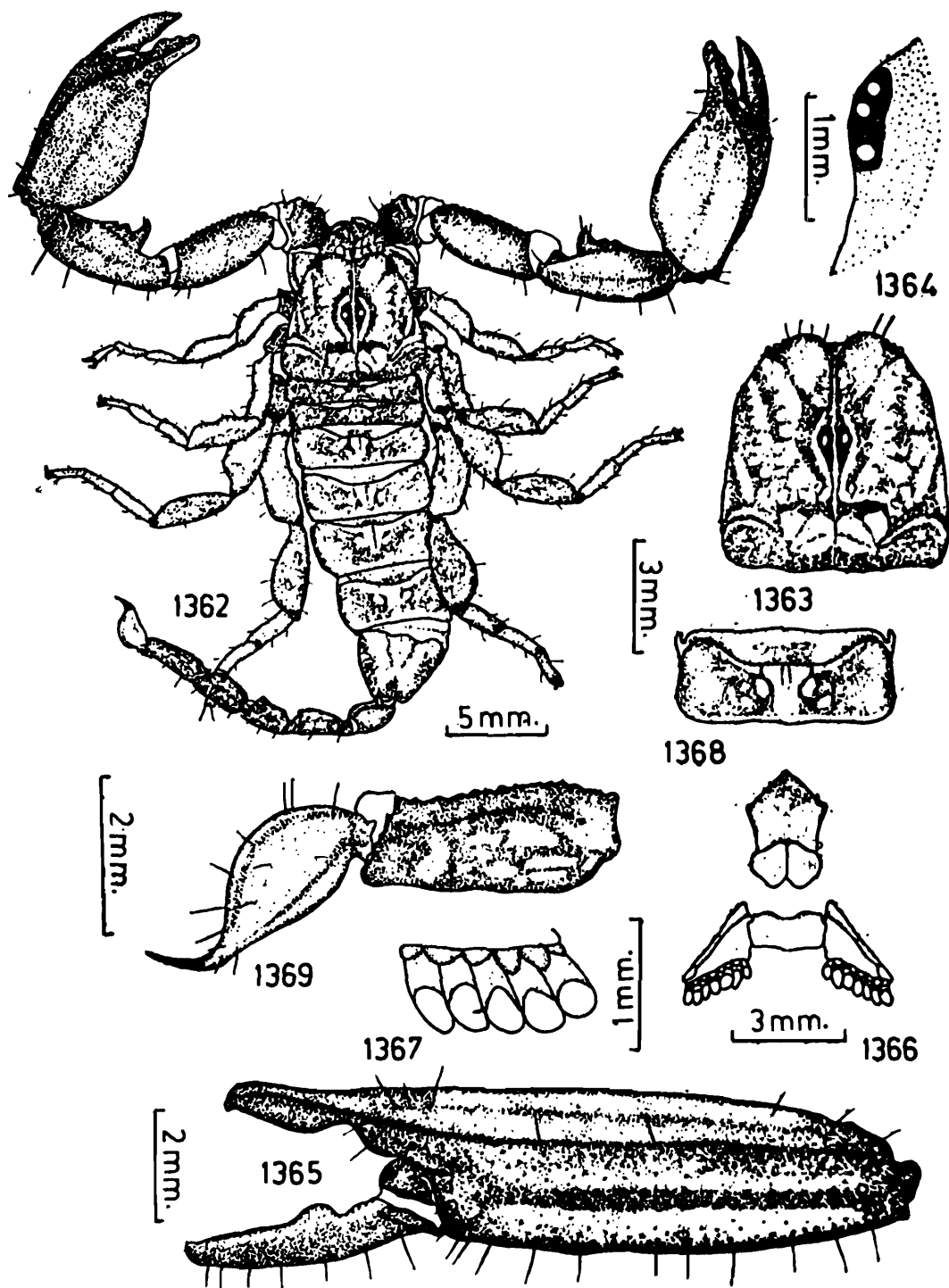
Carapace : Surface smooth and finely punctate. Ocular tubercles also smooth and punctate. Lateral ocular tubercles provided with three contiguous eyes as in text-fig. 1364. Median ocular tubercles slightly elevated and provided with a pair of median eyes, situated anteriorly in the ratio slightly less than 1 : 1.5 as in text-fig. 1363. Median furrow more distinct on posterior portion and bifid. Posterior lateral furrows also distinct. Anterior margin smooth and weakly notched in the middle portion. Lateral margins also smooth and provided with a submarginal ridge. Posterior margin smooth. Chelicera smooth on basal segment, clothed thickly with silky hairs on ventral surface. Fingers short and stout with dentition as characterised in family

and distal tooth on dorsal fang of movable finger shorter than distal tooth on ventral fang. Pedipalp stout and dorso-ventrally flat on femur, patella and manus but less flat on patella. Femur shorter than carapace. Carinae evenly granular, only inner or posterior surface provided with sparsely granular carina. Intercarinal space sparsely and finely granular. Patella as long as femur but shorter than carapace and less flat than femur, smooth, carinated, dorsal carinae irregularly but strongly granular, inferior carinae almost evenly granular. Inner or anterior surface provided with strong, pointed tubercle. Intercarinal space smooth. Manus much flattened and length of under hand more than as long as carapace, only three carinae distinct and digital and marginal carinae evenly granular as in text-fig. 1365. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1370-1375. Inner marginal carina evenly but sparsely granular. Intercarinal space closely granular on exterior surface, weakly and sparsely granular on dorsal surface, ventral surface smooth. Inferior surface irregularly granular. Entire surface finely punctate. Movable finger shorter than femur and immovable finger shorter than movable finger. Dentition on fingers minute, arranged in double row and deeply scalloped in case of female. Legs with carinated femur and patella, carinae weakly granular. Intercarinal space also weakly and sparsely granular and finely punctate. Tibia weakly carinated and granular on outer portion. Tarsomere I almost smooth. Tarsomere II smooth, furnished with a row of paired bristles on ventral surface. Distal lateral margins form right angle with the base of claw lobes. Pectines moderately developed and one and a half times longer than wide. Middle lamellae almost united to form single lamella. Fulcra distinct and almost round. Lamellae clothed sparsely with reddish megascopic setae. Pectinal teeth short not much pointed as in text-fig. 1367 and 7/7 in number. Basal segment smooth, anterior margin poorly notched in the middle portion. Genital operculum always wider than long and sclerites

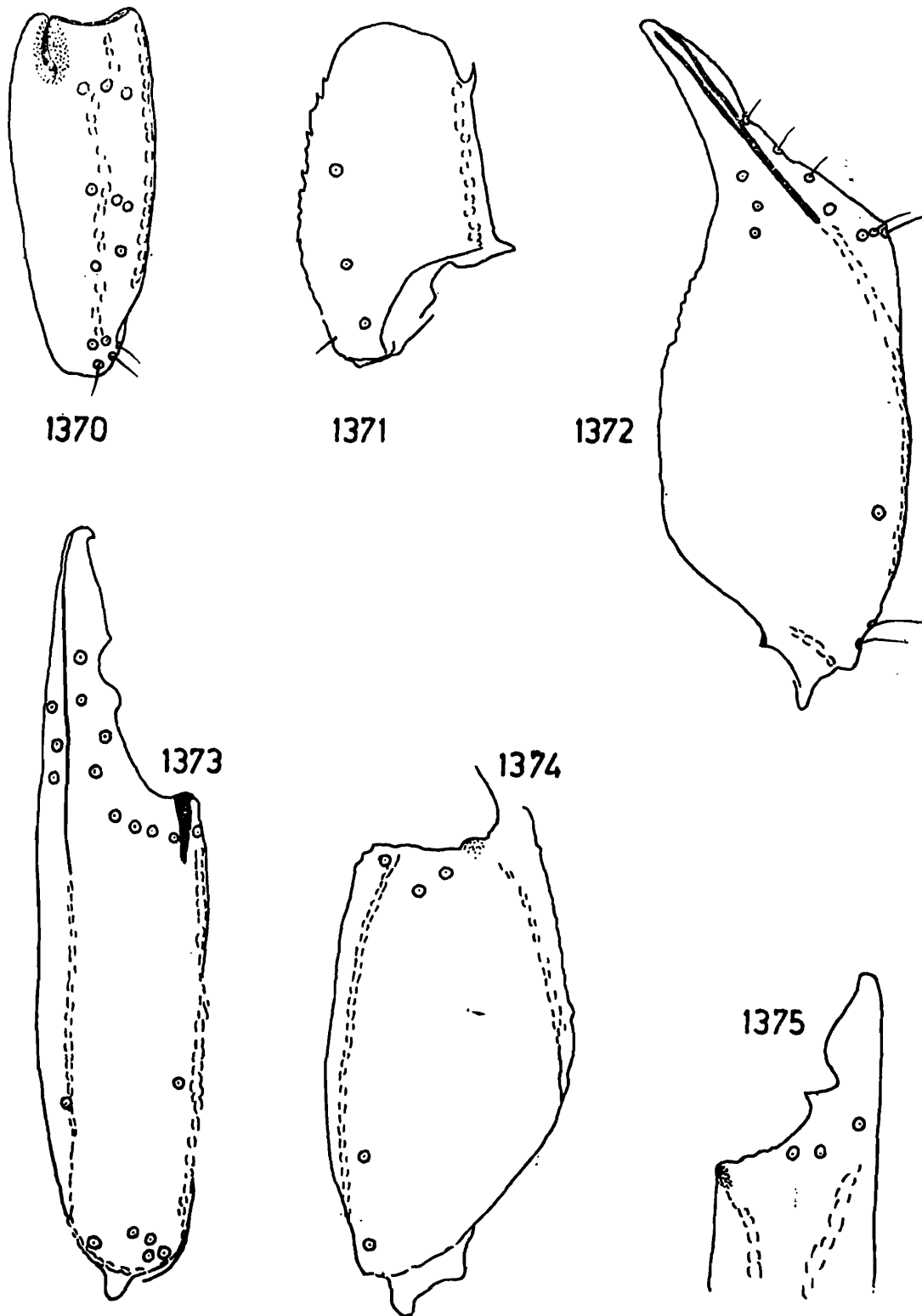
FIGS. 1362-1369. *Hormurus australasiae* (Fabr.)

1362. Dorsal view of male.

1363. Carapace, dorsal view.



- 1364. Lateral eyes, lateral view.
- 1365. Manus and fingers, exterior view.
- 1366. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1367. Pectinal teeth and fulcra, ventral view.
- 1368. Tergite, dorsal view.
- 1369. Telson and metasomal segment V, lateral view.



FIGS. 1370-1375. *Hormurus australasiae* (Fabr.)

1370. Patella, exterior view.

1371. Patella, ventral view.

1372. Manus and immovable finger, dorsal view.

1373. Manus and immovable finger, exterior view.

1374. Manus, ventral view.

1375. Immovable finger, interior view.

united in the middle portion but male genital papillae visible after lifting the sclerites. Cephalothoracic sternum pentagonal and longer than wide. Sternum and genital sclerites sparsely clothed with few reddish setae as in text-fig. 1366.

Mesosoma : All tergites smooth and finely punctate, portion of median carina elevated on tergites III-VI as in text-fig. 1368. Pretergal portion smooth with smooth posterior margin. Tergite VII smooth with smooth pretergal portion. Lateral and posterior margins of each tergite smooth. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion not distinct. Sternite V smooth, posterior and lateral margins also smooth. Presternal portion not distinct.

Metasoma : Cauda slightly less than two and a half times as long as carapace. Basal segment always longer than wide and smooth, except inferior granular carinae, developed only on posterior portion. Segment II entirely smooth except inferior lateral carinae sparsely granular. Segments III & IV smooth and dorsal carinae dentiform only on posterior end of segment III, dorsolateral carinae thickly and closely granular on segments I-IV. Segment V almost about half as long as carapace, entirely on anterior portion, inferior lateral and single inferior median carinae sparsely granular and crenulated. Anal rim of this segment sparsely crenulated. Telson slightly longer than segment V. Vesicle as long as segment IV in male and segment III in female, globular but tapering on distal portion and covered with many long megascopic setae as in text-fig. 1369. Aculeus short, not much curved, less than half the vesicular length, pointed and reddish brown on distal portion as in text-fig. 1369.

Distribution : INDIA : Andaman and Nicobar Islands; BURMA : Akyab; Myanyourg, Moulmein, Kaw Kareik, Thagatajuva and Mount Mooleyit in Tenasserim; Tavoy and Reef islands; Great Cocos Islands. Hence over the whole of the Indo-Malayan and Austro-Malayan area.

Remarks : We have studied, described and illustrated on the basis of type specimen received from B.M. (N.H.), London, Regd. No. nil.

75. *Hormurus nigripes* Pocock

(Figs. 1376-1389)

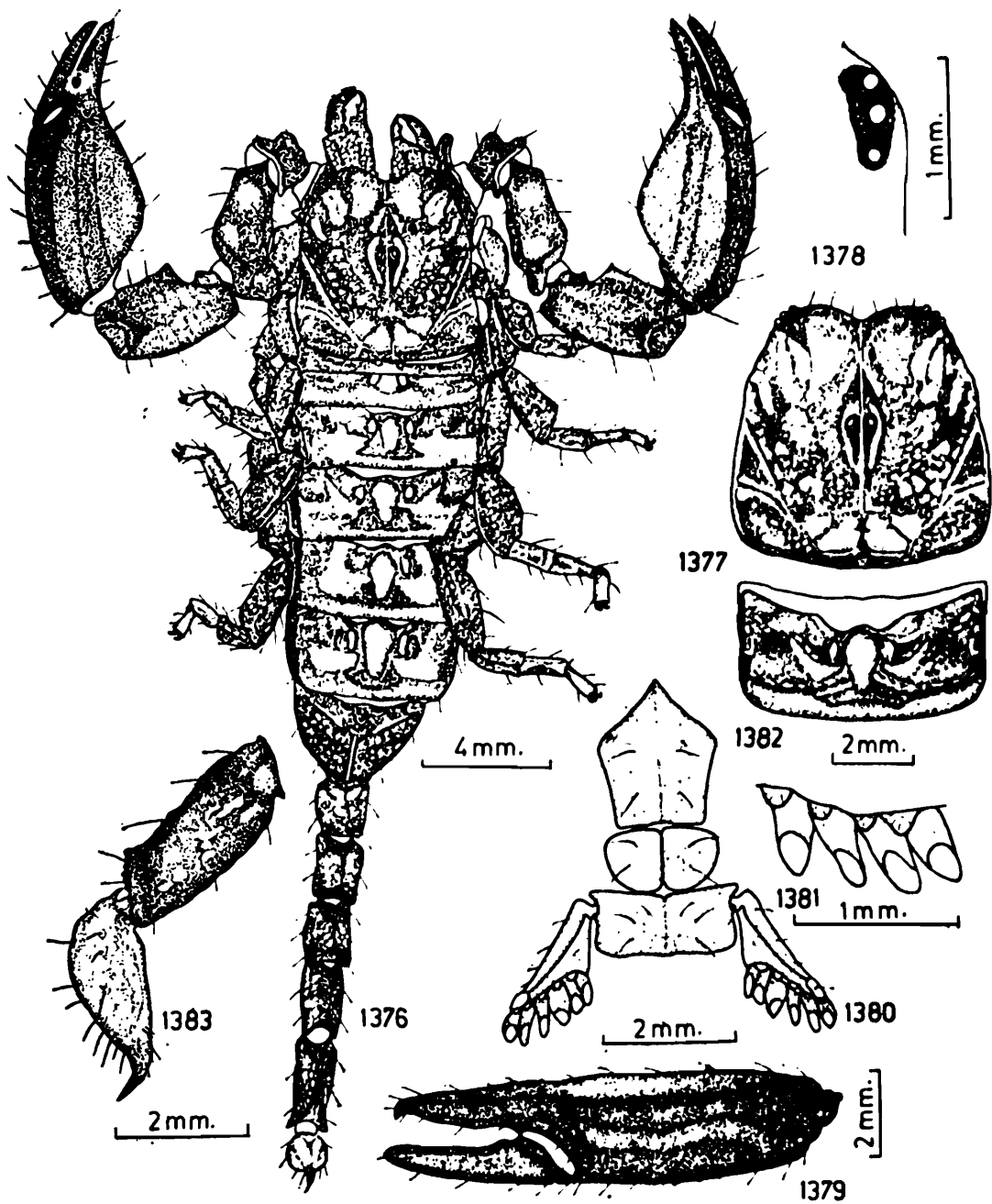
1897. *Hormurus nigripes* Pocock, *J. Bombay nat. Hist. Soc.*, 11 : 117.
 1899. *Hormurus nigripes* : Kraepelin, *Tierr. Scorp. etc.*, : 155.
 1900. *Hormurus nigripes* : Pocock, *Fauna Brit. India, Arachn.*, : 80.

General : Female small to medium in size as in text-fig. 1376. Entirely smooth on carapace, mesosoma and metasoma. Chelicera smooth, dorsal flang of movable finger short. Pedipalp strong, dorso-ventrally flat. Legs normal. Cephalothoracic sternum pentagonal and pectines weakly developed. Mesosoma smooth. Metasoma weak and smooth on segments I-V. Telson with globular vesicle, with short, weak aculeus.

Body colour dark brown to black. Chelicera light brown. Pedipalp almost black. Legs dark brown. Pectines yellowish. Mesosoma dark brown with a pair of small elliptical yellowish patches on tergites I-VI. Sternites yellowish brown but darker on sternite V. Metasoma blackish brown with yellowish telson.

Measurements : Total length 36.00 mm. Carapace 6.00 mm. long; Mesosoma 16.50 mm. long; Metasoma 13.50 mm. long.

Carapace : Entirely smooth, finely punctate and flat, middle portion slightly depressed in which a pair of median eyes situated. Median ocular tubercles very weak, smooth and situated anteriorly in the ratio 1 : 1.5 as in text-fig. 1377. Lateral ocular tubercles also smooth, weakly developed, situated almost on lateral margin and provided with three lateral eyes as in text-fig. 1378. Anterior margin smooth, weakly notched in middle portion. Lateral and posterior margins smooth. Posterior median and posterior lateral furrows not much prominent and distinct. Chelicera smooth on basal segment and thickly clothed with fine, silky hairs on ventral portion. Fingers thin and elongated, movable finger with distal tooth on dorsal fang shorter than distal tooth on ventral, dentition on fingers as characterised in family. Pedipalp stout and dorso-ventrally flat. Femur shorter than carapace, carinae very poorly develop-



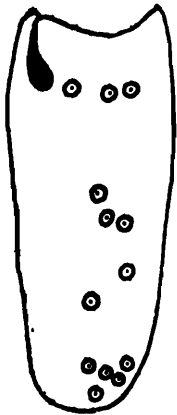
Figs. 1376–1383. *Hormurus nigripes* Pocock

- 1376. Dorsal view of female.
- 1377. Carapace, dorsal view.
- 1378. Lateral eyes, lateral view.
- 1379. Manus and fingers, exterior view.
- 1380. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1381. Pectinal teeth and fulcra, ventral view.
- 1382. Tergite, dorsal view.
- 1383. Telson and metasomal segment V, lateral view.

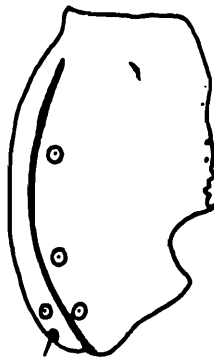
ed and almost obsolete. Intercarinal space smooth and very finely punctured. Patella slightly longer than femur but shorter than carapace. Carinae not developed but anterior or inner surface provided with a broad elevation at the base and outer or posterior surface provided with very weakly developed carinae. Intercarinal space smooth and very finely punctate. Manus longer than carapace, more flat and broader than patella, provided with only four carinae as in text-fig. 1379. Digital carina evenly granular and continued upto the tip of immovable finger. Secondary accessory very short and smooth. Exterior marginal evenly granular. Inner marginal carina closely granular at the base, sparsely granular on middle portion, continued anteriorly as smooth carina on anterior portion of immovable finger. Intercarinal space smooth and finely punctured on dorsal and ventral portions; finely but closely granular on exterior portion while weakly granular on inner portion. Fingers weakly granular at the base, movable finger slightly longer than femur but immovable finger shorter than femur. Dentition on fingers fine and arranged in two rows. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1384-1389. Legs weakly and irregularly granular on femur but more granular on I and II pairs, carinated but carinae almost obsolete. Patella and tibia smooth, without carinae. Tarsomere I smooth, provided with one pedal spine on distal portion. Femur, patella and tarsomere I finely punctate. Tarsomere II smooth, clothed sparsely with long, stiff hairs on ventral side. Lateral margins forming right angle with the base of claw lobes. Pectines moderately developed and more than one and a half times longer than wide. Middle lamellae poorly divided into three digits. Lamellae sparsely covered with long, stiff, reddish megascopic setae. Fulcra distinct. Pectinal teeth short, pointed as in text-fig. 1381 and 6/6 in number as in text-fig. 1380. Genital operculum wider than long, sclerites fused in the

FIGS. 1384-1389. *Hormurus nigripes* Pocock

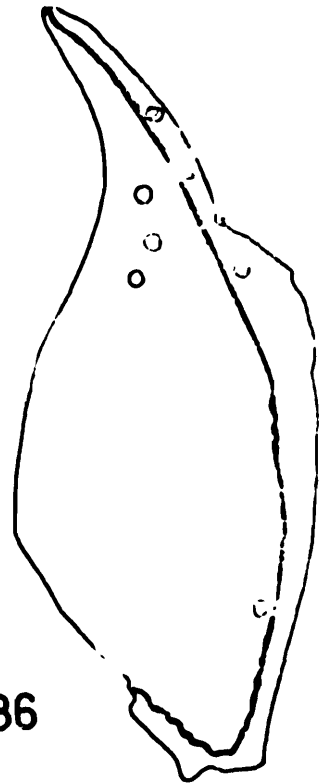
- 1384. Patella, exterior view.
- 1385. Patella, ventral view.
- 1386. Manus and immovable finger, dorsal view.
- 1387. Manus and immovable finger, exterior view.



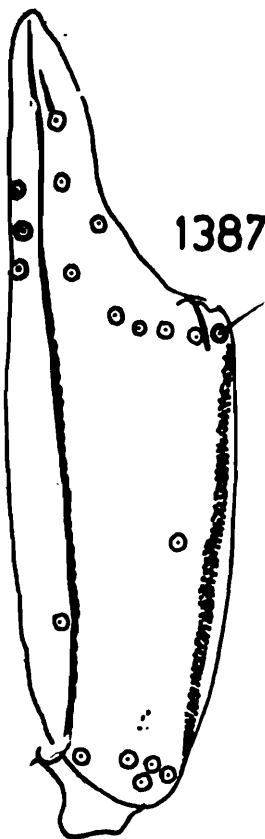
1384



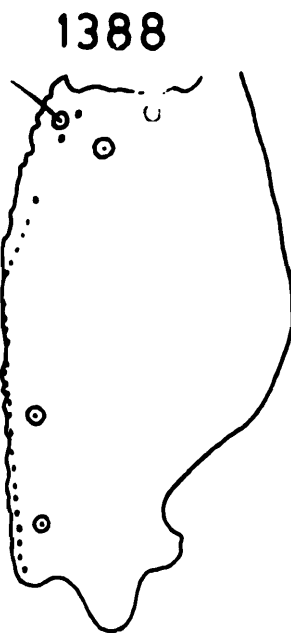
1385



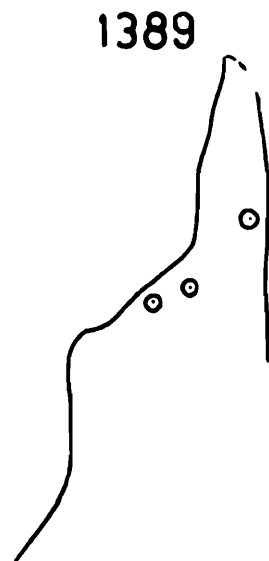
1386



1387



1388



1389

1388. Manus, ventral view.

1389. Immovable finger, interior view.

middle but a median superficial suture distinct. Cephalothoracic sternum pentagonal, longer than wide and smooth as in text-fig. 1380.

Mesosoma : All tergites smooth, finely punctate and median carinal portion elevated on tergites II-VI. Tergites I-VI provided with a pair of elliptical, yellow median spots as in text-fig. 1382. Pretergal portion smooth with smooth posterior margin. Tergite VII entirely smooth. Lateral and posterior margins of each tergite smooth. Sternite I-IV smooth, each provided with a pair of small, slit like stigmata for book lungs. Presternal portion not distinct. Lateral and posterior margins smooth. Sternite V smooth, lateral and posterior margins smooth. Presternal portion not distinct.

Metasoma : Cauda weak and about twice as long as carapace. Basal segment wider than long, smooth, carinae not developed except few granules of inferior carinae on posterior portion. Segments II-IV entirely smooth except sparsely granular on inferior carinae on segment II. Dorsal carinae smooth, obsolete and tuberculate posteriorly. Segment V much shorter than carapace and slightly longer than preceding segment, smooth except irregularly granular inferior lateral and inferior carinae. Anal rim of this segment crenulated in middle portion and lobate on lateral portions. Segments I-V sparsely setose. Telson longer than segment V but shorter than carapace. Vesicle globular but narrowed on distal portion and as long as segment IV, entirely smooth, lateral and ventral bands not distinct but brown, sparsely clothed with many megascopic setae. Aculeus much short, one third of vesicle, not much curved and sharp as in text-fig. 1883.

Distribution : INDIA : Panch Mahal, Gujarat; Gogunda Dist. Udaipur, Rajasthan.

Remarks : We have studied, described and illustrated on the basis of female type specimen received from B.M. (N.H.), London, Regd. No. 1896.9.26.84. We have also studied numerous specimens collected from Rajasthan, these specimens are deposited in Western Regional Station, ZSI, Poona.

Genus 17. *Chiromachetes* Pocock

1899. *Chiromachetes* Pocock, *J. Bombay nat. Hist. Soc.*, 12 : 744.

1900. *Chiromachetes* : Pocock, *Fauna Brit. India, Arachn.*, ; 77.

Characters : Median eyes situated anteriorly in the ratio 1 : 2. Three lateral eyes, anterior two separated by a very narrow space from the edge but posterior practically on the edge. Tarsomere II furnished on ventral surface with few spines and few small median spicules only on proximal portion, lateral margins spined. Dentition on fingers of pedipalp of two rows of small granules. Patella of pedipalp with large basal elevation.

Type-species : *Chiromachetes fergusoni* Pocock

Distribution : INDIA : Malabar coast, Kerala.

76. *Chiromachetes fergusoni* Pocock

(Figs. 1390-1402)

1899. *Chiromachetes fergusoni* Pocock, *J. Bombay nat. Hist. Soc.*, 12 : 744.

1900. *Chiromachetes fergusoni* : Pocock, *Fauna Brit. India, Arachn.*, : 78.

General : Female of large size as in text-fig. 1390. Carapace entirely smooth and finely punctate, anterior margin with deep medium notch. All tergites smooth and finely punctured. All sternites also smooth, without presternal portion. Metasomal segments thin, smooth. Telson with bulbous vesicle and small, short aculeus. Chelicera smooth on basal segment, dentition normal. Pedipalp very strong with longer femur and manus, fingers scalloped at the base. Legs stout and tarsomere II provided with a row of paired spines and a ventral median row of small spicules. Cephalothoracic sternum pentagonal. Pectines weakly developed with few teeth.

Body colour brownish but slightly darker on posterior mesosomal segments. Carapace light on anterior portion but darker on posterior and blackish on ocular region. Metasomal segments also slightly more darker but telson with clear yellow vesicle

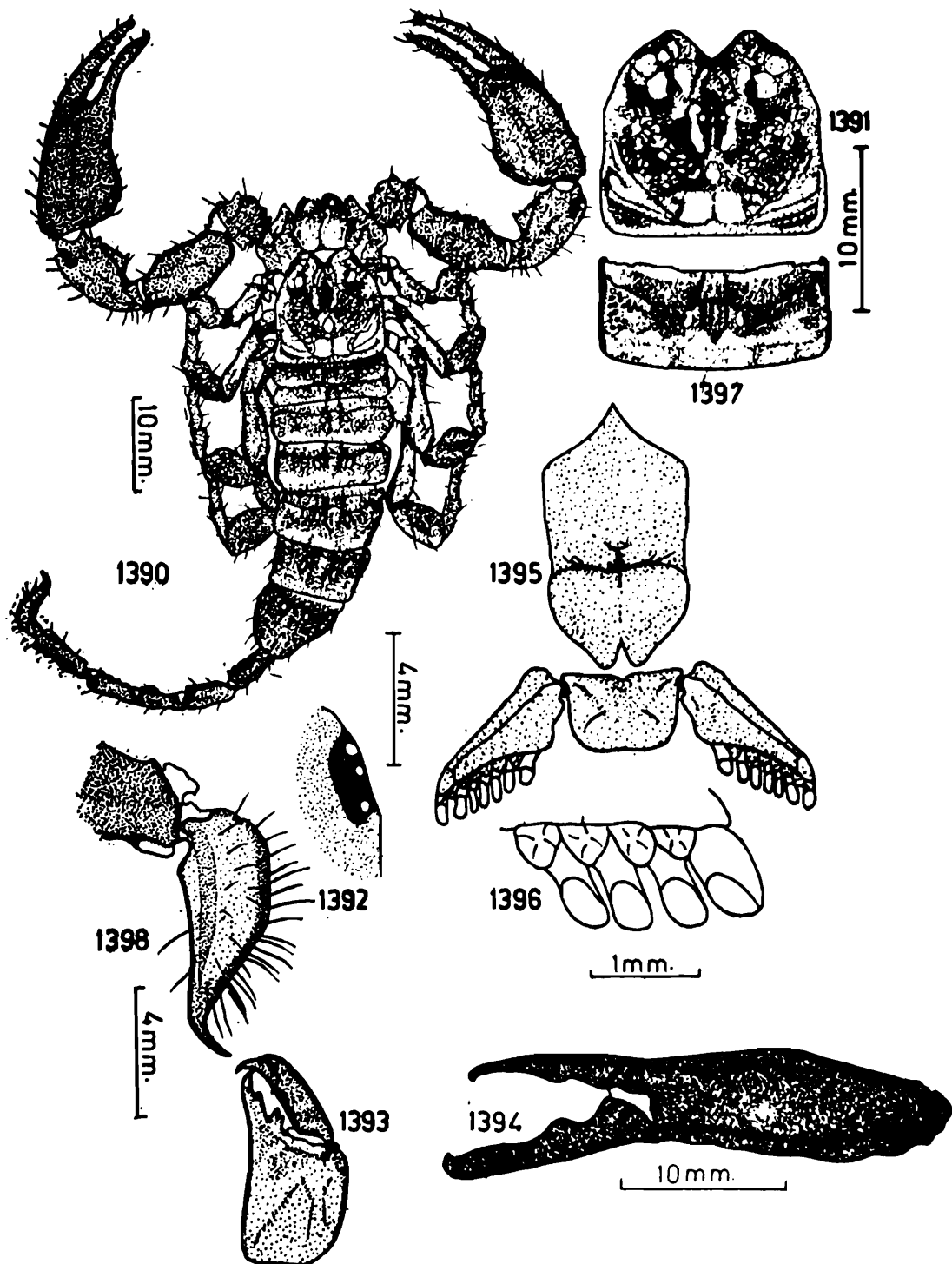
and reddish aculeus. Ventral surface pale yellow. Chelicera yellowish on basal segment and reddish on fingers. Pedipalp reddish brown but darker on carinae. Legs light brown to yellowish, tarsomere II clear yellow.

Measurements: Total length 89.50 mm. Carapace 12.50 mm. long; Mesosoma 40.00 mm. long; Metasoma 37.00 mm. long.

Carapace: Wider than long, narrowed anteriorly, entire surface smooth, finely punctured, without carinae, ocular tubercles weak, smooth and median ocular tubercles not much elevated, provided with a pair of small median eyes, situated anteriorly in the ratio 1 : 2 as in text-fig. 1391. Lateral ocular tubercles weak and three lateral eyes almost situated on the margin of carapace as in text-fig. 1392. Furrows also poorly distinguished and only posterior lateral furrows slightly prominent. Anterior margin smooth with a deep median notch. Lateral margins and posterior margin smooth. Chelicera smooth on basal segment, ventral surface thickly covered with silky hairs. Fingers almost as long as basal segment and dentition as characterised in the family as in text-fig. 1393. Pedipalp dorso-ventrally flat on femur, patella and manus and more than as wide as deep. Femur longer than carapace, anterior dorsal and anterior ventral carinae coarsely granular and all granules tuberculate. Inner or posterior surface with a granular carina and few granules tuberculate. Outer or anterior surface thickly granular. Dorsal and ventral surfaces weakly granular. Patella longer than carapace but shorter than femur. Dorsal inner and ventral inner carinae coarsely granular. Inner or anterior surface very finely granular and provided with a pair of broad denticulate tubercles on proximal portion. Outer or posterior margin coarsely and thickly granular and few granules tuberculate. Dorsal and ventral surface weakly and irregularly

FIGS. 1390-1398. *Chiromachetes fergusonii* Pocock

- 1390. Dorsal view of female.
- 1391. Carapace, dorsal view.
- 1392. Lateral eyes, lateral view.
- 1393. Chelicera, dorsal view.



1394. Manus and fingers, exterior view.
 1395. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1396. Pectinal teeth and fulcra, ventral view.
 1397. Tergites, dorsal view.
 1398. Telson and posterior portion of metasomal segment V, lateral view.

granular. Manus flat, more than as wide as patella and length of under hand always more than femur. Only dorsal and ventral outer carinae well developed but ventral carina more crenulate than dorsal carina. Dorsal inner and outer surfaces granular but ventral surface almost smooth. Fingers shorter than manus and scalloped at the base as in text-fig. 1394. Movable finger longer than femur but immovable finger shorter than patella and carinated but carina obsolete. Dentition on fingers provided with two rows of minute teeth. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1399-1402. Legs stout and finely granular on inner surface of femur but smooth on patella. Carinae obsolete. Tibia smooth. Tarsomere I carinated but smooth, provided below with a row of paired spicules and a pedal spur. Tarsomere II smooth, provided below with a row of paired spines and a median row of very fine spicules on proximal portion. Pectines weakly developed and twice longer than wide. Middle lamellae not divided into small digits. Fulcra well distinguished and round. Pectinal teeth short, weak, round on distal portion as in text-fig. 1396 and 7-7 in number as in text-fig. 1395. Basal segment smooth with weak median notch on anterior margin. Genital operculum with united sclerites, narrowed posteriorly. Cephalothoracic sternum pentagonal and wider than long as in text-fig. 1395.

Mesosoma : All tergites smooth and finely punctured, without carinae except the median low elevation on each tergite as in text-fig. 1397. Pretergal portions also smooth. Sternites also smooth and finely punctured. Presternal portion not distinct. Sternites I-IV each provided with a pair of slit like stigmata for book lungs.

Metasoma : Cauda about three times as long as carapace. Basal segment slightly less than twice as long as wide. Segment II about twice as long as wide. Segments III & IV more than

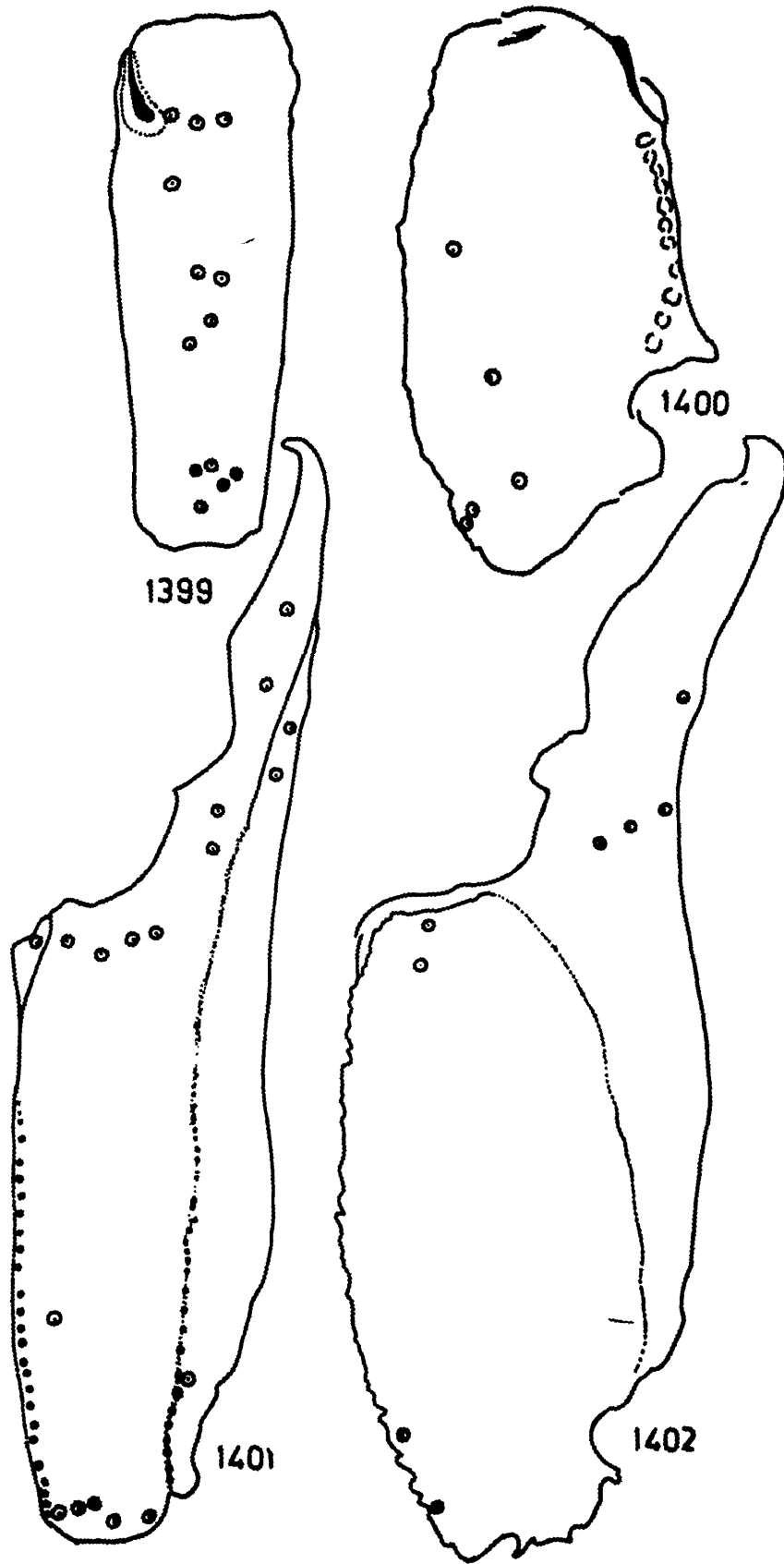
FIGS. 1399-1402. *Chiromachetes fergusonii* Pocock

1399. Patella, exterior view.

1400. Patella, ventral view.

1401. Manus and immovable finger, exterior view.

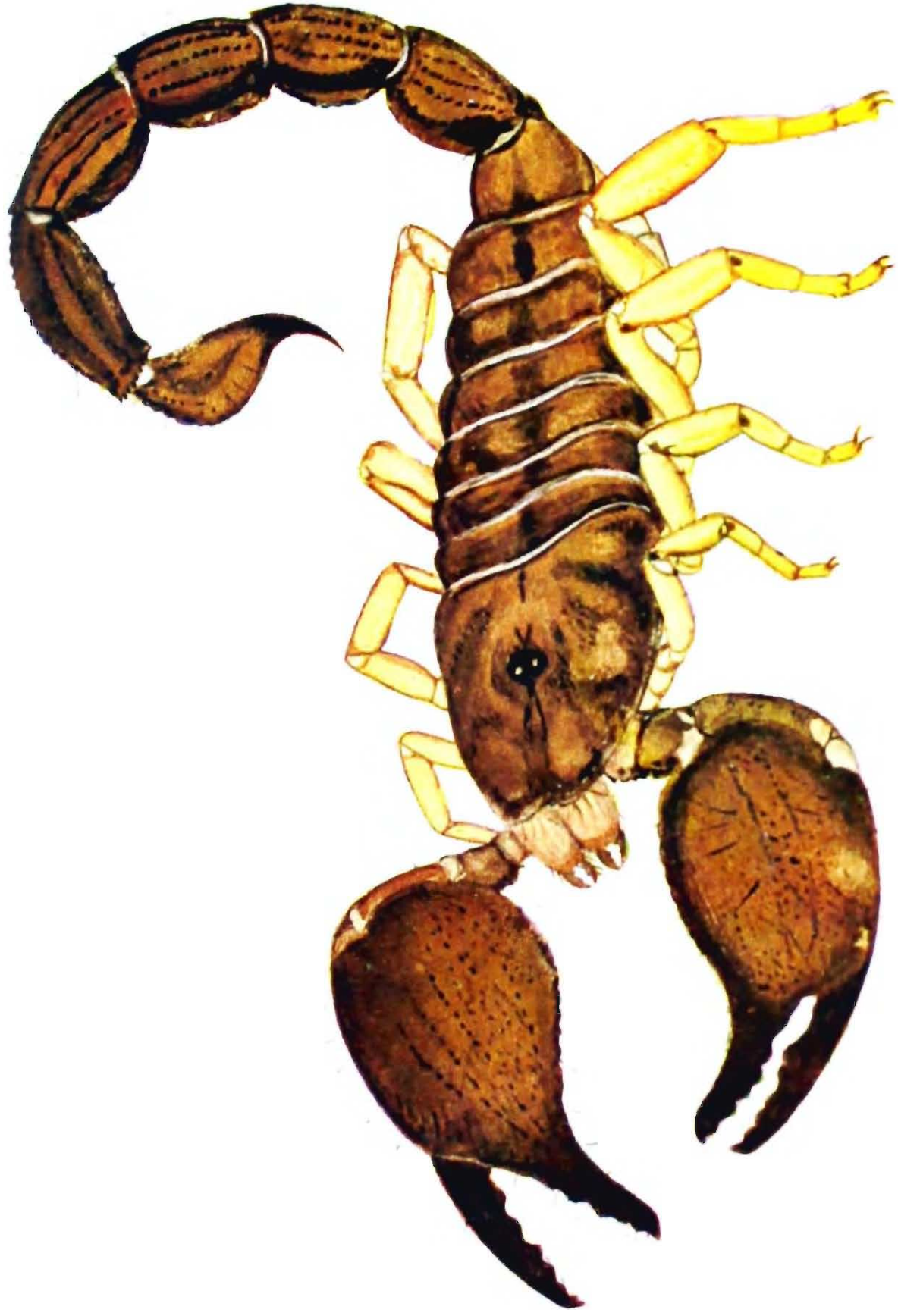
1402. Manus and immovable finger, ventral view.



twice as long as wide. Segment V three times as long as wide. Segments I-IV smooth, without carinae but segment IV very finely granular on ventral surface and finely punctured. Anterior peduncle and posterior margins smooth. Segment V slightly longer than segment IV but as wide or deep as segment IV, almost granular, interior lateral and inferior median carinae on posterior portion. Anal rim of this segment finely granular. Anterior peduncle smooth. Telson longer than segment V but much shorter than carapace. Vesicle smooth, lateral and ventral bands brown and distinct. Ventral median crest poorly developed and almost obsolete. Ventral surface covered with many long bristles. Aculeus short, broad at the base, less curved and reddish brown on distal portion as in text-fig. 1398.

Distribution : INDIA : Trivandram (*Type-locality*), Kerala.

Remarks : We have studied the type specimen received from B.M. (N.H.), London, Regd. No. 1897.7.11.1. The present description and illustrations are based on same specimen.



Family SCORPIONIDAE

Heterometrus (Gigantometrus) swammerdami Simon ♀

Family V : SCORPIONIDAE

1893. Scorpionidae Pocock, *Ann. Mag. nat. Hist.*, 12 (6) : 306.
1896. Scorpionidae : Pocock, *Ann. Mag. nat. Hist.*, 18 (4) : 75.
1896. Scorpionidae : Laurie, *Ann. Mag. nat. Hist.*, 18 (6) : 121.
1899. Scorpionidae : Kraepelin, *Tierr. Scorp. etc.*, : 107.
1900. Scorpionidae : Pocock, *Fauna Brit. India, Arachn.*, : 84.
1917. Scorpionidae : Birula, *Rus. Zap. Kavk. Mus.*, 5 : 170.
1950. Scorpionidae : Vachon, *Archs. Zool. exp. gen.*, 86 (3) : 137.
1957. Scorpionidae : Dagert, *Biol. soc. Venezuelana Cien Nat.*, 18 (88) : 101-105.
1958. Scorpionidae : Cloudsly Thompson, *Academic Press London*, : 1-278.
1965. Scorpionidae : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 37 (2) : 308.
1967. Scorpionidae : Stahnke, *Turtox News*, 45 (9) : 218.
1972. Scorpionidae : Stahnke, *J. Bombay nat. Hist. Soc.*, 69 (1) : 205.
1973. Scorpionidae : Vachon, *Bull. Mus. natn. Hist. nat., Paris*, 3 ser, Zool. 104 (140) : 857-958.
1974. Scorpionidae : Francke, *Brenesia*, 4 : 31-35.
1974. Scorpionidae : Stahnke, *Bio-Science*, : 339.
1977. Scorpionidae : Francke, *Hom. Univ. Nac. Agraria*, 20 (1) : 73-76.
1978. Scorpionidae : Couzijn, *Symp. zool. Soc. Lond.*, 42 : 327.
1981. Scorpionidae : Couzijn, *Zool. Verln.*, 184 : 1-196.

Characters : Carapace smooth, without carinae and anterior margin deeply incised; superciliary crest present. Cephalothoracic sternum broad, pentagonal and almost as long as wide. Legs provided with only one pedal spur and lateral margins of tarsomere II overlapping the base of claw and forming a very acute angle with the base of claw lobes and ventral surface provided with stout spines. Large scorpions, body and pedipalps not compressed, dorsal surface of manus usually convex. Carinae or keels on manus not strong and complete. Fingers of pedipalp armed with strong, triangular pointed teeth. Chelicera with three teeth on dorsal fang of movable finger. Cauda or tail powerful and not compressed. Trichobothria on pedipalp is of 'C' type

and ventral surface of patella always provided with only three trichobothries and *Dt* is always placed distal to *Est* on manus. Stridulating organ present between coxa of pedipalp and first leg.

Type-genus : *Scorpio* Linn.

Distribution : Ethiopian and oriental Regions.

Subfamily 4. SCORPIONINAE

- 1893 Scorpionini Pocock, *Ann. Mag. nat. Hist.*, 7 (6) : 306.
 1899. Scorpionini : Kraepelin, *Tierr. Scorp. etc.*, : 106.
 1973. Scorpioninae : Vachon, *Bull. Mus. natn. Hist. nat.*, Paris, 3 ser, Zool. 104 (140) : 857-958.

Characters : Same as family characters.

Distribution : Same as family distribution.

Genus 18. *Heterometrus* Hemprich & Ehrenberg

1828. *Heterometrus* Hemprich & Ehrenberg, *Symb. Phys.*, 7 : 1-2.
 1876. *Palamnaeus* : Thorell, *Ann. Mag. nat. Hist.*, 17 : 1-15.
 1879. *Heterometrus* : Karsch, *Mt. Much. ent. Ver.*, 3 : 11.
 1896. *Palamnaeus* : Pocock, *Ann. Mag. nat. Hist.*, 18 : 75-78.
 1899. *Heterometrus* : Kraepelin, *Mt. Mus. Hamburg*, 11 : 199-203.
 1900. *Palamnaeus* : Pocock, *Fauna Brit. India, Arachn.*, : 84.
 1934. *Heterometrus* : Werner, *Bronn's Klassen und ord. des Tier*, 5 (8) : 1-160.
 1952. *Heterometrus* : Vachon, *Publs. Inst. Pasteur Alger*, : 1-482.
 1973. *Heterometrus* : Vachon, *Bull. Mus. natn. Hist. nat.*, Paris, 3 ser, Zool. 104 (140) : 857-958.
 1978. *Heterometrus* : Couzijn, *Symp. zool. Soc. Lond.*, 42 : 327.
 1981. *Heterometrus* : Couzijn, *Zool. Verln.*, 184 : 1-196.

Characters : Anterior margin of carapace deeply notched in the middle portion. Tarsomere II furnished with two rows of stout spines on ventral portion. A stradulating organ situated between the chela and first leg. Ventral surface of patella of

pedipalp furnished only with three trichobothries as in text-fig. 1413.

Type-species : *Heterometrus longimanus* (Herbst.)

Distribution : INDIA, SRI LANKA, BURMA, BORNEO AND PHILIPPINES; AFRICA.

Remarks : This genus has recently been revised by Couzijn (1978) and he has proposed to split up the genus *Heterometrus* into five subgenera namely *Heterometrus*, *Chersonesometrus*, *Gigantometrus*, *Srilankametrus* and *Javanimetrus*.

Key to the subgenera of the genus Heterometrus

1. Rostrolateral margin of carapace continuous, without incision next to the posterior lateral eyes. Manus of pedipalp wider than long or as long as wide, granular and carinated on dorsal surface. Superciliary crest may or may not be present. 2

- Rostrolateral margin of carapace with distinct incision next to the posterior lateral eyes. Manus of pedipalp longer than wide (except *malapuramensis*), smooth or very poorly granular on dorsal surface. Superciliary crest present but may be smooth or granular. ... *Heterometrus*

2. Superciliary crest on carapace absent. Manus of pedipalp generally wider than long, granular and sometimes carinated. Second lateral eye more closer to the first than to third. *Srilankametrus*

- Superciliary crest on carapace present. Manus of pedipalp generally as long as wide, granular or smooth and carinated. Second lateral eye not closer either to the first or to the third. 3

3. Lateral eyes on carapace much smaller in size; superciliary crest granular on anterior portion. Terminal latero-ventral tooth of segment V much stouter. *Javanimetrus**

Lateral eyes on carapace not smaller in size; Superciliary crest granular on both portions. Terminal latero-ventral tooth of segment V not much stouter. 4

4. The ratio of ventral length as to maximum width of manus of pedipalp is 0.7 to 0.8; the ratio of total length of metasomal segments I-V as to the length of only metasomal segment V is 3.6 to 3.8; Superciliary crest granular on anterior and posterior portion. *Gigantometruss*

The ratio of ventral length as to maximum width of manus of pedipalp is 0.8 to 1.00, the ratio of total length of metasomal segments I-V as to the length of only metasomal segment V is 3.3 to 3.6; Superciliary crest granular only on anterior portion. *Chersonesometruss*

Subgenus (i) : *Heterometruss* Hemprich & Ehrenberg

1828. *Heterometruss* Hemp. & Ehreb., *Symb. Phys.*, 7 : 1-2.
 1978. *Heterometruss* : Couzijn, *Symp. zool. Soc. London*, 42 : 327.
 1981. *Heterometruss* : Couzijn, *Zool. Verln.*, 184 : 88.

