

THE FAUNA OF INDIA AND THE ADJACENT COUNTRIES

CRUSTACEA : ONISCIDAE

By

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Edited by the Director, Zoological Survey of India.

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EDITOR'S PREFACE

The wood lice or pill bug belonging to family Oniscidae of the Order Isopoda are highly specialised group of Crustacea which have completely adopted to terrestrial mode of life. This is one of the few groups of Crustacea which has received very little attention by the zoologists in past and our knowledge on Indian fauna is mainly confined to the workers of Stebbing (1911), who initiated the work Collinge (1914-17), who described most of the species, and Chopra (1923-24) who added few more species and more recently of Ramakrishna (1969-70).

The present volume, is the first comprehensive work on the group, which is the result of the author's two decades of work and deals with 30 species under ten genera of the family Oniscidae. It is expected that this consolidated document will present an overall picture of this little known group. I would like to place on record my deep sense of appreciation to the author, Shri G. Ramakrishna for this present work.

January, 1995
Calcutta

A. K. GHOSH
Director
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AUTHOR'S PREFACE

The terrestrial Isopoda, Oniscidae are one of the specialised group of animals that pertain to class Crustacea, includes many parasitic and cave dwelling and mermecophilous species. Hitherto, literature on the group was scattered and little attention was paid to their taxonomic studies at compared to other Crustacean groups namely prawns and crabs. Though the group as such have monographic publications by eminent authors viz. Barnard, Budde-Lund, (1885-1912) Chilton, Collinge, Richardson (1904-1922), Sars (1899), Vanname (1936) and Ver hoeff literature is inadequate.

The present volume on Fauna of India-Oniscidae deals with thirty species of terrestrial Isopods pertaining to ten genera. One species new science has been described in recognition of the selfless service and to encouragement rendered by my wife, Smt. Indira. A detailed account of general structure, adaptation to the terrestrial habits, collection, preservation and labelling, origin and distribution, food and keys to the families, genera and species are as far as possible have been included. The Fauna also contains the diagram of every species dealt with.

I wish to take this opportunity to express my great thanks to Dr. S. Khera, Joint Director (in-charge) and the Department of Environment, Government of India, for assigning this work to me. I also wish to thank Dr. B. K. Tikadar, Director, Zoological Survey of India, in appointing me as the Emeritus Scientist during the period of which the bulk of the work was completed. Further, I wish to express my indebtedness to Dr. A. K. Ghosh, Director of Zoological Survey of India for the facility such as the laboratory, library, artists and other facilities, encouragement as in-charge of the Fauna of India unit.

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G.Ramakrishna

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INTRODUCTION

The Isopods are one of the specialised group of animals that pertain to Class Crustacea and treated as an Order of Sub-class Malacostraca of the highly evolved Crustacea group. These along with their closely related group Amphipoda, are placed under a Super-order Arthorstraca, which are characterised by segmented condition of thorax and related sessile eyes.

This order is the largest among the Crustaceans, apart from Decapoda. While most of the 4000 (approximate) known species are marine, the freshwater's terrestrial species also contribute significantly. The wood lice or pill bugs, belonging to subfamily Oniscidae are the only large group of terrestrial crustaceans. This interesting and fairly diverse order is the only group of crustaceans that, in addition to marine and freshwater inhabitants, has evolved several true terrestrial species in all stages of development independent of the marine or freshwater environment, these terrestrial forms are placed under suborder Oriidea.

Isopods differ most significantly from other highly evolved Malacostraca in that the dorsal plates of the segments of the anterior parts of the body are not extensively fused into an immovable carapace ; generally immovable fixed unstalked eyes and usually of much smaller size, say measuring an approximate marginal length upto a maximum of 30 mm, and larger dimensions by only very few.

The Isopoda are closely related to Amphipoda but can be distinguished by the following characters :—While in Isopoda, the body usually is somewhat flattened and dorso-ventrally compressed it is more or less compressed from side to side or laterally in amphipods. Abdominal appendages are usually reduced to flattened plates and modified for respiratory purposes in Isopods while in the Amphipoda, the first three pairs of abdominal appendages form short swimming feet and the last three are modified into processes for hopping and sudden jerks either on land or water. However, in both the groups the eggs and developing young ones are carried by the mother in a broad pouch (marsupium) formed by overlapping plates like outgrowths called oostegites. Both groups comprise marine and freshwater forms. In addition, while Isopods have one large group namely, Oniscoidea comprising completely terrestrial forms, only one family of Amphipoda viz. Orchestidae include well known beach fleas acquired terrestrial habitat.