Characters : Rostrolateral margin of carapace with an incision near the posterior lateral eyes. Superciliary crest smooth or granular. Manus of pedipalp generally longer than wide, almost smooth or weakly granular and with weakly distinguished carinae.

Type-species : *Heterometruss longimanus* (Herbst.)

Distribution : INDIA : Kerala and Andaman, Nicobar Islands.

* This genus is so far not reported from India in our studies,

Key to the species of the subgenus Heterometrus

1. Manus of pedipalp distinctly longer than wide, metasomal segment V narrow and almost straight on lateral portion. Femur of pedipalp always longer than carapace, trichobothrial group including *esb*, *em* and *est* placed sparsely. 2

Manus of pedipalp not all the times distinctly longer than wide, metasomal segment V not much narrowed and lateral sides slightly convex and bulging. Femur of pedipalp always shorter than carapace; trichobothrial group including *esb*, *em* and *est* placed closer to each other. 3

2. Patella of pedipalp longer than femur and anterior surface provided with a strong tubercles on proximal portion; trichobothria *esb1* placed distal to *esb2* and *eb2-4* placed in a straight line on patella (Fig. 1412); trichobothria *Dt* placed away from *Et5* on manus (Fig. 1414); pectines two and a half times longer than wide and pectinal teeth 19/19 in number. *longimanus*

Patella of pedipalp shorter than femur and anterior surface provided with many tuberculate granules on proximal portion; trichobothria *esb1* placed proximal to *esb2* and *eb5* placed distal to *eb2-4* (Fig. 1426); trichobothria *Dt* on manus placed closer to *Et5* (Fig. 1428); pectines two and a half times longer than wide but pectinal teeth only 13/13 in number. *keralaensis*

3. Body colour entirely blackish with bluish-green tint. Carapace and mesosomal tergites entirely coarsely granular (Fig. 1432). First and second lateral eyes larger than third (Fig. 1433); Median eyes situated anteriorly in the ratio 1:1.5 (Fig. 1432); pectinal teeth 11/11 in num-

ber (Fig. 1435); trichobothria *et1-3* placed almost in straight line and also *esb*, *est* and *em* closer to each other on patella (Fig. 1440). Angle between trichobothria *Dt* to *Et5* and *Et4* on manus more than 90° (Fig. 1442). *malapuramensis*

Body colour dark brown with reddish tint. Carapace and mesosomal tergites almost entirely smooth. All three lateral eyes of same in size (Fig. 1447). Median eyes situated anteriorly in the ratio 1:1.1 (Fig. 1446); pectinal teeth 15/15 in number (Fig. 1449); trichobothria *et2* placed proximal to *et1* and *et3* and also *est* and *em* placed little distal from *esb* on patella (Fig. 1453). Angle between trichobothria *Dt* to *Et5* and *Et4* on manus almost 90° (Fig. 1455). *bengalensis*

77. *Heterometrus (Heterometrus) longimanus longimanus* (Herbst.)

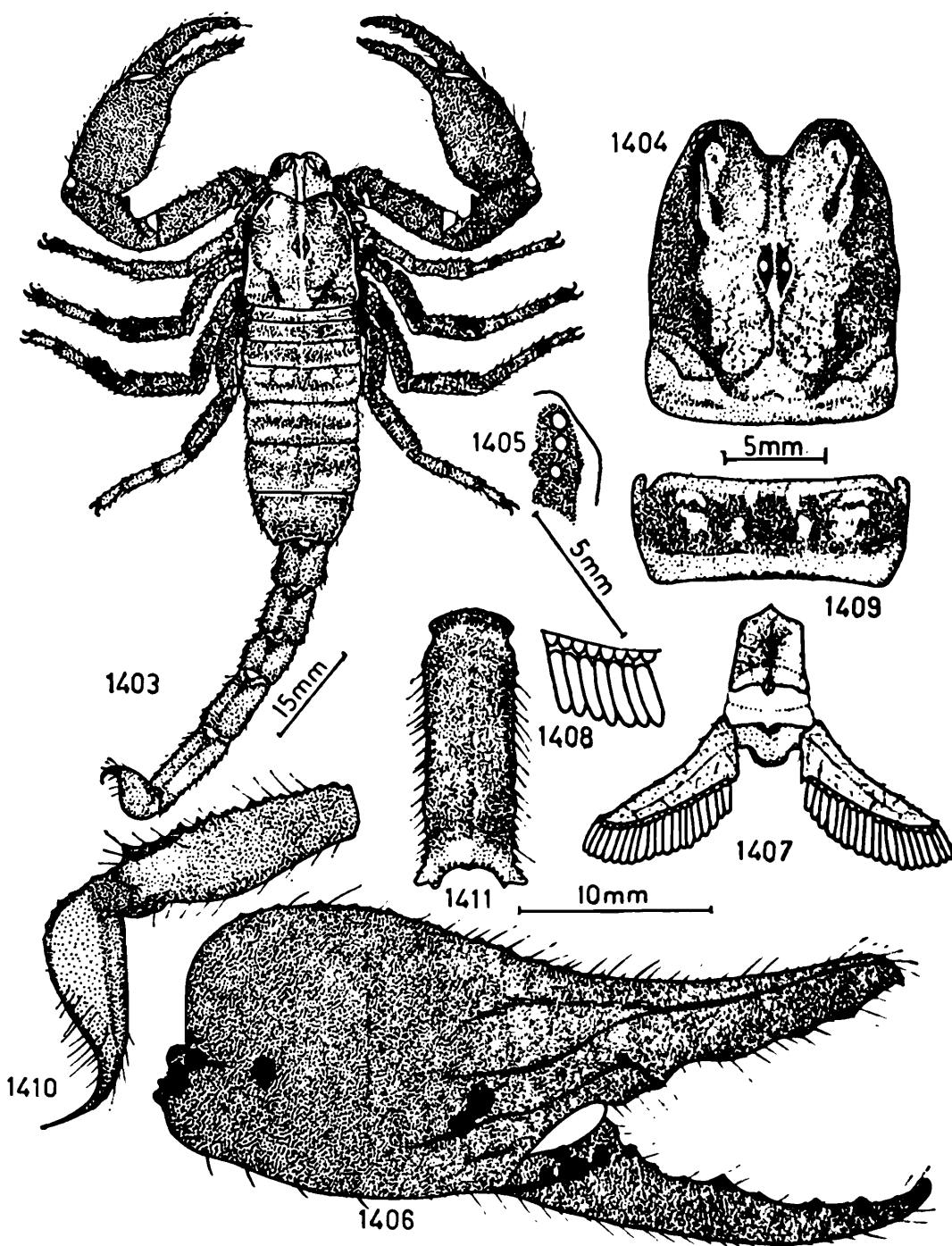
(Figs. 1403-1416)

1800. *Scorpio longimanus* Herbst., *Nat. Wngfl. Ins.*, 4 : 42.
 1884. *Heterometrus bengalensis* : Simon, *Ann. Mus. Genov.*, 20 : 360.
 1889. *Heterometrus petersii* : Thorell, *Ann. Mus. Genov.*, 2 (7) : 588:
 1892. *Palamnaeus thorelli* : Pocock, *Ann. Mus. nat. Hist.*, 9 (6) :
 40.
 1900. *Palamnaeus longimanus* : Pocock, *Fauna Brit. India, Arachn.*,
 : 97
 1981. *Heterometrus (Heterometrus) longimanus longimanus* :
 Couzijn, *Zool. Verln.*, 184 : 100.

General : Male of large size. Carapace coarsely granular on lateral portion. Mesosomal tergites granular but not coarsely granular. Chelicera smooth. Pedipalp strong, stout, with longer segments, femur strongly carinated. Pectines well developed.

FIGS. 1403-1411. *Heterometrus (Heterometrus) longimanus longi-*
manus, (Herbst.)

1403. Dorsal view of male.
 1404. Carapace, dorsal view.



- 1405. Lateral eyes, lateral view.
- 1406. Manus and fingers, exterior view.
- 1407. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1408. Pectinal teeth and fulcra, ventral view.
- 1409. Tergite, dorsal view.
- 1410. Metasomal segment V and telson, lateral view.
- 1411. Metasomal segment V, ventral view.

Legs thin with elongated digits and smooth. Metasoma comparatively short, all segments distinctly strong. Telson with much bulbous vesicle as in text-fig. 1403.

Body blackish brown with reddish tint. Chelicera brown, more darker on finger. Pedipalp dark blackish on femur and patella, slightly reddish brown on manus but fingers darker. Legs dark reddish brown. Mesosoma blackish with reddish tint on tergites, brownish on sternites. Metasoma blackish with slight brownish tint but completely blackish on carinae. Telson with brown to yellowish brown vesicle. Aculeus brownish on proximal portion while blackish on distal portion.

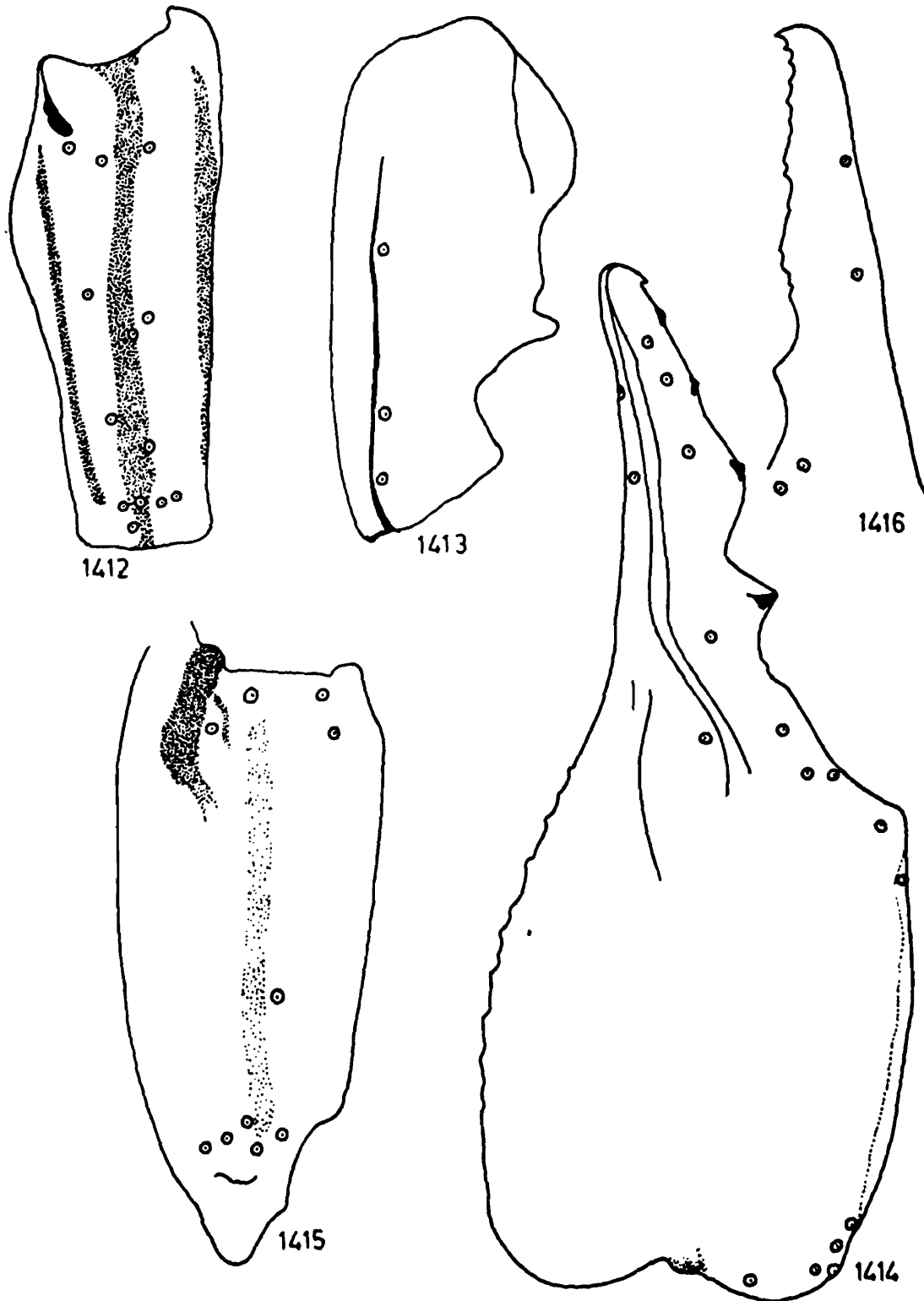
Measurements : Total length 106.00 mm. Carapace 11.25 mm. long. Mesosoma 35.50 mm. long. Metasoma 59.25 mm. long.

Carapace : Most of the surface granular but anterior lateral surface more closely and coarsely granular. Middle portion almost smooth. Posterior lateral furrows distinct, posterior median and anterior median furrows less distinct. Lateral ocular tubercles granular and eyes as in text-fig. 1405. Median ocular tubercles smooth, provided with a pair of median eyes and situated anteriorly in the ratio 1 : 1.5 as in text-fig. 1404. Anterior margin coarsely granular and deeply notched in the middle. Lateral margins coarsely granular on anterior portion and finely crenulated on rest of the portion. Posterior margin finely granular. Chelicera smooth on basal segment. Ventral surface thickly clothed with short silky hairs, extending on ventral portion of fingers. Fingers elongated, smooth, not much sharp on dentition. Dentition characterized as in the family. Pedipalp stout, strong but segments slightly more elongated, manus lobate, flat but longer than wide as in text-fig. 1403. Femur longer than carapace, carinated and carinae strongly but sparsely serrated. Anterior or inner surface provided with sparsely serrated carina. Intercarinal space entirely smooth.

FIGS. 1412-1416. *Heterometrus* (*Heterometrus*) *longimanus longimanus*, (Herbst.)

1412. Patella, exterior view.

1413. Patella, ventral view.



1414. Manus and immovable finger, dorsoexterior view.
 1415. Manus, ventral view.
 1416. Immovable finger, interior view.

Patella longer but as wide and more than as deep as femur, carinated but all carinae smooth and obsolete. Anterior or inner surface elevated and provided with stout spine and a small tubercle at the base. Intercarinal space weakly granular only on inner surface. Manus as long as patella but nearly twice as wide and more than as deep as manus. Dorsal and exterior surface smooth, ventral surface weakly granular. Inner margin provided with few tuberculate granules, arranged very sparsely as in text-fig. 1406. Carinated and only exterior carina distinct and smooth. Movable finger much longer than carapace, smooth, but immovable finger as long as carapace, carinated and two dorsal carinae finely granular. Dentition on fingers not much clear and five to six broad, triangular teeth prominent as in text-fig. 1406. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1412-1416. Legs thin, segments elongated, femur weakly granular on outer surface, carinated and only outer carinae distinct and crenulated. Patella smooth, almost without carinae. Tibia also smooth. Tarsomere I smooth and provided with few reddish spines on distal portion. Tarsomere II smooth, armed below with a row of paired reddish spines and spine formula on legs. I-IV : $\frac{4}{6}\frac{4}{6}$, $\frac{4}{6}\frac{4}{6}$, $\frac{4}{6}\frac{4}{6}$, $\frac{4}{7}\frac{5}{7}$, lateral margins covering the base of claw lobes. A pair of claws normal. Pectines well developed and two and a half times longer than wide. Middle lamellae sub-divided into three sub-digits. Fulcra distinct, triangular and sub-finger like. Teeth much elongated, not tapering as in text-fig. 1408 and 19/19 in number as in text-fig. 1407. Basal piece sclerotized, narrowed posteriorly and provided with a deep median suture. Genital operculum wider than long and a pair of sclerites exposed from which a pair of male genital papillae visible. Cephalothoracic sternum pentagonal, smooth and provided with a median suture as in text-fig. 1407.

Mesosoma : Tergites I-VI finely granular but more granular on lateral portions as in text-fig. 1409. Lateral and posterior margins also finely granular. Tergite VII more granular than pre-

ceding tergites, carinated and two pairs of lateral carinae distinct and granular only on posterior portion. Lateral and posterior margins granular. Prestergal portion smooth but finely granular on posterior margin. Sternites I-IV smooth, each provided with a pair of slit like elongated stigmata for book lungs. Lateral, posterior margins and presternal portion smooth. Sternite V entirely smooth, lateral and posterior margins smooth. Presternal portion smooth.

Metasoma : Cauda about four times as long as carapace. Basal segment wider than long. Segments II-IV longer than wide. Segment V two and half times longer than wide. Segments II & III equally deep. All segments carinated, segments I-III with dorsal, dorsolateral carinae granular and dorsal carinae strongly crenulated and weakly spiniform posteriorly. Inferior lateral and inferior carinae smooth and obsolete. Intercarinal space smooth. Anterior peduncle and posterior margin also smooth. Segment IV with dorsal carinae strongly crenulated, dorsolateral, inferior lateral and inferior carinae weakly crenulated. Intercarinal space smooth. Anterior peduncle and posterior margin smooth. Segment V shorter than carapace and less than as wide or deep as preceding segment, carinated and dorsal carina distinct, crenulated, dorsolateral carinae granular, distinct only on anterior portion. Inferior lateral and single inferior median carinae distinct and strongly serrated and inferior lateral carinae ending posteriorly in a strong triangular tubercles. Intercarinal space smooth. Anal rim of this segment evenly serrated as in text-figs. 1410 and 1411. Telson longer than carapace but vesicle slightly longer than segment IV and more than as wide as segment V but less than as deep as segment V. Dorsal surface smooth but ventral surface provided with a median and a pair of lateral carinae but all carinae very weakly granular. Aculeus shorter than vesicular length but as long as segment I, not much curved, sharp and dark on distal portion as in text-fig. 1410.

Distribution : INDIA : Andaman and Nicobar Islands; Kulin Kelah in BURMA.

Remarks : We have studied, described and illustrated on the basis of specimens (2 ♂♂) received from B.M. (N.H.), London; Regd. No. 1895.8.15.10 & 13.

78. *Heterometrus* (*Heterometrus*) *keralaensis* sp. nov.

(Figs. 1417-1430)

General : Male of large size. Carapace and tergites weakly granular. Chelicera smooth. Pedipalp stout but slender and much long, manus also narrow and long as in text-fig. 1417. Legs granular on femur and patella. Pectines well developed. Tergites without carinae. Sternites smooth. Metasoma strong, all segments carinated. Telson with globular vesicle and strong aculeus.

Body almost entirely black except reddish brown, manus of pedipalp and yellowish brown telson. Chelicera yellowish brown on basal segment. Legs blackish except yellowish brown on tarsomere II. Pectines clear yellow. Ventral body surface blackish brown.

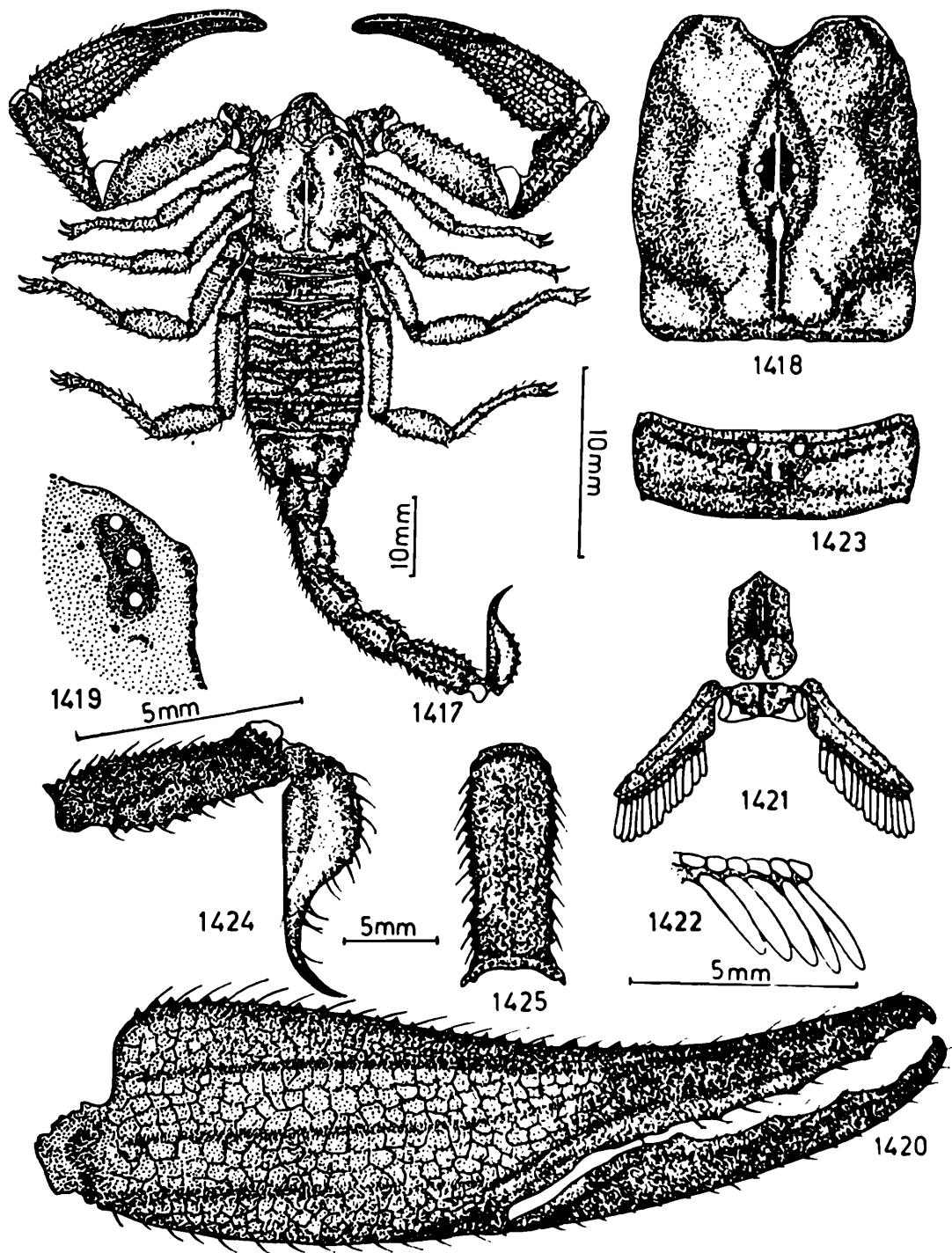
Measurements : Total length 110.00 mm. Carapace 16.25 mm. long. Mesosoma 34.75 mm. long. Metasoma 59.00 mm. long.

Carapace : Middle portion almost smooth but weakly granular on lateral portion. Ocular tubercles almost smooth and lateral tubercles provided with three contiguous lateral eyes as in text-fig. 1419. Median tubercles weak and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.25 as in text-fig. 1418. Anterior margin smooth, deeply notched in the middle portion. Lateral margins weakly crenulated but more crenulated on anterior portion. Posterior margin smooth. Chelicera smooth on basal segment, thickly clothed with short, silky hairs on ventral portion, extending on fingers. Fingers short, stout,

FIGS. 1417-1425. *Heterometrus* (*Heterometrus*) *keralaensis* sp. nov.

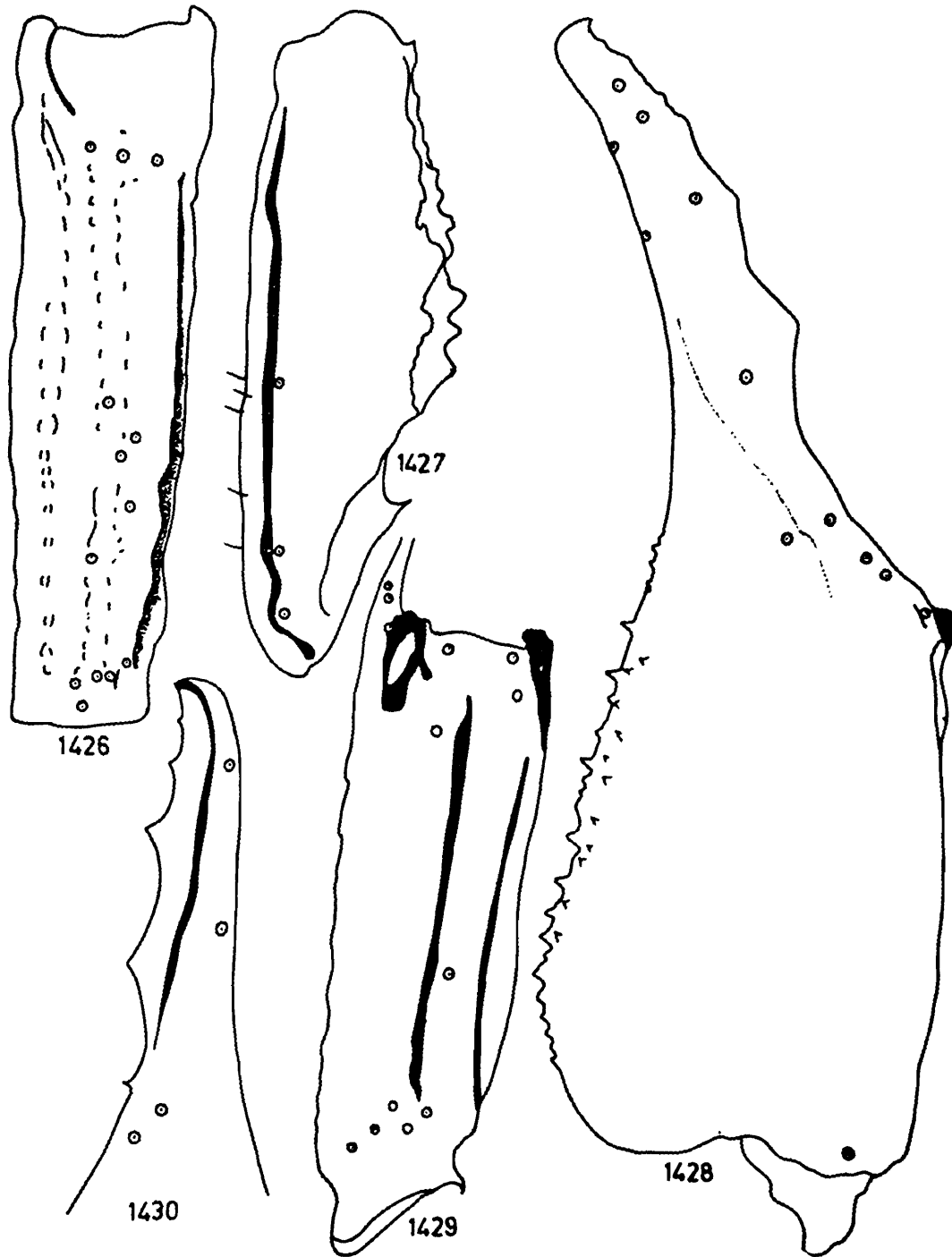
1417. Dorsal view of male.

1418. Carapace, dorsal view.



- 1419. Lateral eyes, lateral view.
- 1420. Manus and fingers, exterior view.
- 1421. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1422. Pectinal teeth and fulcra, ventral view.
- 1423. Tergite, dorsal view.
- 1424. Metasomal segment V and telson, lateral view.
- 1425. Metasomal segment V, ventral view.

not much sharp on dentition. Dentition as characterized in the family. Pedipalp exceptionally long, slender and narrow on manus, carinated only on femur. Femur longer than carapace, strongly carinated and dorsal inner, dorsal outer and ventral outer carinae sparsely granular and all granules denticulate. Anterior or outer surface provided with few denticulate granules. Intercarinal space smooth except sparsely granular on dorsal surface. Patella slightly shorter than femur but longer than carapace, as wide as femur but more than as deep as femur, carinated but carinae very weakly distinct and obsolete. Anterior or inner surface weakly elevated on proximal portion and furnished with few dentiform tubercles. Intercarinal space smooth. Manus not much enlarged, narrow and length of under hand shorter than femur or patella but longer than carapace and more as wide as patella but almost as deep as patella. Carinated but only exterior carinae distinct and smooth. Dorsal surface not much convex, smooth and covered with smooth and obsolete ridges as in text-fig. 1420. Exterior surface smooth. Inferior surface weakly granular and few granules tuberculate, arranged and short carinae on distal portion. Interior portion granular and granules strongly tuberculate. Fingers also slender and long, movable finger as long as femur and immovable finger longer than carapace, weakly carinated and carinae distinct only on proximal portion. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1426-1430. Legs granular on femur and patella, carinated but carinae weakly distinct only on femur. Tibia smooth. Tarsomere smooth, furnished with few spines and a pedal spur on distal portion. Tarsomere II smooth, disto-lateral margin overlapping the base of claw lobes and ventral surface furnished with two rows of spines and spine formula on legs I-IV : $\frac{4}{5} \frac{4}{5}$, $\frac{4}{6} \frac{4}{5}$, $\frac{4}{6} \frac{4}{6}$ & $\frac{4}{6} \frac{4}{6}$. A pair of claws normal. Pectines well developed and two and a half times longer than wide. Middle lamellae poorly distinguished in sub-digits. Fulcra distinct and round to triangular. Lamellae and fulcra covered with few reddish and whitish setae. Pectinal teeth long, tapering, pointed distally as in text-fig. 1422 and 13/13 in number as in text-fig. 1421. Basal piece broad, smooth and deeply notched in the middle portion of anterior margin, genital operculum



Figs. 1426–1430. *Heterometrus (Heterometrus) keralaensis* sp.nov.
 1426. Patella, exterior view.
 1427. Patella, ventral view.
 1428. Manus and immovable finger, dorsoexterior view.
 1429. Manus, ventral view.
 1430. Immobile finger, interior view.

wider than long, sclerites partially united in the middle portion and a pair of male genital papillae visible after lifting the sclerites. Cephalothoracic sternum pentagonal, smooth and a median longitudinal suture distinct as in text-fig. 1421.

Mesosoma : Tergites I-VI weakly granular on lateral portions, without carinae as in text-fig. 1423. Lateral and posterior margins smooth. Prestergal portion smooth and also smooth on posterior margin. Tergite VII more granular than preceding tergite, carinated and two pairs of lateral carinae weakly distinct on posterior portion. Lateral and posterior margins smooth. Prestergal portion smooth and also smooth on posterior margin. Sternites I-IV entirely smooth, each provided with a pair of slit like stigmata for book lungs. Posterior, lateral margins and pre-sternal portions also smooth. Sternite V entirely smooth.

Metasoma : Cauda slightly longer than three and a half times as long as carapace. Basal segment wider than long. Segments I-III carinated and dorsal, dorsolateral carinae granular; inferior lateral and inferior carinae smooth. Lateral carinae distinct only on segment I. Intercarinal space irregularly and weakly granular. Anterior peduncle and posterior margin smooth. Segment IV with dorsal carinae distinct and granules serrated, dorsolateral carinae granular, inferior lateral and inferior carinae weakly granular and obsolete. Intercarinal space irregularly and weakly granular. Anterior peduncle and posterior margin smooth. Segment V much shorter than carapace, carinated, dorsal carinae irregular and granules strongly tuberculate, dorsolateral carinae poorly distinct but few granules tuberculate on anterior portion. Inferior lateral carinae strongly but sparsely serrated and posteriorly ending into a broad triangular spine on anal rim as in text-fig. 1425. Single inferior median carina not much distinct, moderately and sparsely serrated. Anal rim of this segment weakly but evenly serrated. Intercarinal space irregularly granular. Anterior peduncle smooth. Telson slightly longer than carapace but shorter than patella. Vesicle longer than segment IV, as wide but more than as deep as segment V. Ventral median crest poorly crenulated. Ventral portion smooth except few granules on lateral portion. Lateral and ventral bands not much distinct.

Aculeus more than half the vesicular length and about as long as segment II, not much curved, sharp and dark on distal portion. Entire surface of vesicle and base of aculeus covered with long hairs as in text-fig. 1424.

Type-specimens : *Holotype* male in spirit, deposited in National Collection, ZSI, Calcutta, Regd. No. 5110/18. *Paratype* female (Immature) in spirit, deposited in National Collection, ZSI, Calcutta; Regd. No. 5111/18.

Type-locality : INDIA : Meenmutty, New Amaranbalan (R.F.) Kerala; 21.ii.1979. Coll. T S. N. Murthy.

Discussion : This species closely resembles with *Heterometrus* (*Heterometrus*) *longimanus longimanus* (Herbst.) but it differs from it as follows. (i) Femur, patella and manus of pedipalp much narrow and strongly carinated. (ii) Pectinal teeth 13/13 in number where as in *H. (H.) longimanus longimanus* pectinal teeth are 19/19 in number. (iii) Trichobothrial pattern on pedipalp also different in both species.

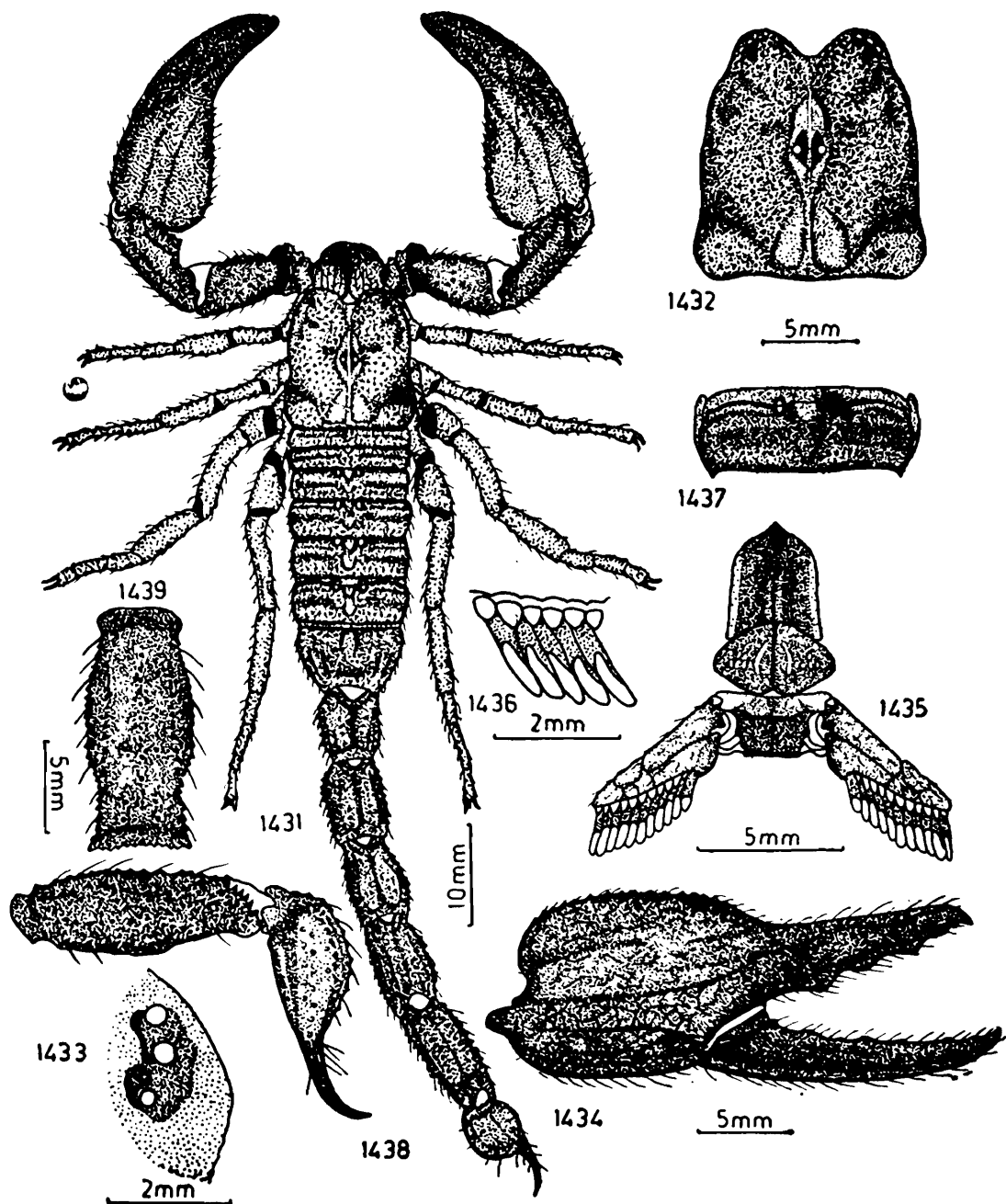
79. *Heterometrus* (*Heterometrus*) *malapuramensis* sp. nov.

(Figs. 1431-1444)

General : Male of large body, entirely granular. Carapace closely granular, ocular tubercles also granular. Chelicera smooth on basal segment, fingers short, not much sharp on dentition. Pedipalp stout, strong and large on manus as in text-fig. 1431. Legs weakly carinated only on femur. Pectines well developed. Mesosomal tergites granular, without carinae except weakly carinated on tergite VII. Sternites smooth. Metasoma strongly carinated.

Body dark black except brownish on basal segment of chelicera, manus of pedipalp, vesicle of telson and tarsomere II of legs. Ventral surface also darker except yellowish pectines.

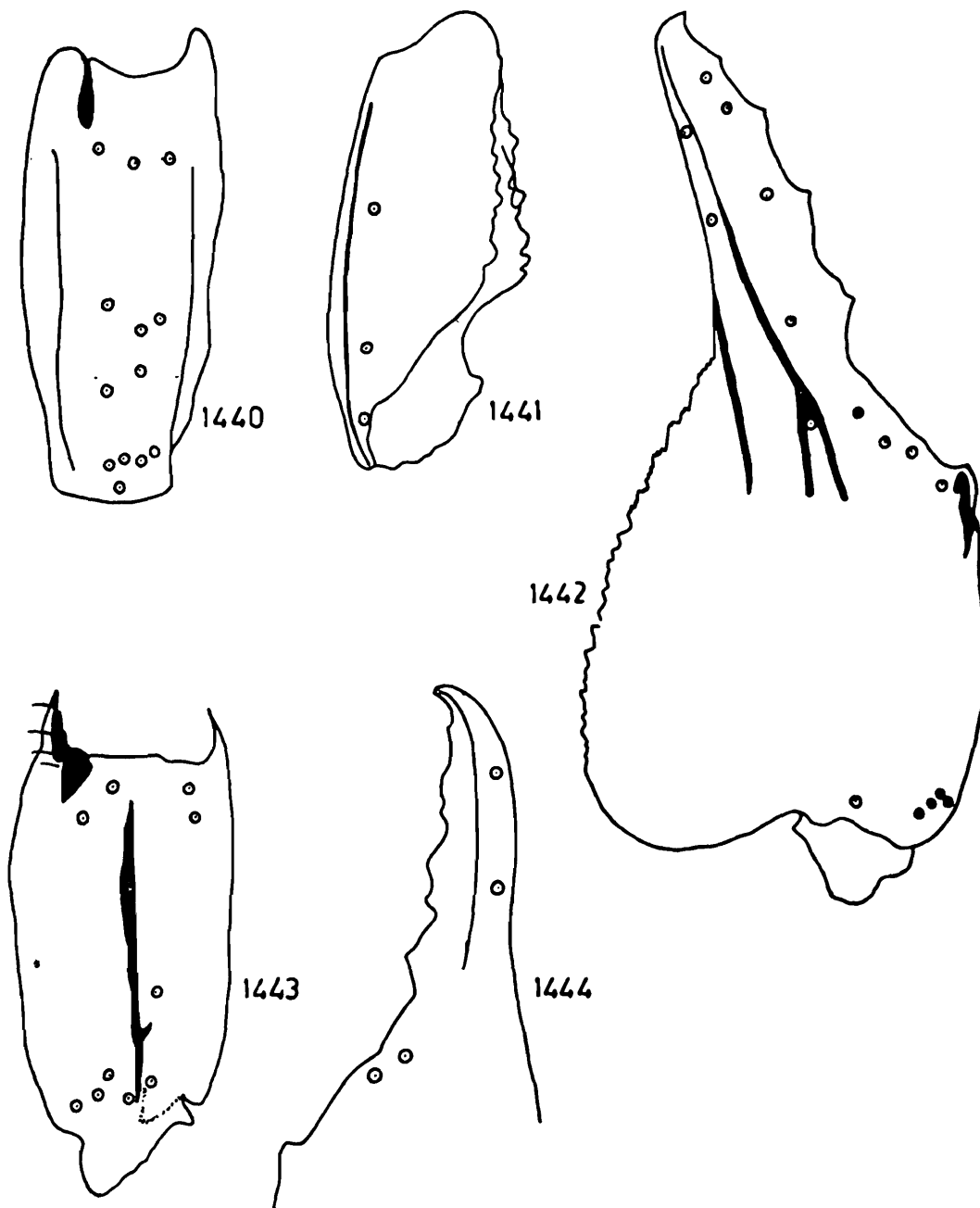
Measurements : Total length 101.00 mm. Carapace 13.50 mm. long. Mesosoma 29.50 mm. long. Metasoma 58.00 mm. long.



FIGS. 1431-1439. *Heterometrus (Heterometrus) malapuramensis* sp.nov.

- 1431. Dorsal view of male.
- 1432. Carapace, dorsal view.
- 1433. Lateral eyes, lateral view.
- 1434. Manus and fingers, exterior view,
- 1435. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1436. Pectinal teeth and fulcra, ventral view.
- 1437. Tergite, dorsal view.
- 1438. Metasomal segment V and telson, lateral view.
- 1439. Metasomal segment V, ventral view.

Carapace : Entire surface coarsely granular. Ocular tubercles weakly granular. Lateral ocular tubercles provided with three contiguous lateral eyes as in text-fig. 1433. Median ocular tubercles



FIGS. 1440-1444. *Heterometrus* (*Heterometrus*) *malapuramensis* sp.nov.

- 1440. Patella, exterior view.
- 1441. Patella, ventral view.
- 1442. Manus and immovable finger, dorsoexterior views.
- 1443. Manus, ventral view.
- 1444. Immovable finger, interior view.

weakly distinct, provided with a pair of median eyes and situated anteriorly in the ratio 1 : 1.5 as in text-fig. 1432. Posterior lateral, anterior median furrows prominent and granular. Median posterior furrow deep, narrow and bifid posteriorly. Anterior margin smooth, deeply notched in middle portion. Lateral margins weakly crenulated. Posterior margin smooth. Chelicera smooth on basal segment. Ventral surface fully covered with short silky hairs, extending on fingers. Fingers stout, not much sharp on dentition. Dentition on fingers as characterized in the family. Pedipalp stout, enlarged on manus as in text-fig. 1431. Femur shorter than carapace, carinated and all carinae coarsely granular. Intercarinal space smooth except weakly but coarsely granular dorsal surface. Anterior or outer surface furnished with few tuberculate granules. Patella slightly longer than femur but shorter than carapace, carinated but only dorsal interior carina weakly granular on proximal portion. Intercarinal space entirely smooth. Outer or posterior surface smooth. Inner or anterior portion smooth, elevated on proximal portion and furnished with a pair small tuberculate granules. Manus enlarged, as long as wide, carinated but only exterior and exterior ventral carinae distinct and smooth. Dorsal surface convex, covered with smooth, obsolete ridges except granular inner portion. Exterior portion smooth. Ventral portion irregularly granular and furnished with a pair of sparsely granular carinae. Fingers smooth, carinated only on immovable finger but carinae obsolete. Movable finger longer than carapace. Immobile finger almost as long as femur. Dentition on fingers broad, triangular and five to six in number as in text-fig. 1434. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1440-1444. Legs weakly carinated on femur, smooth on patella and tibia. Tarsomere I smooth, furnished with few spines on distal portion. Tarsomere II smooth, furnished on ventral side with paired spines and spine formula on legs I-IV : $\frac{4}{5} \frac{3}{5}$, $\frac{4}{5} \frac{3}{4}$, $\frac{4}{5} \frac{4}{5}$, $\frac{4}{5} \frac{4}{5}$. Distal margin overlapping the base of claw lobes. A pair of claw normal. Pectines well developed, two times longer than wide. Middle lamellae sub-divided into three to four sub-digits. Fulcra distinct and round to triangular. Lamellae and fulcra clothed with reddish megascopic setae as well as whitish microscopic setae. Pectinal

teeth elongated, tapering as in text-fig. 1436 and 11/11 in number as in text-fig. 1435. Basal piece smooth, invaginated on anterior margin. Genital operculum wider than long, sclerites fused in middle portion but a conspicuous male genital papillae visible after lifting the sclerites. Cephalothoracic sternum broad, pentagonal, smooth and provided with a median longitudinal depression as in text-fig. 1435.

Mesosoma : Tergites I-IV granular but coarsely granular on posterior portion and without carinae as in text-fig. 1437. Lateral and posterior margins smooth. Pretergal portion smooth but finely granular on lateral portions of posterior margins. Tergite VII more granular than preceding tergites, few granules tuberculate, provided with two pairs of weakly granular lateral carinae. Lateral and posterior margins smooth. Pretergal portion smooth but finely granular on posterior margin. Sternites I-IV entirely smooth, each provided with a pair of slit like, elongated stigmata for book lungs. Presternal portion entirely smooth. Lateral and posterior margins also smooth. Sternite V entirely smooth. Lateral and posterior margins smooth. Presternal portion smooth.

Metasoma : Cauda four and a half times as long as carapace. Basal segment wider than long. Segments II-IV always longer than wide and more wide as deep. Segments I-IV carinated and dorsal, dorsolateral carinae coarsely granular but weakly crenulated. Lateral carinae distinct but smooth only on segment I. Inferior lateral and inferior carinae smooth and almost obsolete. Intercarinal space irregularly granular but more granular on dorsal and dorsolateral portion of each segment. Anterior peduncle and posterior margins almost smooth. Segment V slightly longer than patella but shorter than carapace, dorsal carinae not distinct and irregular, dorsolateral carinae granular, granules serrated and distinct on 2/3 anterior portion. Inferior lateral and inferior carinae sparsely serrated and lateral carinae ending posteriorly into a broad spines on anal rim as in text-fig. 1439. Anal rim on this segment evenly serrated. Intercarinal space irregularly granular but more granular on dorsal portion. Anterior peduncle smooth. Telson more than as long as carapace.

Vesicle longer than segment III, weakly granular, ventral median crest weakly granular. Ventral surface carinated and carinae granular. Dorsal surface smooth. Lateral and ventral bands not much distinct. Entire surface clothed with many long hairs. Aculeus slightly longer than segment I, not much curved, sharply pointed, dark black on distal portion and proximal portion clothed with numerous hairs as in text-fig. 1438.

Type-specimens: *Holotype* ♂ in spirit, deposited in National Collection, ZSI, Calcutta; Regd. No. 5104/18. *Paratypes* 2 ♂♂ and 6 ♂♂ (immature) in spirit, deposited in National Collection, ZSI, Calcutta; Regd. Nos. 5106/18, 5107/18 and 5108/18. *Allotype* 1 ♀ with 29 youngs, in spirit, deposited in National Collection, ZSI, Calcutta; Regd. No. 5109/18.

Type-locality: INDIA : Malapuram, Poonus estate, Kozhikode Dist., Kerala, 16.vii.1981, Coll. K. N. Nair. *Paratypes*: 2 ♂♂ same locality, 14.vii.1981, Coll. K. N. Nair. 3 ♂♂ Immature, Puthupady; Kozhikode Dist., Kerala, 14.vii.1981. Coll. K. N. Nair. 3 ♂♂ Immature, Perambra, Chermalai Hills, Kozhikode Dist., Kerala, 18.vii.1981, Coll. K. N. Nair. *Allotype* 1 ♀ with 29 youngs, Perumpally, Kozhikode Dist., Kerala, 16.vii.1981, Coll. K. N. Nair.

Discussion: This species closely resembles with *Heterometrus* (*Heterometrus*) *bengalensis* (Koch) but differs from it as follows: (i) Carapace and all mesosomal tergites entirely covered with coarse granules where as in *H. (H.) bengalensis* (Koch) carapace and tergites smooth. (ii) Median eyes situated anteriorly in the ratio 1 : 1.5 where as in *H. (H.) bengalensis* they are situated in the ratio 1 : 1.1. (iii) Trichobothrial pattern on patella and manus also differs considerably in these species (Pl. see species key).

80. *Heterometrus* (*Heterometrus*) *bengalensis* (Koch)

(Figs. 1445-1470)

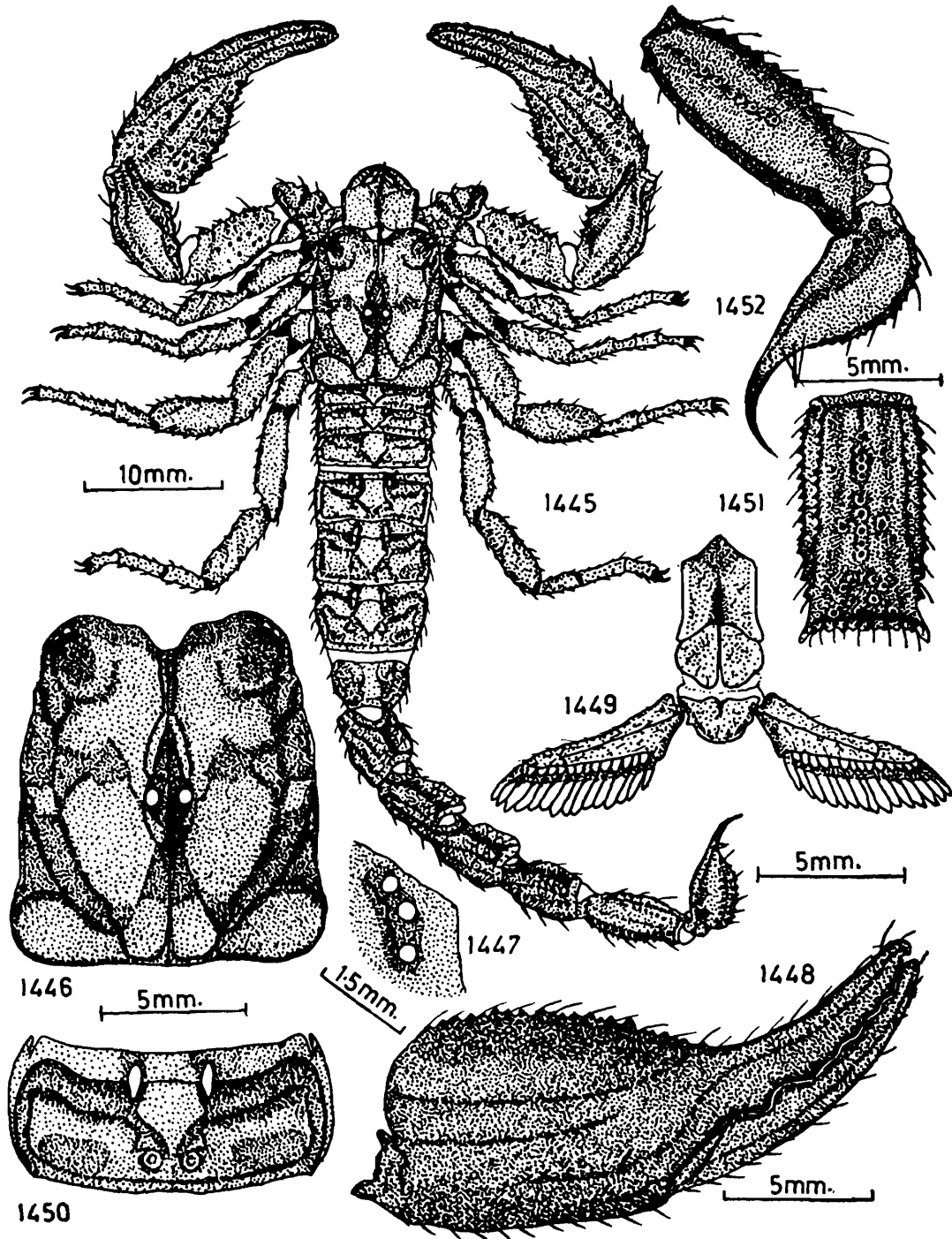
1842. *Buthus bengalensis* C. Koch, *Arachn.*, 9 : 3.
1893. *Palamnaeus bengalensis* : Pocock, *J. Bombay nat. Hist. Soc.*, 7 : 310.
1899. *Heterometrus bengalensis* : Kraepelin, *Tierr. Scorp. etc.*, : 114.
1900. *Palamnaeus bengalensis* : Pocock, *Fauna Brit. India, Arachn.*, : 94.
1981. *Heterometrus* (*Heterometrus*) *bengalensis* : Couzijn, *Zool. Verln.*, 184 : 117.