HISTORICAL REVIEW

Very little was known about the Isopod fauna of India prior to the establishment of the Zoological Survey of India in 1916. It was Stebbing (1907) who initiated the study on Indian Isopods by publishing an account of the genus *Tachaea* and described a new species of the genus from Calcutta. He later (1911) gave a detailed account of Indian Isopods and dealt with two genera of the Tribe Flabellifera and five genera of the tribe Oniscoidea (Terrestrial). Two new genera viz., *Parapericyphus* and *Exalloniscus* were described by him as new to science, based on the material collected from different parts of the country.

It was, however, not until Collinge entered the field and made several contributions that the work received adequate attention. Collinge (1914) published an account of three species pertaining to three genera viz., *Philoscia*, *Parapericyphus* and *Cubaris* collected from Port Blair, Andamans and from the Annamalai Hills about 4000 ft. above sea-level. He again (1912-22) contributed two papers on the terrestrial Isopods obtained from the Abor Expedition. While working out the material, he came across two genera new to science viz., *Rotungus* and *Burmoniscus*, the former obtained from Kobo. Abor country at an altitude of 400 ft. and the latter from the caves near Moulmein. Apart from these two genera, he also described six other species of which three happened to be new to science.

His next contribution to our knowledge of terrestrial Isopods of India dates back to 1914, when he worked out the collection received from Madras Province. Of the ten species dealt with nine species were new to science. *Ennurensis hispidus* and *Hemiporcellio carinatus* stand significant among this collection. Collinge (1916) published another article on the same subject and described 13 species all of them being new to science, pertaining to the genera *Parapericyphus*, *Cubaris* and *Burmoniscus*. *Burmoniscus kemp* was collected from Maosmai cave near Cherrapunji at an altitude of 4,000 ft. This was the second species of the genus *Burmoniscus* found in a cave, the other being *B. mouimeinus*. He, later, (1917) described another new species of the genus *Synidotea* from the Gulf of Mannar.

Subsequently, Chopra (1923) contributed a monumental monograph on the Bopyrid Isopods of Indian Decapod Macrura. Till then, nothing was known on the Bopyrid Isopod parasites of India and also of the neighbouring countries. These were, however, common in

Indian waters since almost all the species of Caridean prawns generally available in Calcutta markets were infested with them. The fauna of Bopyrids is rich in the number of species and also in the number of some individual species. 33 species pertaining to 13 genera were described by him, collected mostly from the Andaman Islands, Delta of Ganges, Madras and other areas.

Later, he (1924) worked out the fauna of Siju cave and described four species of terrestrial Isopods belonging to three genera and two families viz, Oniscidae and Armadillidae. The cave fauna between 300 to 500 ft, from the entrance had the richest fauna and this was true of Isopods too. So far as characters associated with cave-life go, the three species of Isopoda collected in the Siju cave do not show an advanced degree of adaptation to their environment. Of the three, *Philoscia dobakholi* Chopra shows the greatest modification ; its colour is almost totally bleached and the eyes are partly reduced. In *Cubaris cavernosus* also the eyes are considerably reduced, but the colouration does not show any indication of a subterranean life. The species lives, however, almost upto the inner end of the cave. The third species (*Porecellio assamensis*) does not seem to have succeeded in penetrating to any great depth. It has well developed eyes and is dark coloured.

Two Myrmecophilous Isopods collected from Barkuda Islands, Chilka Lake were then described by Chopra (1924) brought by Annandale. Of the two, *Cubaris granulatus* was not known to be associated with ants earlier. The species is perhaps only a casual visitor in ants nests and may have taken this mode of life recently. *Platyarthrus aeropyga* on the other hand shows some adaptations indicative of a subterranean existence. It is almost perfectly white in colour having only scanty pigmentation on the exterior and is totally blind. Chopra (1930) further contributed another interesting paper on the Bopyrid Isopods on Indian Decapod Macrura. The collections included 12 species pertaining to 7 genera collected mostly from Andaman and Nicobar group of Islands, Delta of Ganges, Gulf of Mannar and Bombay.

Chilton (1926) described several species of Isopods and Tanaidacea based on the collection obtained from a tour in the Far East.

Barnard (1935, 1936) reported on some Isopods Tanaidacea, and Amphipoda based on the collection obtained by the R. I. M. S. Investigator. The collections contained littoral, shallow-water and deep-water species from localities in the whole Indian region extending

from the Mergui Archipelago in the east to the Arabian sea and mouth of Persian Gulf in the west. The collection contains 34 species of which seven were described as new to science, one of which is a littoral wood louse. Verhoeff (1936) also dealt with several species of terrestrial Isopods collected from Madras and other parts of South India. He further described a new species of the genus *Protracheoniscus* from Ladakh.

Chopra (1947) gave an account of the first occurrence in India of the ancient suborder Phreatoicoidea (Crustacea : Isopoda), based on material received from Dr. M. Sharif of the Haffkine Institute in 1946 collected in a pucca well at Lohagara Railway station, eighteen miles from Allahabad. Later, several, specimens pertaining to this group were collected from the wells at Banaras (U. P.). This suborder is known to have a very interesting distribution, being somewhat plentiful in Australia, Tasmania and New Zealand and having been found outside this region only in Cape Province of South Africa. Its occurrence in South Asia was, therefore, considered to be of particular significance. Chopra and Tiwari (1950) described a genus *Nichollsia kashiense* from the material collected from the well in the outer lawn of the Kaiser Castle, Banaras Cantt. Subsequently Tiwari (1952) dealt with in detail the morphology of *Nichollsia kashiense*. He (1953) described a new species of the rare Cymothoid genus *Agarna*, parasitic on the Clupeid fish *Nematolosa nasus* in the Bay of Bengal. Later, Tiwari (1955) described yet another new species of *Nichollsia*, viz., *N. menoni* collected from an abandoned well at Monghyr (Bihar). Tiwari (1955) contributed yet another article erecting a new family Nichollsidae to accommodate the genus *Nichollsia* of the suborder Phreatoicoidea based on the preserved material.

In recent years, Ramakrishna (1970) contributed a paper on the terrestrial Isopods collected by Dr. Jayaramakrishnan in the Kameng Division of the North Eastern Frontier Agency. Although few in numbers, the collection includes fascinating forms. It consists of four species belonging to four genera viz., *Porcellio*, *Philoscia*, *Porcellionides* and *Cubaris*. Of the three genera pertaining to the family Oniscidae, *Porcellio* and *Philoscia* were collected from a comparatively higher altitude viz., 6,500 ft, and 6,600 ft. (1,982 and 2,013 metres), while *Porcellionides* was collected from 2,000 ft. (610 metres) .

The family Armidillidae is represented by a single species viz., *Cubaris marmoratus* Collinge in the collection and was collected from

an altitude of 6,500 ft. Of these species, *Philoscia muscorum* is reported for the first time from the Kameng Division of NEFA and indeed from India.

Subsequently, Ramakrishna (1969) described a new species of *Philoscia* based on material received from Shri Azeez, Entomologist, Coal Mines Welfare Organisation, Dhanbad. The material consisted of four specimens (one male and three females) collected from a pit and the surrounding galleries of Lodna Colliery, 13 km from Dhanbad, Bihar State.]

The terrestrial Isopoda

Suborder : ONISCOIDEA

The most familiar members of the Order Isopoda are the terrestrial forms pertaining to suborder Oniscoidea, popularly known by various names, such as wood lice, slators, sow bugs or in the case of those that roll up, as pill bugs. These animals, in general appearance look almost like insects, but can be very well distinguished from them with their large number of legs, to be specific seven pairs and other characters.

The terrestrial isopods are rather quite small, seldom exceeding 20-25 mm. long. They are rather slow moving and can roll up into a complete ball when frightened or accosted, thus making itself secure by protecting their delicate appendages and other under parts exposing only the hard chitinous plates of the back.

The terrestrial Isopods are found only at places where certain amount of moisture exists, namely in almost any dark and damp situations, close to residential houses, such as cellars, out-houses, around walls, cisterns, water tanks and boards, stones and other corners. They occur in large numbers in green houses, herbarium and under pots of horticultural plants. They are also found beneath the bark of decaying and dead wood and also among decaying vegetable matter, moss and leaf litter in forests. In addition some of the terrestrial forms occur amidst rocky beaches (such as *Ligia*, *Alloniscus*) etc.) which can bear a little amount of salinity and as denizens of desert environments (like *Hemilepistus* and some species of *Porcellio*).

ADAPTATION TO TERRESTRIAL HABITATS

Almost all terrestrial isopods are believed to have invaded land

directly from sea rather than by way of freshwater and have come to occupy a wide range of habitats and in exhibiting varying degrees of tolerance to desicating conditions.