General : Male of medium to bigger in size. Entire surface of carapace and tergites smooth or weakly granular on lateral portion. Chelicera smooth. Pedipalp slightly more longer, stout, carinated as in text-fig. 1445. Legs smooth. Pectines well developed. Sternites entirely smooth. Metasoma carinated. Telson with carinated vesicle.

Body entirely brown with reddish tint. Only lateral ocular tubercle black. Chelicera light brown to yellowish. Pedipalp more reddish and dark brown on carinae. Pectines light yellowish. Legs light brown to yellowish. Sternites yellowish brown. Metasoma reddish brown with yellowish telson.

Measurements : Total length 78.25 mm. Carapace 11.25 mm. long. Mesosoma 27.50 mm. long. Metasoma 39.50 mm. long.

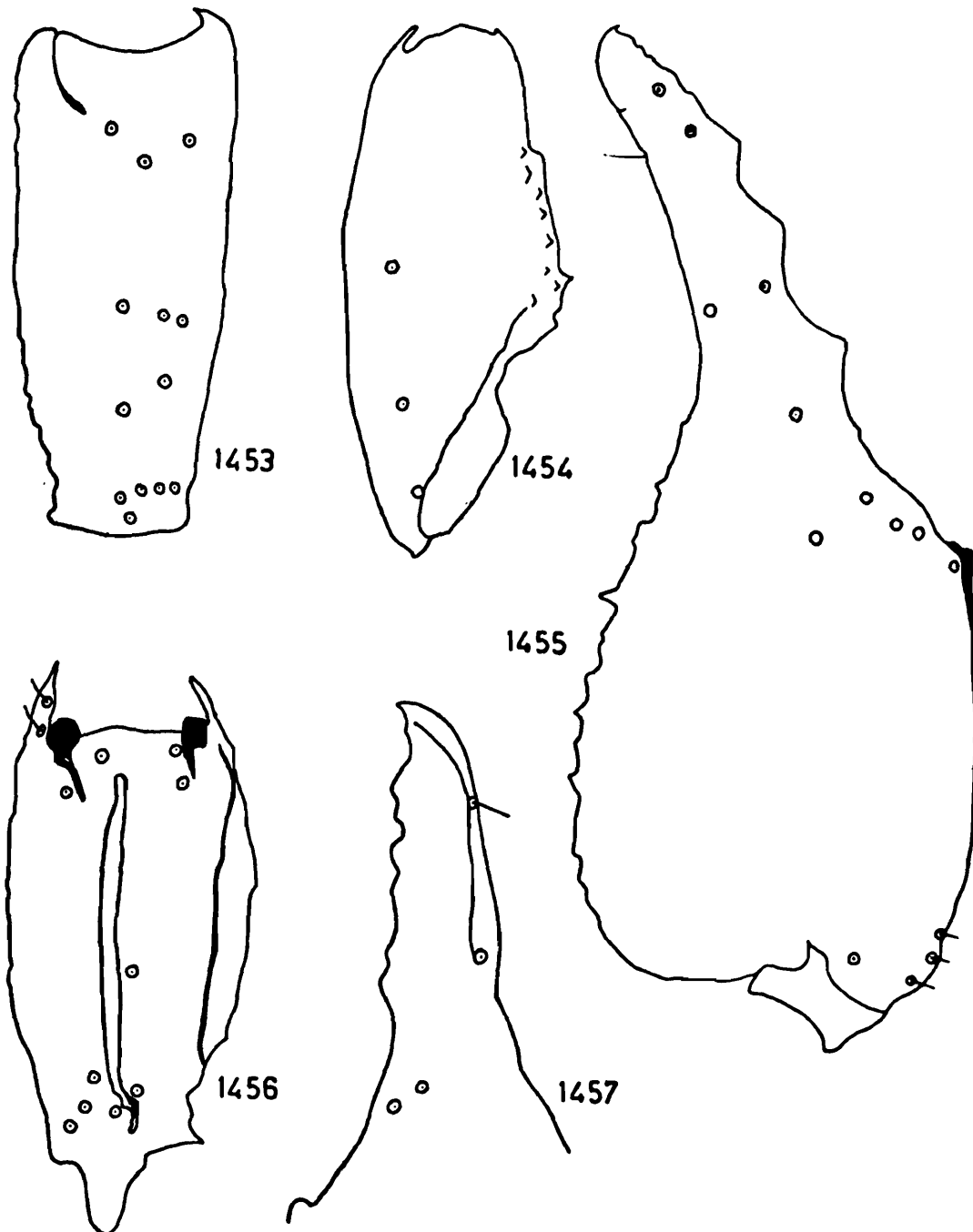
Carapace : Almost entirely smooth, but few obsolete granules present on lateral portion and anterior part of interocular space. Posterior lateral furrow distinct, median posterior furrow not much distinct on anterior portion but distinct and bifid on posterior portion. Ocular tubercles smooth. Lateral ocular tubercles provided with three contiguous lateral eyes as in text-fig. 1447. Median tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1446. Anterior margin smooth and deeply notched in the middle portion. Lateral and posterior margins smooth. Chelicera smooth on basal segment, thickly clothed with short silky hairs, extending on ventral por-



FIGS. 1445-1452. *Heterometrus (Heterometrus) bengalensis* (Koch)

- 1445. Dorsal view of male.
- 1446. Carapace, dorsal view.
- 1447. Lateral eyes, lateral view.
- 1448. Manus and fingers, exterior view.
- 1449. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1450. Tergite, dorsal view.
- 1451. Metasomal segment V, ventral view.
- 1452. Metasomal segment V and telson, lateral view.

tion of fingers. Fingers thin, elongated and sharp on dentition, dentition as characterized in the family. Pedipalp stout, elongated, carinated and with elongated lobate manus as in text-fig.



FIGS. 1453-1457. *Heterometrus (Heterometrus) bengalensis* (Koch)

1453. Patella, exterior view.

1454. Patella, ventral view.

1455. Manus and immovable finger, dorsoexterior view.

1456. Manus, ventral view.

1457. Immobile finger, interior view.

1445. Femur shorter than carapace, carinated and dorsal anterior, dorsal posterior and ventral anterior carinae strong and crenulated. Anterior or outer surface provided with sparsely granular carina and all granules strongly tuberculate. Intercarinal space coarsely and sparsely granular. Patella longer than femur but shorter than carapace, carinated but all carinae weakly developed and obsolete. Anterior or inner surface elevated and provided with few tuberculated granules. Intercarinal space almost smooth except finely granular inner surface. Manus shorter than femur but longer than wide. Dorsal surface covered with obsolete granules, forming small ridges. Inner margin furnished with many tuberculate granules as in text-fig. 1448. Carinated but only exterior, smooth and obsolete carinae distinct. Fingers smooth and movable finger longer than carapace and immovable finger shorter than femur, carinated and dorsal inner carina on immovable finger weakly crenulated. Dentition on fingers not clear but five broad, triangular teeth distinct as in text-fig. 1448. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1453-1457. Legs stout, smooth and only femur weakly carinated on outer surface. Patella and tibia smooth. Tarsomere I smooth and provided with few reddish spines on distal portion. Tarsomere II smooth, furnished with a row of paired spines on ventral surface, spine formula on legs I-IV : $\frac{3}{8} \frac{3}{8}$, $\frac{3}{8} \frac{3}{8}$, $\frac{4}{8} \frac{4}{8}$, $\frac{4}{8} \frac{4}{8}$, and lateral margins overlapping the base of claw lobes. A pair of claws normal. Pectines well developed two and a half times longer than wide. Middle lamellae weakly sub-divided into two to three digits. Fulcra distinct, triangular. Fulcra and lamellae clothed with microscopic setae. Pectinal teeth elongated, not much tapering and 15/15 in number as in text-fig. 1449. Basal segment smooth, provided with a depression on anterior portion. Genital operculum wider than long. A pair of sclerites partially fused in the middle portion, from under which a pair of male genital papillae visible. Cephalothoracic sternum pentagonal, smooth and provided with a median, longitudinal depression as in text-fig. 1449.

Mesosoma : Tergites I-VI almost smooth, finely and weakly granular on lateral portion, without carina as in text-fig. 1450. Lateral and posterior margins smooth. Pretergal portion smooth

and also smooth on posterior margin. Tergites VII granular on lateral portion and two pairs of lateral carinae distinct on posterior portion and granular. Lateral margins weakly crenulated. Posterior margin smooth. Pretergal portion smooth. Sternite I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion not distinct. Sternite V entirely smooth. Lateral, posterior margins and presternal portion smooth.

Metasoma : Cauda about three and a half times as long as carapace. Basal segment wider than long. Segment V twice as long as wide. Segment II & III equal in depth. All segments carinated. Segments I-III with dorsal and dorsolateral carinae granular and weakly crenulated. Inferior lateral and inferior carinae smooth and obsolete. Intercarinal space irregularly granular only on posterior portion of each segment. Anterior peduncle and posterior margin smooth. Segment IV with dorsal, dorsolateral, inferior lateral and inferior carinae granular but dorsal and dorsolateral carinae more crenulated. Intercarinal portion irregularly granular on posterior portion. Anterior peduncle and posterior margin smooth. Segment V shorter than carapace carinated, dorsal and dorsolateral carinae serrated but dorsolateral carinae developed only on anterior portion as in text-fig. 1457. Inferior lateral sparsely serrated and strongly tuberculate posteriorly. Single inferior median carina almost evenly serrated. Anterior peduncle smooth. Anal rim of this segment evenly and closely crenulated on ventral portion but broad denticulate on lateral portion as in text-figs. 1451 & 1452. Telson longer than segment V but shorter than carapace and as long as femur of pedipalp. Vesicle slightly shorter than segment IV and less than as wide or deep as segment V. Dorsal surface smooth but ventral surface furnished with closely crenulated median and a pair of lateral carinae. Lateral and ventral bands distinct. Aculeus more than half the vesicular length but shorter than segment I, not much curved, sharp and dark on distal portion as in text-fig. 1452.

Distribution : INDIA : Dehra Dun, Allahabad, Uttar Pradesh; Gwalior, Madhya Pradesh; Sibsagar, Assam; Meghalaya; West Bengal; Satara, Nagpur, Maharashtra.

Remarks : We have studied, described and illustrated on the basis of authenticated identified specimens (2 ♂♂) received from B.M. (N.H.), London. Regd. No. 1897.5.10.217 & 221.

Subgenus (ii) : *Srilankametrus* Couzijn

1981. *Srilankametrus* Couzijn, *Zool. Verln.*, **184** : 327.

Characters : Rostrolateral margin of carapace continuous and incision next to posterior lateral eyes not present. Superciliary crest almost absent. Median eyes situated anteriorly in the ratio of 1 : 1.1. Manus of pedipalp wider than long, almost thickly granular and sometimes with prominent carinae. Im-movable finger of pedipalp with smooth, distinct carina.

Type-species : *Heterometrus indus* (De Geer)

Distribution : INDIA : Tanjore, Tamil Nadu; Andhra Pra-desh; SRI LANKA.

*Key to the species of the subgenus *Srilankametrus**

1. Carapace smooth except few coarse gra-nules on anterior portion of interocular area (Fig. 1458). Manus of pedipalp granular only on distal portion and strongly carinated on immovable finger (Fig. 1459); trichobothria *dsb* placed proximal to *esb* on immovable finger; trichobothria *esb1* & 2 in same plane on patella (Fig. 1463). Distolateral margins of tarsomere II provided with three spines. *latimanus*

Carapace coarsely granular on lateral portions and middle portion almost smooth (Fig. 1470). Manus of pedipalp fully covered with coarsely or obsolete granular and weakly carinated on immovable finger (Fig. 1472); trichobothria *dsb* placed in the same plane or distally to *esb* on im-movable finger (Fig. 1480); trichobothria *esb2* placed distal to *esb1* on patella (Fig. 1478). Distolateral margins of tarsomere II provided with one or two spines.2

2. Manus of pedipalp fully granular on dorsal surface but granules smooth and obsolete. Distal carina distinct but weakly granular and granules not separated, continued on immovable finger (Fig. 1472); trichobothria *em2* placed distal to *em1* on patella (Fig. 1478); trichobothria V3 & V4 placed closer on manus (Fig. 1481). *gravimanus*

Manus of pedipalp fully granular and granules coarse and placed sparsely, digital carina not much distinct but granular and granules separated, continued weakly on immovable finger (Fig. 1486); trichobothria *em2* placed close and proximal to *em1* on patella (Fig. 1491); trichobothria V3 & V4 placed at little distance on manus (Fig. 1495). *serratus*

81. *Heterometrus* (*Srilankametrus*) *latimanus* (Pocock)

(Figs. 1458-1468)

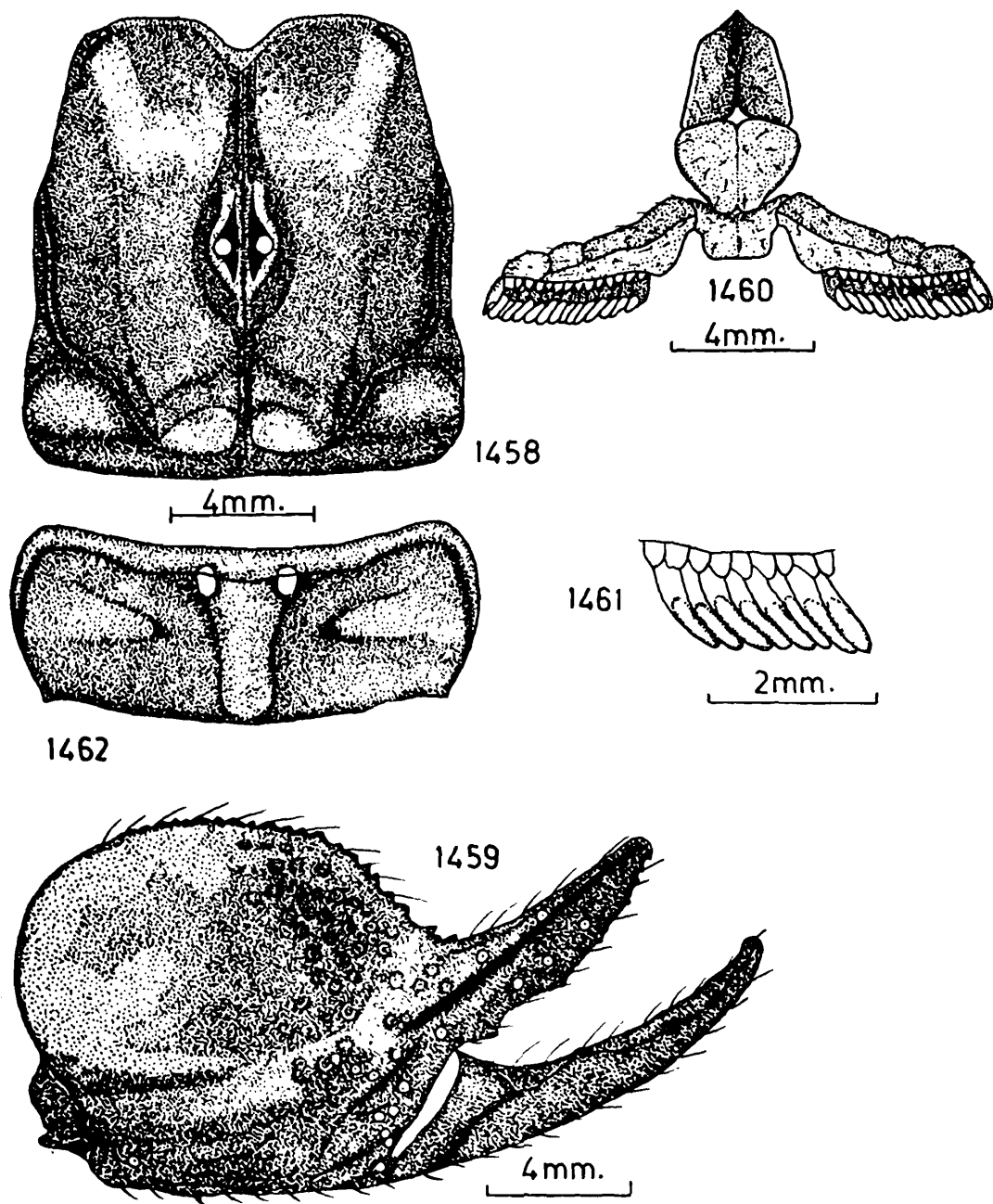
1894. *Scorpio latimanus* Pocock, *Ann. Mag. nat. Hist.*, 8 (6) : 74.
 1899. *Heterometrus latimanus* : Kraepelin, *Tierr. Scorp.etc.*, : 113.
 1900. *Palamnaeus latimanus* : Pocock, *Fauna Brit. India, Arachn.*, : 90.
 1981. *Heterometrus* (*Srilankametrus*) *indus indus* : Couzijn, *Zool. Verln.*, 184 : 121.

General : Female of large size. Body surface weakly granular. Carapace with lateral eyes more anteriorly directed. Chelicera smooth. Pedipalp short, stout and manus much curved and round on inner margin, convex on dorsal surface. Legs smooth and tarsomere II with three spines on lateral margins. Pectines well developed. Mesosoma smooth. Metasoma carinated (segments I-IV) and all carinae smooth.

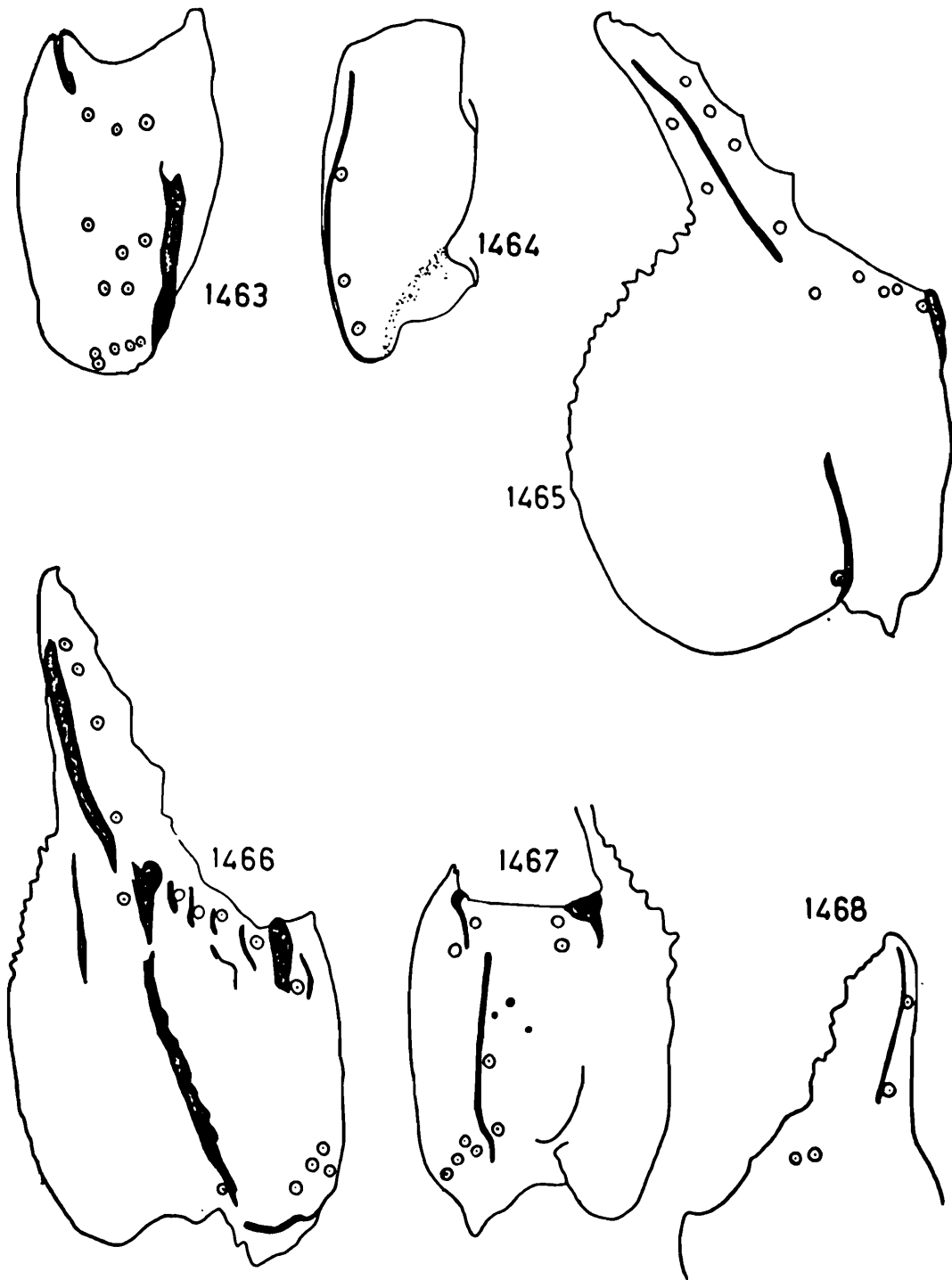
Body blackish brown. Carapace with few light spots. Chelicera yellowish on basal segments but dark brown on fingers. Pedipalp reddish brown on femur, patella and manus but blackish brown on fingers. Legs pale yellow to dark yellow-

ish. Pectines light yellow. Mesosoma pale brown to dark brown. Metasoma more darker than mesosoma.

Measurements : Total length 59.25 mm. Carapace 12.00 mm.



FIGS. 1458-1462. *Heterometrus (Srilankametrus) latimanus* (Pocock)
 1458. Dorsal view of carapace of female.
 1459. Manus and fingers, exterior view.
 1460. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1461. Pectinal teeth and fulcra, ventral view.
 1462. Tergite, dorsal view.



FIGS. 1463-1468. *Heterometrus (Srilankametrus) latimanus* (Pocock)

1463. Patella, exterior view.

1464. Patella, ventral view.

1465. Manus and immovable finger, dorsoexterior view.

1466. Manus and immovable finger, exterior view.

1467. Manus, ventral view.

1468. Immobile finger, interior view.

long. Mesosoma 29.25 mm. long. Metasoma 18.00 mm. long (except segment V and telson).

Carapace : Almost entirely smooth except weakly granular anterior median portion of interocular space. Lateral ocular tubercles smooth, provided with three contiguous lateral eyes and anterior two directed more anteriorly as in text-fig. 1458. Median ocular tubercles smooth, not much elevated, separated by median suture and furnished with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1458. Anterior margin smooth, notched in the middle portion but not deeply notched. Lateral margins smooth and supported with finely granular submarginal ridge. Posterior margin smooth and straight. Only posterior lateral, posterior and anterior median furrows distinct. Chelicera smooth on basal segment, thickly clothed with silky hairs on ventral side which extend on fingers. Fingers thin, elongated, not much sharp on dentition. Dentition characterized as in the family. Distal tooth of dorsal fang much shorter than distal tooth on ventral fang. Pedipalp short, stout and much lobed on inner portion of manus as in text-fig. 1459. Femur much shorter than carapace, carinated but only dorsal interior and ventral exterior carinae distinct and dorsal interior smooth and obsolete where as ventral interior carina granular. Anterior or exterior surface thickly granular and some granules tuberculate. Intercarinal space almost smooth except weakly granular dorsal surface. Patella longer than femur but shorter than carapace, carinated but all carinae smooth and obsolete. Intercarinal space smooth, reticulate with smooth obsolete ridges. Anterior or inner surface elevated but without granules. Manus longer than femur but shorter than patella, wider than long; inner margin much curved, lobed on posterior portion, smooth but crenulated to serrated, distal portion and dorsal surface fully covered with smooth, obsolete ridges. Carinated but only exterior marginal carina distinct, smooth and elevated. Exterior surface smooth, ventral surface weakly granular on inner portion. Fingers smooth, carinated but carinae smooth. Movable finger longer than carapace and immovable finger longer than femur but shorter than patella. Dentition on fingers triangular, broad and five in number as in text-fig. 1459.

Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1463-1468. Legs smooth on femur and patella except granular carinae on femur. Tibia smooth. Tarsomere I smooth, distally furnished with few spines on ventral and lateral portion and a pedal spur on distal end. Tarsomere II smooth, lateral margins overlapping the base of the claw and furnished with three spines. Ventral surface also furnished with spines in two rows and spine formula on legs I-IV : $\equiv \frac{4}{8} \frac{4}{8}, \equiv, \frac{4}{8} \frac{5}{8}, \frac{5}{8} \frac{5}{8}$. Pectines well developed and two and a half times longer than wide. Middle lamellae subdivided into two digits. Fulcra distinct, triangular and more pointed on distal portion. Lamellae and fulcra clothed with microscopic setae. Teeth thin, more tubular as in text-fig. 1461 and 15/15 in number as in text-fig. 1460. Basal piece smooth and slightly invaginated on anterior margins. Genital operculum about as wide as long; sclerites united in the middle and narrowed posteriorly. Cephalothoracic sternum pentagonal, smooth and provided with a deep, longitudinal furrow as in text-fig. 1460.

Mesosoma : Tergites I-VI almost smooth except weakly and finely granular lateral portion as in text-fig. 1462. Lateral margins finely crenulated. Posterior margin smooth in the middle portion and finely granular on lateral portion. Pretergal portion smooth and also smooth on posterior margin. Tergite VII smooth on middle portion and weakly granular on lateral portion, carinated; only outer carina weakly distinct and poorly granular. Lateral and posterior margins smooth. Pretergal portion smooth and also smooth on posterior margin. Sternites I-IV smooth, each provided with a pair of elongated slit like stigmata for book lungs. Posterior and lateral margins smooth. Presternal portion not much distinct but smooth. Sternite V smooth, furnished with two pairs of weakly distinct, smooth and obsolete carinae. Lateral and posterior margins smooth. Presternal portion distinct, smooth and also smooth on posterior margin.

Metasoma : Segments I and II wider than long. Segment III as long as wide. Segment IV longer than wide. All segments carinated and dorsal, dorsolateral, inferior lateral and inferior carinae smooth and obsolete. Lateral carinae distinct only on

segment I and smooth. Dorsal carinae very weakly and too sparsely crenulated only on segment IV. Intercarinal space entirely smooth. Anterior peduncle and posterior margin also smooth.

Distribution : INDIA (*Type-locality*)

Remarks : We have studied the syntype, one female received from B.M. (N.H.), London, Regd. No. 1879.7.3.1. The present description and illustrations are based on the same syntype. According to Couzijn (1981) this species is synonym to the *Heterometrus* (*Srilankametrus*) *indus indus* (De Geer) but our observations and studies of trichobothrial pattern on pedipalp of Syntype conclude that this is a separate valid species.

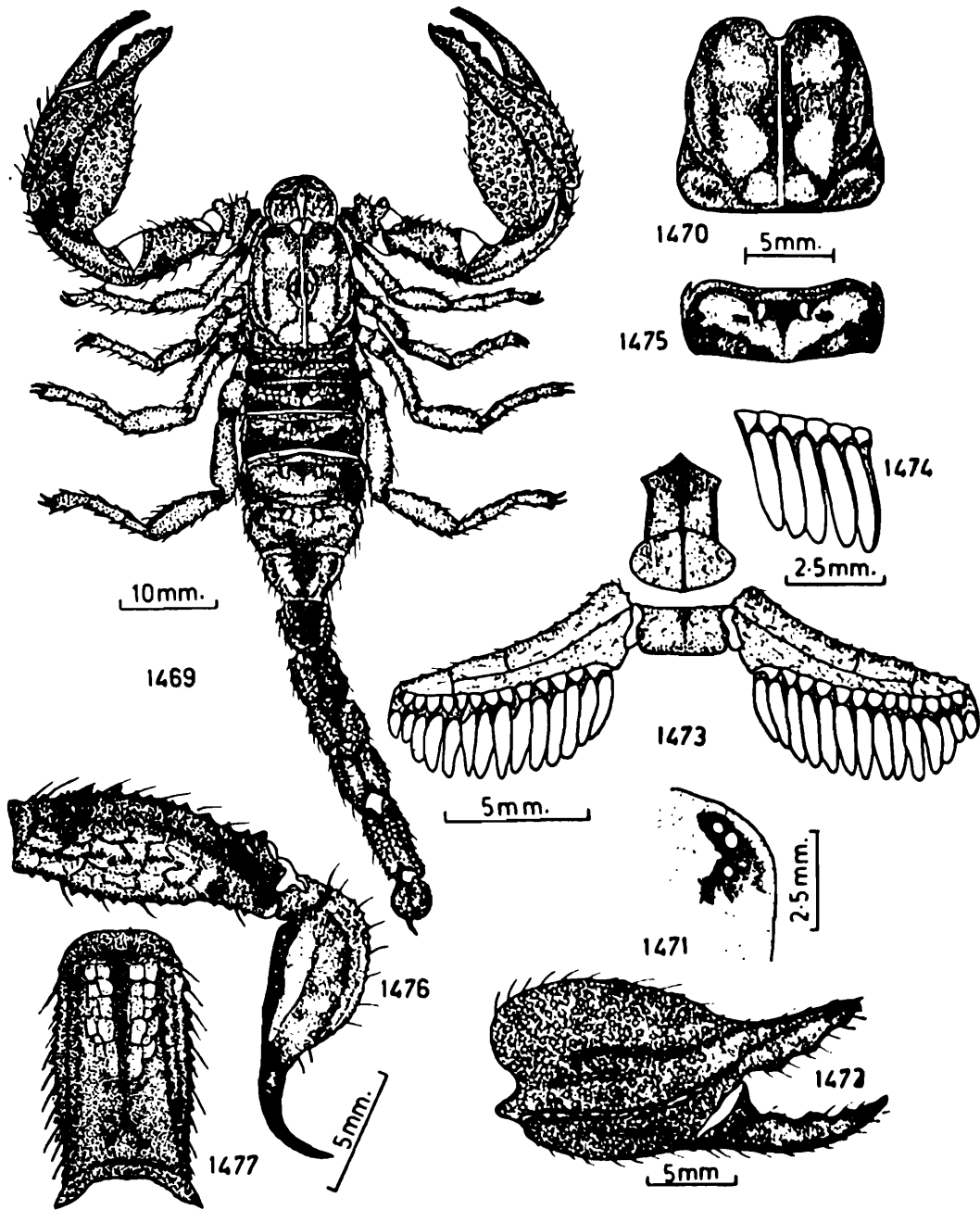
82. *Heterometrus* (*Srilankametrus*) *gravimanus* (Pocock)

(Figs. 1469-1482)

1894. *Scorpio gravimanus* Pocock, *Ann. Mag. nat. Hist.*, **13** (6) : 75.
 1900. *Palamnaeus gravimanus* : Pocock, *Fauna Brit. India, Arachn.*, : 90.
 1981. *Heterometrus* (*Srilankametrus*) *indus indus* : Couzijn, *Zool. Verln.*, **184** : 121.

General : Male of large size. Chelicera smooth, pedipalp not much stout, more elongated on femur, patella and manus; fingers comparatively short, manus much lobate on proximal inner portion as in text-fig. 1469. Legs almost smooth except weakly granular and carinated on femur. Pectines well developed. Carapace smooth. Mesosomal tergites almost smooth, last tergite weakly granular and carinated, sternites also smooth. Metasoma carinated and all carinae crenulated. Telson granular on vesicle, aculeus strong and sharp.

Body dark reddish brown and more darker with blackish tint on mesosomal tergites. Ocular tubercles black. Chelicera yellowish on basal segment and brownish on fingers. Pedipalp more reddish. Legs yellowish with light reddish tint. Mesosomal sternites



FIGS. 1469-1477. *Heterometrus (Srilankametrus) gravimanus* (Pocock)

- 1469. Dorsal view of male.
- 1470. Carapace, dorsal view.
- 1471. Lateral eyes, lateral view.
- 1472. Manus and fingers, exterior view.
- 1473. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1474. Pectinal teeth and fulcra, ventral view.
- 1475. Tergite, dorsal view.
- 1476. Metasomal segment V and telson, lateral view.
- 1477. Metasomal segment V, ventral view.

yellowish. Metasoma reddish, slightly darker on carinae. Telson slightly pale reddish with yellowish tint on vesicle. Aculeus brownish black on distal portion.

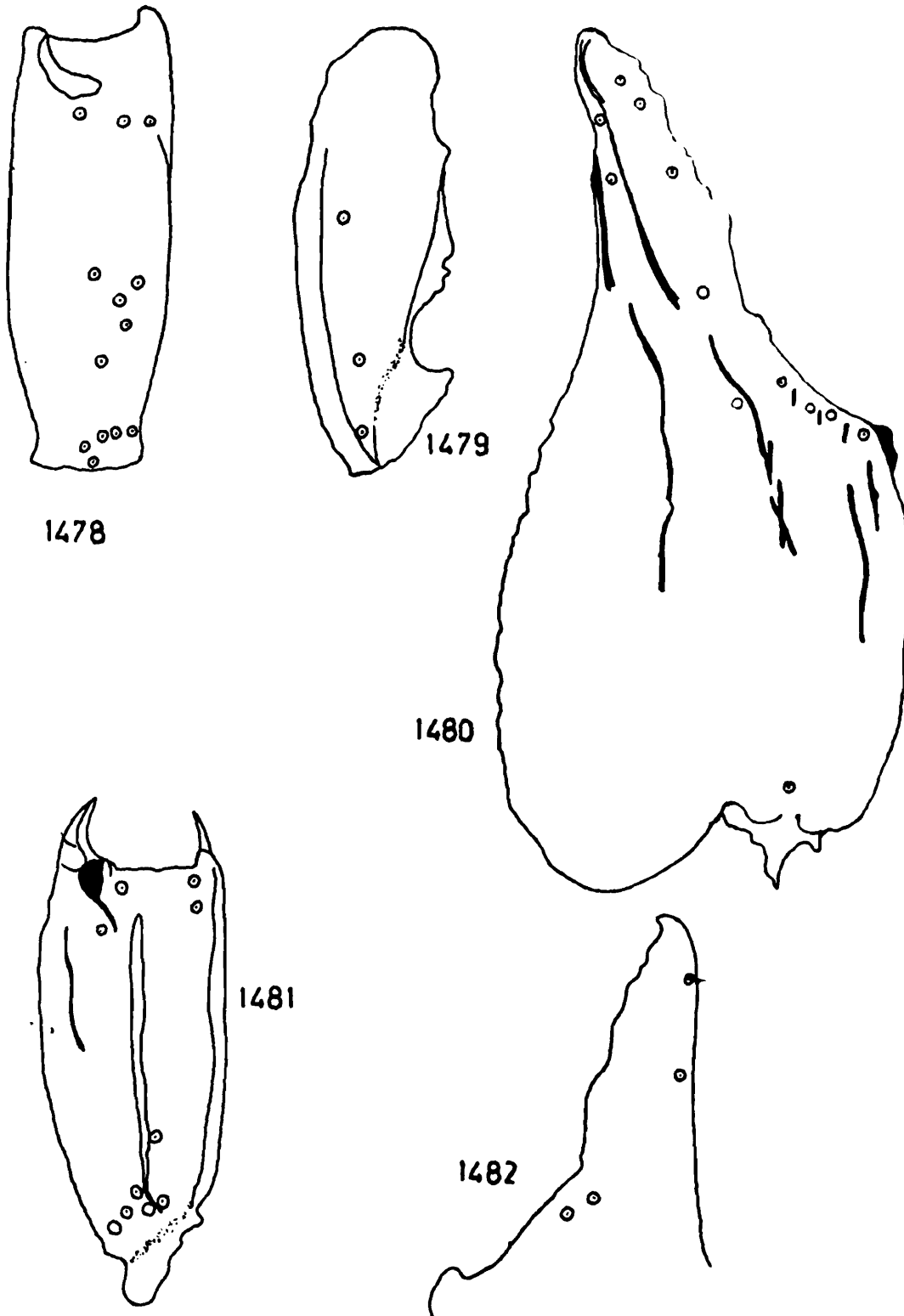
Measurements : Total length 74.50 mm. Carapace 8.50 mm. long. Mesosoma 28.50 mm. long. Metasoma 37.50 mm. long.

Carapace : Almost entire surface smooth except weakly, finely and sparsely granular lateral portion. Ocular tubercles smooth, lateral tubercles provided with three eyes as in text-fig. 1471, and anterior two eyes directed more anteriorly. Median tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1470. Anterior median and posterior lateral furrows distinct. Posterior median furrow not much distinct. Anterior margin smooth with deep median notch as in text-fig. 1470. Lateral margins finely crenulated. Posterior margin smooth. Chelicera smooth on basal segments covered thickly with short silky hairs on ventral side, extending on fingers. Fingers short, stout, not sharp on dentition. Dentition characterized as in the family. Pedipalp slightly longer, thinner but stout with enlarged manus as in text-fig. 1469. Femur slightly shorter than carapace, carinated and dorsal exterior, dorsal interior and ventral inner carinae distinct but only dorsal inner carina strongly and sparsely crenulated. Intercarinal space very sparsely but coarsely granular. Outer or anterior surface provided with a crenulated carina. Patella longer than carapace, carinated but all carinae smooth and obsolete. Intercarinal space weakly granular. Anterior or inner surface elevated and covered with few granules. Manus as long as wide, slightly shorter than femur, carinated, dorsal surface with three to four weak carinae as in text-fig. 1472, and fully covered with granules but most of the granules obsolete. Granules on inner margin weak and tuberculate. Interior margin smooth and exterior marginal carinae strong and smooth.

FIGS. 1478-1482. *Heterometrus (Srilankametrus) gravimanus*
(Pocock)

1478. Patella, exterior view.

1479. Patella, ventral view.



1480. Manus and immovable finger, dorsoexterior view.
1481. Manus, ventral view.
1482. Immovable finger, interior view.

Ventral surface covered with few irregularly scattered granules. Fingers smooth, carinated, all carinae smooth and obsolete. Dentition on fingers not much clear but five to six triangular teeth distinct as in text-fig. 1472. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1478-1482. Legs weakly granular on femur and carinated only on inner margin. Patella, tibia, tarsomere I smooth. Tarsomere I provided with few spines on distal portion. Tarsomere II smooth, provided with a row of paired spines and spine formula on legs I-IV: $\frac{3}{4} \frac{3}{4}, \frac{3}{4} \frac{3}{4}, \frac{4}{5} \frac{3}{6}, \frac{4}{5} \frac{3}{5}$. Lateral distal margins lobate, covering the base of claw lobes. A pair of claws normal. Pectines well developed three times longer than wide. Middle lamella sub-divided into four small digits. Fulcra triangular. Fulcra and lamellae covered with microscopic setae. Pectinal teeth much elongated, tubular, tapering distally as in text-fig. 1474 and 14/14 in number as in text-fig. 1473. Basal piece smooth with weak depression on anterior portion. Genital operculum wider than long. Sclerites not fused and a pair of male papillae visible after lifting the sclerites. Cephalothoracic sternum pentagonal provided with a deep, median longitudinal depression as in text-fig. 1473.

Mesosoma : Tergites I-VI smooth, without carinae. Lateral margins, posterior margin and pretergal portion also smooth as in text-fig. 1475. Tergite VII weakly granular but more granular as lateral portion and provided with two pairs of lateral carinae. Lateral margins weakly crenulated. Posterior margin smooth. Pretergal portion smooth. All sternites smooth. Lateral and posterior margins also smooth. Presternal portion smooth. Sternites I-IV each provided with elongated slit like stigmata for book lungs.

Metasoma : Cauda slightly more than three times as long as carapace. Basal segment wider than long. Segments II & III also wider than long. Segment IV longer than wide. Segment I as long as deep. Segments II-IV of same depth. Segment V slightly less than as deep as half the length. Segments I-IV provided with dorsal, dorsolateral, inferior and inferior lateral carinae. All carinae crenulated. Intercarinal space weakly and irregularly granular. Anterior peduncle and posterior margins smooth.

Segment V less than as long as carapace, carinated and dorso-lateral carinae developed only on half of the proximal portion, sparsely granular. Inferior lateral and single inferior median carinae strongly serrated. Intercarinal space irregularly granular but granular on dorsolateral portion. Anterior peduncle smooth. Anal rim of this segment evenly serrated but strongly denticulate at inferior lateral carinae as in text-figs. 1476 & 1477. Telson longer than segment V but shorter than carapace. Vesicle longer than segment IV but shorter than segment V and less than as wide or deep as segment V. Dorsal surface smooth. Ventral surface granular and carinated. Carinae crenulated. Lateral and ventral bands distinct as in text-fig. 1477. Aculeus slightly less than half the length of segment V, not much curved, stout, sharp and dark reddish on distal portion as in text-fig. 1476.

Distribution : INDIA : Tanjore, Tamil Nadu; SRI LANKA.

Remarks : We have studied, described and illustrated on the basis of identified specimen received from B.M. (N.H.), London; Regd. No. 1896.7.30.121. According to Couzijn (1981) this species becomes synonym to *Heterometrus (Srilankametrus) indus indus* (De Geer) but our studies of above specimens specially on the trichobothrial pattern reveal that this is a separate valid species.

83. *Heterometrus (Srilankametrus) serratus* (Pocock)

(Figs. 1483-1496)

1900. *Palamnaeus serratus* Pocock, *Fauna Brit. India, Arachn.*, : 97.

1981. *Heterometrus (Srilankametrus) indus indus* : Couzijn, *Zool. Verln.*, 184 : 121.

General : Male of large size. Carapace weakly granular on lateral portion. Chelicera smooth. Pedipalp short, stout and manus lobed on inner portion, much robust and convex on dorsal surface as in text-fig. 1483. Legs granular and carinated on

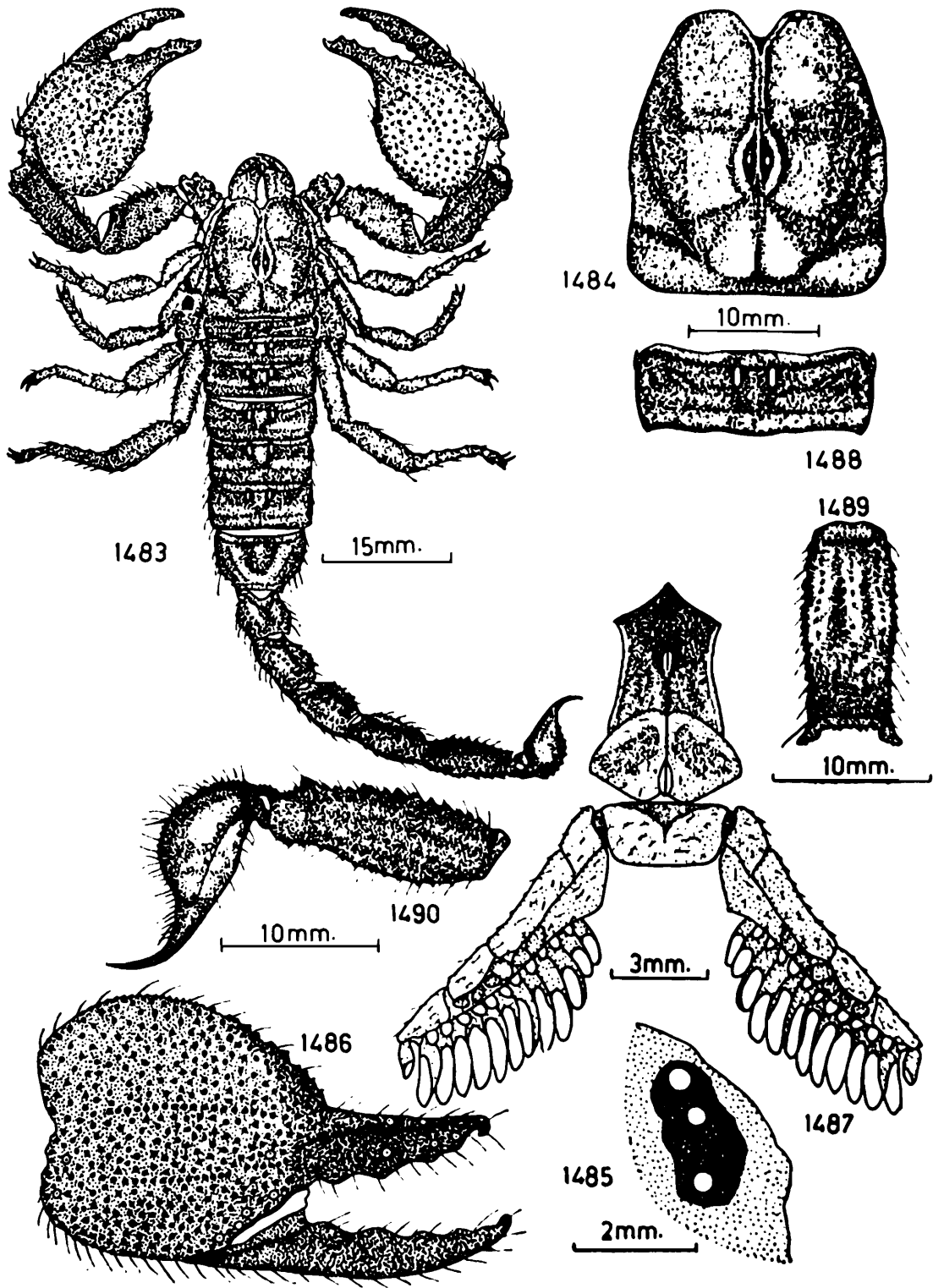
femur and patella. Pectines well developed. Mesosoma smooth. Metasoma strongly carinated and all carinae crenulated. Telson carinated on ventral portion of vesicle.

Body blackish brown and more darker on carapace. Chelicera yellowish brown on basal segment but blackish on finger. Pedipalp dark blackish brown but blackish on carinae, manus reddish brown with blackish tint but more reddish on ventral portion, fingers entirely black. Legs blackish with few brownish spots on femur, patella, tibia, tarsomere I and brownish on tarsomere II. Pectines yellowish. Mesosoma brownish with reddish tint. Metasoma dark brown but blackish on carinae. Telson dark brown on vesicle and blackish on aculeus.

Measurements : Total length 107.25 mm. Carapace 16.00 mm. long. Mesosoma 36.50 mm. long. Metasoma 54.75 mm. long.

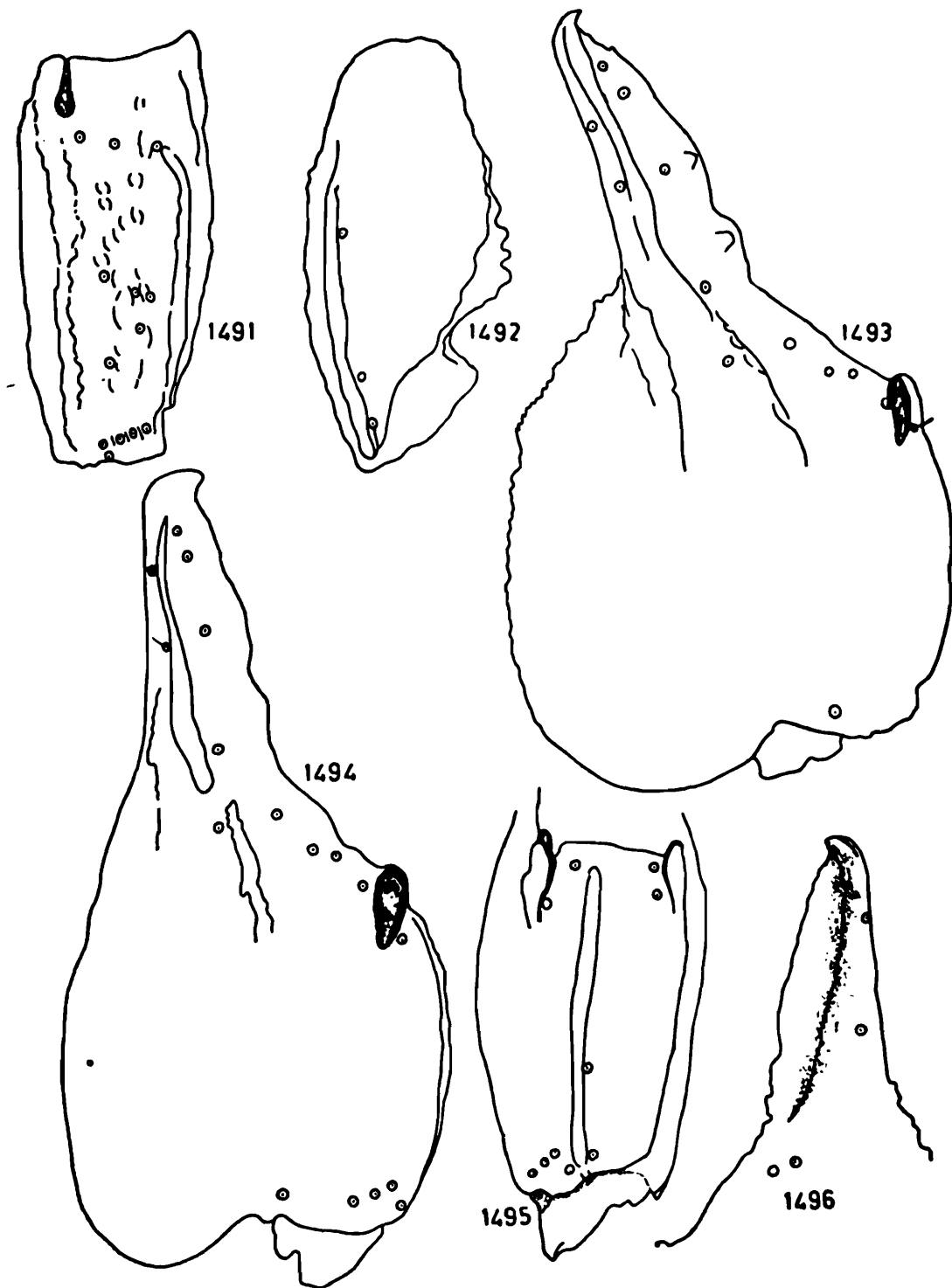
Carapace : Median surface smooth and lateral portion weakly and sparsely granular, lateral ocular lobes and inter ocular space also granular. Lateral ocular tubercles granular and furnished with three contiguous eyes as in text-fig. 1485. Median ocular tubercles smooth, weakly elevated and separated by median suture, provided with a pair of median eyes and situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1484. Anterior margin smooth, deeply notched in the middle. Lateral margin finely crenulated and supported with finely granular submarginal ridge. Posterior margin smooth and straight. Anterior median furrow not much distinct. Posterior median furrow deep, bifurcated posteriorly and continued laterally into posterior lateral furrow. Chelicera smooth on basal segment, thickly clothed with short, silky hairs on ventral surface, these hairs also cover the ventral surface of fingers. Fingers thin, elongated, not much sharp on dentition. Dentition on fingers as characterized in family. Dorsal distal tooth much shorter than the ventral distal tooth on mov-

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- FIGS. 1483-1490. *Heterometrus (Srilankametrus) serratus* (Pocock)
 1483. Dorsal view of male.
 1484. Carapace, dorsal view.
 1485. Lateral eyes, lateral view.
 1486. Manus and fingers, exterior view.