Majority of the land isopods possess some form of adaptation or the other to reduce water loss, but the group as a whole is not sufficiently adapted for the purpose as compared to other terrestrial arthropods. They do not possess a waxy cuticle of the type found in insects and spiders which is responsible for minimising water evaporation through the integument. The thin ventral layer of exoskeleton is the primary site of evaporation and the ability of Oniscoids to roll up into a ball is perhaps another adaptation to reduce the water loss.

The eyes of wood-lice are poorly developed perhaps correlated with their nocturnal and sensitive behaviour and their diet of decaying vegetation.

The cave dwelling habit of certain species of land isopods brings in a bit of natural adaptation in them. Among the cave dwelling isopods described so far, from India only *Philoscia dobakholi* Chopra found between 600 to 3600 feet inside the siju cave Meghalaya shows greatest modification, though it does not show an advanced degree of adaptation to its environment. Compared with other Cavernicolous species its colour is almost bleached and the eyes are considerably reduced. In *Cubaris cavernosus* Collinge, the eyes are reduced but the colour of the animal is not very abnormal.

Among the Myrmecophilous isopods collected from Barkuda Islands, Chilka lakes (Orissa) and described by Chopra (1924) *Platyarthrus acropyga* Chopra shows adaptation indicative of a subterranean existence. The specimens are almost perfect white in colour, having only scanty pigmentation on the exterior and is totally blind, thus showing adaptation of a subterranean habitat.

GENERAL STRUCTURE

The terrestrial Isopods (Oniscoidea) in particular have three prominent divisions of the body viz. the head which is short and attached to the first segment of the thorax, the principal part of the body, consisting of the seven segmented thorax, and an abdomen composed of six segments which are smaller. The terminal segment of the abdomen constitutes Telson which bears its appendages, a pair of short, stout stylets and the Uropoda each with a two jointed terminal branch.

The head or Cephalon bears a pair of lateral sessile, compound eyes unlike stalked eyes among other Malacostracan. It also bears a pair of jointed antennae. The mouth parts are on the interior side.

Each segment of thorax is provided with a pair of walking legs.

The first five segments of the abdomen are provided each with a pair of pleopods or Swimmerets which are overlapping and plate like in structure. In the males, the first two pairs of pleopods are modified and act as the sexual organ. Some or all the pleopods are provided with vascular inner leaf like plates serving as organs of respiration.

Females, may be differentiated from males by the lack of modifications found in the first two pairs of pleopods and also by the presence of a broad pouch or marsupium, which usually bear eggs (usually not very large) in number and the hatched young ones until they are able to move about.

The embryology of terrestrial isopods has been studied thoroughly. The development is by far direct and larval stages do not differing much from the adult. However, the seventh thoracic segment or Somite, specially the pairs of legs it bears long behind the preceeding six in development, thereby indicating a stage with six pairs of legs is passed through in the process of development.

As in most other Crustaceans, the external surface of the body and its appendages are covered with the chitinous integument secreted by the external epithelium of the body which get strengthend and hardened in the larger species by calcareous deposition. The integument or exoskeleton is shed or moulted at periodic intervals to allow growth.

The dorsal surface of the body and the head are sometimes covered by rough structures such as granules, tubercles, warts pubescence of hairs or setae and in same case by spines also as in *Porcellio spinicornis* Say, *Hemilepistus Klugii* (Brandt).

Majority of the members of Oniscoidea exhibit more or less deep coloured dorsal surface with varying tinges of brown, grey, black or sometime purple pigments that contrasts with the lower part of the body which is usually provided with lighter pigments or sometimes devoid of pigments. Exception to the rule—exist among terrestrial isopods living in darker situations such as caves, where the dorsal surface is practically devoid of any pigmentation and are at pale yellow or white in colour.

CEPHALON OR HEAD

The head or cephalon is a single segment, though it is a fusion of five segments. According to certain other views, the head is composed of seven segments, considering the antenna and the eyes to be representing appendages of two somites.

The eyes are sessile and not stalked as in other higher Crustaceans and composed of number of ocelli. However, they appear as small black spots and occasionally totally absent in the cave dwelling forms such as the species *Philoscia dobakholi* Chopra.

In Oniscidae the first pair of antennae or antennules are small and composed of two or three joints as compared where these are well developed and several jointed to. These are situated in between the second pair of antennae, instead of being placed in front of it.

The second pair of antennae on the other hand are large and well developed and composed of a "Peduncle" consisting of five distinct movable joints. The basic two joints are short, third and the fourth long, the fifth being largest of all, and a flagellum or a slender terminal part composed of two or three joints or articles. Where as in primitive terrestrial and aquatic Isopods the joints are several in number. The antennae are situated in lower down the face than the eyes and somewhat nearer is the median line.