- 1487. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1488. Tergite, dorsal view.
- 1489. Metasomal segment V, ventral view.
- 1490. Metasomal segment V and telson, lateral view.

able finger. Pedipalp stout, short and lobate on manus and slightly more convex on dorsal surface as in text-fig. 1486. Femur shorter than carapace, carinated and dorsal exterior, dorsal interior and ventral exterior carinae distinct, granular and all granules strongly tuberculate and only ventral interior carina very weakly distinct and granular on proximal portion. Anterior and exterior surface furnished with few strongly tuberculate granules. Intercarinal space except few granules on dorsal surface entirely smooth. Patella longer than femur but shorter than carapace, carinated and except ventral interior granular carina all carinae almost smooth and obsolete. Anterior or inner surface elevated and covered with many granules. Intercarinal space smooth. Manus wider than long, length of under hand less than as long as femur, dorsal surface convex, smooth on inner posterior portion and granular on remaining portion but all granules coarse but obsolete and few granules fused to form some carinated structure but only digital carina distinct on distal portion and continues on immovable finger. Exterior marginal carina distinct, elevated and smooth. Exterior submarginal distinct but obsolete. Ventral surface sparsely granular but granules coarse and few granules placed in two short ventral carinae. Inner margin not parallel to exterior margin, smooth on proximal portion and strongly crenulated on distal portion upto the base of immovable finger. Fingers smooth, carinated and carinae also smooth and obsolete. Movable finger longer than carapace carinated on ventral surface but carinae smooth and obsolete. Immovable finger shorter than femur but almost as long as the length of under hand, carinated but smooth and obsolete. Dentition on fingers broad triangular and four to five teeth as in text-fig. 1486. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1491-1496. Legs granular and carinated on femur and patella. Tibia smooth. Tarsomere I smooth and furnished with few spines on distal portion and a pedal spur. Tarsomere II smooth furnished on ventral portion with two rows of stout spines and spine formula on legs I-IV : $\frac{5}{8} \frac{5}{8}$, $\frac{5}{7} \frac{5}{8}$, $\frac{5}{8} \frac{5}{8}$, $\frac{5}{8} \frac{5}{8}$. Lateral margins with two spines and overlapping the base of claw lobes. Pectines well developed slightly more than two and a half times longer than wide. Middle lamellae subdivided into



FIGS. 1491-1496. *Heterometrus (Srilankametrus) serratus* (Pocock)

1491. Patella, exterior view.

1492. Patella, ventral view.

1493. Manus and immovable finger, dorsoexterior view.

1494. Manus and immovable finger, exterior view.

1495. Manus, ventral view.

1496. Immobile finger, interior view.

three digits. Fulcra distinct and triangular. Lamellae and fulcra clothed with microscopic setae. Teeth more elongate, tubular but not tapering on distal end and 13/13 in number as in text-fig. 1487. Basal segment smooth with shallow depression on anterior portion. Genital operculum wider than long, sclerites slightly separated on posterior portion and from under which a pair of male genital papillae visible. Cephalothoracic sternum pentagonal, smooth and a median longitudinal depression distinct as in text-fig. 1487.

Mesosoma : Tergites I-VI weakly granular on lateral portions and smooth in the middle portion as in text-fig. 1488. Lateral and posterior margins smooth. Preteragl portion smooth and also smooth on posterior margin. Tergite VII more granular on lateral portion but smooth on median portion. Posterior and lateral margin smooth. Pretergal portion smooth and also smooth on posterior margin. Sternite I-IV smooth and each tergite provided with a pair of elongated slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion also smooth. Sternite V smooth without carinae. Posterior and lateral margins smooth. Presternal portion smooth and also smooth on posterior margin.

Metasoma : Cauda slightly less than three and a half times as long as carapace. Segments I and II wider than long. Segment III as long as wide. Segment IV and V longer than wide. All segments carinated. Segments I-IV with dorsal, dorsolateral carinae crenulated and inferior lateral and inferior carinae smooth but very weakly crenulated on segment IV. Lateral carinae weakly developed only on posterior portion of segment I. Intercarinal space weakly granular. Anterior peduncle and posterior margin smooth. Segment V shorter than femur and not as wide or deep as segment IV. All carinae strongly crenulated, dorsal and dorsolateral carinae sparsely but coarsely granular, but dorsolateral carinae developed only on 2/3 anterior portion as in text-fig. 1483. Inferior lateral and single inferior median carinae serrated and inferior lateral carinae ending posteriorly in a broad triangular tubercle on anal rim. Intercarinal space irregularly granular. Anterior peduncle smooth. Anal rim of this

segment evenly serrated as in text-fig. 1490. Telson longer than segment V, as long as patella but shorter than carapace. Vesicle longer than segment IV but shorter than segment V and as wide or deep as segment V. Entire surface smooth except ventral median and a pair of ventro-lateral granular crests. Lateral and ventral bands not much distinct. Aculeus not much curved, sharp and slightly more than half the vesicular length, dark blackish on distal portion as in text-fig. 1490.

Distribution : SRI LANKA.

Remarks : We have studied the male type-specimens received from B.M. (N.H.), London, Regd. No. nil. The present description and illustrations are based on the above type specimen. According to Couzijn (1981) this species is a synonym of *Heterometrus (Srilankametrus) indus indus* (De Geer) but our studies of above specimens reveal that this is a separate valid species.

Sub-genus (iii) : *Gigantometrus* Couzijn.

1978. *Gigantometrus* Couzijn, *Symp. zool. Soc. Lond.*, 42 : 327.

1981. *Gigantometrus* : Couzijn, *Zool. Verln.*, 184 : 159.

Characters : Rostrolateral margin of carapace without any incision next to posterior lateral eyes; second lateral eye not so closer to the first than to the third. Superciliary crest granular on anterior and also sometimes on posterior portion. Manus of pedipalp sometimes granular but granules broad and obsolete with weak carinae. Immovable finger almost smooth.

Type-species : *Heterometrus swammerdami* Simon

Distribution : INDIA : Tamil Nadu; Andhra Pradesh; Bihar; Karnataka; Maharashtra; Uttar Pradesh; Madhya Pradesh and West Bengal; SRI LANKA.

Key to the species of the subgenus Gigantometrus

1. Manus of pedipalp coarsely granular on dorsal surface, carinated (Fig. 1500) and interior margin strongly denticulate (serrated). Carapace and mesosomal tergites also coarsely granular (Figs. 1498 & 1503);

trichobothria *et1* placed proximal to *et2* & 3; *esb1-2*, *em1-2* and *est* placed close to each other and *esb2* placed distally to *esb1* on patella (Fig. 1506). *swammerdami*

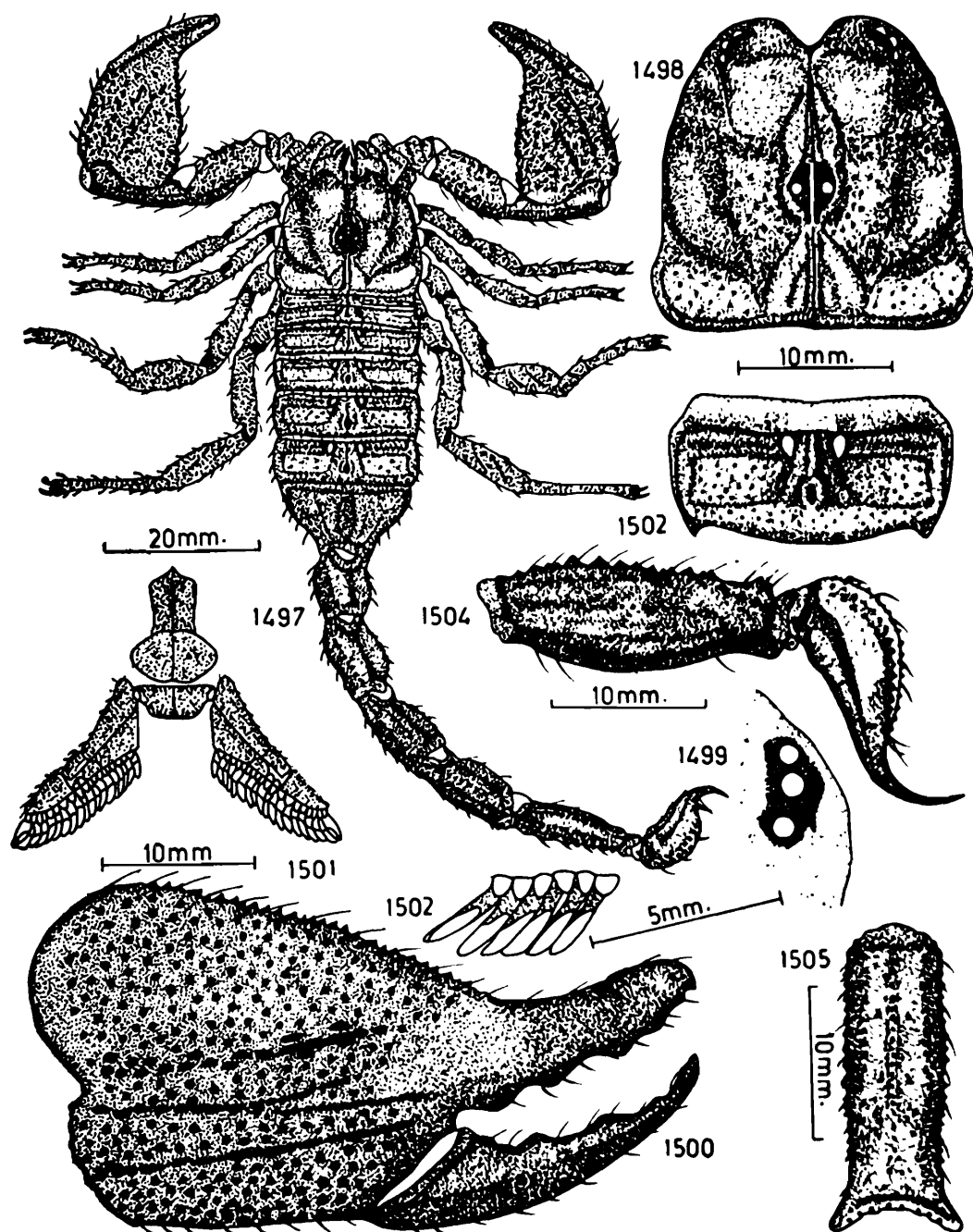
Manus of pedipalp coarsely granular but granulation not regular and carinated, interior margin weakly and sparsely denticulate (Fig. 1514). Carapace and mesosomal tergites not much granular (Figs. 1512 & 1517); trichobothria *et1* placed distal to *et2* & 3; *esb1-2*, *em1-2* and *est1* placed away from each other and *esb1* & 2 placed on the same plane on patella (Fig. 1522). *flavimanus*

84. *Heterometrus* (*Gigantometrus*) *swammerdami* Simon

(Figs. 1497-1510)

1872. *Heterometrus swammerdami* Simon, *Rev. et. Mag. Zool.*, 23 (2) : 56.
1877. *Pandinus asper* : Thorell, *Atti Soc. Ital.*, 19 : 199.
1879. *Pandinus kochii* : Karsch, *Mt. Munch ent. Ver.*, 3 : 127.
1893. *Heterometrus swammerdami* : Pocock, *J. Bombay nat. Hist. Soc.*, 7 : 304.
1894. *Scorpio swammerdami* : Kraepelin, *Jb. hamb. wiss. Anst.*, 79 : 62.
1899. *Heterometrus swammerdami* : Kraepelin, *Tierr. Scorp. etc.*, : 112.
1900. *Palamnaeus swammerdami swammerdami* : Pocock, *Fauna Brit. India, Arachn.*, : 87.
1981. *Heterometrus* (*Gigantometrus*) *swammerdami swammerdami* : Couzijn, *Zool. Verh.*, 184 : 162.

General : Female of large size, carapace and mesosomal tergites granular. Pedipalp stout, strong with large, flat manus as in text-fig. 1497. Legs thin, elongated, granular and carinated. Pectines well developed. Metasoma stout, carinated with slightly elongated vesicle.



FIGS. 1497-1505. *Heterometrus (Gigantometrus) swammerdami*
Simon

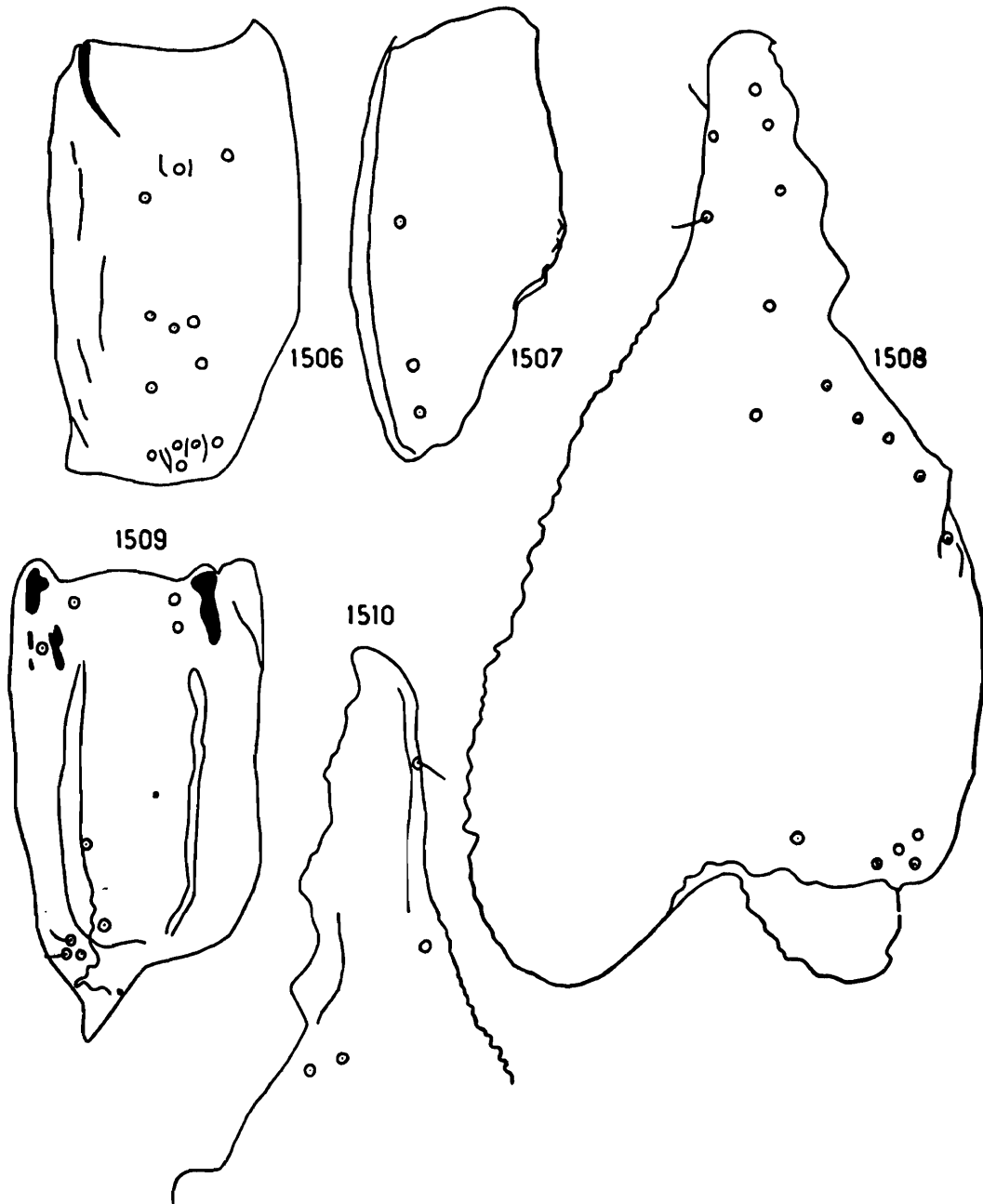
- 1497. Dorsal view of female.
- 1498. Carapace, dorsal view.
- 1499. Lateral eyes, lateral view.
- 1500. Manus and fingers, exterior view.
- 1501. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1502. Pectinal teeth and fulcra, ventral view.
- 1503. Tergite, dorsal view.
- 1504. Metasomal segment V and telson, lateral view.
- 1505. Metasomal segment V, ventral view.

Body dark brown to blackish brown. Chelicera light brown to yellowish on basal segment while brown on fingers. Pedipalp blackish with bluish tint on femur, patella and fingers; manus dark brown, with slight blackish tint. Legs uniformly brown. Tergites blackish brown. Sternites yellowish brown. Pectines brownish. Metasoma dark brown, darker on carinae. Telson light brown but dark on aculeus.

Measurements : Total length 138.75 mm. Carapace 17.00 mm. long. Mesosoma 43.25 mm. long. Metasoma 78.50 mm. long.

Carapace : Entire surface coarsely but sparsely granular except anterior lateral portion. Posterior median and other furrows moderate. Ocular tubercles smooth. Lateral tubercles provided with three lateral eyes as in text-fig. 1499. Median tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1 as in text-fig. 1498. Anterior margin granular, provided with a deep median notch. Lateral margins also granular and weakly crenulated. Posterior margin granular. Chelicera smooth on basal segment and thickly clothed with fine, short silky hairs on ventral portion. Fingers short, not sharp on dentition and dentition as characterized in the family. Pedipalp strong, stout, much flattened as in text-fig. 1497. Femur shorter than carapace and as wide as deep, carinated, all carinae granular. Anterior or outer surface provided with crenulated carinae. Intercarinal space coarsely but sparsely granular. Patella shorter than femur, slightly more than as deep as wide, carinated but carinae almost smooth and obsolete. Anterior or inner surface elevated and covered with few weak denticulate granules. Intercarinal space weakly and finely granular. Manus longer than patella, as long as femur and shorter than carapace but more than as wide as long, carinated. Dorsal surface entirely covered with large, obsolete granules as in text-fig. 1500. Inner margin provided with few tuberculate granules. Ventral and exterior surface weakly, sparsely but coarsely granular. Only exterior carinae distinct and smooth but exterior ventral weak, smooth and obsolete. Movable finger longer than carapace, carinated but carinae smooth and obsolete. Immobile finger shorter than carapace and almost as long as femur, carinated and a pair of carinae distinct only on tip of

the finger, smooth and obsolete. Dentition on fingers not distinct but five to six broad, triangular teeth distinct as in text-fig. 1500. Trichobothrial pattern on patella, manus and immovable finger



FIGS. 1506-1510. *Heterometrus (Gigantometrus) swammerdami* Simon

1506. Patella, exterior view.

1507. Patella, ventral view.

1508. Manus and immovable finger, dorsoexterior view.

1509. Ventral view, ventral view.

1510. Immoveable finger, interior view.

as in text-figs. 1506-1510. Legs thin, segments elongated, femur finely granular, carinated only on outer surface, carinae granular. Patella smooth. Tibia smooth. Tarsomere also smooth but provided with few reddish spines on distal portion. Tarsomere II smooth, distolateral margins overlapping the base of claw lobes, provided with a paired row of reddish stout spines and spine formula on legs I-IV : $\frac{4}{8} \frac{4}{8}$, $\frac{4}{8} \frac{4}{8}$, $\frac{4}{8} \frac{4}{8}$, $\frac{4}{8} \frac{4}{8}$. A pair of claws normal. Pectines well developed and slightly more than two times longer than wide. Middle lamellae subdivided into two to three digits. Fulcra distinct, triangular. Lamellae and fulcra covered with microscopic setae. Pectinal teeth elongated, tapering as in text-fig. 1502 and 19/19 in number as in text-fig. 1501. Basal piece smooth, provided with a weak suture on anterior median portion. Genital operculum wider than long, sclerites fused in the middle portion and free on posterior portion. Cephalothoracic sternum pentagonal, smooth provided with a median, longitudinal depression as in text-fig. 1501.

Mesosoma : Tergites I-VI finely and closely granular but slightly less granular in middle as in text-fig. 1503. Lateral and posterior margins granular. Presternal portion weakly granular but granules obsolete, posterior margin smooth. Tergite VII more granular than preceding tergites, a pair of lateral carinae distinct with few granules on posterior portion. Lateral and posterior margins finely granular. Pretergal portion smooth, posterior margin also smooth. Sternites I-IV entirely smooth, each provided with a pair of elongated slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion smooth, posterior margin smooth. Sternite V smooth, lateral and posterior margins smooth. Presternal portion smooth, posterior margin smooth.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment slightly longer than wide. Segments II-V always longer than wide, segment IV slightly less than three times as long as wide and almost as wide as deep. All segments carinated and dorsal, dorsolateral carinae weakly crenulated on segments I-III. Inferior and inferior lateral carinae smooth, more distinct on segment III only but all the times obsolete. Lateral

carinae in few granular form on only segment I. Segment IV with dorsal, dorsolateral, inferior lateral and inferior carinae distinct and weakly crenulated but dorsolateral carinae more clearly crenulated. Intercarinal surface irregularly granular. Anterior peduncle and posterior margin smooth. Segment V as long as carapace, strongly carinated, but only inferior lateral and single inferior median carinae sparsely serrated. Lateral carinae weakly distinct on proximal portion. Intercarinal space granular but more granular on dorsal surface. Anterior peduncle smooth. Anal rim of this segment evenly crenulated except lateral broad triangular denticle as in text-fig. 1505. Telson longer than segment V. Vesicle slightly more than as long as but as wide as and less than as deep as segment II. Entirely smooth on dorsal surface, granular on ventral surface, carinated and carinae sparsely granular. Lateral and ventral bands distinct. Aculeus shorter than segment I, stout, not much curved, sharp and dark on distal portion as in text-fig. 1504.

Distribution : INDIA : Satara, Nagpur, Maharashtra; Raipur, Madhya Pradesh; Dehra Dun, Uttar Pradesh; Dharwar, Karnataka; Madras, Ramnad, Tanjore, Tamil Nadu; Andhra Pradesh; Burdwan, Midnapore, West Bengal; SRI LANKA : Trincomali and Chilan.

Remarks : We have studied, described and illustrated on the basis of authentically identified specimens (2 ♀♀) received from B.M. (N.H.), London, Regd. No. 1897.9.17.14 & 1. Though Couzijn (1981) has described this as sub-species, our studies reveal that this can be described as species. This is the largest scorpion of India, and with the exception of its near ally the West-African *Pandinus imperator*, the largest scorpion in the world, sometimes reaching a length of 180 mm. (7 inches).

85. *Heterometrus (Gigantometrus) flavimanus* (Pocock)

(Figs. 1511-1524)

1900. *Palamnaeus swammerdami flavimanus* Pocock, *Fauna Brit. India, Arachn.*, : 87.
1981. *Heterometrus (Gigantometrus) swammerdami flavimanus* Couzijn, *Zool. Verh.*, 184 : 164.

General: Largest scorpion with much stronger pedipalps. Carapace granular on lateral portion. Mesosoma sparsely granular, without carinae. Metasoma strongly carinated with robust telson and stout aculeus. Chelicera smooth. Pedipalp carinated on femur and patella, manus convex and fingers with triangular teeth as in text-fig. 1511. Legs granular on femur and patella. Pectines well developed. Cephalothoracic sternum pentagonal.

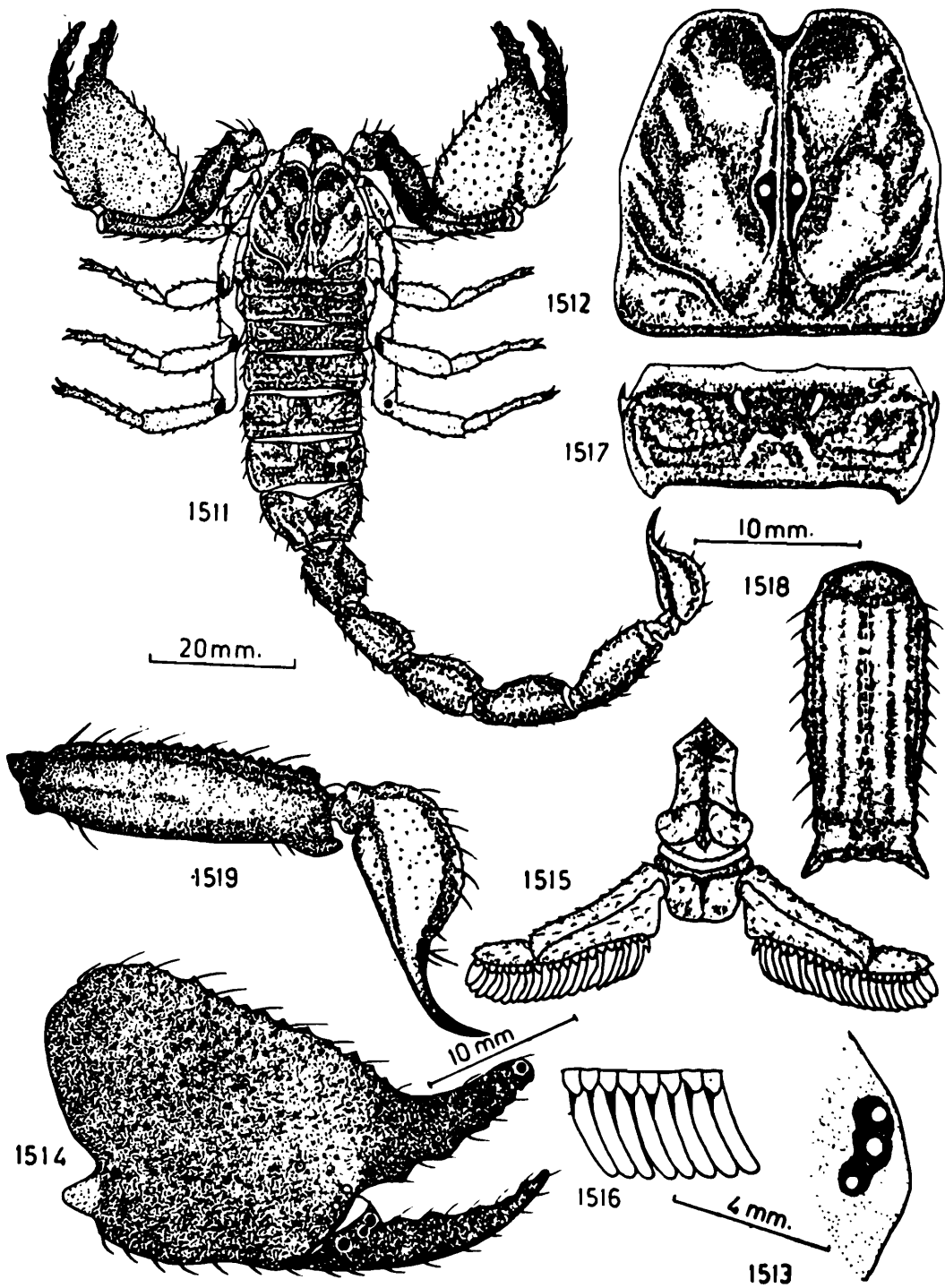
Body dark brown to black but more darker on carapace. Chelicera yellowish on basal segment and brownish on fingers. Pedipalp dark brown on femur and patella and light brown to yellowish on manus but blackish on fingers. Legs light brown to yellowish. Pectines light yellow but darker on cephalothoracic sternum.

Measurements: Male total length 136.25 mm. Carapace 16.75 mm. long; Mesosoma 38.50 mm. long; Metasoma 81.00 mm. long. Female total length 116.75 mm long. Carapace 16.00 mm. long; Mesosoma 38.50 mm. long; Metasoma 62.25 mm long.

Carapace: Almost entirely granular except posterior and median lateral interocular portion but more coarsely granular in male. Lateral ocular tubercles granular and furnished with three contiguous lateral eyes as in text-fig. 1513. Median ocular

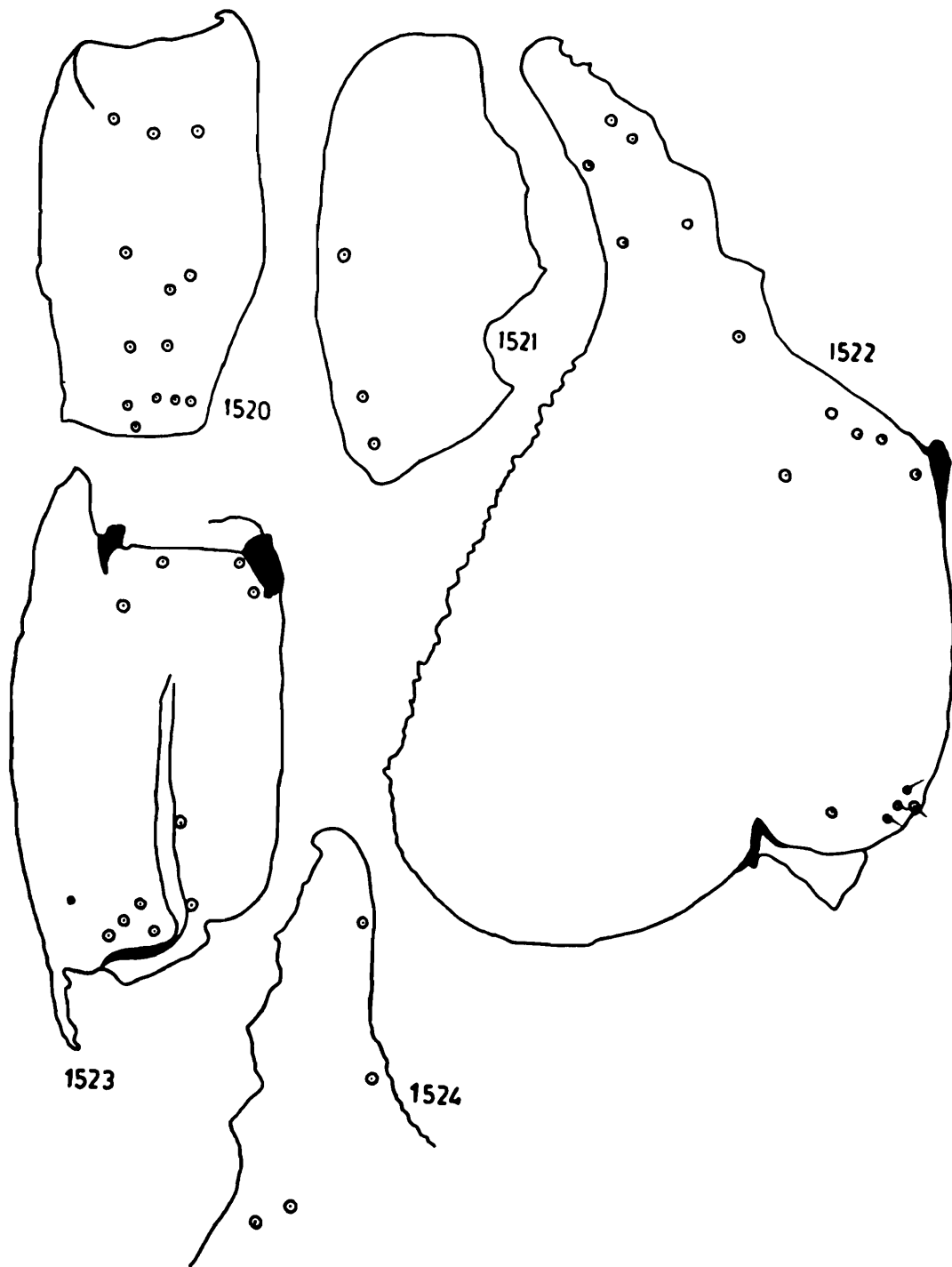
FIGS. 1511-1519. *Heterometrus (Gigantometrus) flavimanus* (Pocock)

1511. Dorsal view of male.
 1512. Carapace, dorsal view.
 1513. Lateral eyes, lateral view.



- 1514. Manus and fingers, exterior view.
- 1515. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1516. Pectinal teeth and fulcra, ventral view.
- 1517. Tergite, dorsal view.
- 1518. Metasomal segment V, ventral view.
- 1519. Metasomal segment V and telson, lateral view.

tubercles smooth, not much elevated, provided with a pair of median eyes and situated anteriorly in the ratio 1 : 1 as in text-fig. 1512. Anterior margin deeply notched in the middle portion and weakly crenulated on lateral portion. Lateral margin weakly but evenly and finely crenulated and furnished with finely granular sub-marginal ridge. Posterior margin smooth and almost straight as in text-fig. 1512. Chelicera smooth on basal segment and thickly clothed with fine, silky hairs on ventral portion. Fingers short, stout and dentition on fingers as characterized in the family. Distal tooth of dorsal fang much shorter than distal tooth of ventral fang. Pedipalp stout with flat, large manus as in text-fig. 1541. Femur shorter than carapace, carinated, all carinae sparsely granular and granules tuberculate. Anterior or outer surface granular and all granules tuberculate. Intercarinal surface sparsely and coarsely granular. Patella slightly shorter than femur, smooth, carinated and carinae weakly granular or smooth and obsolete. Manus much large, flat but dorsal surface convex, fully covered with big, obsolete granules, and only exterior median carina well developed, smooth and obsolete, length of under hand always shorter than patella and always wider than long. Movable finger longer than carapace but immovable finger shorter than carapace, without carinae, smooth and dentition on fingers not definite and provided with four to five broad, triangular teeth as in text-fig. 1514. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1520-1524. Legs smooth but carinated on femur and patella and only inner carinae granular and weakly crenulated. Tibia smooth. Tarsomere I carinated but smooth, obsolete and furnished with few spines on distal portion and a inner pedal spur. Tarsomere II smooth, furnished on ventral portion with two rows of stout spinules and spine formula on legs I to IV : $\frac{4}{8} \frac{4}{8}$, $\frac{4}{8} \frac{4}{8}$, $\frac{5}{8} \frac{5}{8}$, $\frac{5}{7} \frac{5}{8}$. Lateral margins overlapping the base of claw lobes. A pair of claws stout. All digits clothed with many long reddish setae. Pectines slightly less than three times longer than wide. Middle lamellae sub-divided into two digits. Fulcra distinct, triangular and tubular. Fulcra and lamellae clothed with microscopic setae. Teeth well developed and more tubular in male as in text-fig. 1516 and 21/21 as in



FIGS. 1520-1524. *Heterometrus (Gigantometrus) flavimanus* (Pocock)

1520. Patella, exterior view.

1521. Patella, ventral view.

1522. Manus and immovable finger, dorsoexterior view.

1523. Manus, ventral view.

1524. Immovable finger, interior view.

text-fig. 1515. Genital operculum wider than long and operculi partially united in male on anterior portion and a pair of male genital papillae visible on posterior portion but in female operculi united fully in the middle. Cephalothoracic sternum pentagonal, longer than wide and provided with median longitudinal furrow as in text-fig. 1515.

Mesosoma : All tergites sparsely granular but more granular on posterior portion of each tergites. Tergites I-VI without carinae. Lateral margins and posterior margins of each tergite granular as in text-fig. 1517. Pretergal portion smooth but granular on posterior margin. Tergite VII granular, granules more coarse, carinated and two pairs of lateral carinae sparsely granular. Lateral margins finely crenulated but smooth on posterior margin. Pretergal portion smooth but granular on posterior margin. Sternites I-IV smooth, each provided with a pair of elongated, slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion smooth. Sternite V smooth, without carinae. Lateral and posterior margins smooth. Presternal portion also smooth.

Metasoma : Cauda five times as long as carapace in male but slightly more than four times longer in female. Basal segment wider than long. Segments II-V progressively narrowed and elongated and segment V about twice as long as segment I. All segments carinated. Segment I with dorsal, dorsolateral, lateral carinae granular but smooth on inferior lateral and inferior carinae. Segments II and III with dorsal, dorsolateral carinae granular and inferior lateral and inferior carinae smooth. Segment IV with all dorsal, dorsolateral, inferior lateral and inferior carinae crenulated and dorsolateral carinae more sparsely crenulated. Intercarinal space almost smooth on segments I and II, weakly granular on posterior portion on segments III and IV. Segment V more shorter in female, and almost as long as carapace in male. Dorsal carinae not distinct, dorsolateral carinae sparsely granular on $3/4$ anterior portion. Inferior lateral and single inferior median carinae serrated. Intercarinal space granular on dorsal and ventral surface. Anterior peduncle smooth. Anal rim of this segment evenly serrated on ventral

portion and provided laterally with a strong, triangular tubercle as in text-fig. 1518. Telson slightly longer than segment V and as long as carapace in male. Vesicle about as long as segment III, as wide as segment V in male but more than as wide as segment V in female but always not as deep as segment V. Dorsal surface smooth but evenly granular on ventral and lateral surface. Ventral median crest evenly granular. Ventral and lateral bands distinct as in text-fig. 1518. Setation on vesicle not clear. Aculeus stout, strong, not much sharp and also not much curved and about half the vesicular length as in text-fig. 1519.

Distribution : INDIA : Coimbatore (*Type-locality*), Tamil Nadu.

Remarks : We have examined, described and illustrated on the basis of type specimens 1 ♂ and 1 ♀ received from B.M. (N.H.), London, Regd. No. 1899.111.2.292. Though Couzijn (1981) has described this as a sub-species, our studies reveal that this can be described as a separate valid species.

Subgenus (iv) : *Chersonesometrus* Couzijn

1978. *Chersonesometrus* Couzijn, *Symp. zool. Soc. Lond.*, **42** : 327.

1981. *Chersonesometrus* : Couzijn, *Zool. Verln.*, **184** : 131.

Characters : Rostrolateral margin entire without incision next to posterior lateral eyes. Superciliary crest mostly granular on anterior part. Manus of pedipalp almost granular and sometimes granular carinae distinct or smooth, short ridges also present. Immovable finger with or without carina.

Type-species : *Heterometrus fulvipes* (Koch)

Distribution : All over Indian subcontinent.

Key to the species of subgenus Chersonesometrus

1. Femur shorter than carapace. Manus generally wider than long (except in *tristis*, *granulomanus* and *fastidiosus*).2

- Femur as long as carapace or longer than carapace. Manus also generally longer than wide. 10
2. Patella as long as femur. Manus as long as wide or longer than wide. Angle between the trichobothria *Dt*, *Et5* & *Et4* on manus almost 90°. 3
- Patella always longer than femur. Manus also wider than long. Angle between the trichobothria *Dt*, *Et5* & *Et4* on manus generally more than 90° (except *wroughtoni*). 5
3. Dorsal surface of manus entirely coarsely granular (Fig. 1528); Trichobothria *V3* & *V4* on manus placed away (Fig. 1537) and *eb2-5* and *et1-3* on patella placed in oblique rows (Fig. 1534). *granulomanus*
- Dorsal surface of manus covered with short, smooth granules or ridges; Trichobothria *V3* & *V4* on manus (Fig. 1551), placed close to each other and *eb2-5* and *et1-3* on patella not placed in oblique row (Fig. 1548). 4
4. Cauda about three times as long as carapace; Vesicle more than as long as caudal segment II; Pectinal teeth 17/17 in number, spine formula on legs I-IV : $\frac{4}{6}\frac{4}{6}, \frac{4}{6}\frac{4}{6}, \frac{5}{7}\frac{5}{7} \& \frac{5}{7}\frac{5}{7}$. Trichobothria *eb4* proximal to *eb2*, 3 & 5 but distal to *eb1*; *em1* & 2 in same plane but close to *est* and *et2* & 3 in same plane but proximal to *et1* on patella (Fig. 1548). *tristis*
- Cauda three and a half times as long as carapace, segments II and III equally long. Vesicle as long as segments II or III. Pectinal teeth 13/13 in number. Spine formula on legs I-IV : $\frac{3}{4}\frac{3}{4}, \frac{3}{4}\frac{3}{5}, \equiv \frac{4}{5} \& \equiv \frac{4}{5}$ Trichobothria *eb3* proximal to *eb2* & 4 but distal to *eb1*, *em2* distal to *em1*, *esb*, *em* and *est* close to each other and *et2* placed proximal to *et1* & 3 (Fig. 1561). *fastigosus*

5. Trichobothria *est*1, 2 & 3 on patella placed in row, *em*1 & 2 also placed in same plane.6

Trichobothria *est*1, 2 & 3 on patella not placed in a row, *em*1 & 2 also not placed in same plane.7

6. Pectinal teeth 17/17 in number; Vesicle as long as caudal segment III; Trichobothria *eb*2-5 in a same plane and placed in straight line; *esb*1 & 2 in same plane and *em* placed close to *est* (Fig. 1575). *wroughtoni*

Pectinal teeth 13/13 in number; Vesicle as long as caudal segment IV; Trichobothria *eb*2-5 placed progressively distal to preceding one and not in a same plane or straight line, *esb*2 placed distal to *esb*1; all *esb*, *em* and *est* placed close on patella (Fig. 1590). *fulvipes*

7. Vesicle as long as caudal segment III; Aculeus shorter than caudal segment I. Trichobothria *et*2 & 3 on patella placed proximal to *et*1 and in same plane (Fig. 1604). *liurus*

Vesicle as long as caudal segment IV or longer; Aculeus as long as caudal segment I; Trichobothria *et*2 placed proximal to *et*1 & 3 and not in same plane (Fig. 1620).8

8. Pectines not more than $2\frac{1}{2}$ times longer than wide and pectinal teeth not more than 13/13 in number; Trichobothria *eb*2-5 either in same plane or *eb*2-5 placed progressively distal to preceding so as to form a oblique row (Fig. 1620) on patella and trichobothria *et*1 & 3 not placed in same plane (Fig. 1620)9

Pectines more than $2\frac{1}{2}$ times longer than wide and pectinal teeth more than 13/13 in number; Trichobothria *eb5* placed proximal to *eb3* & 4 and not in a row or same plane on patella and *et1* & 3 placed in same plane (Fig. 1620). *xanthopus*

9. Dorsal surface of manus covered with smooth, broad, obsolete granules and three smooth carinae present on distal portion (Fig. 1628); Trichobothria *esb1* placed distal to *esb2* and *em1* & 2 in same plane on patella (Fig. 1634). *barberi*

Dorsal surface of manus smooth or very weakly covered with short, smooth mosaic ridges (Fig. 1642) and without any carinae; Trichobothria *esb2* placed slightly distal to *esb1* and *em2* also much distal to *em1* (Fig. 1648). *scaber*

10. Femur generally as long as carapace. Trichobothria *et1*, 2 & 3 on patella placed in a oblique row (Fig. 1662). 11

Femur always longer than carapace. Trichobothria *et1*, 2 & 3 on patella not placed in oblique row (Fig. 1691). 12

11. Patella as long as femur. Pectines almost twice longer than wide, pectinal teeth 12/12 in number. Cauda slightly longer than two and half times as long as carapace. Trichobothria *eb5* on patella placed distal to *eb-2-4* and *esb*, *em* and *est* placed sparsely (Fig. 1662). *collinus*

Patella longer than carapace. Pectines more than three times longer than wide, pectinal teeth 16/16 in number. Cauda four times longer than carapace. Trichobothria *eb2-5* placed in a oblique row, *em1* & 2 placed close to *est* (Fig. 1677). *madraspatensis*

12. Dorsal surface of manus smooth. Pectines slightly more than twice longer than wide, pectinal teeth not more than 13/13 in number. Vesicle as long as caudal segment II. Trichobothria *eb1-5* and *esb1* & 2 on patella placed in same plane (Fig. 1691). Angle between *Dt*, *Et5* & *Et 4* more than 90° (Fig. 1693). *kanaraensis*

Dorsal surface of manus granular but granules obsolete and carinated. Pectines always more than three times longer than wide and pectinal teeth more than 15/15 in number. Vesicle as long as caudal segment IV. Trichobothria *eb1-5* and *esb1* & 2 on patella may or may not be in same plane (Fig. 1705). Angle between *Dt*, *Et5*, *Et4* not more than 90° (Fig. 1707). 13

13. Manus as long as wide; trichobothria *eb2-5* placed in recurved plane; *esb2* slightly distal to *esb-1*, *em2* distal to *em1* and much closer to *est* (Fig. 1705) and angle between *Dt*, *Et5* *Et4* acute, less than 90° on manus (Fig. 1707)... .. *pelekomanus*

Manus longer than wide, trichobothria *eb2-5* placed in same plane, *esb2* distal to *esb1*, *em1* closer and proximal to *em2*; *esb*, *em* and *est* placed close on patella (Fig. 1719); Angle between *Dt*, *Et5* & *Et4* almost 90° (Fig. 1721). *hipsoni*

86. *Heterometrus* (*Chersonesometrus*) *granulomanus* Couzijn

(Figs. 1525-1538)

1981. *Heterometrus* (*Chersonesometrus*) *granulomanus* Couzijn,
Zool. Verln., 184 : 142.

General : Male and female of large body size. Pedipalp flat and more enlarged, fully granular on dorsal portion of manus as in text-fig. 1525. Chelicera normal. Legs carinated on femur.

Pectines well developed. Carapace weakly granular on lateral portions. Mesosomal tergites granular on lateral and latero-posterior portion. Sternites smooth. Metasoma strong, stout, carinated on segments with slightly compressed telson.

Body dark blackish with reddish brown tint in male, only legs, chelicera and telson light reddish brown in colour. Female reddish brown, more darker on carapace, mesosomal tergites and manus of pedipalp. Pectines and sternites yellowish.

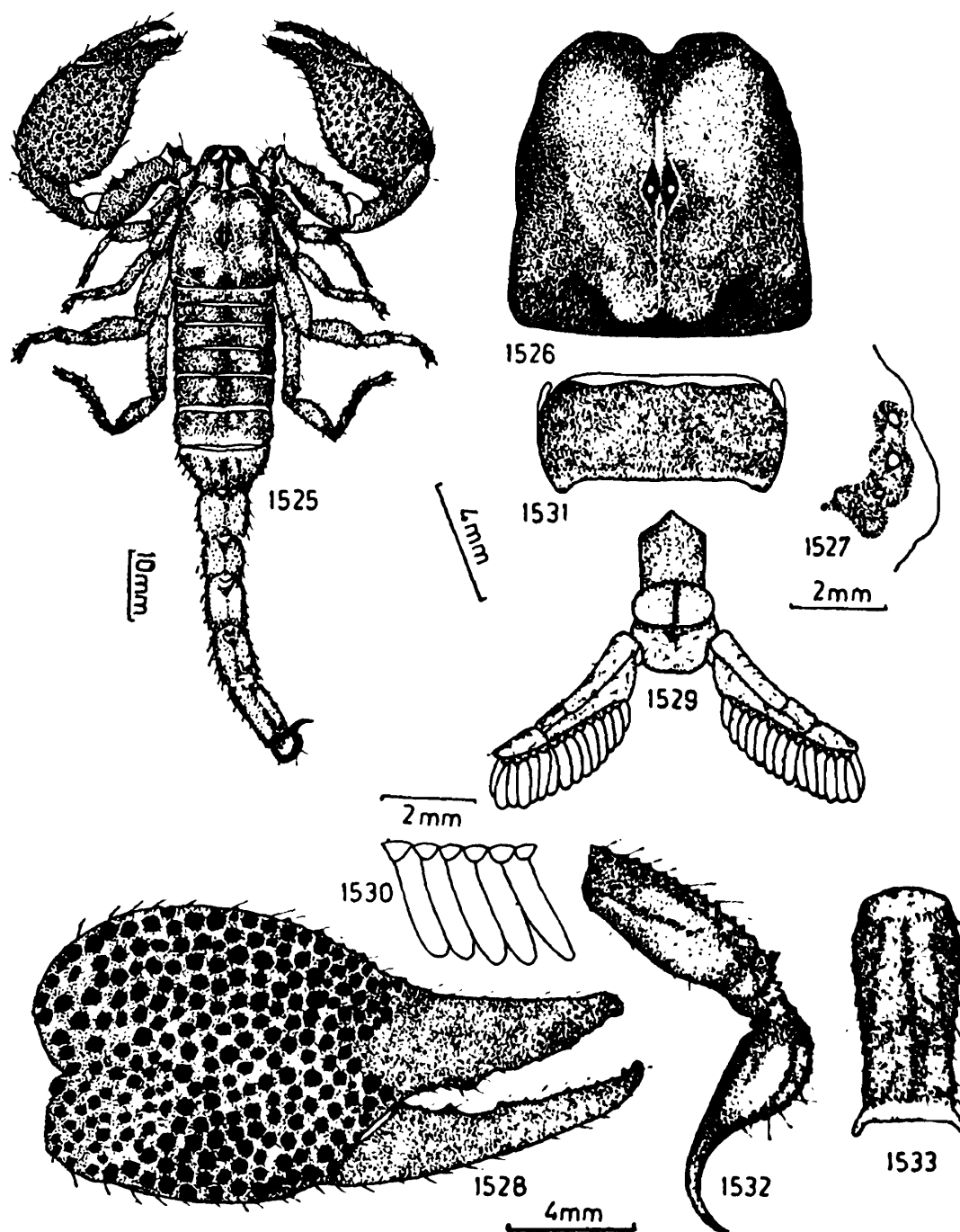
Measurements : Male total length 112.75 mm. Carapace 15.50 mm. long; Mesosoma 45.75 mm. long; Metasoma 51.50 mm. long. Female total length 100.00 mm. Carapace 16.00 mm. long; Mesosoma 35.00 mm. long; Metasoma 49.00 mm. long.

Carapace : Median portion almost smooth except anterior portion of interocular area, lateral portions weakly granular but more granular in male. Superciliary crest entirely smooth and weakly distinct. Median ocular tubercles also smooth and less distinct, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1526. Lateral ocular tubercles weakly granular and provided with three contiguous lateral eyes as in text-fig. 1527. Anterior median, lateral ocular, posterior median and posterior transverse furrows less distinct and much shallow but posterior lateral furrow much distinct. Anterior margin smooth, deeply notched in the middle. Prolateral margins straight and without notch. Lateral margins finely crenulated. Posterior margin smooth. Chelicera smooth on basal segment, clothed thickly with fine silky hairs. Fingers stout, short on dentition in female, dorsal distal tooth very short than ventral distal on movable finger, dentition as characterized in family. Pedipalp stout, much flatter on manus and fully granular on dorsal surface as in text-fig. 1525. Femur shorter than carapace but much shorter in female, carinated and carinae crenulated but anterior carinae more crenulated than posterior

FIGS. 1525-1533. *Heterometrus* (*Chersonesometrus*) *granulomanus*
Couzijn

1525. Dorsal view of male.

1526. Carapace, dorsal view.

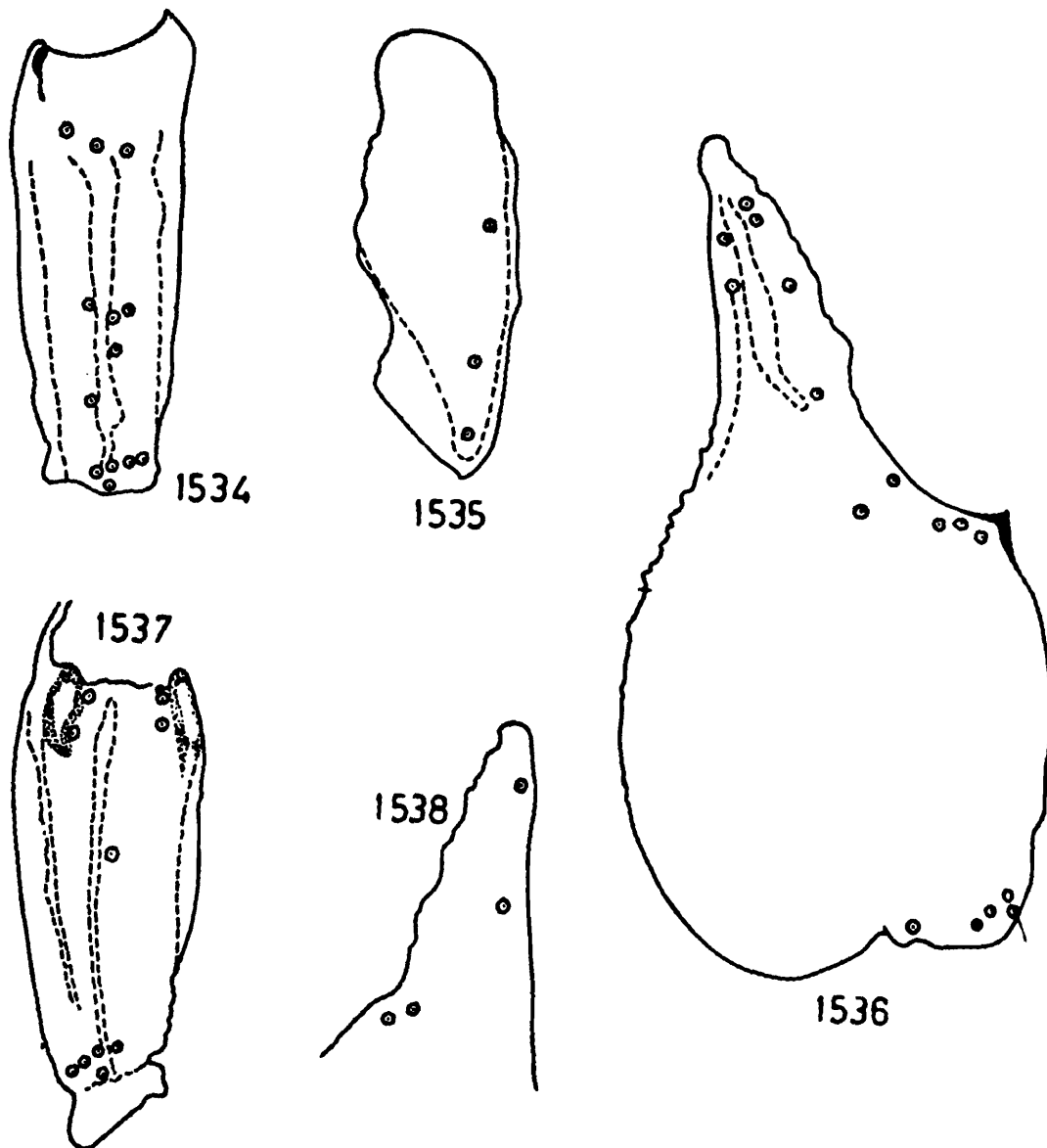


1527. Lateral eyes, lateral view.
 1528. Manus and fingers, exterior view.
 1529. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1530. Pectinal teeth and fulcra, ventral view.
 1531. Tergite, dorsal view.
 1532. Telson and metasomal segment V, lateral view.
 1533. Metasomal segment V, ventral view.

carina. Anterior or outer surface provided with a crenulated carina. Posterior or inner surface covered with few granules. Intercarinal space poorly granular on dorsal surface, entirely smooth on ventral surface. Patella almost as long as femur but shorter than carapace, carinated but all carinae smooth and obsolete. Intercarinal space also entirely smooth. Anterior or inner surface elevated on proximal portion, provided with few small tuberculated granules. Manus much flattened, as long as wide in male but wider than long in female as in text-fig. 1528, dorsal surface fully covered with coarse granules, carinated but only exterior carinae distinct and smooth. Exterior and ventral surface weakly granular but more granular on inner portion. Fingers entirely smooth, weakly carinated on proximal portion. Dentition on the fingers broad, triangular and four to five teeth distinct. Movable finger longer than carapace in male but shorter in female. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1534-1538. Legs weakly granular on femur, smooth on patella, tibia and tarsomere I; tarsomere I provided with few spines and pedal spur on distal portion. Tarsomere II smooth, provided ventrally with a paired row of spines and spine formula on legs I-IV : ♂ : $\frac{3}{5}$ $\frac{3}{5}$, $\frac{3}{4}$ $\frac{3}{5}$, $\frac{3}{5}$ $\frac{3}{5}$ & $\frac{3}{5}$ $\frac{3}{5}$ and ♀ $\frac{3}{5}$ $\frac{3}{5}$, $\frac{3}{5}$ $\frac{3}{5}$, \equiv $\frac{3}{5}$ & $\frac{4}{8}$ $\frac{3}{5}$, lateral margins overlapping the base of the claw lobes. A pair of claws normal. Pectines well developed and more than two and a half times longer than wide. Middle lamellae not subdivided into small digits. Fulcra distinct and triangular. Lamellae and fulcra covered with many microscopic setae. Pectinal teeth elongated, tapering distally as in text-fig. 1530 and 15/15 in number in male as in text-fig. 1529. Basal piece smooth, weakly notched on anterior median portion. Genital operculum wider than long, sclerites separated in male from under which a pair of male genital papillae visible, sclerites fused in the middle in female and narrowed posteriorly. Cephalothoracic sternum pentagonal, smooth and a median depression prominent as in text-fig. 1529.

Mesosoma : Tergites I-VI granular on lateral, posterior and lateromedian portion but smooth on median portion, without carina as in text-fig. 1531. Lateral and posterior margins smooth. Pretergal portion also entirely smooth. Tergite VII more dis-

tinctly granular and two pairs of granular carinae distinct. Lateral margins finely crenulated. Posterior margin smooth. Pretergal portion entirely smooth. Sternites I-IV entirely smooth, each provided with a pair of slit like, oblique and elongated stigmata for book lungs. Sternite V also entirely smooth.



FIGS. 1534-1538. *Heterometrus (Chersoneaometrus) granulomanus* Couzijn.

- 1534. Patella, exterior view.
- 1535. Patella, ventral view.
- 1536. Manus and immovable finger, exterior view.
- 1537. Manus, ventral view.
- 1538. Immovable finger, interior view.

Metasoma : Cauda slightly more than three times as long as carapace. Segments I & II wider than long. Segments III & IV longer than wide. Segment V slightly less than twice as long as wide. Segments I-IV each provided with dorsal, dorsolateral carinae weakly crenulated. Inferior lateral and inferior carinae smooth. Segment IV with dorsal, dorsolateral, inferior lateral and inferior carinae weakly crenulated. Intercarinal space irregularly and weakly granular only on dorsal portion. Anterior peduncle and posterior margin smooth. Segment V shorter than femur or carapace, carinated and dorsolateral carinae crenulated and distinct only on anterior portion. Inferior lateral and inferior median carinae strongly serrated as in text-fig. 1533. Intercarinal space irregularly granular but more granular on dorsal portion. Anterior peduncle smooth. Anal rim of this segment evenly serrated and lateral denticle much prominent and large. Telson longer than segment V, as long as patella in female, but always not as wide or deep as segment V. Vesicle as long as segment II, crested on ventral surface and all crests sparsely granular as in text-fig. 1532. Dorsal surface smooth. Lateral and ventral bands distinct. Aculeus stout, shorter than vesicle but as long as segment I, not much curved, sharply pointed as in text-fig. 1532.

Distribution : INDIA : Pondicherry; Tamil Nadu (*Type-locality*); Palni Hills and Kodai Canal, Kerala and Madhya Pradesh.

Remarks : We have studied *Holotype* ♂ and *Allotype* ♀ received from M.N.H.N., Paris; Regd. No. MNHN-RS-0087, and present description and illustrations are based on same type specimens.

87. **Heterometrus (Chersonesometrus) tristis** (Henderson)
(Figs. 1539-1552)

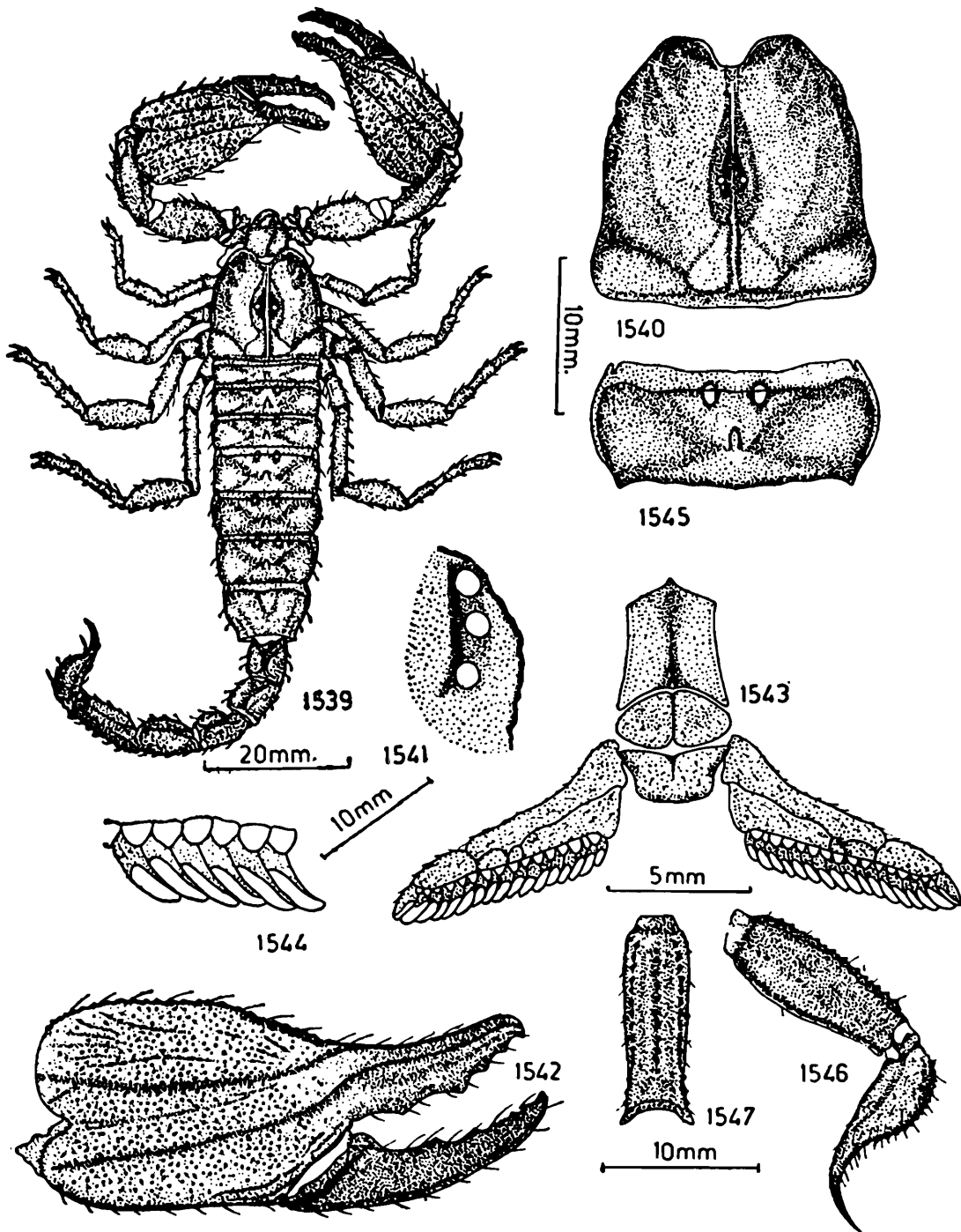
1919. *Palamnaeus tristis* Henderson, *Rec. Indian Mus.*, Calcutta, 16 : 378-381.
1981. *Heterometrus (Chersonesometrus) tristis* : Couzijn, *Zool. Verln.*, 184 : 157.

General : Female larger than male. Carapace weakly granular. Tergites and sternites smooth. Chelicera smooth. Pedipalp strong, stout, carinated, granular and manus flat and enlarged as in text-fig. 1539. Legs weakly granular only on femur. Pectines well developed. Metasoma stout, all segments carinated. Telson with strong and stout aculeus.

Male darker than female. Female yellowish brown but more darker on metasomal segments except yellowish vesicle. Chelicera yellowish on basal segment and reddish on carinae and fingers. Legs yellowish.

Measurements : Male total length 75.50 mm. Carapace 11.25 mm. long; Mesosoma 28.25 mm. long; Metasoma 36.00 mm. long. Female total length 98.50 mm. Carapace 15.75 mm. long; Mesosoma 37.50 mm. long; Metasoma 45.25 mm. long.

Carapace : Weakly granular on lateral portion and anterior portion of interocular portion. Ocular tubercles weakly distinct and smooth. Lateral ocular tubercles provided with three contiguous eyes as in text-fig. 1541. Median tubercles provided with a pair of median eyes, situated in ratio 1 : 1.1 as in text-fig. 1540. Anterior margin smooth and deeply notched in the middle portion. Lateral margins smooth except weakly crenulated on anterior portion. Posterior margin smooth. Chelicera smooth on basal segment, fingers short, stout and not much sharp on dentition. Dentition as characterized in family. Pedipalp stout, much enlarged on manus, carinated and granular. Femur slightly shorter than carapace, carinated and all carinae granular but outer dorsal carinae much strong and crenulated. Anterior or outer surface provided with a crenulated carina. Intercarinal space sparsely granular and some granules coarse. Patella as long as femur, carinated and all carinae weakly granular. Intercarinal space also granular. Anterior or inner surface elevated on proximal portion and covered with few tuberculate granules. Manus longer than wide, as long as femur or patella in male, but longer than femur, patella or carapace in female but always wider than long. Dorsal surface less convex, carinated and three weak carinae distinct as in text-fig. 1539, entirely granular and granules arranged in mosaic fashion but slightly sparsely in

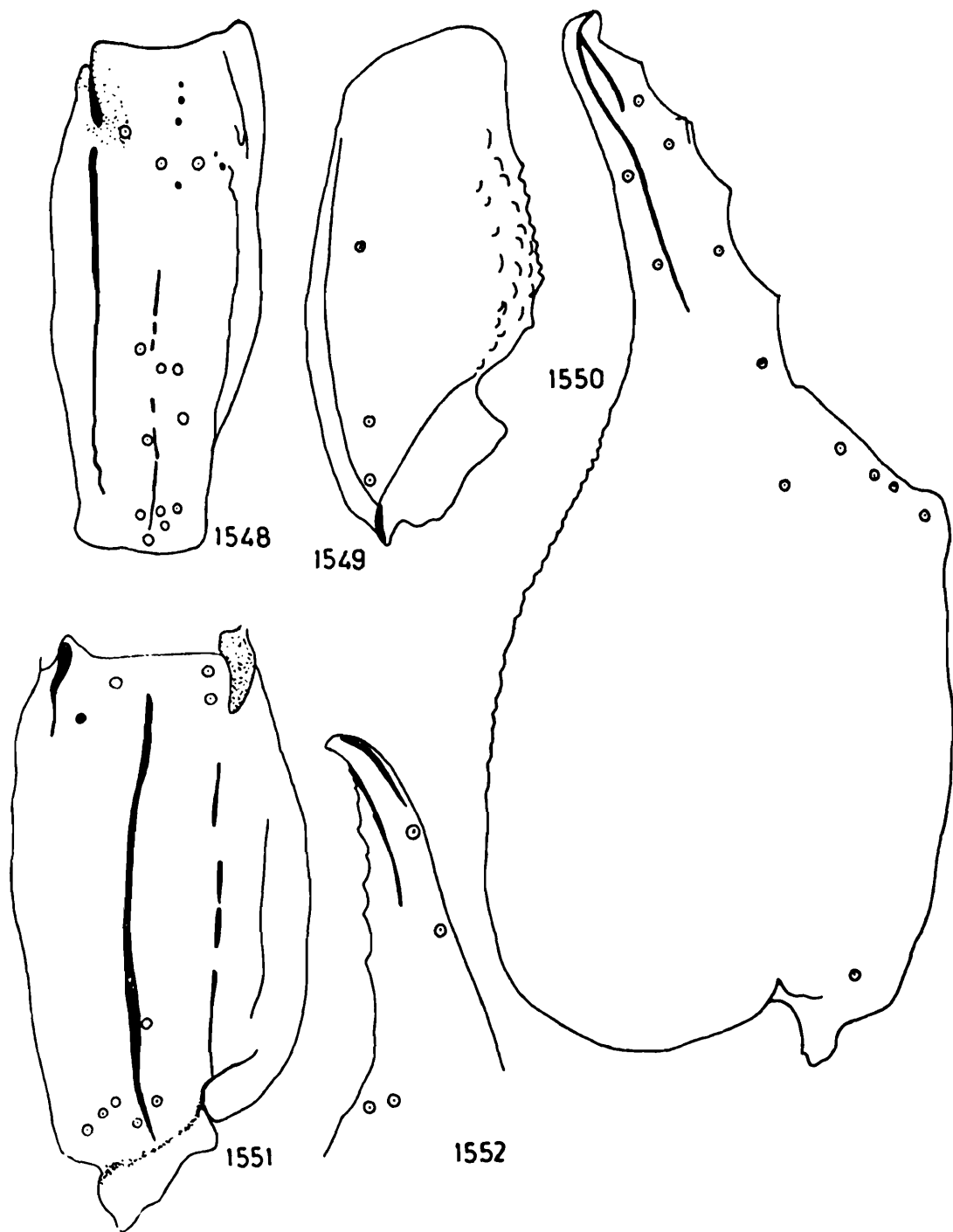


FIGS. 1539-1547. *Heterometrus (Chersonesometrus) tristis* (Henderson)

- 1539. Dorsal view of male.
- 1540. Carapace, dorsal view.
- 1541. Lateral eyes, lateral view.
- 1542. Manus and fingers, exterior view.
- 1543. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1544. Pectinal teeth and fulcra, ventral view.
- 1545. Tergite, dorsal view.
- 1546. Metasomal segment V and telson, lateral view.
- 1547. Metasomal segment V, ventral view.

female. Exterior carina strong and obsolete, dorsal exterior and central exterior carinae weakly distinct and smooth. Ventral surface almost entirely smooth and provided with two sparsely granular weak carinae. Inner margin granular and granules weakly tuberculate. Fingers entirely smooth but immovable finger carinated and single carina, smooth and obsolete. Movable finger always longer than carapace or under hand. Dentition on fingers broad, triangular and five to six in number as in text-fig. 1542. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1548-1552. Legs weakly granular and carinated on femur but smooth on patella and tibia. Tarsomere I smooth but carinated and provided with few spines on proximal portion and a pedal spur. Tarsomere II smooth, distal margin overlapping the base of claw lobes, provided on ventral surface with a row of paired spines and spine formula on legs I-IV : $\frac{4}{6} \equiv , \frac{4}{8} \frac{5}{7}, \frac{5}{6} \frac{5}{7} \& \equiv \frac{5}{7}$ in male and $\frac{4}{6} \frac{4}{5}, \frac{4}{6} \frac{4}{6}, \frac{5}{7} \frac{5}{6} \& \frac{5}{7} \frac{5}{7}$ in female. A pair of claws normal. Pectines well developed two and a half times longer than wide in male. Middle lamellae weakly subdivided in two to three digits. Fulcra distinct and triangular. Lamellae and fulcra covered with many setae. Pectinal teeth weak, short and more tapering in female as in text-fig. 1544 and 17/17 in female as in text-fig. 1543. Basal piece smooth and anterior margin weakly invaginated. Genital operculum wider than long, sclerites separated in male and from under which a pair of conspicuous male genital papillae visible. Cephalothoracic sternum pentagonal, smooth and provided with a median longitudinal suture as in text-fig. 1543.

Mesosoma : Tergites I-VI weakly and irregularly granular on lateral portions in male but entirely smooth in female as in text-fig. 1545. Tergite VII weakly granular and provided with two pairs of weak granular carinae. Lateral, posterior margins and pretergal portion for each tergite also entirely smooth. Sternites I-IV entirely smooth and each provided with a pair of slit like stigmata for book lungs. Sternite V weakly granular on posterior portion in female and granules obsolete. Lateral, posterior margins and presternal portions smooth.



FIGS. 1548-1552. *Heterometrus (Chersonesometrus) tristis* (Henderson)

- 1548. Patella, exterior view.
- 1549. Patella, ventral view.
- 1550. Manus and immovable finger, dorsoexterior view.
- 1551. Manus, ventral view.
- 1552. Immovable finger, interior view.

Metasoma : Cauda almost three times as long as carapace. Segments I-IV carinated, dorsal carinae weakly crenulated but dorsolateral, inferior lateral and inferior carinae smooth except inferior carinae weakly crenulated on segment IV. Intercarinal space weakly and irregularly granular. Anterior peduncle smooth. Segment V shorter than carapace, carinated and only inferior and single inferior median carinae serrated and inferior carinae ending posteriorly into a strong triangular tubercle as in text-fig. 1547. Anal rim of this segment weakly crenulated. Intercarinal space irregularly and weakly granular. Telson longer than segment V but shorter than carapace. Vesicle more than as long as segment III in male and segment IV in female but always less than as wide or deep as segment V, carinated on ventral side, a ventral median and ventral lateral carinae sparsely crenulated, entire surface smooth, ventral and lateral bands not much distinct. Aculeus as long as vesicle in male but shorter in female, not much curved, sharp and dark on distal portion as in text-fig. 1546.

Distribution : INDIA : Venkatgiri Hills, Tamil Nadu.

Remarks : We have studied, described and illustrated on the basis of 1 ♂ and 1 ♀ type specimens received from National Collection, ZSI, Calcutta, Regd. No. 2160/18.

88. *Heterometrus* (*Chersonesometrus*) *fastigosus* Couzijn

(Figs. 1553-1565)

1981. *Heterometrus* (*Chersonesometrus*) *fastigosus* Couzijn, *Zool. Verln.*, 184 : 137.

General : Male of large body size, manus of pedipalp not much flat but little narrower as in text-fig. 1553. Carapace weakly granular without any carinae. Chelicera normal, smooth on basal segment. Pedipalp not much stout and flat but carinated on femur and patella. Legs granular and carinated on patella. Pectines well developed. Mesosomal tergites smooth in

middle portion and finely granular on lateral portions. Sternites entirely smooth. Metasoma stout, all segment carinated and carinae almost crenulated. Telson with round, carinated vesicle and stout reddish aculeus.

Body reddish brown with slightly blackish tint but carapace and pedipalps more blackish. Ocular tubercles complete black. Chelicera yellowish on basal segment but dark brown to blackish on fingers. Pedipalp darker with reddish tint on manus but dark on fingers. Legs reddish brown on femur and patella while pale brown on tibia, tarsomere I, while yellowish on tarsomere II. Claws brown. Pectines yellow. Mesosomal tergites reddish brown, sternites yellow. Metasoma yellowish brown but more darker on carinae. Vesicle clear yellow but ventral and lateral bands brownish. Aculeus almost entirely dark reddish brown to black.

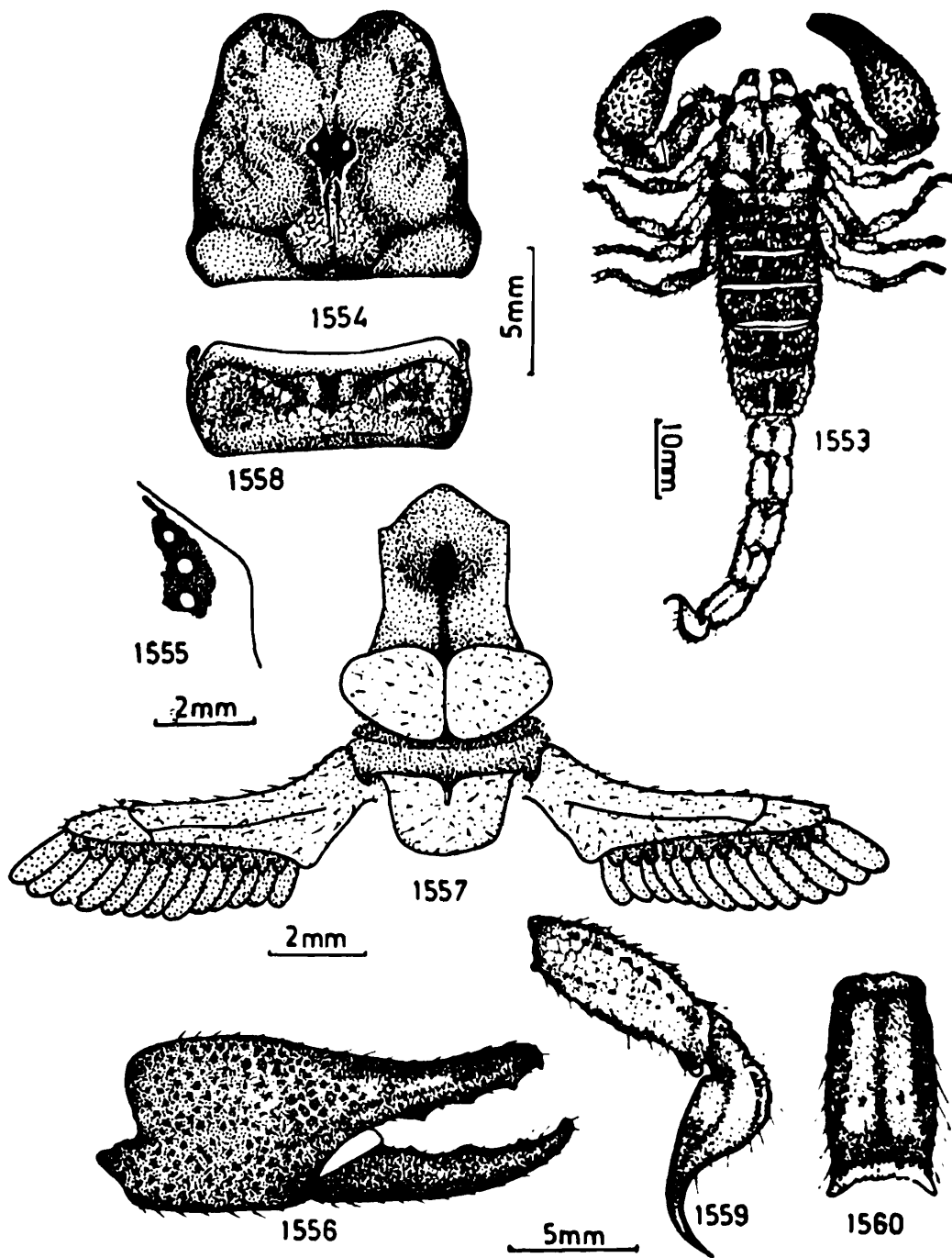
Measurements : Total length 90.25 mm. Carapace 13.00 mm. long; Mesosoma 32.50 mm. long; Metasoma 44.75 mm. long.

Carapace : Smooth on middle portion, weakly granular on lateral and anterior marginal portion. Interocular area smooth except granular anterior submarginal area. Lateral ocular tubercles granular and provided with three contiguous lateral eyes but posterior placed and directed more posterior ward as in text-fig. 1555. Median ocular tubercles smooth, median furrow narrow and distinct, continued anteriorly as smooth to weakly granular superciliary crest, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1554. Anterior median, lateral ocular, posterior central furrows shallow but distinct, posterior transverse and posterior lateral furrows also distinct. Anterior margin smooth with deep notch in the middle. Lateral margins finely crenulated but more crenular on rostrolateral portion. Posterior margin smooth. Chelicera smooth on basal segment and ventral surface thickly clothed

FIGS. 1553-1560. *Heterometrus (Chersonesometrus) fastigosus*
Couzijn.

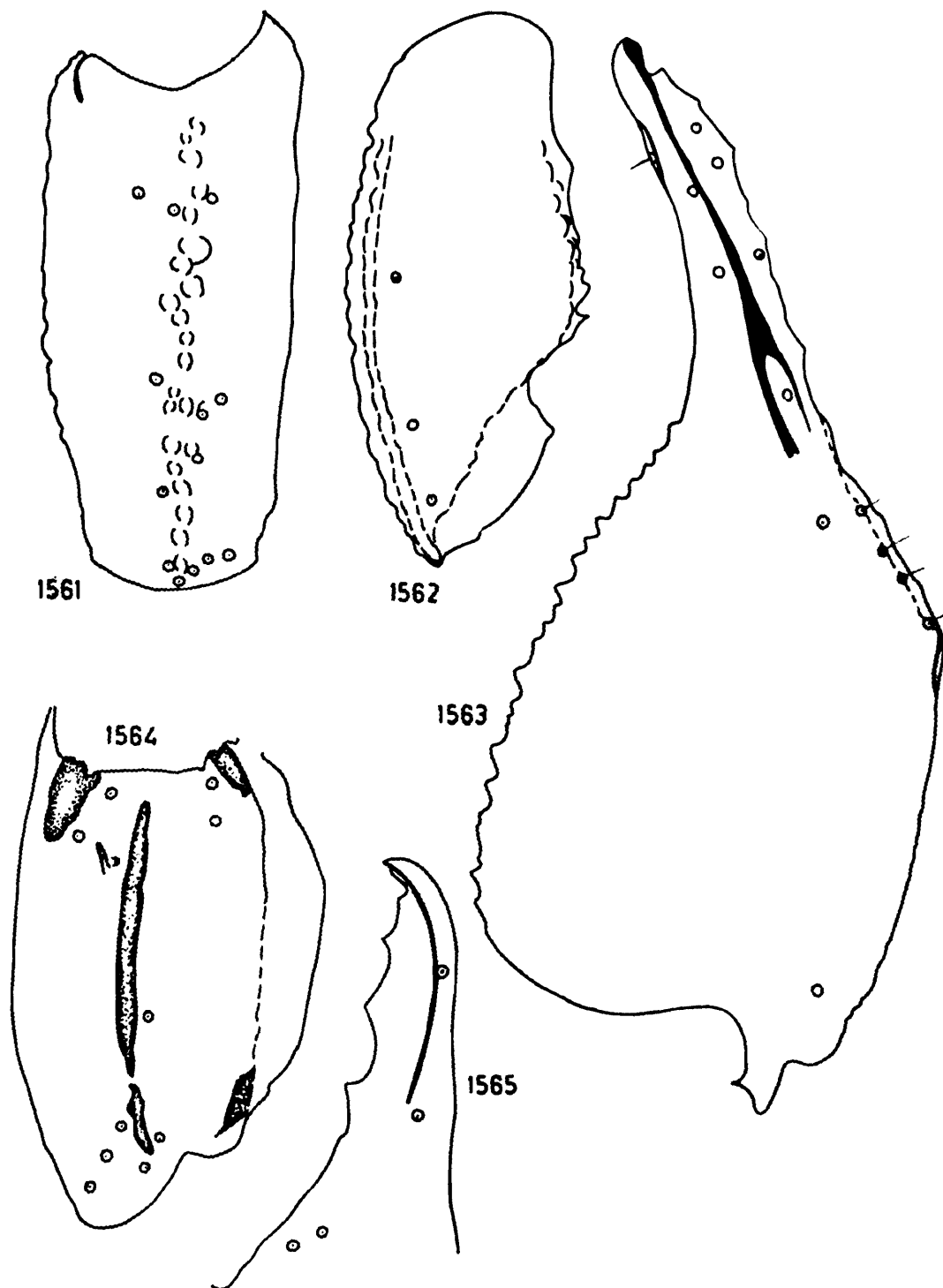
1553. Dorsal view of male.

1554. Carapace, dorsal view.



- 1555. Lateral eyes, lateral view.
- 1556. Manus and fingers, exterior view.
- 1557. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1558. Tergite, dorsal view.
- 1559. Telson and metasomal segment V, lateral view.
- 1560. Metasomal segment V, ventral view.

with short silky hairs. Fingers stout but not sharp on dentition, dentition as characterized in the family. Dorsal distal tooth much shorter than ventral distal tooth. Pedipalp not much stout and flat as in text-fig. 1553. Femur shorter than carapace, carinated. Anterior or outer surface provided with granular carinae, dorsal and ventral outer carinae granular. Intercarinal space granular. Patella shorter than carapace but as long as femur, carinated all carinae weakly crenulated. Intercarinal space weakly granular. Anterior or inner margin elevated on proximal portion and provided with three to four small tuberculate granules. Ventral surface entirely smooth. Manus not much flat, more than as deep as patella and slightly shorter than patella. Dorsal surface with two short, weakly granular carinae but only on distal portion, granules arranged in short obsolete mosaic fashion except on outer granular portion as in text-fig. 1556. Exterior dorsal portion granular but exterior ventral portion entirely smooth. Exterior carina smooth. Ventral surface weakly granular and two smooth carinae weakly distinct. Inner margin granular and all granules dentiform. Immobile finger as long as the length of under hand but shorter than patella or femur. Carinated, inner carinae weakly crenulated but outer carinae smooth, five triangular teeth and a distal notch prominent. Movable finger longer than carapace, granular on inner portion and with basal ridge, provided with five triangular teeth. Trichobothrial pattern on patella manus and immobile finger as in text-figs. 1561-1565. Legs carinated and weakly granular on femur. Patella smooth. Tibia also smooth. Tarsomere I smooth, provided with few spines on distal portion and pedal spur. Tarsomere II smooth, provided with pairs of ventral spines and spine formula on I-IV : $\frac{3}{4} \frac{3}{4}, \frac{3}{4} \frac{3}{5}, \equiv \frac{4}{5} \& \equiv \frac{4}{5}$. Latero distal margins overlapping the base of claw lobes. A pair of claws normal. Pectines well developed and two and a half times longer than wide. Middle lamellae not divided. Fulcra triangular and distinct. Lamellae and fulcra clothed with microscopic setae. Pectinal teeth elongated, tapering and 13/13 in number as in text-fig. 1557. Basal piece sclerotized with median anterior depression. Genital operculum wider than long, both the sclerites separate and a pair of male genital



FIGS. 1561-1565. *Heterometrus (Chersonesometrus) fastigosus* Couzijn.

1561. Patella, exterior view.

1562. Patella, ventral view.

1563. Manus and immovable finger, dorsoexterior view.

1564. Manus, ventral view.

1565. Immobile finger, interior view.

papillae seen after lifting the sclerites. Cephalothoracic sternum pentagonal, smooth and provided with median notch as in text-fig. 1557.

Mesosoma : Tergites I-VI smooth on middle portion, weakly granular on lateral portions, without carinae as in text-fig. 1558. Lateral and posterior margins smooth. Presternal portion also entirely smooth. Tergite VII more granular than preceding tergite and granules coarse, carinated, two pairs of lateral carinae weakly crenulated. Lateral margins weakly crenulated. Posterior margin smooth. Pretergal portion smooth. Sternite I-IV entirely smooth and each provided with a pair of oblique, elongated slit like stigmata for book lungs. Sternite V also entirely smooth.

Metasoma : Cauda more than four times as long as carapace. Basal segment wider than long. Segment II as long as wide. Segments III & IV longer than wide. Segment V more than twice as long as wide but as wide as deep. All segments carinated and segments I-IV with dorsal and dorsolateral carinae weakly crenulated while inferior lateral and inferior carinae smooth. Lateral carinae weakly represent only on segment I. Segment IV with dorsal, dorsolateral, inferior lateral and inferior carinae crenulated, inferior carinae more crenulated. Intercarinal space sparsely granular but granulation coarse on lateral portions. Anterior peduncle and posterior margins smooth. Segment V shorter than carapace, femur, patella or manus, carinated, only inferior lateral and single inferior median carinae strongly developed and sparsely serrated as in text-fig. 1559. Lateral portion granular and few granules arranged in a row on anterior portion. Anal rim of this segment evenly crenulated and lateral tubercle dentiform, strong and triangular as in text-fig. 1560. Anterior peduncle smooth. Telson longer than segment V but shorter than carapace and as wide or deep as segment V. Vesicle as long as segment II or III, smooth on dorsal portion but weakly granular on lateral and inferior portion. Inferior granules arranged into six crenulated crests. Lateral and inferior bands distinct. Aculeus shorter than vesicular length, stout, not much curved and sharply pointed as in text-fig. 1559.

Distribution : INDIA : Kulu, Himachal Pradesh; Ambala, Punjab; Dehra Dun, Allahabad, Uttar Pradesh; Gwalior, Madhya Pradesh; Satara, Nagpur, Maharashtra; Bihar; West Bengal and Assam.

Remarks : We have studied, described and illustrated on the basis of *Holotype* 1 ♂ received from SMF, West Germany; Regd. No. R II/8886.

89. *Heterometrus* (*Chersonesometrus*) *wroughtoni* (Pocock)

(Figs. 1566-1580)

1899. *Palamnaeus wroughtoni* Pocock, J. *Bombay nat. Hist. Soc.*, 12 : 745.
1900. *Palamnaeus wroughtoni* : Pocock, *Fauna Brit. India, Arachn.*, : 89.
1981. *Heterometrus* (*Chersonesometrus*) *wroughtoni* : Couzijn, *Zool. Verln.*, 184 :158.

General : Female of large size. Carapace almost smooth except weakly granular on lateral portions. Chelicera smooth. Pedipalp stout, strong and inner margin of manus almost parallel to outer margin and not much convex on dorsal surface as in text-fig. 1566. Legs weakly granular on femur and patella. Pectines well developed. Mesosoma entirely smooth except granular on last tergite. Metasoma carinated but intercarinal space smooth. Telson with elongated sharp aculeus as in text-fig. 1566.

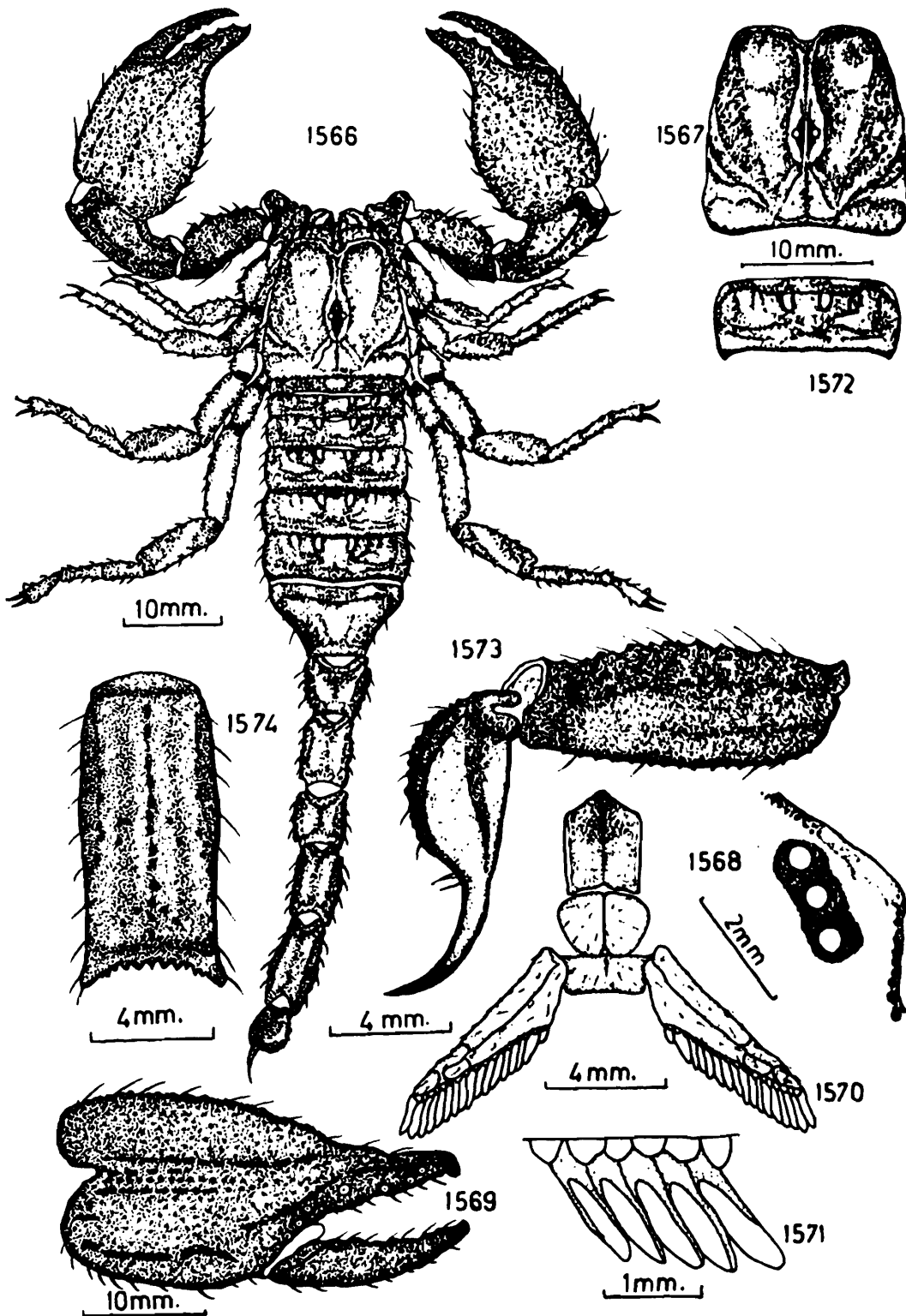
Body almost entirely blackish except few dark reddish patches on carapace. Mesosomal tergites reddish on edges or margins. Metasoma blackish with reddish tint. Telson with reddish brown on vesicle. Aculeus blackish on distal portion. Chelicera yellowish with reddish tint on basal segment and dark reddish brown on fingers. Pedipalp almost black on femur, patella and finger but manus with slightly reddish tint. Legs reddish brown on femur and patella but pale brown on tibia and tarsomere I and II. Pectines yellowish.

Measurements : Total length 92.25 mm. Carapace 13.50 mm. long; Mesosoma 32.75 mm. long; Metasoma 46.00 mm. long.

Carapace : Almost entirely smooth except weakly granular lateral portion. Lateral ocular tubercles weakly granular and provided with three contiguous lateral eyes as in text-fig. 1568. Median ocular tubercle smooth, weakly distinct, separated by a median suture, provided with a pair of median eyes and situated anteriorly in the ratio 1 : 1 as in text-fig. 1567. Anterior margin smooth and deeply notched in the middle. Lateral margins finely crenulated and supported with finely granular submarginal ridge. Posterior margin straight and smooth. Only posterior lateral, posterior and anterior median furrows distinct. Chelicera smooth on basal segment. Ventral surface clothed thickly with short, silky hairs which extend on ventral surface of fingers. Fingers thin, elongated and dentition as characterized in the family. Distal tooth of dorsal fang much shorter than distal tooth on ventral fang. Pedipalp stout, manus convex on dorsal surface and with inner and outer margins almost parallel as in text-fig. 1566. Femur shorter than carapace, carinated and exterior carinae coarsely granular and some granules strongly tuberculate. Inner dorsal carina granular but granules obsolete. Anterior or exterior surface provided with few tuberculate granules. Intercarinal space sparsely granular only on dorsal surface. Patella longer than femur but shorter than carapace, carinated but carinae weakly granular to obsolete. Posterior or exterior surface provided with weakly granular carina. Anterior or inner surface elevated and covered with few granules. Intercarinal space weakly granular on dorsal surface but smooth on ventral. Manus wider than long, inner and outer margins almost parallel and dorsal surface fully covered with coarse but

FIGS. 1566–1574. *Heterometrus* (*Chersonesometrus*) *wroughtoni* (Pocock)

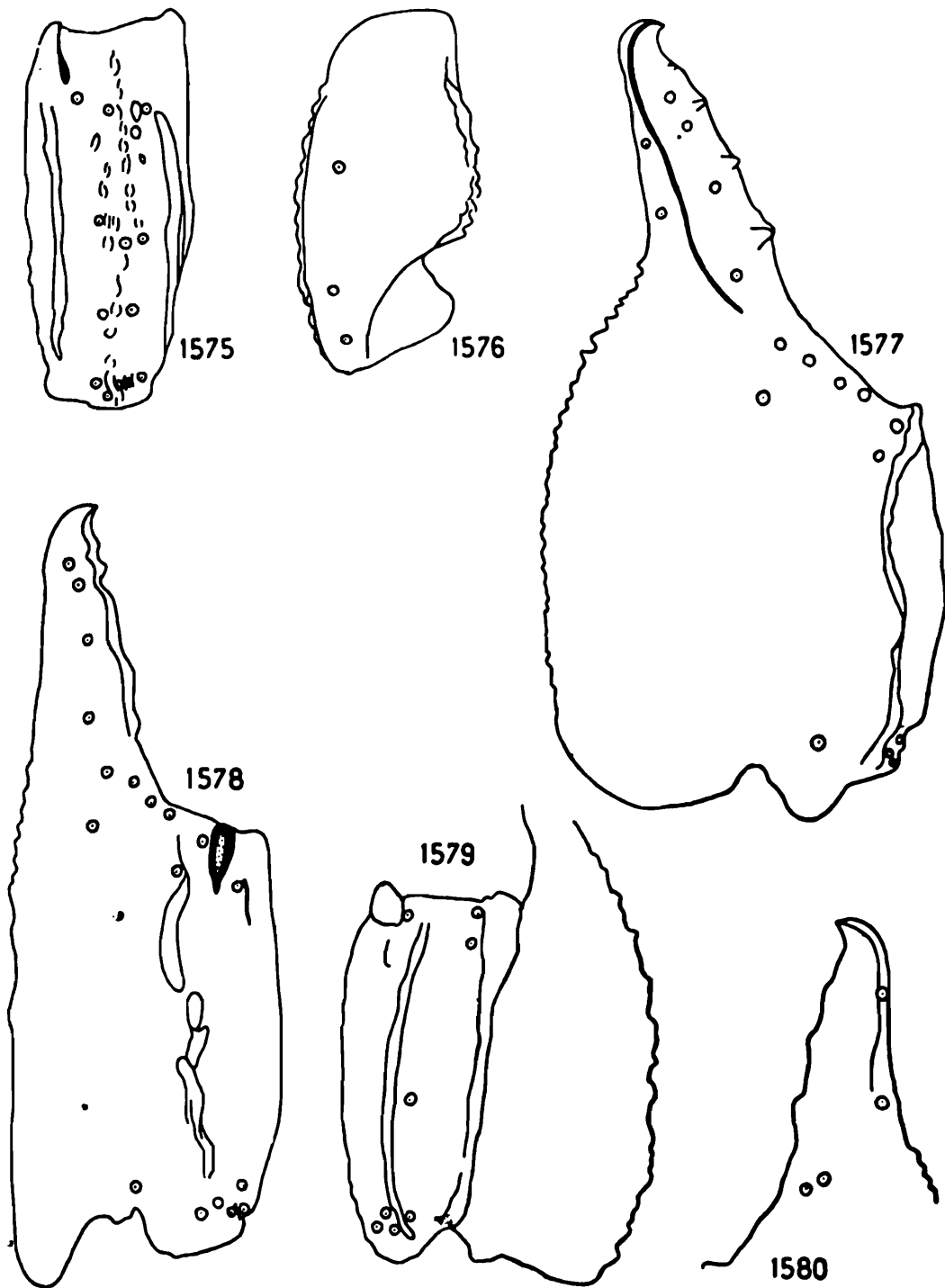
- 1566. Dorsal view of female.
- 1567. Carapace, dorsal view.
- 1568. Lateral eyes, lateral view.
- 1569. Manus and fingers, exterior view.
- 1570. Pectines, genital operculum and cephalothoracic sternum, ventral view.



1571. Pectinal teeth and fulcra, ventral view.
 1572. Tergite, dorsal view.
 1573. Metasomal segment V and telson, lateral view.
 1574. Metasomal segment V, ventral view.

obsolete granules, carinated, digital carinae weakly distinct and granular on distal portion as in text-fig. 1569. Exterior secondary carinae distinct and smooth. Exterior marginal carina strongly developed, elevated and smooth. Exterior carina not much distinct and obsolete. Inner margin granular and granules weakly crenulated. Ventral margin weakly granular. Fingers smooth but carinated and carinae obsolete. Movable finger longer than carapace, carinated on ventral surface but carinae smooth. Immobile finger shorter than carapace or femur, carinated and carina smooth. Dentition on fingers not definite but five broad triangular teeth as in text-fig. 1569. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1575-1580. Legs almost smooth on femur and patella except on femur of leg IV, weakly granular, carinated but only exterior carinae weakly granular. Tibia smooth. Tarsomere I smooth and provided with few spines on distal portion and a pedal spur on distal end. Tarsomere II smooth, lateral distal margins overlapping the base of claw lobes and ventral surface furnished with two rows of strong reddish spines. Spine formula on legs I-IV : $\frac{4}{6} \frac{4}{5}, \frac{4}{6} \frac{4}{6}, \frac{4}{6} \frac{4}{6}, \frac{4}{6} \frac{4}{6}$. Pectines well developed and more than two and a half times longer than wide. Middle lamellae subdivided into two subdigits. Fulcra distinct, round to triangular. Lamellae and fulcra clothed sparsely with megascopic and microscopic setae. Pectinal teeth elongated, tapering on distal end as in text-fig. 1571 and 17/17 in number as in text-fig. 1570. Basal piece smooth, weakly notched on anterior margin. Genital operculum wider than long, sclerites united in the middle. Cephalothoracic sternum pentagonal, smooth and with deep median depression as in text-fig. 1570.

Mesosoma : Tergites I-VI smooth and at the most weakly granular on posterior lateral portions of each tergite as in text-fig. 1572. Lateral margins finely crenulated. Posterior margin smooth in the middle portion but weakly granular on lateral portion. Pretergal portion smooth and also smooth on posterior margin. Tergite VII smooth in middle portion and weakly granular on lateral portion, carinated and two pairs of weakly distinct granular carinae developed only on posterior portion. Lateral margins finely crenulated. Posterior margin smooth. Pre-



FIGS. 1575-1580. *Heterometrus (Chersonesometrus) wroughtoni* (Pocock)

- 1575. Patella, exterior view.
- 1576. Patella, ventral view.
- 1577. Manus and immovable finger, dorsoexterior view.
- 1578. Manus and immovable finger, exterior view.
- 1579. Manus, ventral view.
- 1580. Immobile finger, interior view,

tergal portion smooth and also smooth on posterior margin. Sternite I-IV smooth, each provided with a pair of elongated, slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion smooth. Sternite V entirely smooth. Lateral and posterior margins smooth. Presternal portion smooth.

Metasoma : Cauda three and a half times as long as carapace. Basal segment wider than long. Segment II as long as wide. Segments III and IV longer than wide. All segments carinated. Segments I-III with dorsal, dorsolateral carinae, crenulated and inferior lateral and inferior carinae smooth and obsolete. Lateral carinae weakly developed on segment I and almost obsolete. Segment IV with dorsal carinae crenulated, dorsolateral carinae weakly granular and obsolete. Inferior lateral carinae smooth and obsolete. Inferior carinae smooth on anterior portion but weakly and sparsely crenulated on posterior portion. Intercarinal space almost smooth. Anterior peduncle and posterior margins also smooth. Segment V much shorter than carapace or femur, not as wide as segment IV but as deep as segment IV, carinated, dorsal carinae weakly distinct, smooth on anterior portion but very sparsely granular on $\frac{3}{4}$ of posterior portion. Inferior lateral and single inferior median carinae serrated but inferior lateral much sparsely serrated. Intercarinal space almost smooth. Anterior peduncle smooth. Anal rim of this segment evenly and sparsely crenulated on ventral portion and lateral portion strongly tuberculated, broad and not pointed as in text-fig. 1574. Ventral and lateral bands not much distinct; fully covered with long bristles. Telson longer than segment V but as long as femur. Vesicle as long as segment III but not as wide or deep as segment V, smooth except a median ventral and ventrolateral granular crests. Aculeus not much curved, shorter than segment I, not much pointed and dark brown on distal portion as in text-fig. 1573.

Distribution : INDIA : Belgaum (*Type-locality*) Karnataka; Gadinglaj, Kolhapur Dist., Maharashtra.

Remarks : We have studied, illustrated and described on the basis of the type specimen 1 ♀, received from B.M. (N.H.), London; Regd. No. nil.

90. *Heterometrus* (*Chersonesometrus*) *fulvipes* (Koch)

(Figs. 1581-1594)

1838. *Palamnaeus fulvipes* C. Koch, *Arachn*, 4 :45.
1900. *Palamnaeus fulvipes bombayensis* : Pocock, *Fauna Brit. India*,
Arachn., : 89.
1981. *Heterometrus* (*Chersonesometrus*) *fulvipes* : Couzijn, *Zool.*
Verln., 184 : 133.

General : Female large in size. Body surface smooth, except weakly granular on lateral portion of carapace and tergite VII. Chelicera smooth. Pedipalp strongly granular and carinated but carinae on immovable finger smooth as in text-fig. 1581. Legs smooth and carinated. Pectines well developed. Metasoma strong carinated and carinae serrated on distal segments. Telson with globular vesicle, aculeus stout, sharp and not much curved.

Body dark reddish brown but more darker on pedipalp. Chelicera brownish on finger but yellowish on basal segment. Legs dark yellowish with reddish tint. Mesosomal sternites yellow. Metasoma slightly light reddish brown on mesosomal tergites but darker on carinae. Telson yellowish with ventral median and lateral brownish bands. Aculeus reddish brown at the base and blackish on distal portion.

Measurements : Total length 85.50 mm. Carapace 12.50 mm. long; Mesosoma 30.25 mm. long; Metasoma 42.75 mm. long.

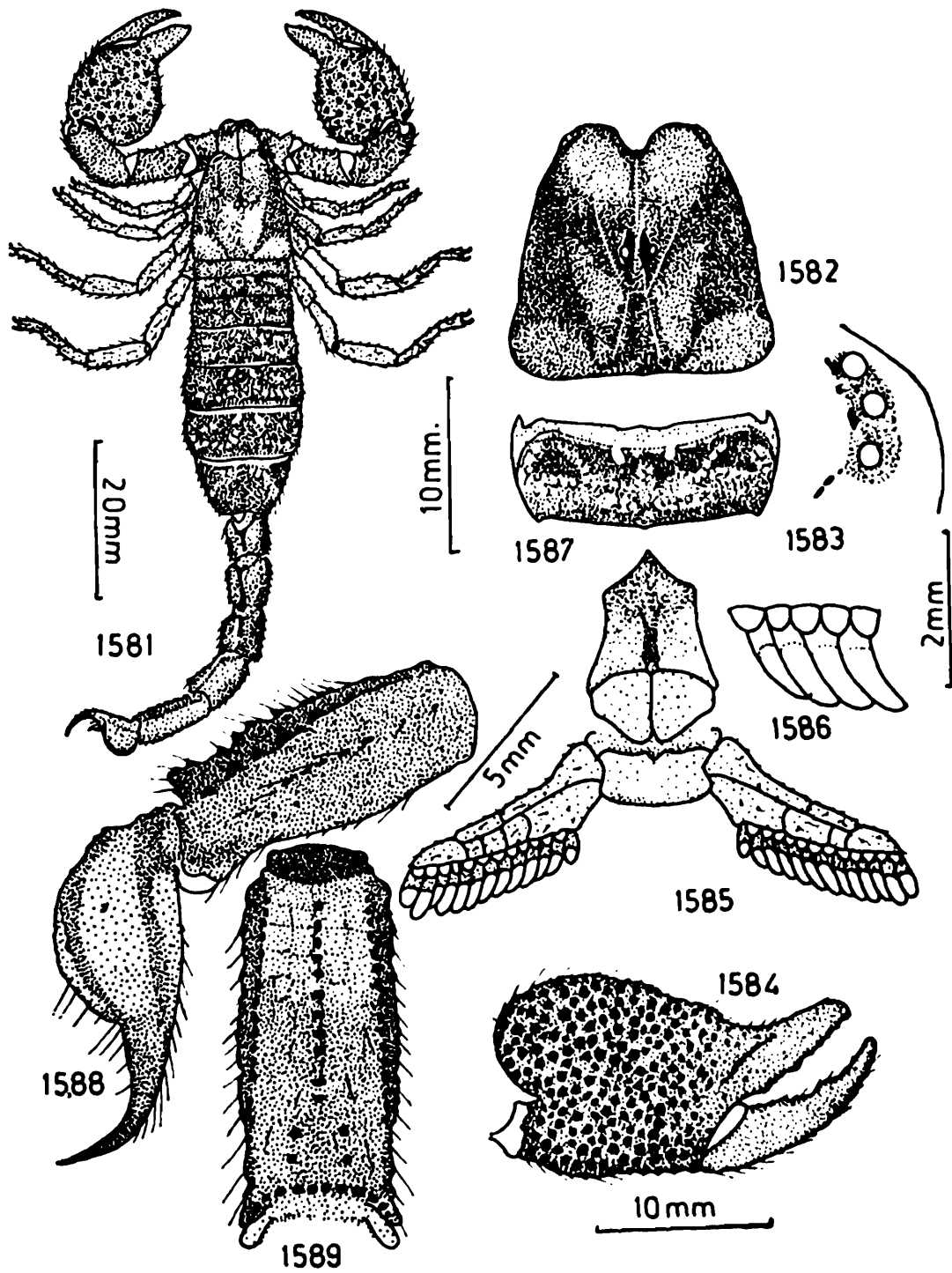
Carapace : Weakly and sparsely granular on lateral portion. Middle portion smooth. Ocular tubercles smooth. Median ocular tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.2 as in text-fig. 1582. Lateral ocular tubercles provided with three contiguous lateral eyes as in the text-fig. 1583. Posterior median, posterior lateral furrows deep and prominent. Anterior median furrows moderate. Anterior margin smooth and deeply notched in the middle portion. Lateral margins finely crenulated. Posterior margin smooth. Chelicera smooth on basal segment. Ventral surface fully covered with many short silky hairs, extending on ventral surface of fingers.

Fingers elongated, not much sharp on dentition and dentition as characterized in the family but dorsal distal tooth much shorter than ventral distal tooth on movable finger. Pedipalp strong with flat, enlarged manus as in text-fig. 1581. Femur shorter than carapace, carinated and dorsal inner, dorsal outer and ventral inner carinae sparsely and strongly granular. Inter-carinal space sparsely granular on dorsal portion, very weakly granular on ventral portion. Patella longer than femur but shorter than carapace, weakly carinated and granular. Outer or posterior surface provided with poorly granular carina. Inner or anterior surface elevated and provided with few tuberculate granules. Manus much flat, wider than long almost round on inner proximal portion, fully covered with much bigger, sparsely arranged granules on dorsal surface. Ventral surface weakly and irregularly granular, carinated and only exterior carina distinct and smooth. Inner margin strongly and closely serrated. Movable finger longer than carapace, carinated but carinae smooth. Immobile finger shorter than femur, carinated but carinae smooth. Dentition on finger triangular and five to six in number. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1590-1594. Legs smooth on all segments, carinated on femur and patella but inner carinae on femur strongly crenulated. Tarsomere I smooth, provided with few reddish spines on ventral portion. Tarsomere II also smooth, provided with a row of paired reddish spines and spine formula on legs I-IV : $\frac{3}{5} \frac{3}{5}$, $\frac{3}{5} \frac{3}{5}$, $\frac{4}{5} \frac{4}{5}$, $\frac{4}{6} \frac{4}{6}$. Pectines well developed and slightly more than two times longer than wide. Lamellae not subdivided. Fulcra distinct, triangular and appear like a short pectinal teeth. Pectinal teeth elongated, tapering distally as in text-fig. 1586 and 13/13 in number as in text-fig. 1585. Fulcra clothed with short, whitish setae. Lamellae sparsely covered with stout, long reddish setae. Basal piece smooth, weakly depressed on anterior portion. Genital operculum longer than wide, sclerites smooth, fully united in the middle portion.

FIGS. 1581-1589. *Heterometrus (Chersonesometrus) fulvipes* (Koch)

1581. Dorsal view of female.

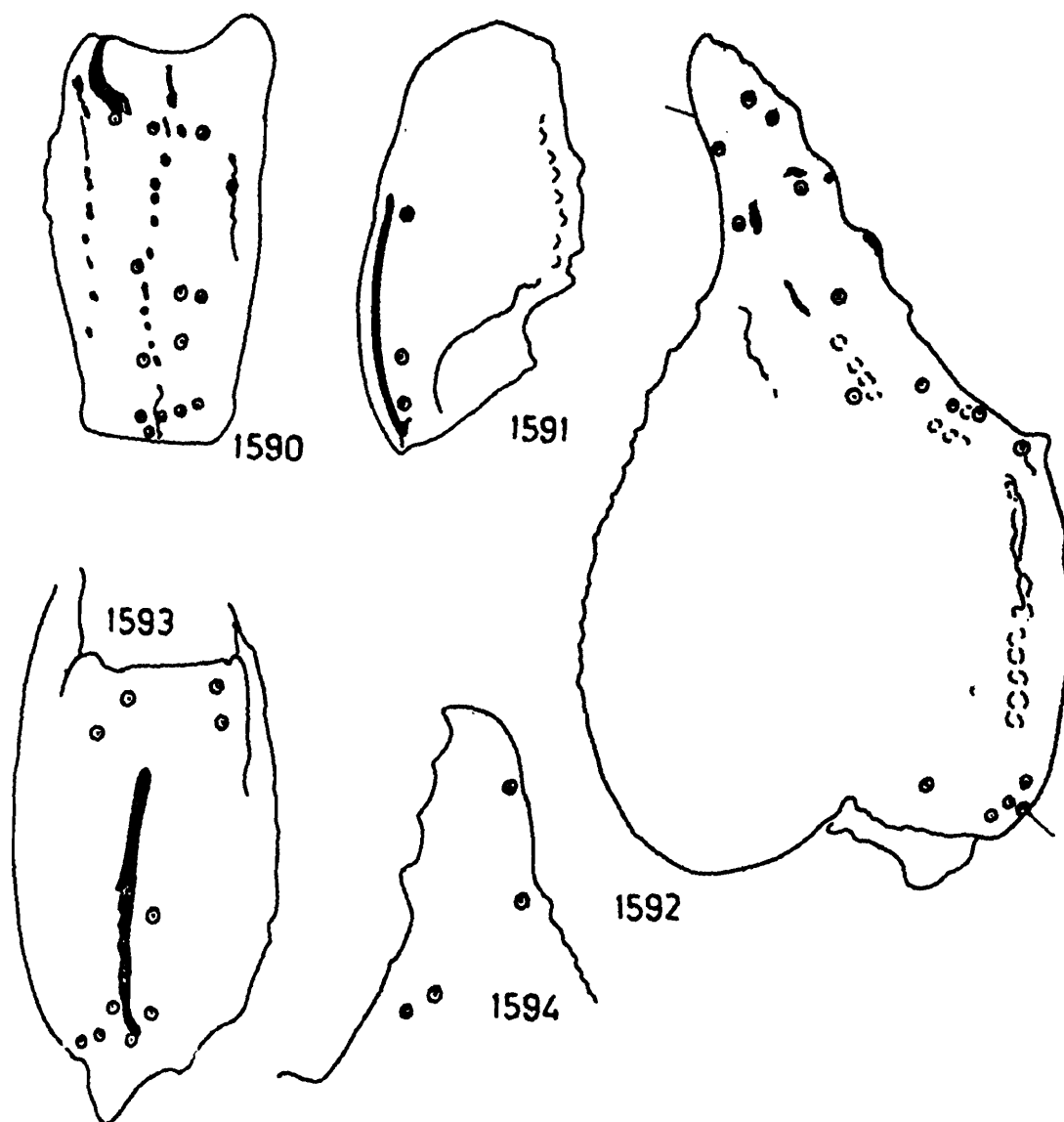
1582. Carapace, dorsal view,



- 1583. Lateral eyes, lateral view.
- 1584. Manus and fingers, exterior view.
- 1585. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1586. Pectinal teeth and fulcra, ventral view.
- 1587. Tergite, dorsal view.
- 1588. Metasomal segment V and telson, lateral view.
- 1589. Metasomal segment V, ventral view.

Cephalothoracic sternum pentagonal with deep posterior median notch as in text-fig. 1585.

Mesosoma : Tergites I-VI almost smooth except weakly and sparsely granular on lateral portions, without carinae as in text-fig. 1587. Pretergal portion smooth with smooth posterior margin. Tergite VII more granular but only on lateral portion,



FIGS. 1590-1594. *Heterometrus (Chersonesometrus) fulvipes* (Koch)

- 1590. Patella, exterior view.
- 1591. Patella, ventral view.
- 1592. Manus and immovable finger, dorsoexterior view.
- 1593. Manus, ventral view.
- 1594. Immovable finger, interior view.

provided with weakly granular lateral carinae. Pretergal portion also smooth. Lateral and posterior margins smooth. All sternites smooth, presternal portion, lateral and posterior margin smooth. Sternites I-IV, each provided with a pair of elongated stigmata for book lungs.

Metasoma : Cauda almost three and a half times as long as carapace. Basal segment one and half times as wide as long. Segment II shorter than wide. Segments II & III longer than wide. Segment V twice as long as wide and as deep as wide. All segments carinated. Segments I-III with all carinae except weakly crenulated but dorsal carinae smooth. Intercarinal space weakly granular on lateral portion while smooth on ventral portion. Segment IV carinated, all carinae crenulated and intercarinal space more granular than preceding segments. Anterior peduncle and posterior margins smooth. Lateral carinae totally absent. Segment V shorter than carapace but twice as long as segment I, thin not as wide or deep as segment IV, carinated, lateral carinae weakly granular. Inferior lateral and single inferior median carinae sparsely serrated. Inferior lateral carinae ending posteriorly into a strong triangular spine on anal rim. Anal rim closely but weakly serrated. Intercarinal space weakly granular as in text-fig. 1589. Telson longer than patella but shorter than carapace. Vesicle almost as long as segment IV, wider than segment V but less than as deep as segment V. Surface smooth on dorsal portion, weakly granular on ventral and lateral portions. Ventral median and ventral lateral carinae distinctly crenulated. Ventral median and lateral bands prominent. Entire surface clothed with many setae. Aculeus shorter than vesicular length but longer than segment I, not much curved, sharp, dark reddish brown on distal portion as in text-fig. 1588.

Distribution : INDIA : Ajmer in Rajasthan; Panch Mahal, Kathiawar, Gujarat; Talegaon, Malegaon, Niphad, Chandoor, Sinnar, Kalwar, Chanda, Bombay, Chalisgaon, Maharashtra.

Remarks : We have illustrated, described on the basis of authenticated identified specimen 1 ♀ received from B.M. (N.H.) London. Regd. No. 1906.13.1.2.

91. *Heterometrus* (*Chersonesometrus*) *liurus* (Pocock)

(Figs. 1595-1608)

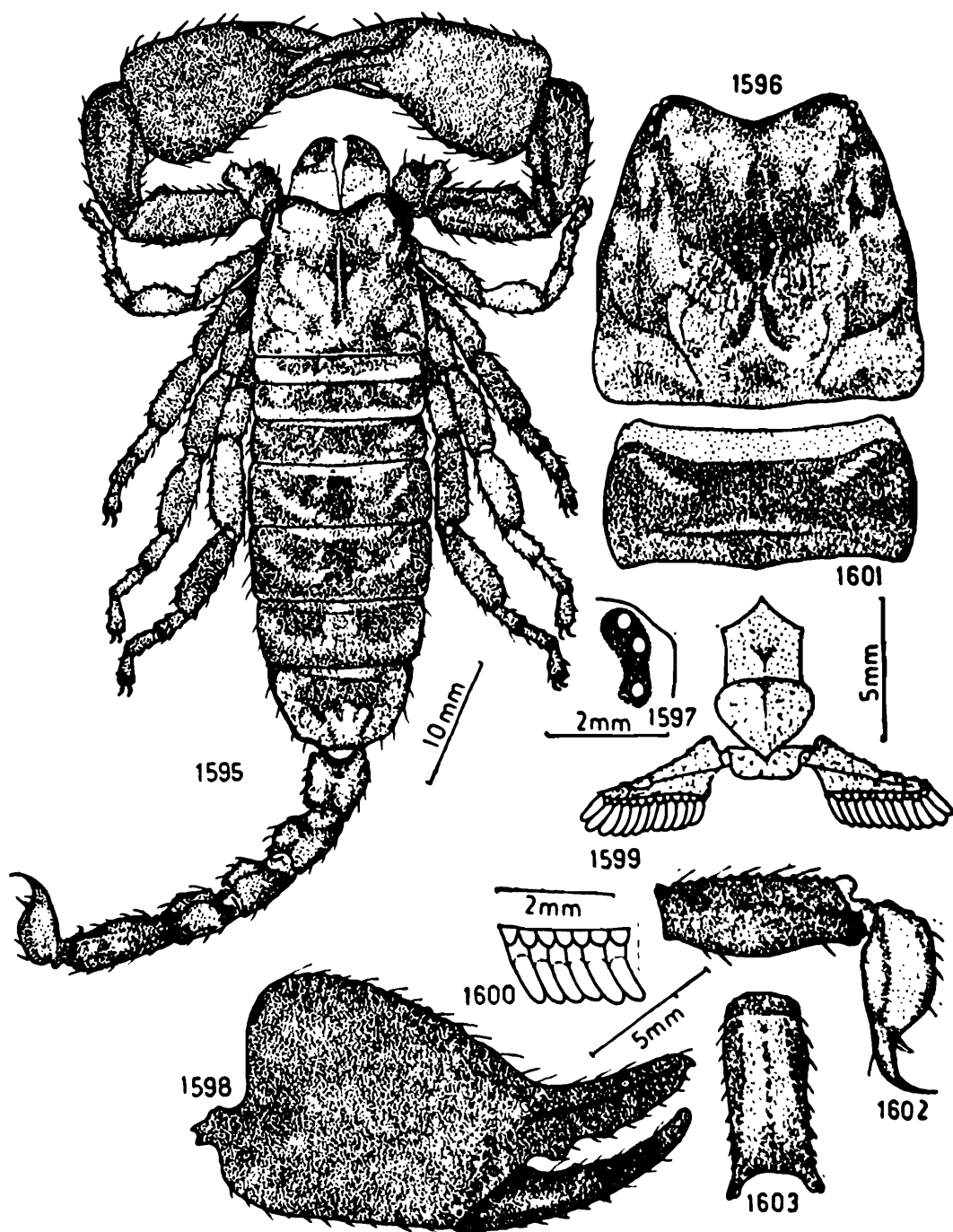
1897. *Palamnaeus liurus* Pocock, *J. Bombay nat. Hist. Soc.*, 11: 114.
 1899. *Heterometrus liurus* : Kraepelin, *Tierr. Scorp. etc.*, : 115.
 1900. *Palamnaeus liurus* : Pocock, *Fauna Brit. India, Arachn.*, : 91.
 1981. *Heterometrus* (*Chersonesometrus*) *liurus* : Couzijn, *Zool. Verln.*, 184 : 153.

General : Female of median size. Carapace granular on lateral portion but granules obsolete. Tergites and sternites smooth. Metasoma carinated but carinae smooth on proximal segments. Chelicera smooth. Pedipalp stout, carinated and large, lobate on manus as in text-fig. 1595. Legs almost smooth. Pectines moderately developed.

Body brownish with reddish tint on pedipalps and carapace. Chelicera yellowish on basal segment and reddish on fingers. Legs light yellowish brown. Tergites brownish with yellowish tint. Sternites almost yellow. Metasoma reddish brown but vesicle yellowish.

Measurements : Total length 66.00 mm. Carapace 10.00 mm. long; Mesosoma 27.25 mm. long; Metasoma 28.75 mm. long.

Carapace : Granular on lateral portions but granules obsolete, median portion smooth. Interocular portion weakly granular on anterior portion. Posterior median and posterior lateral furrows distinct. Ocular tubercles poorly distinct and lateral tubercles provided with three contiguous lateral eyes as in text-fig. 1597. Median tubercles weakly distinct, smooth and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1596. Anterior margin invaginated with poor median notch in the middle. Lateral and posterior margins smooth. Chelicera smooth on basal segment. Ventral surface weakly clothed with short, silky hairs, extending on ventral portion of fingers. Fingers thin, elongated, moderately sharp on

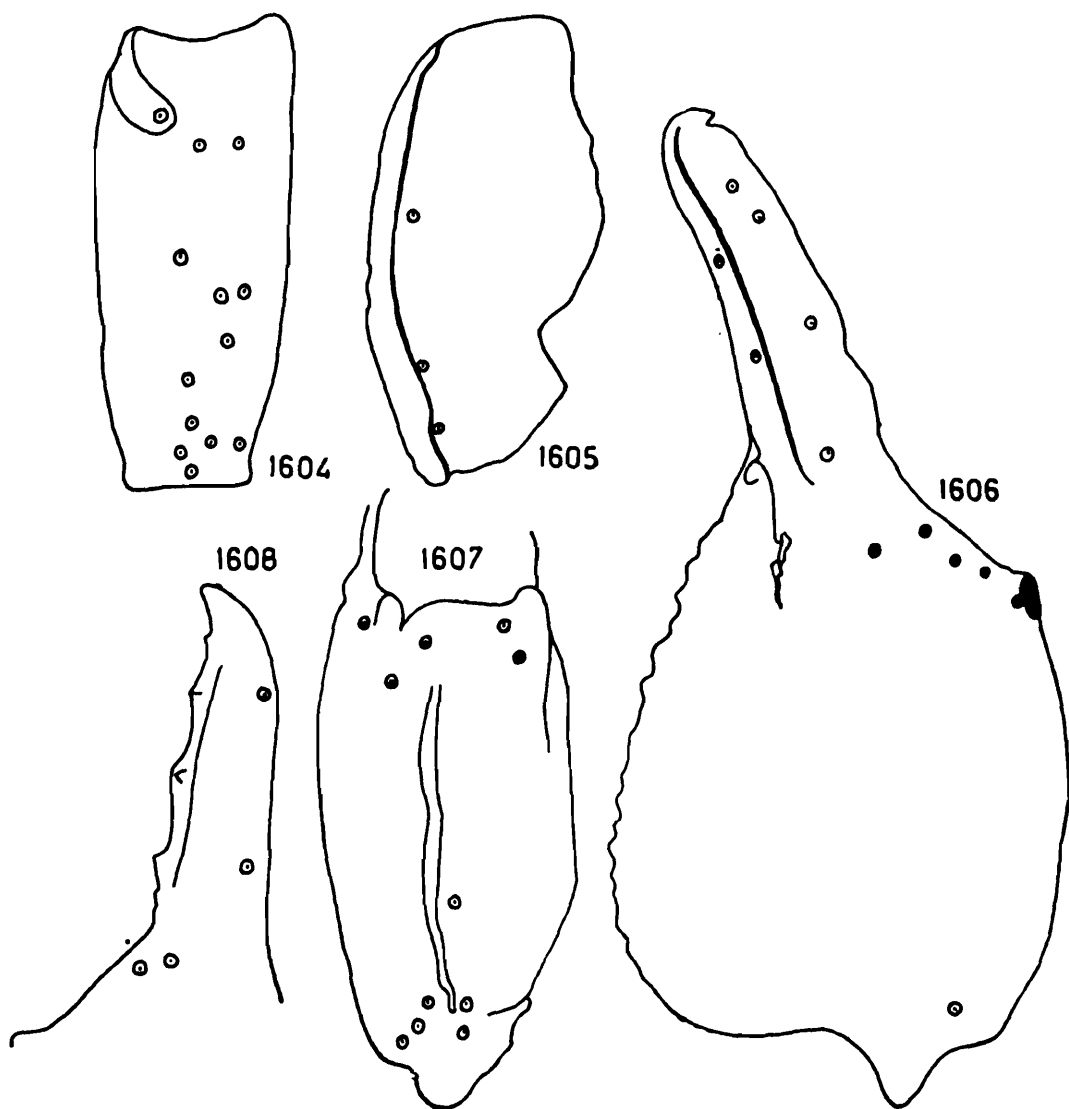


FIGS. 1595-1603. *Heterometrus (Chersonesometrus) liurus* (Pocock)

1595. Dorsal view of female.
 1596. Carapace, dorsal view.
 1597. Lateral eyes, lateral view.
 1598. Manus and fingers, exterior view.
 1599. Pectines, genital operculum and cephalothoracic sternum, ventral view.
 1600. Pectinal teeth and fulcra, ventral view.
 1601. Tergite, dorsal view.
 1602. Metasomal segment V and telson, lateral view.
 1603. Metasomal segment V, ventral view.

dentition. Dentition characterized as in the family. Pedipalp short, stout with flat lobate manus as in text-fig. 1595. Femur shorter than carapace, carinated, dorsal outer and ventral outer carinae, granular and granules weakly crenulated but dorsal inner and ventral inner carinae granular and granules almost obsolete. Anterior or outer surface provided with a strongly crenulated carina. Posterior or inner margin provided with a weakly and sparsely granular carina. Intercarinal space sparsely and coarsely granular on dorsal surface. Patella as long as femur, weakly carinated and only dorsal inner carina distinct, smooth and obsolete. Intercarinal space almost smooth but anterior or inner surface weakly granular, elevated, covered with few tuberculate granules. Manus as long as patella or femur, slightly less than as wide as long, dorsal surface fully covered with obsolete ridges except inner granular margin, few granules denticulate as in text-fig. 1598. Only exterior carina distinct, almost smooth. Exterior surface smooth. Ventral surface weakly granular. Movable finger longer than carapace, smooth, carinated but obsolete. Immobile finger shorter than carapace, carinated but only a dorsal carina, distinct, smooth and obsolete. Dentition on fingers not clear but five triangular, broad teeth distinct as in text-fig. 1598. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1604-1608. Legs smooth but carinated on femur and only inner carinae crenulated. Patella and tibia smooth. Tarsomere I smooth and distal portion furnished with few reddish spines. Tarsomere II smooth, furnished below with a row of paired reddish spines and spine formula on legs I-IV : $\frac{3}{5} \frac{3}{5}$, $\frac{3}{5} \frac{3}{5}$, $\frac{4}{5} \frac{4}{5}$, $\frac{4}{6} \frac{4}{5}$, lateral distal margins overlapping the base of claw lobes. A pair of claws normal. Pectines well developed and slightly more than two times longer than wide. Middle lamella subdivided into two to three digits. Fulcra distinct, triangular and finger like. Lamellae and fulcra clothed with microscopic setae. Pectinal teeth short, more tapering distally as in text-fig. 1600 and 12/12 in number as in text-fig. 1599. Basal piece smooth, provided with a moderate notch on anterior margin. Genital operculum longer than wide, two sclerites united in the middle and narrowed on posterior portion. Cephalothoracic sternum pentagonal, smooth and provided with short, median longitudinal depression as in text-fig. 1599.

Mesosoma : Tergites I-VI entirely smooth, without carinae. Lateral, posterior and pretergal portion also smooth as in text-fig. 1601. Tergite VII smooth, carinated but only outer lateral carinae distinct on posterior portion, smooth and obsolete. Lateral, posterior margins and pretergal portion smooth. Ster-



FIGS. 1604-1608. *Heterometrus (Chersonesometrus) liurus* (Pocock)

1604. Patella, exterior view.

1605. Patella, ventral view.

1606. Manus and immovable finger, dorso-exterior view.

1607. Manus, ventral view.

1608. Immobile finger, interior view.

nites I-IV entirely smooth, each provided with a elongated slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion not distinct. Sternite V smooth and two pairs of carinae weakly distinct on posterior portion and obsolete, lateral and posterior margins smooth. Presternal portion not distinct.

Metasoma : Cauda less than three times as long as carapace. Segments I-III wider than long. Segment IV slightly longer than wide. Segment V twice as long as wide or as deep as segment I, but shorter than carapace and slightly more than half the length of carapace. Segments II & III equally long and segments IV & V equally deep. Segments I-IV carinated and dorsal, dorsolateral, inferior lateral and inferior carinae smooth and obsolete. Intercarinal space, anterior peduncle and posterior margins smooth. Segment V carinated, dorsal carinae smooth and obsolete. Inferior lateral and inferior carinae sparsely serrated but serration weak and delicate. Intercarinal space and anterior peduncle smooth. Anal rim of this segment evenly serrated on ventral portion as in text-figs. 1602 & 1603. Inferior lateral carinae ending posteriorly into a strong, triangular, broad tubercles as in text-fig. 1603. Telson longer than segment V but shorter than carapace, vesicle longer than segment IV but shorter than segment V and more than as wide but almost as deep as segment V. Entire surface smooth except very weakly distinct ventral median crest. Ventral and lateral bands distinct. Aculeus as long as segment II but more than half the vesicular length, not much curved, sharp and dark on distal portion as in text-fig. 1602.

Distribution : INDIA : Gwalior (*Type-locality*) and Bhopal, Madhya Pradesh.

Remarks : We have studied, described and illustrated on the basis of type-specimens (2 ♀♀) received from B.M. (N.H.), London. Regd. No. 1896.12.15.20 & 25.

92. *Heterometrus* (*Chersonesometrus*) *xanthopus* (Pocock)

(Figs. 1609-1624)

1897. *Palamnaeus xanthopus* Pocock, *Ann. Mag. nat. Hist.*, 11 : 116.
 1899. *Heterometrus xanthopus* : Kraepelin, *Tierr. Scorp. etc.*, : 115.
 1900. *Palamnaeus xanthopus* : Pocock, *Fauna Brit. India, Arachn.*, : 92.
 1981. *Heterometrus* (*Chesonesometrus*) *xanthopus* : Couzijn, *Zool. Verln.*, 184 : 136.

General : Male smaller than female but both of medium size. Pedipalp short, stout, enlarged on manus, fingers short as in text-fig. 1609. Legs almost smooth, carinated on femur. Pectines well developed. Mesosoma almost smooth but carinated on last tergite and sternite. Metasoma carinated but smooth. Telson with granular and carinated vesicle, aculeus stout, not much curved.

Body brownish with blackish tint. Tergite I-VI provided with >>-<< yellowish marks on lateral portion. Sternites yellowish. Chelicera yellowish but brown on fingers. Pedipalp yellowish brown and dark brown on fingers. Legs dark yellowish with brownish tint. Metasoma light brown but darker on carinae. Telson yellowish but aculeus brownish on distal portion.

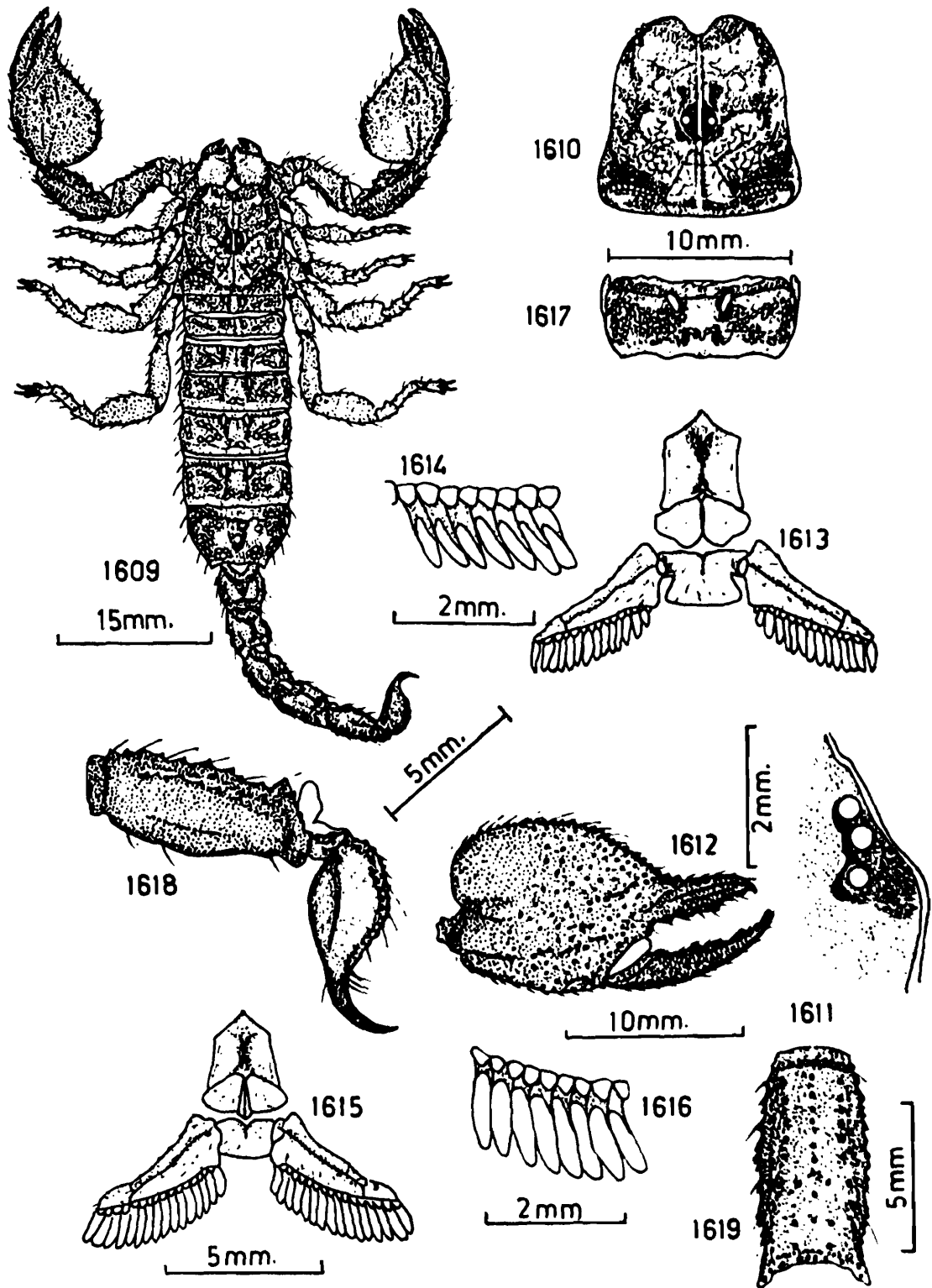
Measurements : Male total length 53.25 mm. Carapace 8.25 mm. long; Mesosoma 21.00 mm. long; Metasoma 24.00 mm. long. Female total length 64.00 mm. Carapace 9.75 mm. long; Mesosoma 24.75 mm. long; Metasoma 29.50 mm. long.

Carapace : Almost entire portion granular except median lateral portion and ocular tubercles but more granular in male. Posterior median, posterior lateral and anterior median furrows distinct but shallow. Ocular tubercles smooth, lateral tubercles provided with three lateral eyes as in text-fig. 1611. Median ocular tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1610. Anterior margin smooth with deep median notch. Lateral margins weakly and finely crenulated. Posterior margin smooth. Chelicera smooth on

basal segment, thickly clothed with short silky hairs on ventral side. Fingers thin, elongated, not much sharp on dentition. Dentition as characterized in the family. Pedipalp stout, short, much enlarged and flat on manus as in text-fig. 1609. Femur much shorter than carapace, carinated; anterior dorsal, posterior dorsal and anterior ventral carinae granular and all granules dentiform, sparsely arranged. Intercarinal space sparsely and coarsely granular on dorsal surface. Anterior or outer surface provided with a crenulated carina. Patella slightly longer than femur but shorter than carapace, weakly carinated and carinae smooth and obsolete. Intercarinal space almost smooth except finely granular on inner or anterior strongly elevated portion. Manus enlarged, wider than long, flat but as long as patella, carinated and only exterior and exterior inner carinae strongly developed but obsolete. Intercarinal space closely granular on dorsal surface but granules mixed to form short mosaic ridges on proximal portion, granules on distal and inner portion distinct and few granules dentiform. Ventral and exterior portions weakly granular. Movable finger longer than carapace but immovable finger shorter than femur, carinated and dorsal carina on immovable finger weakly granular. Dentition on fingers not much clear but five to six triangular teeth prominent as in text-fig. 1612. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1620-1624. Legs weakly granular on femur and crenulated on inner margin. Patella smooth, without carinae. Tibia completely smooth. Tarsomere I smooth, provided with few reddish spines on distal portion. Tarsomere II smooth, ventral surface furnished with a paired row of spines and spine formula on legs I-IV in male : $\frac{4}{5} \frac{4}{5}, \frac{4}{5} \frac{4}{5}, \frac{4}{6} \frac{4}{6}, \& \frac{4}{6} \frac{4}{6}$ and in female : $\equiv \equiv, \frac{4}{5} \frac{4}{5}, \frac{4}{6} \frac{4}{6}, \& \frac{4}{6} \frac{4}{6}$. Lateral margins over-

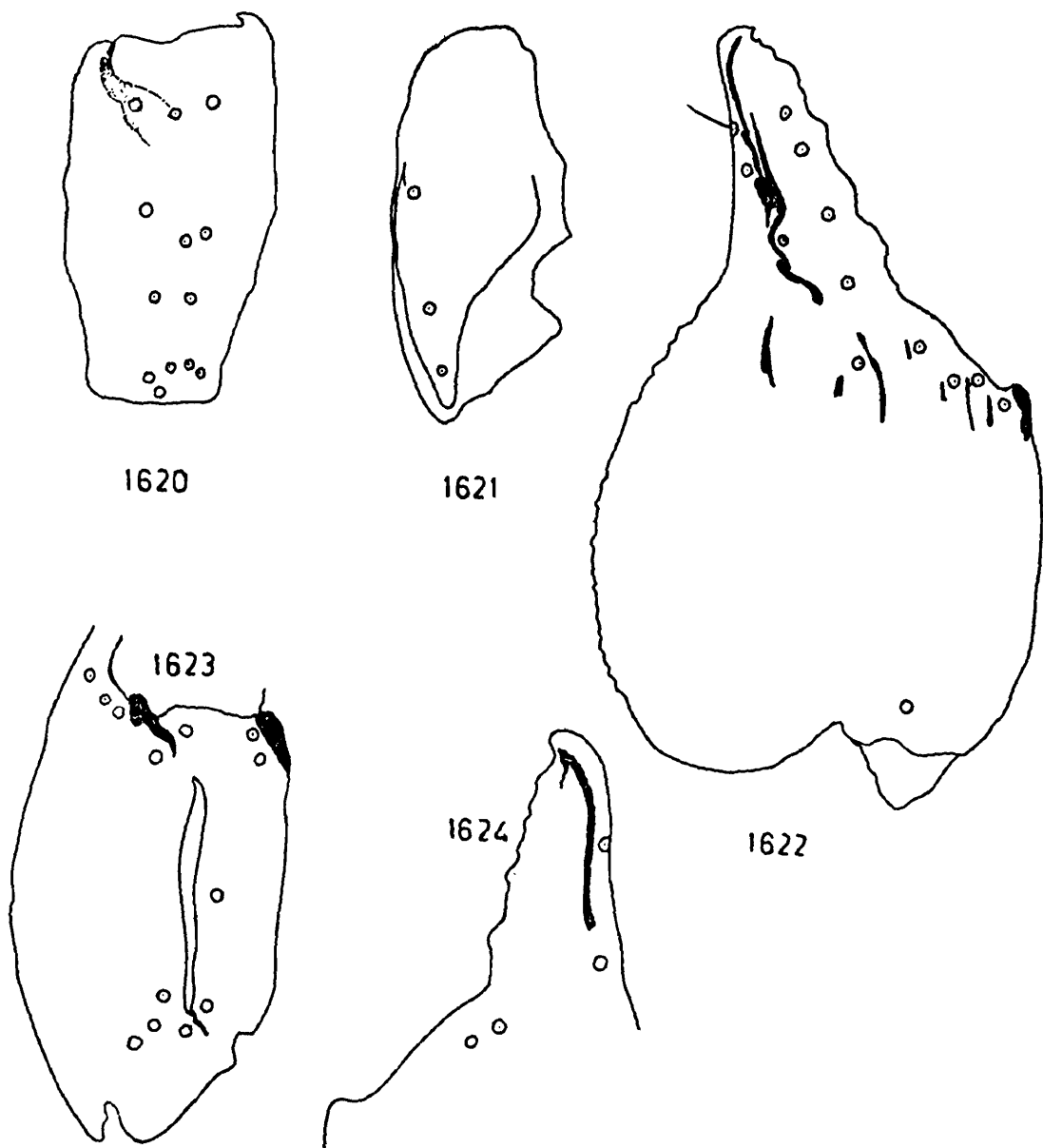
FIGS. 1609-1619. *Heterometrus (Chersonesometrus) xanthopus* (Pocock)

- 1609. Dorsal view of male.
- 1610. Carapace, dorsal view.
- 1611. Lateral eyes, lateral view.
- 1612. Manus and fingers, exterior view.
- 1613. Pectines, genital operculum and cephalothoracic sternum of female, ventral view.
- 1614. Pectinal teeth and fulcra, ventral view.



- 1615. Pectines, genital operculum and cephalothoracic sternum of male, ventral view.
- 1616. Pectinal teeth and fulcra, ventral view.
- 1617. Tergite, dorsal view.
- 1618. Metasomal segment V and telson, lateral view.
- 1619. Metasomal segment V, ventral view.

lapping the base of claws lobes. A pair of claws normal. Pectines well developed and slightly more than two times longer than wide in male and two and a half times longer than wide in female. Middle lamellae subdivided into two to three digits. Fulcra triangular and distinct. Fulcra and lamellae clothed with microscopic setae. Teeth more elongated in male as in text-fig. 1616



FIGS. 1620-1624. *Heterometrus (Chersonesometrus) xanthopus* (Pocock)

- 1620. Patella, exterior view.
- 1621. Patella, ventral view.
- 1622. Manus and immovable finger, dorsoexterior view.
- 1623. Manus, ventral view.
- 1624. Immovable finger, interior view.

and 16/16 in number as in text-fig. 1615 but short more tapering as in text-fig. 1614 and 14/14 in female as in text-fig. 1613. Basal piece sclerotized with weak anterior median suture. Genital operculum wider than long and a pair of sclerites fused in female and slightly separated in male, from which a pair of male genital papillae visible. Cephalothoracic sternum smooth, pentagonal and provided with a deep, median longitudinal suture as in text-figs. 1613 & 1615.

Mesosoma : Tergites I-VI weakly granular on lateral portion, without carinae as in text-fig. 1617. Lateral posterior margins and pretergal portions also smooth. Tergite VII more granular on lateral portion, lateral carinae weakly distinct on posterior portion only. Lateral margins and posterior margins smooth. Pretergal portion also smooth. Sternites I-IV smooth, each provided with a pair of slit like stigmata for book lungs. Lateral, posterior margins and presternal portions smooth. Sternite V smooth, provided with two pairs of smooth, obsolete carinae. Lateral, posterior margins and presternal portion smooth.

Metasoma : Cauda about three times as long as carapace. Segments I & II wider than long. Segment III nearly as long as wide. Segments IV & V longer than wide. All segments carinated and dorsal and dorsolateral carinae weakly granular and crenulated on segments I-IV. Lateral carinae weakly distinct only on segment I. Inferior lateral and inferior carinae smooth on segments I-III but weakly crenulated on segment IV. Intercarinal space weakly and irregularly granular. Anterior peduncle and posterior margin smooth. Segment V shorter than femur of pedipalp, carinated, lateral carinae sparsely granular only on anterior portion and weakly granular. Inferior lateral and single inferior median carina strongly serrated but much sparsely arranged in male. Intercarinal space smooth except few granules on dorsal and ventral surface. Anterior peduncle smooth. Anal rim of this segment evenly crenulated but strongly denticulate on lateral portion as in text-fig. 1619. Telson longer than segment V but shorter than carapace. Vesicle as long as segment IV, but less than as wide and deep as segment V. Dorsal surface smooth but carinated on lateral and ventral surface, carinae

sparsely granular. Intercarinal space smooth. Ventral and lateral bands not much prominent. Aculeus slightly shorter than vesicular length, stout, not much curved, sharp and dark reddish brown on distal portion as in text-fig. 1618.

Distribution : INDIA : Khatau (*Type-locality*), Dist. Satara, Maharashtra.

Remarks : We have studied, described and illustrated on the basis of type-specimens 1♂ & 1♀ received from B.M.(N.H.), London. Regd. No. 1896.9.26.88 & 91.

**93. *Heterometrus* (*Chersonesometrus*) *barberi* (Pocock)
(Figs. 1625-1638)**

1900. *Palamnaeus barberi* Pocock, *Fauna Brit. India, Arachn.*, : 95.

1981. *Heterometrus* (*Chersonesometrus*) *phipsoni phipsoni* : Couzijn, *Zool. Verln.*, **184** : 149.

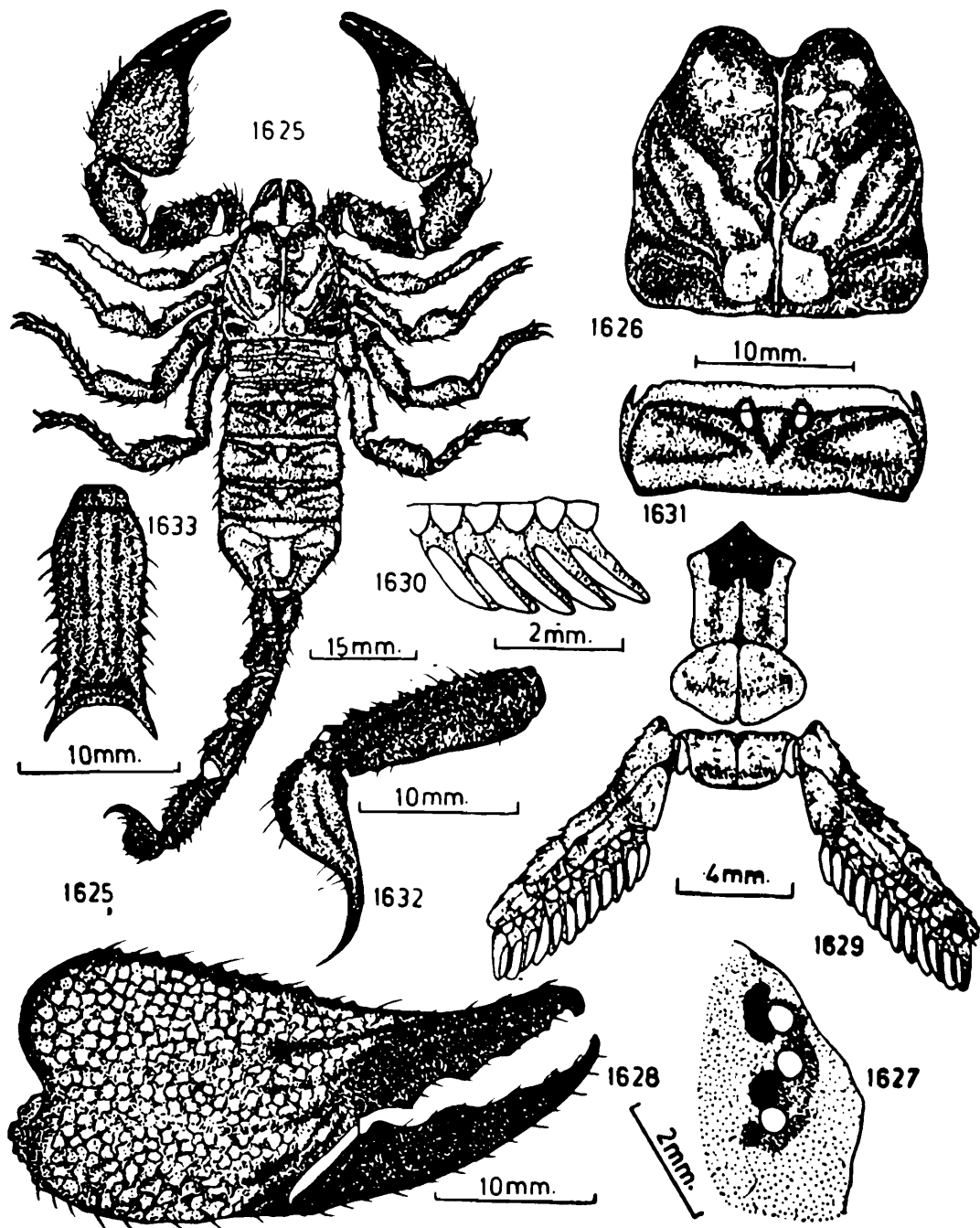
General : Female of large size. Carapace weakly granular on lateral portion. Chelicera smooth, sharp on dentition. Pedipalp stout, carinated, strong, enlarged on manus as in text-fig. 1625. Legs granular on femur and patella. Pectines well developed. Mesosomal tergites entirely smooth except tergite VII. Sternites smooth. Metasoma strong, carinated. Telson with globular vesicle.

Body dark blackish brown with reddish tint. Chelicera yellowish brown on basal segment but dark on anterior portion. Fingers blackish but reddish on dentition. Pedipalp blackish on femur, patella and finger but yellowish brown on manus. Legs entirely blackish. Pectines yellowish. Tergites black but reddish on posterior margin. Metasoma blackish brown but more darker

FIGS. 1625-1633. *Heterometrus* (*Chersonesometrus*) *barberi*
(Pocock)

1625. Dorsal view of female.

1626. Carapace, dorsal view.

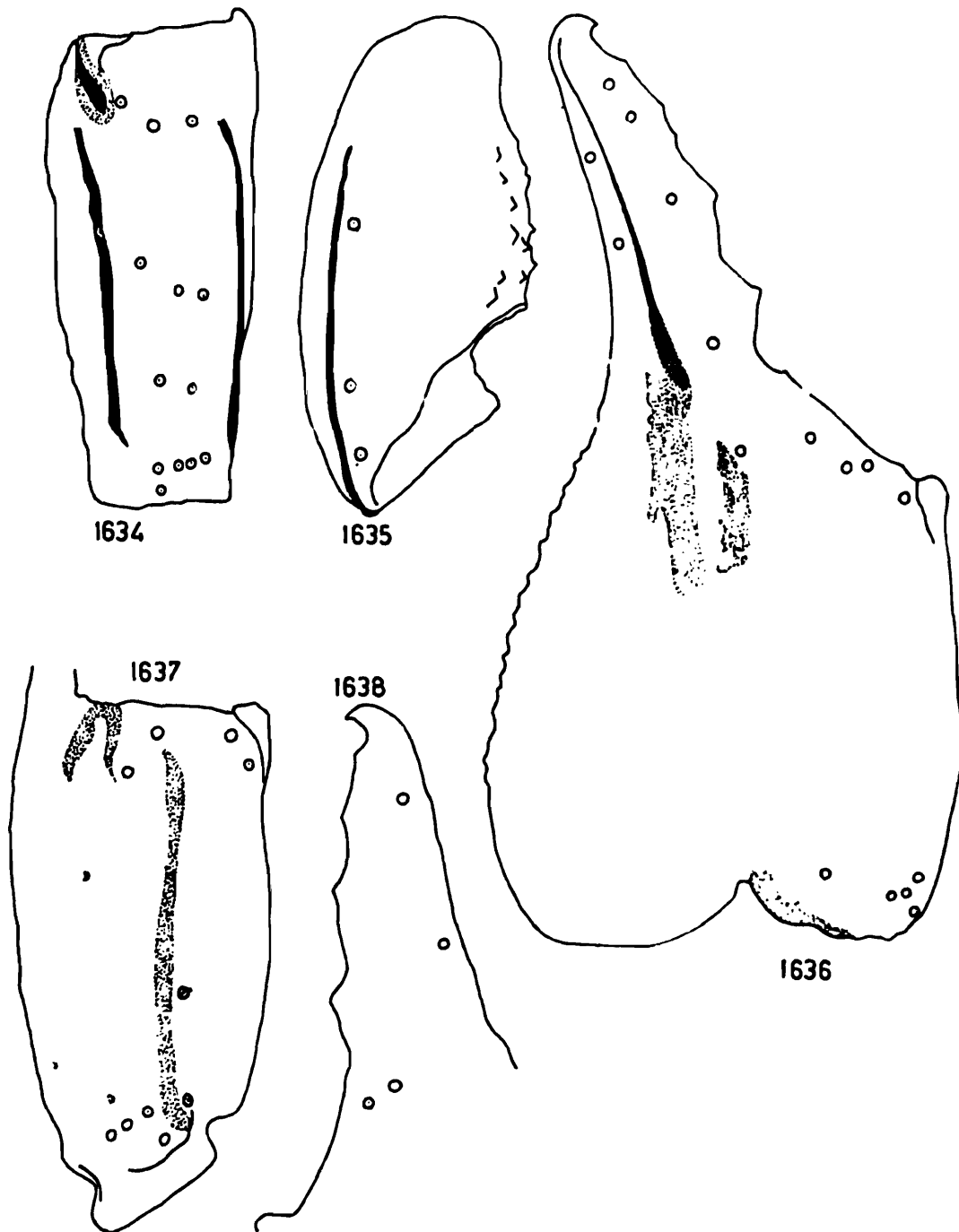


- 1627. Lateral eyes, lateral view.
- 1628. Manus and fingers, exterior view.
- 1629. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1630. Pectinal teeth and fulcra, ventral view.
- 1631. Tergite, dorsal view.
- 1632. Metasomal segment V and telson, lateral view.
- 1633. Metasomal segment V, ventral view.

on carinae. Telson with brownish vesicle but darker on distal portion of aculeus.

Measurements: Total length 110.25 mm. Carapace 16.50 mm. long; Mesosoma 42.75 mm. long; Metasoma 51.00 mm. long.

Carapace: Weakly granular on lateral portion. Interocular portion granular on anterior and lateral portions. Median portion smooth. Lateral carinae granular, provided with three contiguous lateral eyes as in text-fig. 1627. Median ocular tubercles smooth, distinct by median suture and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.2 as in text-fig. 1626. Median and posterior lateral furrows distinct. Anterior margin almost smooth and deeply notched in the middle. Lateral margins weakly crenulated. Posterior margin smooth. Chelicera smooth on basal segment. Ventral portion clothed with fine, short, silky hairs extending on fingers. Finger elongated, sharp on dentition. Dentition as characterized in the family. Pedipalp strong, carinated with enlarged lobate manus as in text-fig. 1625. Femur shorter than carapace, carinated and all carinae coarsely granular but weakly crenulated. Anterior or outer surface provided with few tuberculate granules. Intercarinal space irregularly but coarsely granular. Patella longer than femur but shorter than carapace, weakly carinated and carinae obsolete. Anterior or inner surface elevated on proximal portion and covered with few tuberculate granules. Posterior or outer portion weakly granular. Intercarinal space smooth except outer portion. Manus as long as femur and wider than long as in text-fig. 1628, weakly carinated but exterior marginal and inner marginal carinae strong and smooth. Dorsal surface with three weak carinae distinct only on distal portion. Inner margin granular and few granules weakly dentiform. Dorsal surface sparsely granular and almost all granules obsolete forming short ridges. Ventral surface irregularly granular. Movable finger with smooth carinae, distinct only on distal portion. Inner margin granular carinated but carinae smooth and obsolete. Dentition on fingers broad, triangular and five to six in number as in text-fig. 1628. Trichobothrial pattern on patella, manus and immovable finger



FIGS. 1634–1638. *Heterometrus (Chersonesometrus) barberi* (Pocock)

1634. Patella, exterior view.
 1635. Patella, ventral view.
 1636. Manus and immovable finger, dorsoexterior view.
 1637. Manus, ventral view.
 1638. Immobile finger, interior view.

as in text-figs. 1634-1638. Legs carinated on femur and patella but only outer carinae weakly granular. Intercarinal space granular but more granular on femur. Tibia carinated but smooth. Tarsomere I smooth, furnished with few spines on distal portion. Tarsomere II smooth, armed with a row of paired spines on ventral surface and spine formula on legs I-IV : $\frac{4}{6} \equiv, \frac{4}{6} \frac{4}{6}, \frac{4}{6} \frac{4}{6} \& \frac{4}{6} \frac{4}{6}$. Distal lateral margins overlapping the base of the claw lobes. A pair of claws normal. Pectines well developed and slightly less than two and a half times longer than wide. Middle lamellae not clearly divided into two to three subdigits. Fulcra well developed, broad and triangular. Fulcra and lamellae clothed with microscopic as well as megascopic hairs. Pectinal teeth long, tapering distally, pointed as in text-fig. 1630 and 12/12 in number as in text-fig. 1929. Basal piece sclerotized deeply notched on anterior portion. Genital operculum wider than long, sclerites united but separated by superficial suture. Cephalothoracic sternum pentagonal, smooth, deeply notched in the middle portion as in text-fig. 1629.

Mesosoma : Tergites I-VI entirely smooth as in text-fig. 1631. Lateral and posterior margins smooth. Pretergal portion smooth and also smooth on posterior margin. Tergite VII sparsely and weakly granular and lateral carinae weakly distinct. Lateral margins weakly granular. Posterior margin smooth. Pretergal portion smooth and also smooth on posterior margin. Sternites I-IV entirely smooth, each provided with a pair of elongated slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion smooth and not much distinct. Sternite V smooth, lateral and posterior margins smooth. Presternal portion distinct and smooth, also smooth on posterior margin.

Metasoma : Cauda slightly more than three times as long as carapace. Basal segment wider than long and also more than as deep as long. Segment II also wider than long but less than as deep as long. Segments III & IV longer than wide. Segment V more than twice as long as wide. All segments carinated. Segments I-IV with dorsal, dorsolateral, inferior lateral and inferior carinae distinctly developed but only dorsal and dorsolateral carinae coarsely granular but weakly crenulated and inferior

lateral and inferior carinae smooth and obsolete on segments I & II but weakly crenulated on segments III & IV. Lateral carinae distinct only on posterior portion of segment V. Intercarinal portion irregularly granular. Anterior peduncle and posterior margin smooth. Segment V shorter than carapace, carinated but only inferior lateral and single inferior median carinae strongly developed and serrated as in text-fig. 1633. Intercarinal space irregularly granular. Anterior peduncle smooth. Anal rim of this segment strongly serrated as in text-fig. 1633. Telson longer than segment V and vesicle longer than segment IV; globular, carinated and ventral median crest also crenulated as in text-fig. 1632. Entire surface smooth. Aculeus strong, stout, not much curved, shorter than vesicular length but as long as segment I. dark brown to black on distal portion. Vesicle and the base of aculeus clothed with many long bristles as in text-fig. 1632.

Distribution : INDIA : Tinnevely, Tamil Nadu.

Remarks : We have studied, described and illustrated on the basis of type specimen (1♀) received from B.M.(N.H.), London. Regd. No. 1899.9.24.1.

94. *Heterometrus* (*Chersonesometrus*) *scaber* (Thorell)

(Figs. 1639-1652)

1877. *Pandinus scaber* Thorell, *Atti. Soc. Ital.*, 19 : 202.
 1893. *Palamnaeus scaber* : Pocock, *J. Bombay nat. Hist. Soc.*, 7: 310.
 1894. *Scorpio scaber* : Kraepelin, *Jb. hamb. wiss. Anst.*, 11 : 58.
 1899. *Heterometrus scaber* : Kraepelin, *Tierr. Scorp. etc.*, : 116:
 1900. *Palamnaeus scaber* : Pocock, *Fauna Brit. India, Arachn.*, : 93.
 1981. *Heterometrus* (*Chersonesometrus*) *scaber scaber* : Couzijn, *Zool. Verln.*, 184 : 144.

General : Female of large body. Carapace coarsely granular on lateral portion. Mesosomal tergites irregularly but coarsely granular but granules obsolete. Chelicera comparatively small and smooth. Pedipalp stout, strong and much lobate on manus

as in text-fig. 1639. Legs smooth. Pectines moderately developed. Metasoma stout, slightly short, carinated on all segments. Telson with long aculeus.

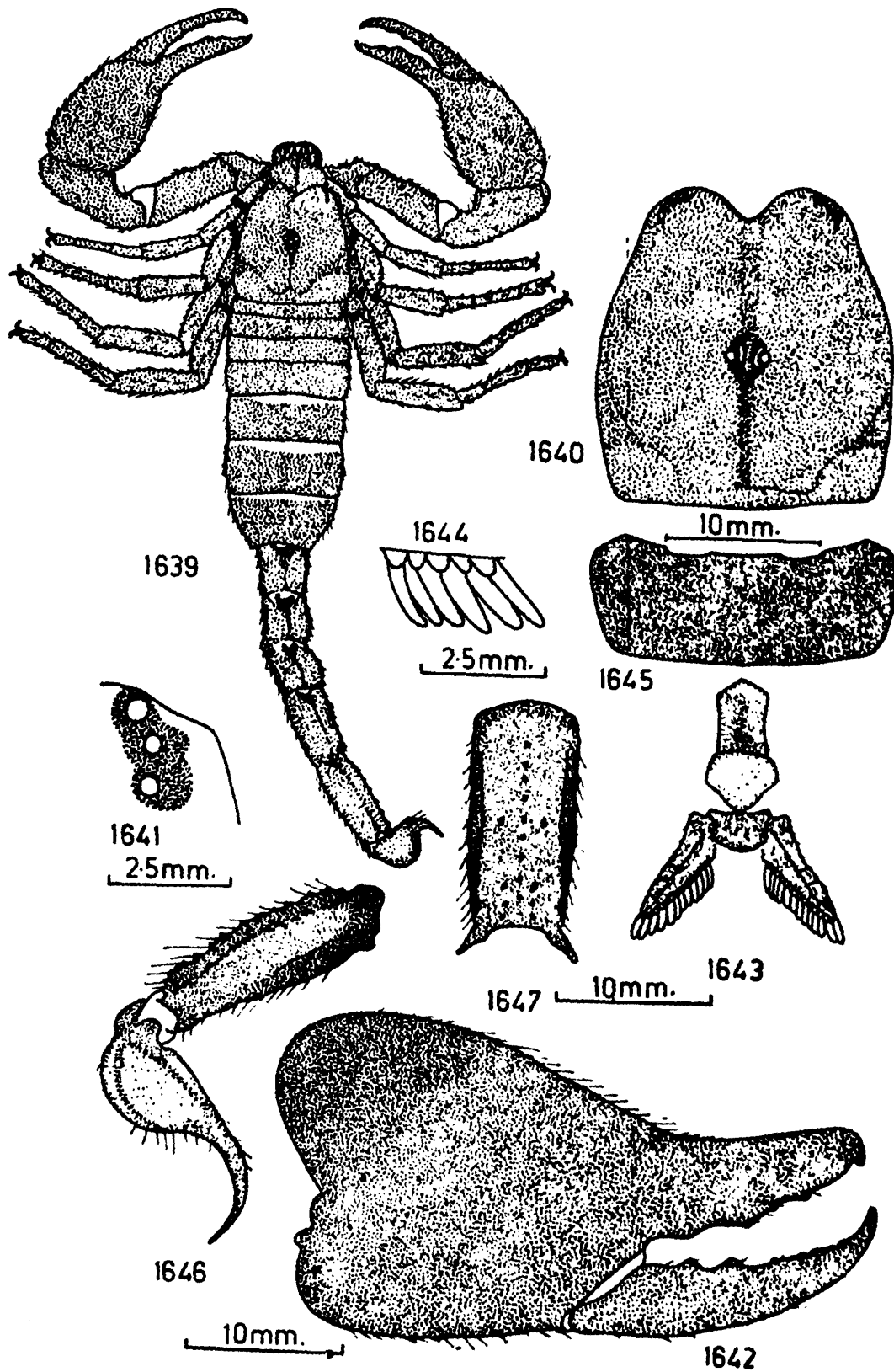
Body entirely reddish brown. Chelicera light brown on basal segment but blackish brown on fingers. Pedipalp dark reddish brown but more darker on carinae. Legs brownish with reddish tint but light brown on distal digits. Pectines light brown to yellow. Tergites reddish brown but sternites light brown with yellowish tint. Metasoma reddish brown and darker on carinae. Telson with light brown vesicle and darker on distal portion of aculeus.

Measurements : Total length 114.50 mm. Carapace 17.00 mm. long; Mesosoma 41.25 mm. long; Metasoma 56.25 mm. long.

Carapace : Almost entirely coarsely granular except median portion, but granules almost obsolete. Posterior median furrow distinct only on posterior portion. Posterior lateral furrows also distinct. Anterior margin smooth, deeply notched in the middle portion. Lateral margins finely crenulated but more crenulated on anterior portion. Posterior margin smooth. Ocular tubercles smooth and lateral tubercles much elevated, furnished with three lateral eyes as in text-fig. 1641. Median tubercles weakly distinct, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1640. Chelicera smooth on basal segment, ventral surface clothed thickly with short silky hairs, extending on fingers. Fingers thin, elongated, sharp on dentition, as characterized in the family. Pedipalp stout, carinated and with much enlarged and lobate on manus as in text-fig. 1639. Femur shorter than carapace, carinated, dorsal inner, dorsal outer and

FIGS. 1639–1647. *Heterometrus* (*Chersonesometrus*) *scaber*
(Thorell)

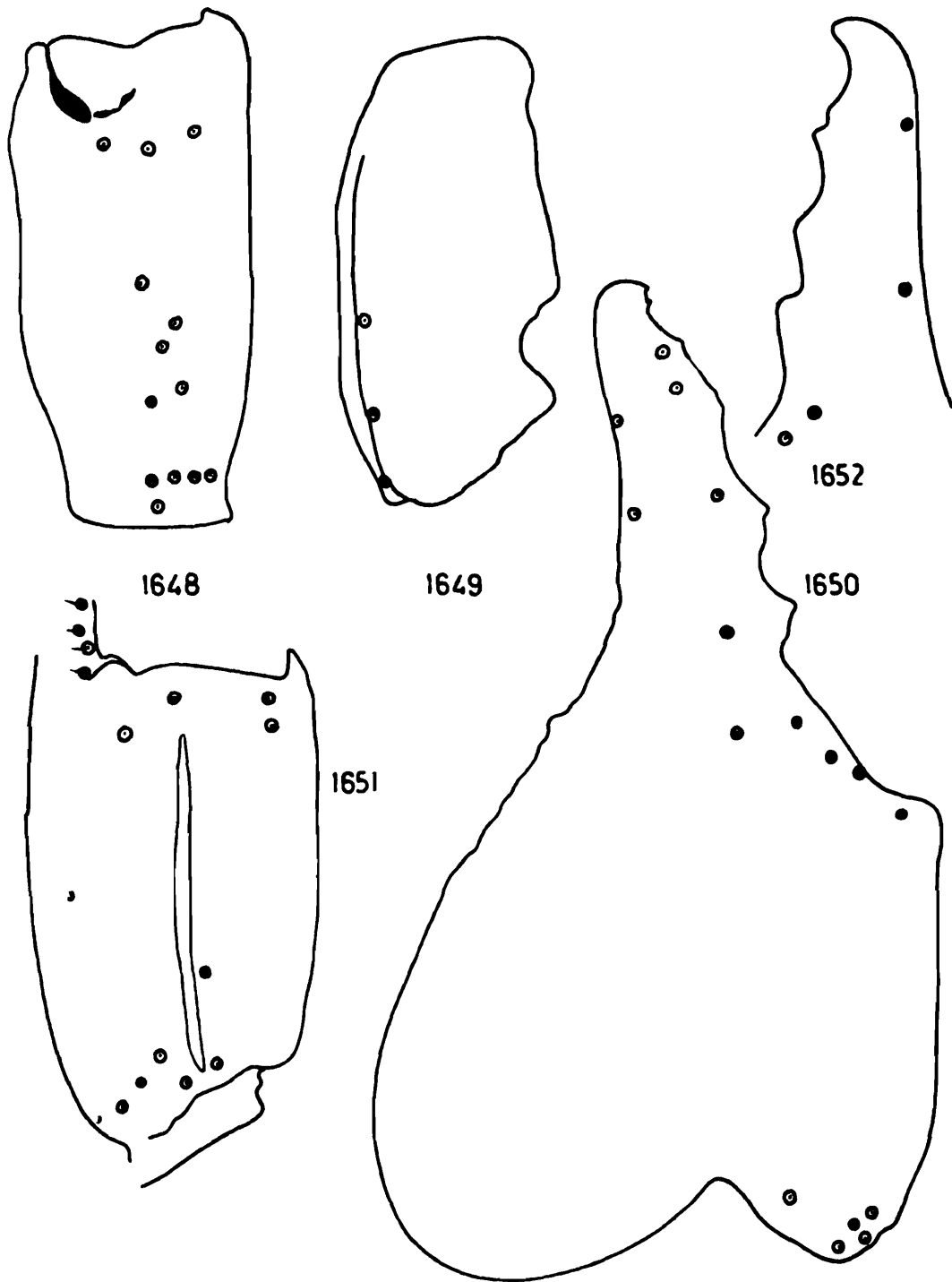
- 1639. Dorsal view of female.
- 1640. Carapace, dorsal view.
- 1641. Lateral eyes, lateral view.
- 1642. Manus and fingers, exterior view.
- 1643. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1644. Pectinal teeth and fulcra, ventral view.



1645. Tergite, dorsal view.
 1646. Metasomal segment V and telson, lateral view.
 1647. Metasomal segment V, ventral view.

ventral outer carinae distinct and coarsely granular. Anterior or outer surface provided with a crenulated carinae. Intercarinal space weakly granular only on dorsal portion. Patella longer than femur but shorter than carapace, carinated but all carinae smooth and obsolete. Anterior or inner surface elevated and furnished with weakly dentiform granules. Intercarinal space weakly granular on inner elevated portion only. Manus almost as long as femur but wider than long. Dorsal surface covered with smooth mosaic ridges. Inner margin furnished with few weakly tuberculate granules. Ventral surface weakly and irregularly granular. Only exterior carina distinct and smooth. Dorsal surface furnished with two smooth, obsolete carinae on distal portion, continuous on immovable finger. Movable finger slightly longer than carapace. Immobile finger shorter than femur, both fingers smooth except two smooth, obsolete carinae on immovable finger. Dentition on fingers not distinct but five triangular broad teeth prominent as in text-fig. 1642. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1648-1652. Legs poorly granular on femur and patella, without carinae. Tibia smooth. Tarsomere I smooth, furnished with few reddish spines on distal portion. Tarsomere II smooth, furnished below with a row of paired reddish spines and spine formula on legs I-IV: $\frac{3}{5} \frac{3}{5}$, $\frac{3}{5} \frac{3}{6}$, $\frac{4}{6} \frac{4}{6}$ & $\frac{4}{6} \frac{4}{6}$, disto-lateral margins overlapping the base of the claws lobes. A pair of claws normal. Pectines moderately developed and slightly more, than two times longer than wide. Middle lamellae subdivided into two to three digits. Fulcra much distinct, broad and triangular. Lamellae and fulcra clothed with megascopic reddish and whitish setae. Pectinal teeth weakly developed, much sparsely arranged, tapering on distal portion as in text-fig. 1644, and 12/12 in number as in text-fig. 1643. Basal piece smooth with weak depression on anterior portion. Genital operculum wider than long; sclerites united in the middle portion and narrowed posteriorly. Cephalothoracic sternum pentagonal, smooth and furnished with a deep, longitudinal depression as in text-fig. 1643.

Mesosoma : Tergites I-VI irregularly granular and almost all granules obsolete as in text-fig. 1645. Lateral, posterior margins and pretergal portion smooth. Tergite VII more granular on



FIGS. 1648-1652. *Heterometrus (Chersonesometrus) scaber* (Thorell)

1648. Patella, exterior view.

1649. Patella, ventral view.

1650. Manus and immovable finger, dorsoexterior view.

1651. Manus, ventral view.

1652. Immovable finger, interior view.

lateral portion and a pair of lateral carinae distinct on posterior portion. Lateral margins poorly crenulated. Posterior margin smooth. Pretergal portion smooth. Sternites I-IV entirely smooth, each provided with a pair of elongated, slit like stigmata for book lungs. Posterior and lateral margins smooth. Presternal portion poorly distinct. Sternite V also entirely smooth but scars of two pairs of carinae poorly distinct. Lateral and posterior margins smooth. Presternal portion also smooth.

Metasoma : Cauda less than three and a half times as long as carapace. Segments I & II wider than long. Segments III & IV longer than wide. Segment V shorter than femur and almost twice as long as wide and as wide as deep. All segments carinated. Segments I-III with dorsal and dorsolateral carinae crenulated; inferior lateral and inferior carinae almost smooth. Lateral carinae distinct on segments I & II but only on posterior portion. Intercarinal space irregularly granular. Anterior peduncle and posterior margin smooth. Segment IV with dorsal and dorsolateral carinae crenulated and inferior lateral and inferior carinae poorly crenulated. Intercarinal space irregularly granular. Anterior peduncle and posterior margin smooth. Segment V with dorsal, dorsolateral carinae crenulated but dorsolateral carinae distinct only on anterior portion. Inferior lateral and single inferior median carinae sparsely serrated and lateral carinae ending posteriorly into a broad dentiform tubercle. Intercarinal space irregularly granular. Anterior peduncle smooth. Anal rim of this segment evenly serrated as in text-fig. 1647. Telson longer than patella but shorter than carapace. Vesicle almost as long as segment IV but less than as wide or deep as segment V. Dorsal surface smooth and weakly granular on ventral surface and furnished with a pair of median lateral sparsely but delicately serrated carinae. Lateral and ventral bands moderately distinct. Aculeus not much curved, shorter than vesicular length but almost as long as segment I, sharp, pointed and dark brown on distal portion as in text-fig. 1646.

Distribution : INDIA : Trivandrum, Malabar, Kerala; Yelgit, Jetkad in Mangalore Dist. and Dharwar, Karnataka.

Remarks : We have studied, described and illustrated on the basis of authenticated identified specimens (2 ♀ ♀) received from B.M. (N.H.) , London. Regd. No. 1896.12.15.26 & 30.

95. *Heterometrus* (*Chersonesometrus*) *collinus* (Pocock)

(Figs. 1653-1667)

1900. *Palamnaeus phipsoni collinus* Pocock, *Fauna Brit. India, Arachn.*, : 95.
1981. *Heterometrus* (*Chersonesometrus*) *collinus* : Couzijn, *Zool. Verln.*, 184 : 155.

General : Female of bigger size. Mostly smooth on carapace and mesosoma. Metasoma short but strongly carinated on all segments. Chelicera smooth. Pedipalp short, stout, carinated and broad, convex on manus as in text-fig. 1653. Legs smooth. Pectines well developed. Telson not much round with elongated aculeus.

Body dark brown to blackish brown. Chelicera pale yellow on basal segment and reddish brown on fingers. Pedipalp blackish on femur and patella but slightly pale on manus, finger dark brown to blackish. Legs brownish with few light spots. Mesosoma brown. Metasoma slightly more dark brown and blackish on carinae. Telson reddish brown but dark on aculeus. Pectines yellow.

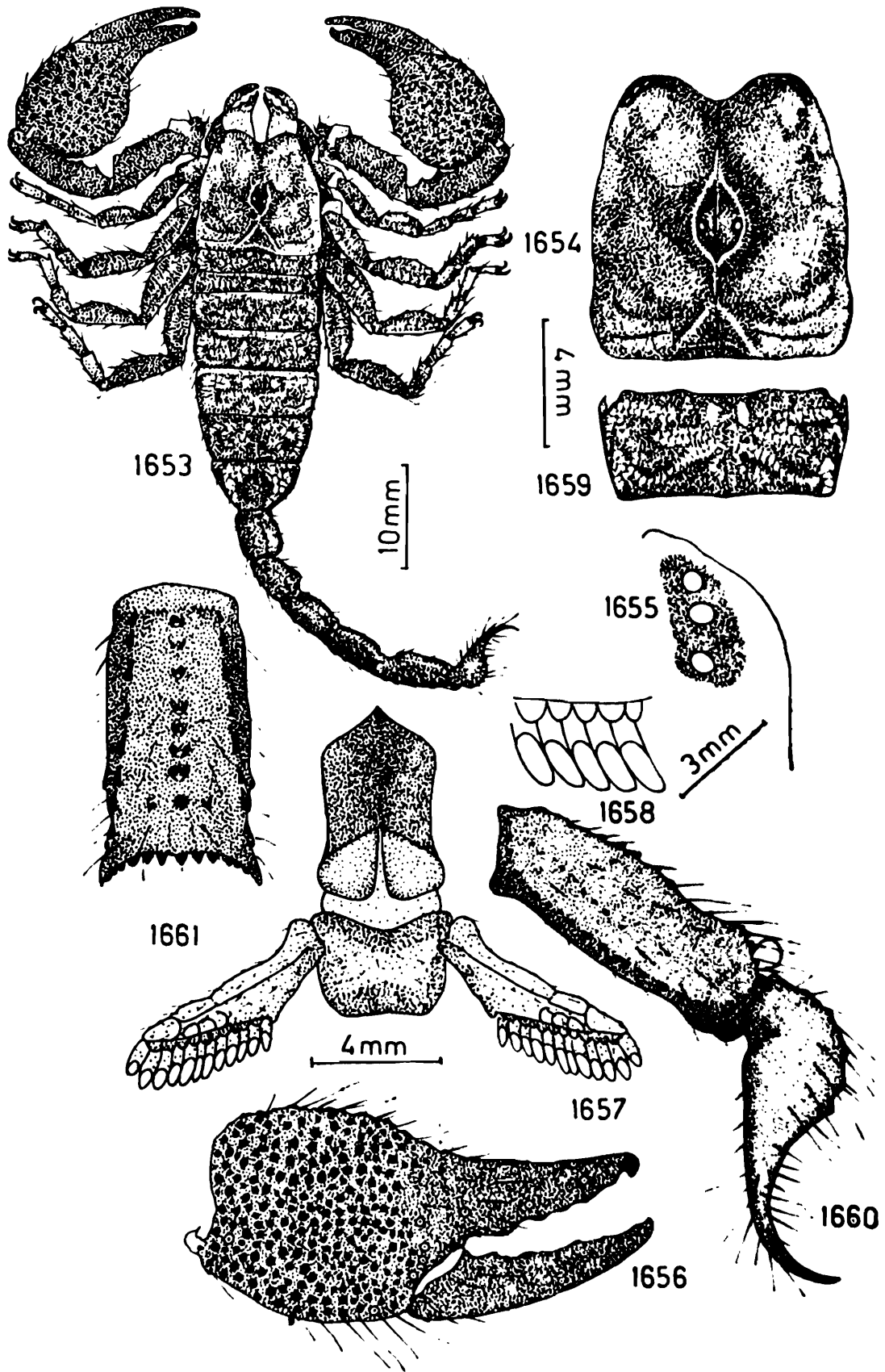
Measurements : Total length 81.75 mm. Carapace 14.00 mm. long. Mesosoma 31.75 mm. long. Metasoma 36.00 mm. long.

Carapace : Almost entirely smooth except granular anterior median portion of interocular area. Lateral ocular tubercles smooth and provided with three contiguous lateral eyes as in text-fig. 1655. Median ocular tubercles smooth and obsolete, separated by median suture, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1654. Anterior margin smooth and deeply notched in the middle. Lateral margins finely crenulated and supported with smooth

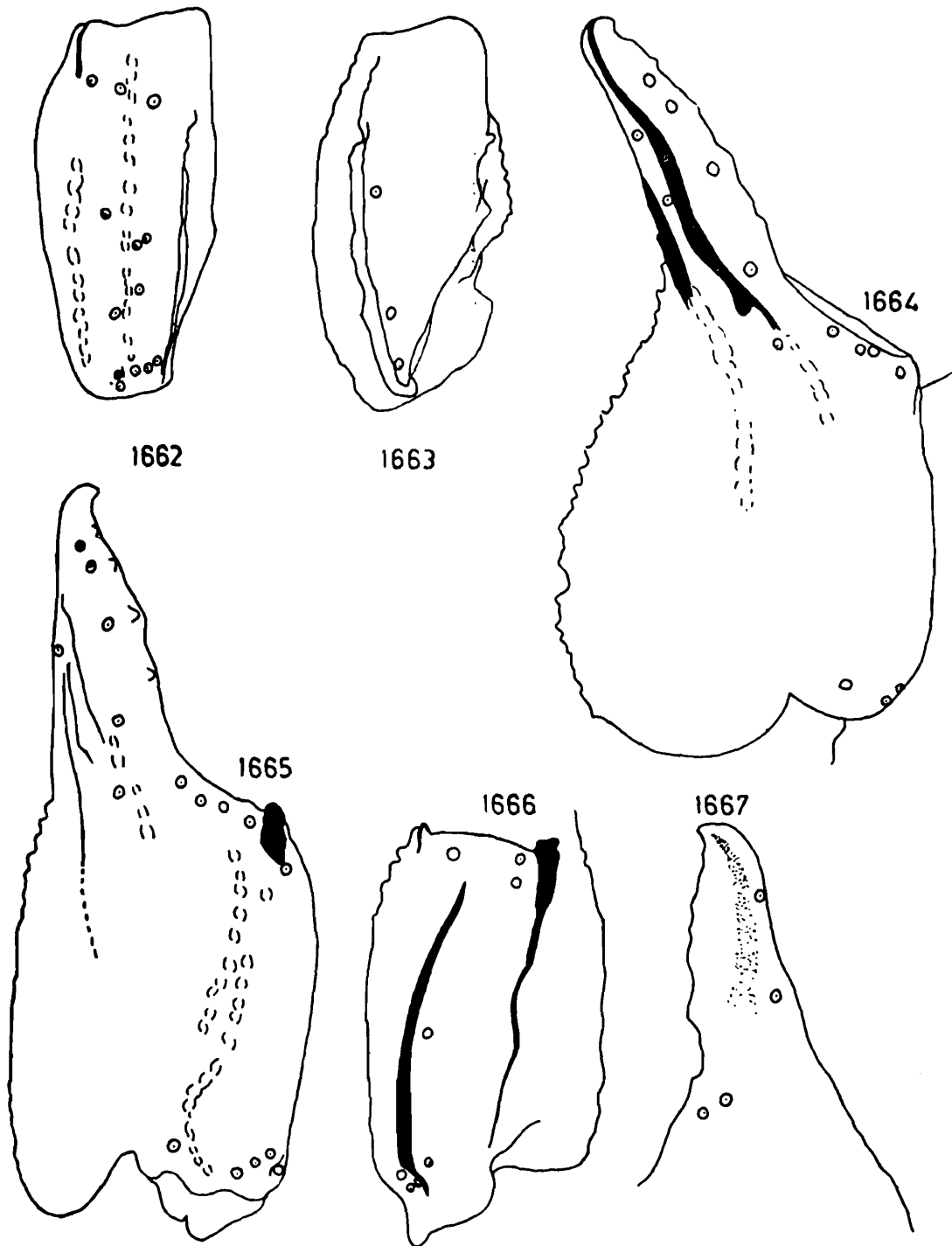
submarginal ridge. Posterior margin smooth, slightly invaginated in the middle. Only posterior lateral, posterior median furrows distinct. Chelicera smooth on basal segment, clothed thickly with silky hairs on ventral surface. Fingers short, stout, not much sharp on dentition. Dentition characterized as in family. Pedipalp short, stout, carinated and convex on dorsal surface of manus as in text-fig. 1653. Femur as long as carapace, carinated and carinae weakly granular but ventral exterior carinae not distinct. Anterior or exterior surface furnished with few strongly tuberculate granules. Intercarinal space sparsely and coarsely granular. Patella as long as femur or carapace, carinated and carinae weakly granular. Intercarinal space smooth on ventral surface, coarsely granular on exterior surface and granules forming smooth ridges on dorsal surface. Anterior or inner surface elevated and furnished with many tuberculate granules. Manus slightly longer than patella and almost as long as wide, carinated but only exterior marginal carina strongly developed, elevated and smooth on proximal portion and weakly granular on distal portion. Dorsal surface convex, fully covered with coarse granules and few granules forming smooth ridges on inner portion. Inner margins weakly serrated. Ventral surface weakly and sparsely granular. Fingers smooth but immovable finger carinated and carinae obsolete. Movable finger longer than manus but immovable finger shorter than femur. Dentition on finger not regular but broad, triangular and five in number as in text-fig. 1656. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1662-1667. Legs smooth, carinated on femur and patella but carinae weakly granular. Tibia smooth. Tarsomere also smooth and furnished with few spines on distal portion and a pedal spur on distal end. Tarsomere II

FIGS. 1653-1661. *Heterometrus (Chersonesometrus) collinus* (Pocock)

- 1653. Dorsal view of female.
- 1654. Carapace, dorsal view.
- 1655. Lateral eyes, lateral view.
- 1656. Manus and fingers, exterior view.
- 1657. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1658. Pectinal teeth and fulcra, ventral view.



1659. Tergite, dorsal view.
 1660. Metasomal segment V and telson, lateral view.
 1661. Metasomal segment V, ventral view.



FIGS. 1662-1667. *Heterometrus (Chersonesometrus) collinus* (Pocock)

1662. Patella, exterior view.

1663. Patella, ventral view.

1664. Manus and immovable finger, dorsoexterior view.

1665. Manus and immovable finger, exterior view.

1666. Manus, ventral view.

1667. Immovable finger, interior view.

smooth, disto-lateral margins overlapping on the base of claw lobes, furnished with a row of paired stout spinules and spine formula on legs I-IV : $\frac{4}{6} \frac{4}{6}, \frac{4}{6} \frac{4}{6}, \frac{4}{6} \frac{4}{6}$ & $\frac{1}{6} \frac{1}{6}$. A pair of claws stout. Pectines well developed, two times longer than wide. Middle lamellae fused to form single lamella. Fulcra well developed and triangular. Fulcra and lamellae clothed sparsely with microscopic hairs. Teeth elongated, tubular, tapering distally as in text-fig. 1658, and 12/12 in number as in text-fig. 1657. Basal piece smooth, anterior margin almost straight. Genital operculum wider than long, sclerites united in the middle. Cephalothoracic sternum pentagonal, longer than wide, smooth and with median longitudinal suture as in text-fig. 1657.

Mesosoma : Tergites I-VI entirely smooth as in text-fig. 1659. Lateral and posterior margins smooth. Tergite VII weakly granular but more granular on posterior and lateral portion. Lateral and posterior margins smooth. Pretergal portion smooth and also smooth on posterior margin. Sternites I-IV smooth, each provided with slit like elongated stigmata for book lungs. Posterior and lateral margins smooth. Presternal portion smooth and also smooth on posterior margin. Sternite V smooth. Lateral and posterior margins smooth. Presternal portion smooth and also smooth on posterior margin.

Metasoma : Cauda slightly longer than two and a half times as long as carapace. Basal segment wider than long. Segment II also wider than long. Segment III as wide as long. Segments IV and V always longer than wide. All segments carinated but carinae weakly crenulated. Segment I with dorsal, dorsolateral, lateral carinae weakly granular. Inferior lateral and inferior carinae smooth. Intercarinal space weakly granular except on dorsal surface. Anterior peduncle and posterior margin smooth. Segments II-IV with dorsal carinae sparsely granular but more tuberculate on segment IV. Dorsolateral carinae also granular but granules slightly obsolete. Inferior lateral and inferior carinae smooth on segments II and III and weakly crenulated on segment IV. Intercarinal space weakly granular but more granular on lateral portion. Anterior peduncle and posterior margin smooth. Segment V about half the length of carapace but less than as wide or deep as segment IV. Dorsolateral carinae

weakly distinct and granular. Inferior lateral and single inferior median carinae sparsely serrated. Intercarinal space weakly granular. Anterior peduncle smooth. Anal rim of this segment evenly serrated on ventral portion and lateral margin provided with triangular tubercle as in text-figs. 1660 & 1661. Telson shorter than carapace. Vesicle longer than segment III but shorter than segment IV and less than as deep or wide as segment V. Dorsal and lateral surface smooth. Ventral surface granular and granules weakly tuberculated. Ventral median crest crenulate. Lateral and ventral bands not distinct. Ventral surface fully covered with long hairs. Aculeus not much curved, slightly shorter than vesicle but longer than segment I, sharp, reddish brown on distal portion and basal portion covered with many reddish setae as in text-fig. 1660.

Distribution : INDIA : Nilgiri Hills (*Type-locality*), Tamil Nadu.

Remarks : We have studied 2 ♀♀ and 1 ♀ (immature) specimens received from B.M. (N.H.), London. Regd. No. 1894.8.21.4-7. Our description and illustrations are based on the above type specimens.

96. *Heterometrus* (*Chersonesometrus*) *madraspatis* (Pocock)
(Figs. 1668-1682)

1900. *Palamnaeus fulvipes madraspatensis* Pocock, *Fauna Brit. India, Arachn.*, : 88-89.

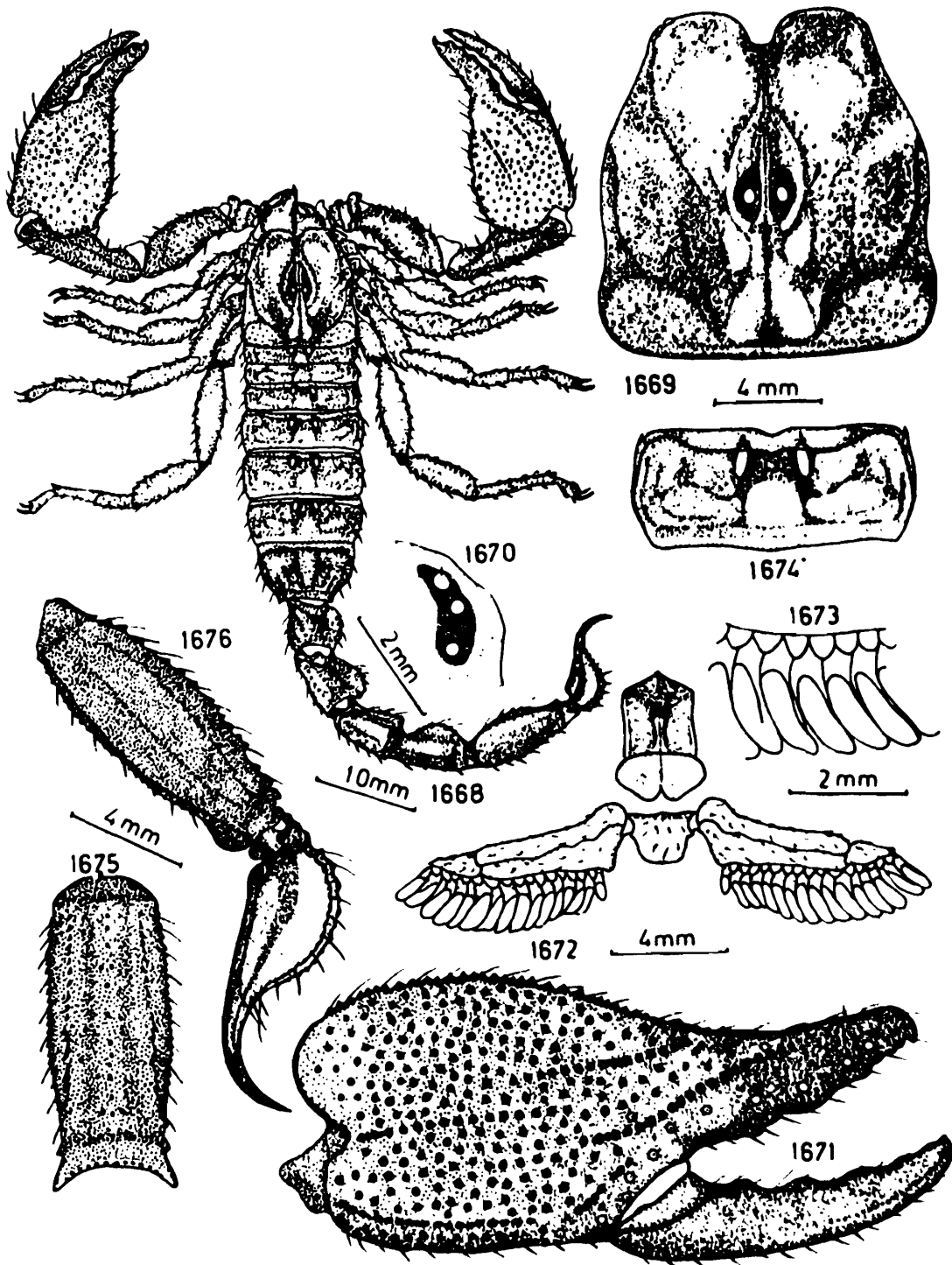
1981. *Heterometrus* (*Chersonesometrus*) *fulvipes* : Couzijn, *Zool. Verln.*, **184** : 133.

General : Male of medium to bigger size, weakly granular on carapace and mesosomal tergites. Chelicera smooth. Pedipalp stout, manus lobed and convex on dorsal surface as in text-fig. 1668. Legs smooth but carinated on femur and patella. Pectines well developed. Cephalothoracic sternum pentagonal. Mesosoma

FIGS. 1668-1676. *Heterometrus* (*Chersonesometrus*) *madraspatis* (Pocock)

1668. Dorsal view of male.

1669. Carapace, dorsal view.



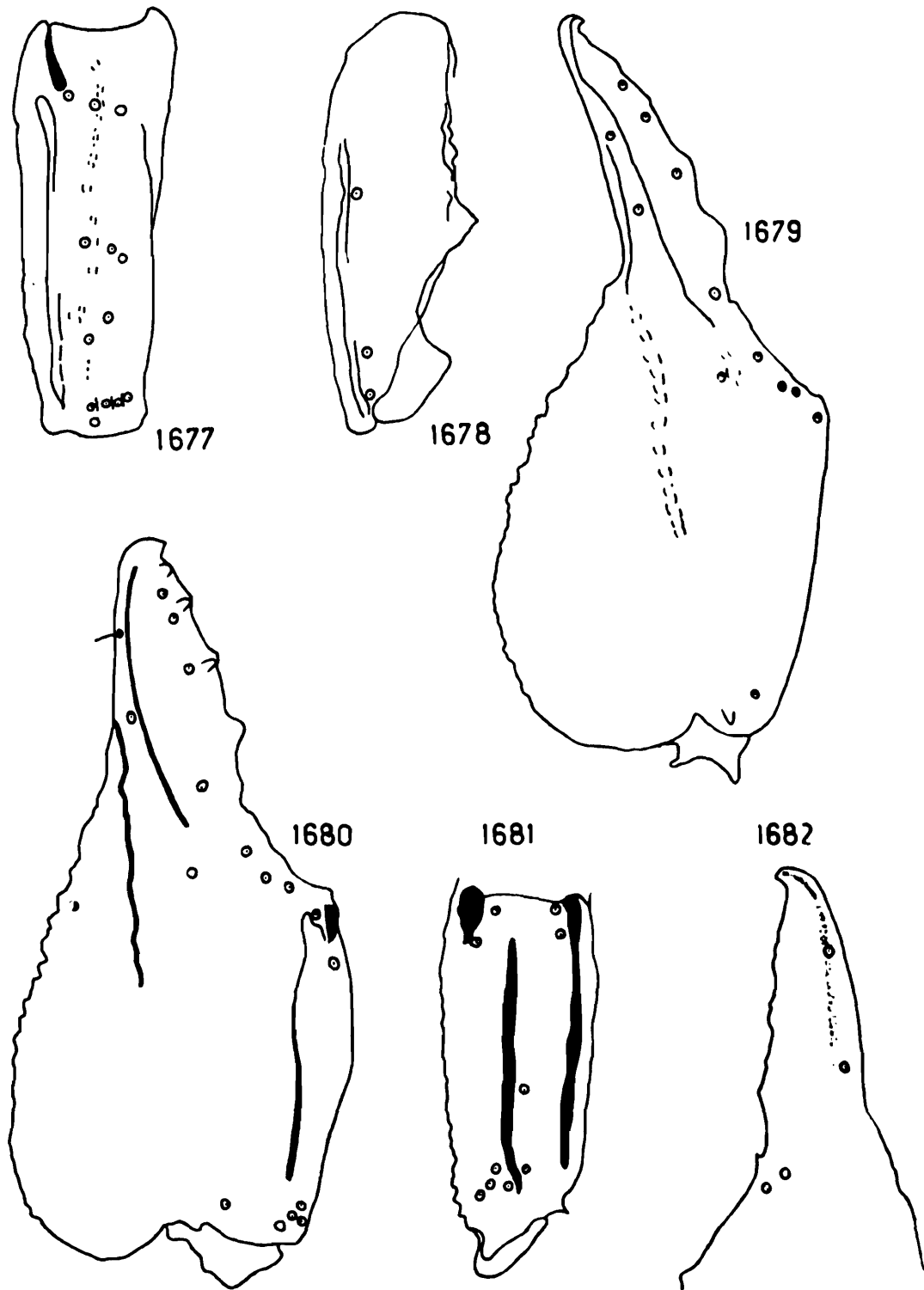
- 1670. Lateral eyes, lateral view.
- 1671. Manus and fingers, exterior view.
- 1672. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1673. Pectinal teeth and fulcra, ventral view.
- 1674. Tergite, dorsal view.
- 1675. Metasomal segment V, ventral view.
- 1676. Metasomal segment V and telson, lateral view.

weakly granular and without carinae. Metasoma carinated but except few carinae all weakly granular. Telson with robust, round vesicle and stout pointed aculeus.

Body dark reddish brown but more darker on carapace. Chelicera yellowish on basal segment but slightly brown on fingers. Pedipalp light brown on femur, dark brown on patella and manus and blackish brown on fingers. Legs dark yellowish to pale yellowish. Pectines yellowish. Metasoma light brown and vesicle yellowish brown but aculeus brown and reddish on distal portion.

Measurements : Total length 83.25 mm. Carapace 11.50 mm. long; Mesosoma 27.75 mm. long; Metasoma 44.00 mm. long.

Carapace : Entire surface granular except posterior interocular area and all granules obsolete. Lateral ocular tubercles granular and provided with three contiguous lateral eyes as in text-fig. 1670. Median tubercles smooth, not much elevated, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1669. Anterior margin poorly crenulated and deeply notched in the middle. Lateral margins finely crenulated. Posterior margin smooth and almost straight. Chelicera smooth on basal segment, thickly clothed with many fine silky hairs, extending on fingers. Fingers elongated and furnished with dentition as characterized in the family. Distal tooth of dorsal fang much shorter than distal tooth of ventral fang on movable finger. Pedipalp stout, flat and convex on dorsal surface of manus as in text-fig. 1671. Femur as long as carapace, carinated and carinae granular but posterior carinae poorly granular. Anterior carinae granular and granules on dorsal inner carina tuberculate. Anterior or inner margin furnished with few strongly tuberculate granules. Intercarinal space sparsely and coarsely granular only on dorsal surface. Patella longer than carapace or femur, carinated and dorsal and ventral inner carinae weakly granular, outer or posterior carinae smooth and obsolete. Anterior or inner margin elevated and provided with few tuberculate granules. Intercarinal space almost smooth. Manus longer than wide but not as long as carapace, flat but convex on dorsal surface and round on inner margin, carinated



FIGS. 1677-1682. *Heterometrus (Chersonesometrus) madraspatensis* (Pocock)

1677. Patella, exterior view.

1678. Patella, ventral view.

1679. Manus and immovable finger, dorsoexterior view.

1680. Manus and immovable finger, exterior view.

1681. Manus, ventral view.

1682. Immobile finger, interior view.

but only exterior marginal and exterior carinae distinct, smooth and obsolete. Dorsal surface fully covered with sparsely arranged coarse granules as in text-fig. 1671. Length of under hand not as long as carapace and more than as wide as patella but as deep as patella. Inner margin evenly and strongly serrated. Ventral surface weakly granular. Movable finger more than as long as patella and smooth. Immobile finger shorter than femur, weakly carinated but carinae obsolete. Dentition on fingers broad, triangular and four to five in number as in text-fig. 1671. Trichobothrial pattern on patella, manus and immobile finger as in text-figs. 1677-1682. Legs smooth but carinated on femur and only outer carinae granular. Patella smooth, carinated but carinae also smooth and obsolete. Tibia entirely smooth. Tarsomere I smooth, furnished with few spines on ventral surface of distal portion and a pedal spur on distal end. Tarsomere II smooth, furnished on ventral surface with two rows of stout spines. Spine formula on legs I-IV : $\frac{4}{5} \frac{3}{5}, \frac{4}{6} \frac{4}{6}, \frac{4}{6} \frac{4}{6}$ & $\frac{4}{6} \frac{4}{6}$. Lateral distal margins overlapping the base of claw lobes. A pair of claws stout. All digits covered very sparsely with long bristles. Pectines well developed and slightly less than three times longer than wide. Middle lamellae subdivided into two to three digits. Fulcra distinct and triangular. Lamellae and fulcra clothed sparsely with microscopic setae. Pectinal teeth elongated, tubular but not much tapering as in text-fig. 1673 and 16/16 in number as in text-fig. 1672. Basal piece smooth with anterior margin almost straight. Genital operculum wider than long. Operculi not exposed but separated on posterior portion and after lifting a pair of male genital papillae visible. Cephalothoracic sternum pentagonal, longer than wide, smooth and provided with a longitudinal depression in middle as in text-fig. 1672.

Mesosoma : Tergites I-VI weakly and sparsely granular but more granular on posterior portion and without carinae as in text-fig. 1674. Lateral margins smooth or very finely crenulated. Posterior margin smooth. Pretergal portion smooth with smooth posterior margin. Tergite VII weakly granular but more granular on lateral and posterior portion, furnished with two pairs of crenulated carinae. Lateral margins finely crenulated. Posterior margins smooth. Pretergal portion smooth with smooth

posterior margin. Sternites I-IV smooth, each furnished with a pair of elongated slit like stigmata for book lungs. Lateral and posterior margins smooth. Presternal portion also entirely smooth. Sternite V entirely smooth.

Metasoma : Cauda almost four times as long as carapace. Basal segment wider than long. Segments II-V progressively become longer and narrowed on posterior segments. All segments carinated. Segments I-III with dorsal and dorsolateral carinae crenulated but inferior lateral and inferior carinae smooth and obsolete. Lateral carinae clearly developed only on segment I and crenulated. Intercarinal space almost entirely smooth. Anterior peduncle and posterior margin smooth. Segment IV with all carinae except lateral carinae weakly crenulated. Intercarinal space smooth. Segment V shorter than carapace and not as wide or deep as segment IV. Dorsal carinae not distinct, dorsolateral carinae distinct only on $2/3$ anterior portion and weakly crenulated. Inferior lateral carinae distinct, obsolete on anterior portion but strongly and sparsely serrated on posterior portion. Single inferior median carina strongly serrated. Intercarinal space irregularly granular and some granules tuberculate. Anterior peduncle smooth on dorsal portion but finely granular on ventral surface. Anal rim of this segment evenly serrated on ventral portion and lateral margins provided with a large, triangular tooth on each side as in text-figs. 1675 & 1676. Telson longer than segment V but slightly shorter than femur or carapace. Vesicle robust but less tapering distally and as long as segment III but more than as wide or deep as segment V. Dorsal surface smooth, lateral surface weakly granular. Ventral surface provided with a ventral median and two lateral crenulated crests as in text-fig. 1675. Aculeus stout, not much curved, two third of vesicular length, not much sharp and dark reddish on distal portion as in text-fig. 1676.

Distribution : INDIA : Madras (*Type-locality*), Tamil Nadu.

Remarks : We have studied, described and illustrated on the basis of 2 ♂ type specimens received from B.M. (N.H.), London. Regd. No. Nil.

97. *Heterometrus* (*Chersonesometrus*) *kanaraensis* (Pocock)

(Figs. 1683-1695)

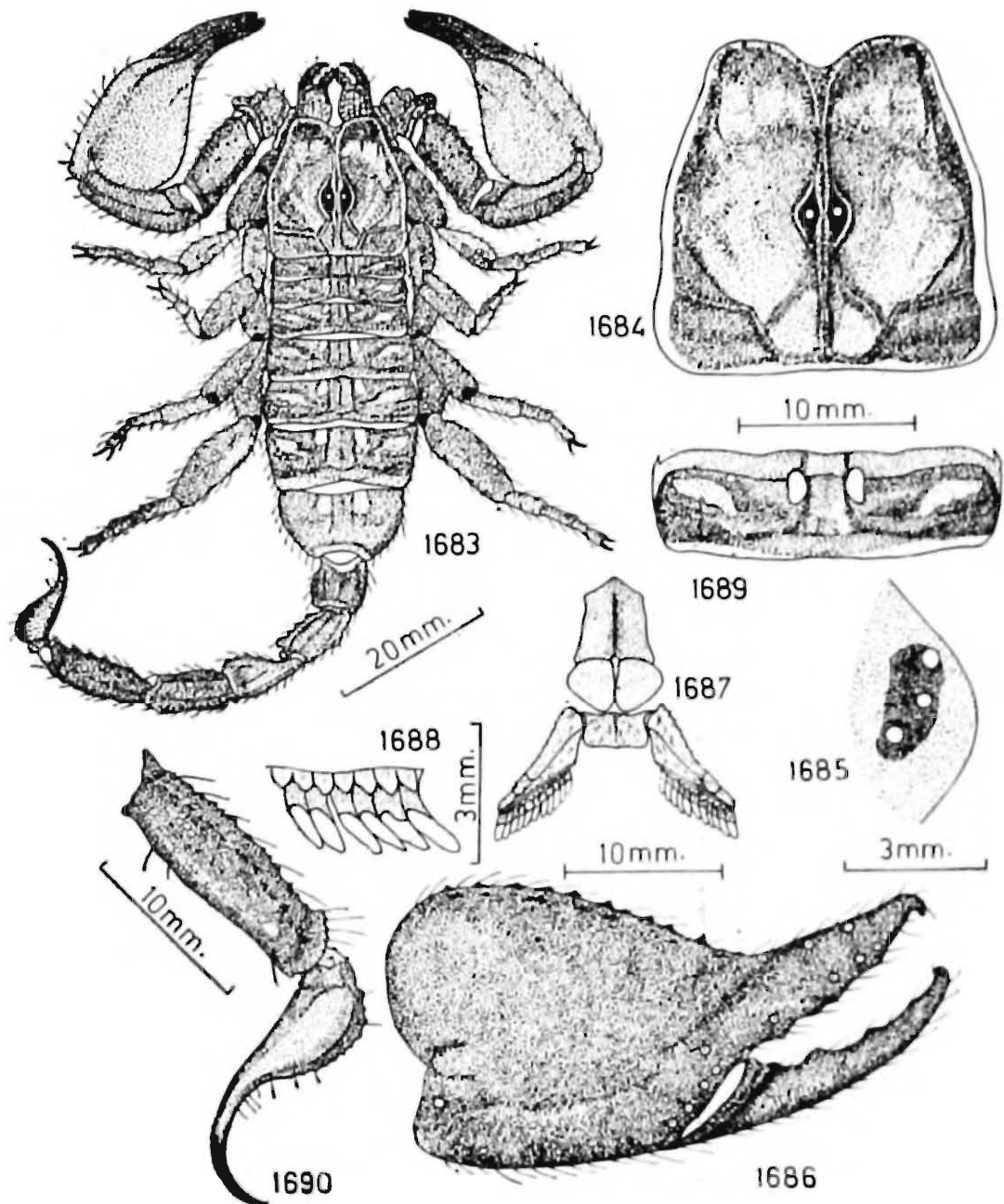
1900. *Palamnaeus scaber kanaraensis* Pocock, *Fauna Brit. India, Arachn.*, : 93.
1981. *Heterometrus* (*Chersonesometrus*) *phipsoni kanaraensis* : Couzijn, *Zool. Verln.*, 184 : 151.

General : Large scorpions. Body surface weakly granular on carapace, smooth on mesosoma, strongly carinated on metasoma but smooth on intercarinal space and telson robust with strong aculeus. Chelicera smooth. Pedipalp carinated on femur and patella but granular on femur, almost smooth on manus and fingers as in text-fig. 1683. Legs granular on femur and patella. Pectines well developed.

Body dark blackish brown in male but dark brown in female. Chelicera light brown on basal segment but blackish brown on fingers. Pedipalp dark blackish on femur and finger and light brown to dark brown on patella and manus. Legs light brown to dark brown but paler than body. Mesosoma brownish on dorsal portion but light brown to yellowish on ventral portion. Metasoma slightly light brown but telson pale and more light brown to yellowish brown.

Measurements : Male total length 110.75 mm. Carapace 15.75 mm. long; Mesosoma 37.00 mm. long; Metasoma 58.00 mm. long. Female total length 111.75 mm. Carapace 17.00 mm. long; Mesosoma 40.25 mm. long; Metasoma 54.50 mm. long.

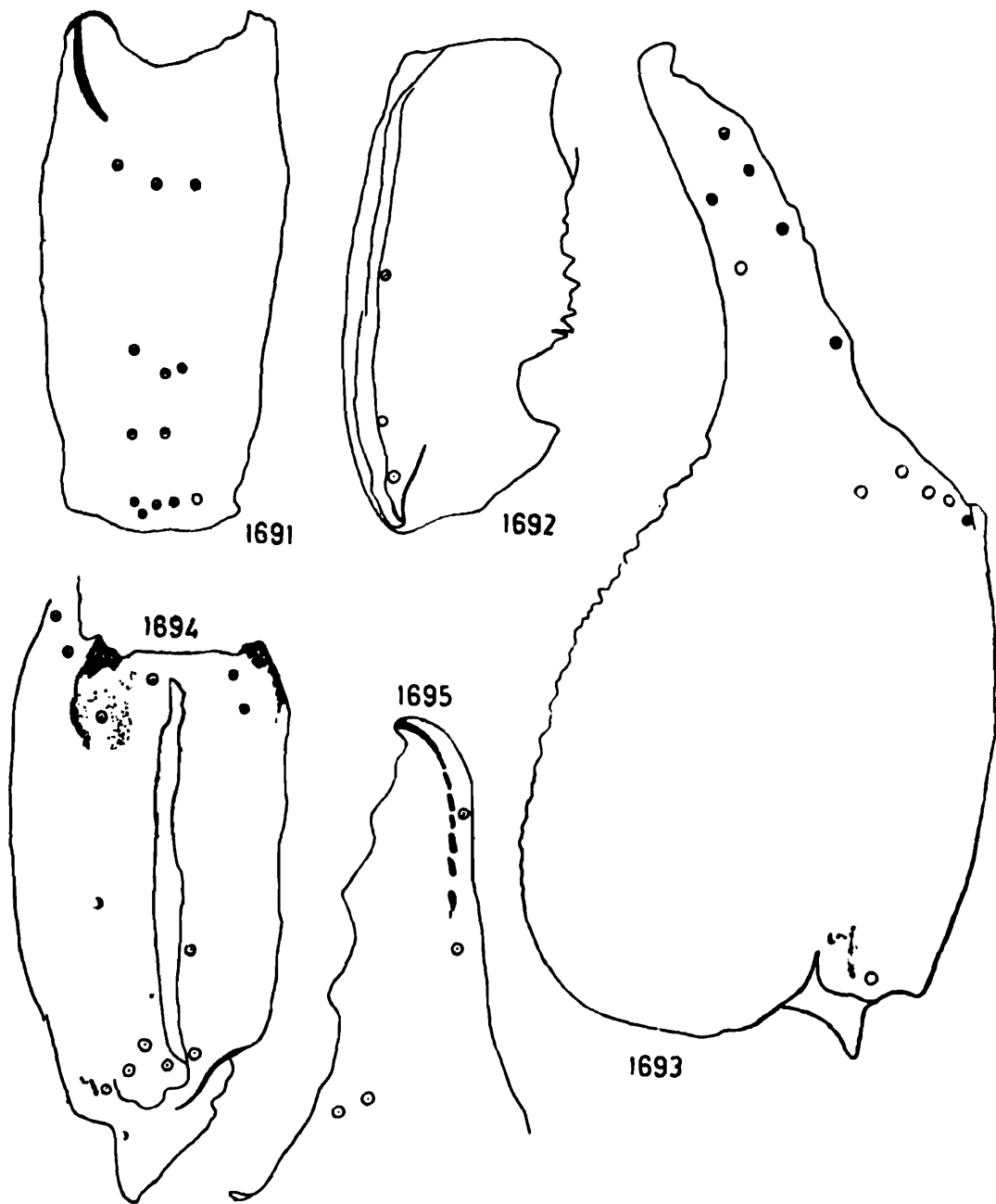
Carapace : Weakly granular on anterior portion otherwise smooth but more granular in male. Ocular tubercles smooth, median ocular tubercles smooth, provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1684. Lateral ocular tubercles smooth, much elevated and provided with three contiguous eyes as in text-fig. 1685. Anterior margin smooth and provided with a deep median notch. Lateral margin finely crenulated but more crenulated on anterior margin.



FIGS. 1683-1690. *Heterometrus (Chersonesometrus) kanaraensis* (Pocock)

- 1683. Dorsal view of male.
- 1684. Carapace, dorsal view.
- 1685. Lateral eyes, lateral view.
- 1686. Manus and fingers, exterior view.
- 1687. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1688. Pectinal teeth and fulcra, ventral view.
- 1689. Tergite, dorsal view.
- 1690. Metasomal segment V and telson, lateral view.

Posterior margin smooth. Furrows almost smooth and only central median, posterior lateral, median lateral and anterior median furrows prominent. Chelicera smooth on basal segment, clothed thickly with short silky hairs, extending on fingers. Fingers stout and dentition as characterized in the family. Distal tooth on dorsal fang much shorter than the distal tooth on ventral fang. Pedipalp stout, strong, flat and convex on manus as in text-fig. 1686. Femur longer than carapace, strongly carinated and dorsal and ventral carinae sparsely but strongly granular. Intercarinal portion sparsely granular on dorsal portion. Anterior or outer and posterior or inner surface provided with few dentiform granules. Patella slightly longer than femur, carinated but all carinae smooth and obsolete except inner dorsal carina weakly granular on proximal portion. Anterior or inner portion elevated and provided with few tuberculate granules. Intercarinal space almost smooth. Manus shorter than patella in male and longer than femur or patella in female, curved on proximal portion of inner margin, dorsoventrally flat but dorsal surface convex; smooth on dorsal and exterior surfaces, weakly granular on ventral surface. Only exterior median and exterior ventral carinae developed but smooth and obsolete. Inner margin sparsely granular and granules strongly tuberculate. Fingers almost smooth, immovable finger carinated but carinae smooth and obsolete. Movable finger longer than manus but immovable finger shorter than manus. Dentition on fingers not regular but provided with five broad and triangular teeth as in text-fig. 1686. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1691-1695. Legs almost smooth on femur and patella, carinated but carinae almost smooth and obsolete. Tibia also smooth. Tarsomere I smooth, provided with a pedal spur and few spinules on distal portion. Tarsomere II smooth and ventral portion provided with two rows of short, reddish spinules and spine formula on legs I-IV : $\frac{3}{4}$ $\frac{3}{5}$, $\frac{4}{6}$ $\frac{4}{6}$, $\frac{4}{6}$ $\frac{4}{6}$ & $\frac{4}{6}$ $\frac{4}{6}$. Lateral margins overlapping the base of claw lobes. A pair of claws much curved and strong. Pectines well developed slightly more than two times longer than wide. Middle lamellae fused. Fulcra distinct and almost triangular. Lamellae and fulcra sparsely clothed with microscopic and megascopic setae. Pectinal



FIGS. 1691-1695. *Heterometrus* (*Chersonesometrus*) *kanaraensis* (Pocock)

1691. Patella, exterior view.
 1692. Patella, ventral view.
 1693. Manus and immovable finger, dorsoexterior view.
 1694. Manus, ventral view.
 1695. Immobile finger, interior view.

teeth well developed in male, not much tapering as in text-fig. 1688, and 11/11 in number as in text-fig. 1687 but teeth thin much narrowed, pointed in female and 9/9 in number. Basal piece smooth, anterior margin almost straight and provided with a median suture on anterior portion. Genital operculum always wider than long, a pair of sclerites smooth, united in the middle in female and free on posterior portion in male, sclerites slightly separated on posterior portion from which a pair of male genital papillae visible. Cephalothoracic sternum pentagonal, almost longer than wide, smooth provided with a median suture as in text-fig. 1687.

Mesosoma : All tergites smooth, without carinae, posterior and lateral margins also smooth as in text-fig. 1689. Tergite VII smooth, without carinae. Pretergal portion smooth. Sternites I-IV smooth, each provided with a pair of elongated slit like stigmata for book lungs, lateral and posterior margins smooth. Presternal portion not distinct. Sternite V smooth, without carinae, lateral and posterior margins smooth.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment longer than wide. Segments II-IV also longer than wide. Segment V more than twice as wide. All segments carinated, dorsal carinae sparsely crenulated and slightly elevated on segments I-III. Dorsal carinae on segment IV weakly and sparsely crenulated and not elevated. Dorsolateral, inferior lateral and inferior carinae smooth on segments I-IV. Lateral carinae weakly developed on segment I. Dorsolateral carinae granular in male. Intercarinal space poorly granular. Anterior peduncle smooth. Posterior margin smooth but few granules present in male. Segment V shorter than carapace, carinated and dorsal, dorsolateral, inferior lateral and single inferior median carinae strongly but sparsely granular but only inferior lateral and inferior median carinae strongly serrated as in text-fig. 1690. Intercarinal space smooth. Anterior peduncle smooth. Anal rim of this segment delicately crenulated to serrated and lateral portion provided with a strong, triangular tuberculate teeth. Telson longer than segment V but shorter than carapace. Vesicle almost as long as caudal segment II, globular, carinated and ventral

crest sparsely granular. Lateral and ventral bands more darker. Entire surface smooth. Setation on vesicle not regular and fully covered with long hairs. Aculeus almost as long as vesicle, not much curved but strong and pointed, blackish on distal portion as in text-fig. 1690.

Distribution : INDIA : Kanara (*Type-locality*), Karnataka; Bombay, Maharashtra.

Remarks : We have examined, described and illustrated on the basis of type specimens (1♂ & 1♀) received from B.M. (N.H.), London, Regd. No. 1897.11.5.29-30.

98. **Heterometrus (Chersonesometrus) pelekomanus** Couzijn
(Figs. 1696-1709)

1981. *Heterometrus (Chersonesometrus) pelekomanus* Couzijn, *Zool. Verln.*, 184 : 137.

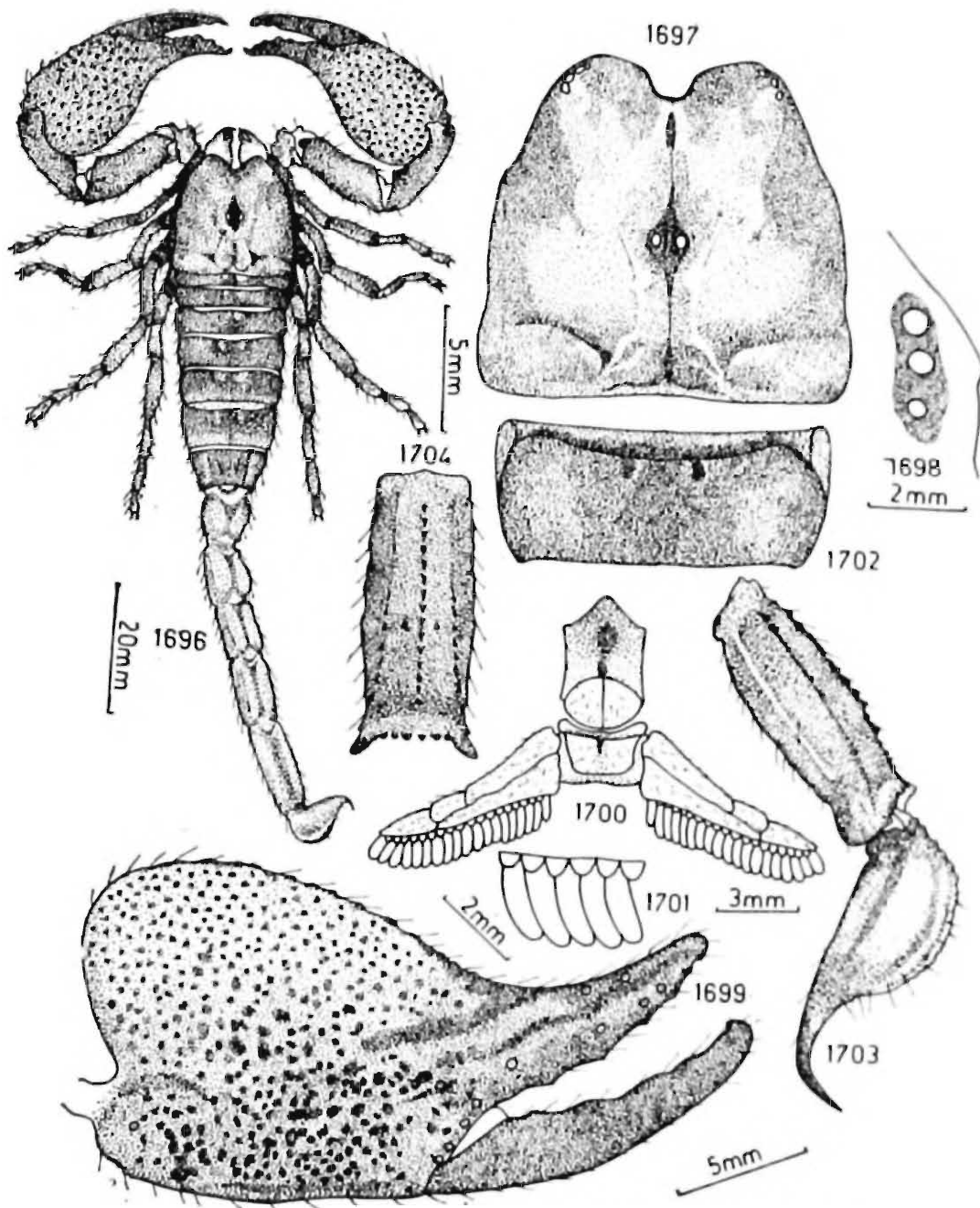
General : Male of large size with flat, enlarged manus of pedipalp. Carapace very weakly and finely granular. Chelicera normal. Pedipalp stout and carinated as in text-fig. 1696. Legs smooth. Pectines well developed. Mesosomal tergites smooth, sternites also entirely smooth. Metasoma stout, each segment strongly carinated. Telson with globular vesicle, carinated and with stout aculeus.

Body dark reddish brown except basal segment of chelicera, legs and telson. Basal segment of chelicera yellow but darker on fingers. Pedipalp more darker and almost blackish on fingers and carinae. Legs light brown to pale yellow but dark reddish brown on claws. Ocular tubercles on carapace blackish. Sternites yellowish. Pectines yellow. Metasoma darker on carinae.

Measurements : Total length 126.75 mm. Carapace 17.25 mm. long; Mesosoma 43.00 mm. long; Metasoma 66.50 mm. long.

Carapace : Almost entirely granular except finely granular lateral portions. Interocular area smooth. Superciliary process

smooth. Ocular tubercles smooth. Lateral tubercles provided with three contiguous lateral eyes as in text-fig. 1698. Median tubercles provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1 as in text-fig. 1697. Anterior margin smooth, deeply notched in the middle and rostrolateral margins continued straight. Lateral margins finely crenulated. Posterior margin smooth. Anterior median furrow not much distinct. Median furrows distinct and smooth. Posterior median furrow distinct only on posterior portion. Posterior transverse furrow weak. Posterior lateral furrows distinct and deep as in text-fig. 1697. Chelicera smooth on basal segment, ventrally clothed with short, silky hairs. Fingers stout and sharp on dentition, dentition as characterized in family. Pedipalp with flattened manus, stout and carinated on femur and patella as in text-fig. 1696. Femur more than as long as carapace, carinated, dorsal carinae coarsely granular but outer dorsal and inner carinae more granular than posterior. Anterior or outer surface provided with few tuberculate granules. Posterior or inner surface almost smooth. Intercarinal space granular on dorsal surface. Patella shorter than femur but longer than carapace, carinated but all carinae smooth, dorsal and posterior carinae more distinct. Anterior or inner surface elevated on proximal portion and provided with four to five small tuberculate granules. Posterior or outer surface smooth. Intercarinal surface almost smooth. Manus much flattened, length of under hand less than patella but longer than carapace and as long as wide. Dorsal surface weakly carinated and three carinae, almost with obsolete granules, weakly distinct as in text-fig. 1699, granules more clear and close on outer portion. Exterior carinae distinct, smooth. Exterior ventral more distinct on proximal portion. Ventral surface weakly granular and provided with three weakly granular carinae. Inner surface sparsely crenulated. Immovable finger slightly longer than half the length of femur, carinated but carinae smooth and obsolete, provided with five distinct triangular teeth and a distinct latero-distal notch as in text-fig. 1699. Movable finger longer than immovable and almost as long as femur, weakly granular on inner portion and basal smooth ridge, provided with five triangular teeth as in text-fig. 1699. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1705-1709. Legs almost smooth except



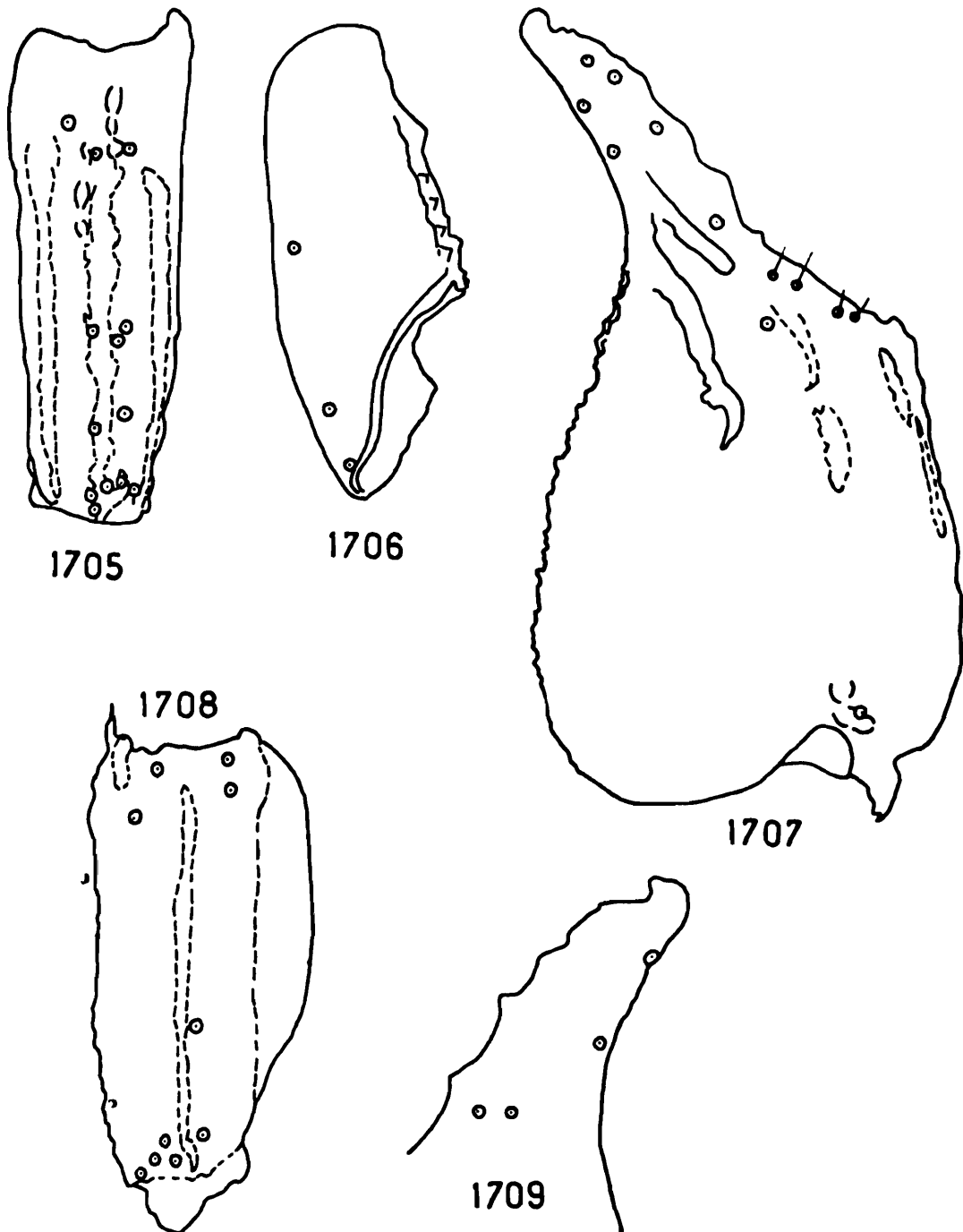
FIGS. 1696-1704. *Heterometrus (Chersonesometrus) pelekomanus* Couzijn.

- 1696. Dorsal view of male.
- 1697. Carapace, dorsal view.
- 1698. Lateral eyes, lateral view.
- 1699. Manus and fingers, exterior view.
- 1700. Pectines, genital operculum and cephalothoracic sternum, ventral view.
- 1701. Pectinal teeth and fulcra, ventral view.
- 1702. Tergite, dorsal view.
- 1703. Metasomal segment V and telson, lateral view.
- 1704. Metasomal segment V, ventral view.

granular on ventral portion of femur. Patella and tibia entirely smooth. Tarsomere I provided with few spines on distal portion and a pedal spur. Tarsomere II smooth, provided with a row of paired spines on ventral portion and spine formula on legs I-IV: $\frac{4}{6} \equiv, \frac{4}{6} \frac{4}{6}, \frac{5}{7} \frac{5}{7} \& \frac{5}{7} \frac{5}{7}$. Latero-distal margins overlapping the base of claw lobes and a pair of claws normal. Pectines well developed and three times longer than wide. Middle lamellae distinct and sub-divided into two to three digits. Fulcra distinct almost triangular to round, covered with microscopic setae. Pectinal teeth long, not much tapering as in text-fig. 1701 and 19/19 in number as in text-fig. 1700. Basal piece sclerotized and moderately notched in the middle of anterior portion. Genital operculum wider than long, operculi weakly united in the middle but a pair of male genital papillae seen after lifting of operculi. Cephalothoracic sternum pentagonal, smooth and provided with a deep, median longitudinal depression as in text-fig. 1700.

Mesosoma : Tergites I-VI almost smooth except weakly granular on lateral portion of each tergite as in text-fig. 1702. Pretergal portion also entirely smooth. Lateral and posterior margins also smooth. Tergite VII more granular on lateral portion than preceding tergites and provided with two pairs of weakly developed, granular carinae. Pretergal portion, lateral margins and posterior margin entirely smooth. Sternite I-IV totally smooth, each provided with a pair of elongated, obliquely placed stigmata for book lungs. Sternite V also totally smooth.

Metasoma : Cauda slightly less than four times as long as carapace. Basal segment wider than long. Segments II-IV always longer than wide. Segment V more than twice as long as wide. Segment III as wide as deep. All carinae carinated. Segments I-III with dorsal, dorsolateral carinae weakly granular, but inferior lateral and inferior carinae entirely smooth. Lateral carinae present only on posterior portion of segment I. Segment IV with dorsal, dorsolateral, inferior lateral and inferior carinae weakly crenulated. Intercarinal space weakly granular. Anterior peduncle and posterior margin for each segment smooth. Segment V less than as long as carapace, carinated lateral carinae less distinct and developed on anterior portion only. Inferior lateral carinae



FIGS. 1705-1709. *Heterometrus* (*Chersonesometrus*) *pelekomanus* Couzijn.

1705. Patella, exterior view.

1706. Patella, ventral view.

1707. Manus and immovable finger, dorsoexterior view.

1708. Manus, ventral view.

1709. Immobile finger, interior view.

distinct, weakly crenulated on anterior portion, crenulation increased on posterior portion and sparsely serrated on $1/3$ of posterior portion. Single inferior median carina weakly and sparsely crenulated. Intercarinal space weakly granular. Anterior peduncle smooth. Anal rim of this segment evenly but sparsely crenulated and provided laterally with large triangular teeth as in text-fig. 1704. Telson longer than carapace but shorter than patella. Vesicle as long as segment IV, smooth on dorsal portion but ventral portion granular and granules arranged in four crests. Central median crest also granular. Lateral and ventral bands distinct, setation not clear. Aculeus shorter than vesicular length, stout, not much curved, sharply pointed as in text-fig. 1703.

Distribution : INDIA : Nilgiris, Tamil Nadu. (Nilgiris, Maharashtra by Couzijn is erroneous) (*Type-locality*); Mysore and Bangalore, Karnataka; Tirumalai Hills, Tirupati, Andhra Pradesh and near Bombay, Maharashtra.

Remarks : We have studied, described and illustrated on the basis of Holotype (σ) received from SMF (Forschungsinstitut Senckenberg, Frankfurt am Main), Regd. No. RII/1088/19.

99. **Heterometrus (Chersonesometrus) phipsoni (Pocock)**
(Figs. 1710-1724)

1893. *Scorpio phipsoni* Pocock, J. *Bombay nat. Hist. Soc.*, 7 : 370.

1899. *Heterometrus phipsoni* : Kraepelin, *Tierr. Scorp. etc.*, : 114.

1900. *Palamnaeus phipsoni* : Pocock, *Fauna Brit. India, Arachn.*, : 94.

1981. *Heterometrus (Chersonesometrus) phipsoni phipsoni* : Couzijn, *Zool. Verln.*, 184 :149.

General : Male large with stout pedipalp but narrowed on manus. Carapace weakly granular on lateral portion. Chelicera smooth. Pedipalp stout narrowed on manus as in text-fig. 1710. Legs carinated and granular on femur and patella. Pectines well developed. Mesosoma granular on lateral portion of each tergite.

Metasoma carinated, almost all carinae crenulated. Telson more elongated, granular and aculeus not much curved and stout at the base.

Body almost entirely black except dark brown on chelicera, legs and telson. Pectines dark yellowish.

Measurements : Total length 101.50 mm. Carapace 15.00 mm. long; Mesosoma 33.00 mm. long; Metasoma 53.50 mm. long.

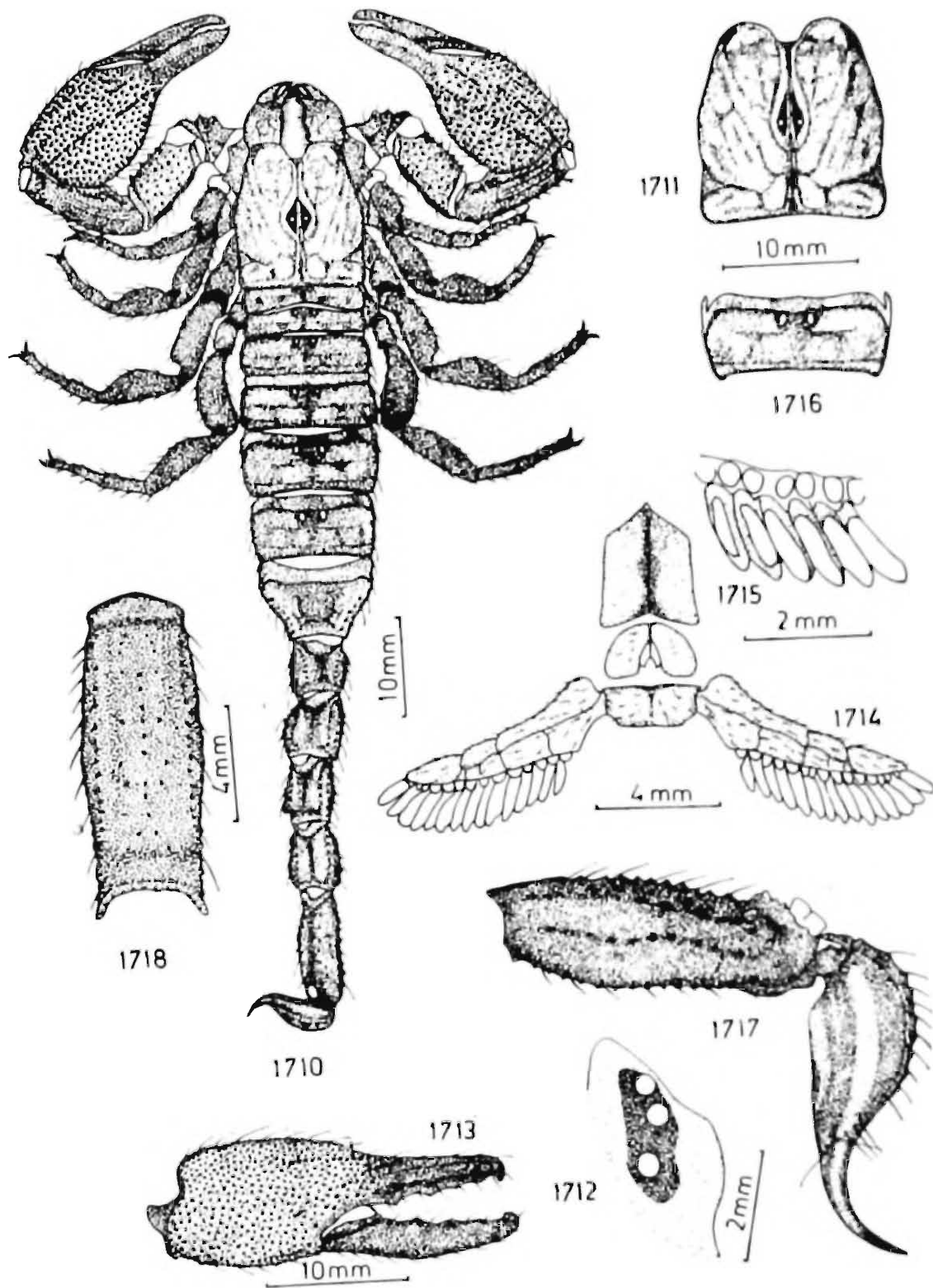
Carapace : Weakly granular on lateral portion. Interocular area also almost smooth except weakly granular on anterior portion. Lateral ocular tubercle smooth, elevated and provided with three contiguous lateral eyes as in text-fig. 1712. Median ocular tubercles with median suture and provided with a pair of median eyes, situated anteriorly in the ratio 1 : 1.1 as in text-fig. 1711. Anterior margin smooth, deeply notched in the middle. Lateral margins finely crenulated and supported with a sub-marginal granular ridge. Posterior margin smooth and almost straight as in text-fig. 1711. Posterior median, lateral and anterior median furrows distinct. Chelicera smooth on basal segment, ventral surface fully clothed with fine, silky hairs, extending on fingers. Fingers elongated, smooth and furnished with dentition characterized as in the family. Distal tooth on dorsal fang shorter than distal tooth on ventral fang. Pedipalp elongated, stout with slightly narrowed on manus as in text-fig. 1711. Femur longer than carapace, carinated and anterior dorsal, anterior ventral and posterior dorsal carinae sparsely granular and granules on inner dorsal carina tuberculate. Anterior or exterior surface granular and granules tuberculate. Intercarinal space sparsely and coarsely granular only on dorsal portion. Patella slightly longer than carapace, carinated and inner dorsal and exterior median carinae weakly granular. Intercarinal space smooth. Anterior or inner surface elevated and covered with few tuberculate granules. Manus shorter than femur but slightly longer than carapace and always longer than wide, carinated and only exterior marginal carina distinct, elevated and almost smooth; dorsal surface not much convex, fully covered with coarse but obsolete granules as in text-fig. 1713. Inner margin granular and all granules tuberculate, almost parallel to exterior

margin. Subdigital carina weakly distinct on distal portion and continued on immovable finger. Ventral surface weakly granular. Movable finger as long as patella but immovable finger shorter than carapace. Finger carinated but obsolete and furnished with broad, triangular, four to five teeth as in text-fig. 1713. Trichobothrial pattern on patella, manus and immovable finger as in text-figs. 1719-1724. Legs smooth on femur and patella but carinated and carinae weakly granular only on femur. Tibia smooth. Tarsomere I smooth, furnished with few spines on distal portion and a pedal spur. Tarsomere II smooth, lateral margins overlapping the base of claw, lobes, furnished with spines on ventral surface and spine formula on legs I-IV : $\frac{5}{7} \frac{5}{7}$, $\frac{5}{7} \frac{5}{7}$, $\frac{5}{7} \frac{5}{7}$, & $\frac{5}{7} \frac{5}{7}$. A pair of claws normal. Pectines well developed, slightly less than three times longer than wide. Middle lamellae subdivided into three digits. Fulcra distinct and triangular. Lamellae and fulcra clothed with microscopic setae. Teeth elongated, tubular, not much tapering on distal portion as in text-fig. 1715, and 15/15 in number as in text-fig. 1714. Basal piece smooth, notched on middle portion of anterior margin. Genital operculum wider than long and sclerite not fully separated in the middle and a pair of male genital papillae conspicuous and visible after lifting the operculi. Cephalothoracic sternum pentagonal, longer than wide, smooth and furnished with a median suture as in text-fig. 1714.

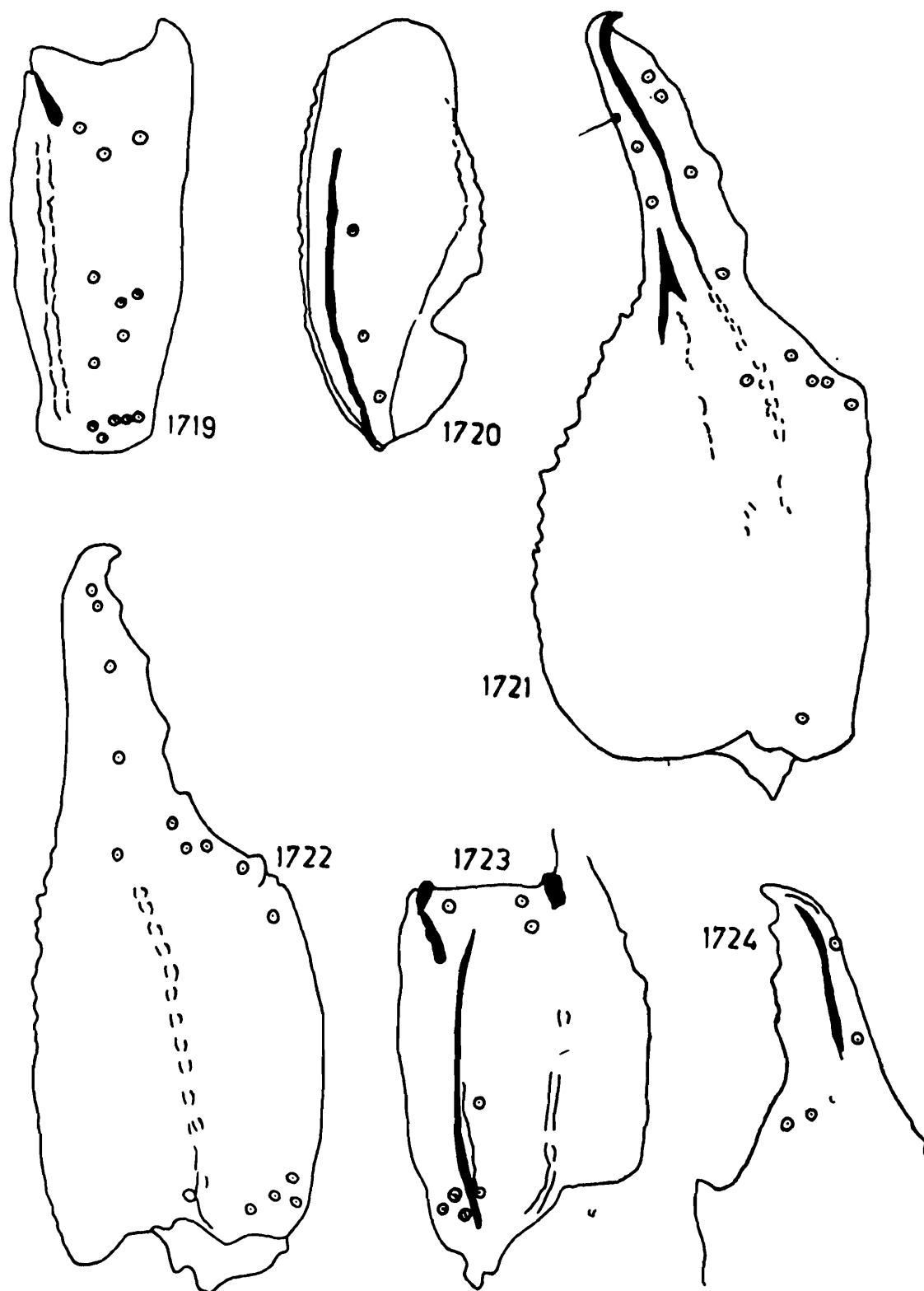
Mesosoma : Tergites I-VI smooth, without carina as in text-fig. 1716. Posterior and lateral margins smooth. Tergite VII weakly granular on lateral portion and provided with a pair of weakly crenulated carinae, distinct only on posterior portion as in text-fig. 1710. Lateral margins finely crenulated. Posterior margin smooth. Pretergal portion smooth and also smooth on

FIGS. 1710-1718. *Heterometrus (Chersonesometrus) phipsoni*
(Pocock)

- 1710. Dorsal view of male.
- 1711. Carapace, dorsal view.
- 1712. Lateral eyes, lateral view.
- 1713. Manus and fingers, exterior view.
- 1714. Pectines, genital operculum and cephalothoracic sternum, ventral view.



1715. Pectinal teeth and fulcra, ventral view.
 1716. Tergite, dorsal view.
 1717. Metasomal segment V and telson, lateral view.
 1718. Metasomal segment V, ventral view.



FIGS. 1719-1724. *Heterometrus (Chersonesometrus) phipsoni* (Pocock)

- 1719. Patella, exterior view.
- 1720. Patella, ventral view.
- 1721. Manus and immovable finger, dorsoexterior view.
- 1722. Manus and immovable finger, exterior view.
- 1723. Manus, ventral view.
- 1724. Immovable finger, interior view.

posterior margin. Sternites I-IV smooth and each provided with a pair of elongated, slit-like stigmata for book lungs. Presternal portion weakly distinct and smooth. Lateral and posterior margins smooth. Sternite V entirely smooth. Lateral and posterior margins smooth. Presternal portion smooth and also smooth on posterior margin.

Metasoma : Cauda slightly more than three and a half times longer than carapace. Basal segment wider than long. Segments II-IV longer than wide. Segment V slightly more than twice longer than wide. Segments I-IV with dorsal, dorsolateral carinae crenulated and inferior lateral and inferior carinae smooth. Lateral carinae weakly distinct only on segment I and represented by few granules on posterior portion of segments II and III. Intercarinal space weakly granular. Anterior peduncle and posterior margins smooth. Segment V with dorsolateral carinae distinct but weakly granular. Inferior lateral and single inferior median carinae serrated but more serrated on posterior portion. Intercarinal space weakly granular but more granular on dorsal portion. Anterior peduncle smooth. Anal rim of this segment weakly but evenly serrated on ventral portion and furnished with a broad tubercle on lateral portion as in text-fig. 1717. Telson longer than segment V but shorter than carapace. Vesicle more than as long as segment IV but less than as wide or deep as segment V, more tapering on distal portion, entirely smooth except on ventral median and ventral lateral crenulated crests. Lateral and ventral bands not much distinct and fully covered with long bristles. Aculeus stout, not much curved, slightly more than half the length of vesicle, shorter than segment I, sharply pointed as in text-fig. 1717.

Distribution : INDIA : Shaveroy Hills, Madras (*Type-locality*), Tamil Nadu; Dists. Raigad, Thana, Ratnagiri, Kolhapur and Nasik, Maharashtra.

Remarks : We have examined the type (1 ♂) received from B.M. (N.H.), London, Regd. No. nil. The present description and illustrations are based on the type.

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