The buccal cavity is situated on the lower side of the head and occupied by the frontal single lamina, the clypeus and below it the labrum or the upper lip. While the above unpaired structures occupy the upper frontal portion of the buccal cavity, the four paired appendages occupy the other parts of the buccal cavity. All the above together constitute what is known as "Mouth parts".

Among the four pairs of appendages, the first is termed mandibles or the masticatory organs. The mandibles terminates in a curved process, the tip of which a few strong teeth. The mandibles do not have jointed palps, unlike other isopods.

Next to these are two pairs of 'Maxillae'. The first pair of maxillae are usually flat and composed of two main joints termed inner and outer, which are attached to a slender and transverse basal segment. While the outer joint bears on its truncated terminal edge a row of eight or more curved teeth, the inner one bears two or sometimes more brush-like tuft of setae.

The second maxillae though not having distinct inner and outer joints, has a partial indications of two branches. They are short without any trace of teeth whatsoever.

The last appendage of the head, placed well behind the second pair of maxillae are a pair of maxillipedes. These are also flattened as in the two pairs of maxillae, their median sides are straight and fit closely so as to serve as a cover for other mouth parts and constitute the lower surface of the buccal cavity. They bear at their terminal portion, a short flat palp composed of several joints.

The head is almost oval in certain genera namely *Philoscia* and *Alloniscus* and composed of three distinct lobes, a median broader one and two large well developed or smaller ones just above the eyes, termed as lateral lobes as clearly existing in the genera such as *Porcellio* and *Oniscus*. In other forms it is almost straight on the anterior end, while its lateral and posterior sides indicate almost oval shape as in the genus *Porcellionides*. The head is attached to the first thoracic somite directly allowing the animal up and down movements and to a little extent lateral motion.

According to prevailing usage, the upper part of the face above the frontal line is termed the forehead or frons. This part merges above and behind so as to form vertex. The area of the face below the frontal line upto the beginning of the clypeus is termed as *Epistome*.

THORAX

The thorax also termed Mesosome or Paereon is situated in between head and the abdomen and truly represents the main part of the body. The thorax consists of seven separate segments, each somite bearing a pair of appendages known as legs (walking legs or paereopods). All the seven pairs of legs are similar in their structure and hence known as Isopods i.e. equal legged), although they gradually are larger towards the posterior end of the body. However, there may be slight change in the form of joints or arrangement and number of spines borne on them, especially in the three anterior pairs.

Each leg consists of six moveable joints named as basis, Ischium, merus carpus, propodus and Dactylus being the distal part.

The thoracic segments lateral extensions are known as *Epimera*. These extensions increase the width of the body.

The first thoracic Somite is the largest and the largest compared with other six and their lateral extensions or Epimera cover up the postero-lateral part of the head. The Epimera of these successive segments fit into other.

ABDOMEN

The abdomen is placed behind the thorax. It is composed of six smaller segments termed also as metasome or pleon. The first two somites in the Oniscoidea are generally small and covered by epimera of the seventh or the last thoracic segment. However, the succeeding three abdominal segments have very well developed epimera which are backwardly curved.

The sixth abdominal segment is also termed as 'Telson, which is generally a small and triangular V shaped *structure* occasionally truncated.

The abdominal appendages namely five pairs of pleopoda and a single pair of uropoda, are significant. Each pieopod consists of a basal joint called protopodite with an attached inner endopodite and an outer expodite, usually of one joint and a flattened or leaf-like in structure. While the endopodites are soft and vascular and respiratory in function, except those of the first and second pair in the males which are modified as elongate stylets for copulatory purposes. The expodites on the outer plates are chitinous in nature and serve as protective covers or opercula. In the males of higher terrestrial Isopods as in the members of the families Oniscidae and Armadillidae the two pleopods of the first pair together with a median male sexual appendage between them are united into a single structure.

In the less specialised families such as *Ligiidae* and *Trichoniscidae* and members of other families the expodites serve as protective cover and moisture conserving function. But the pleopods in the terrestrial Isopods do possess *Tracheae* or respiratory air tubes in the first two pairs or all the five ^{*}pairs.

In certain genera, however, namely *Philoscia* and other related forms, there are no tracheae in the expodites and their respiration is carried out by the delicate cuticle and as such they are less developed and obvious from its fragile nature.

The Uropoda or of the sixth abdominal appendage, usually associated with the Telson, are well developed and consists of a basal joint known as protopodite, generally short and wide. The basal joint

bears two styliform branches of single joint each, the outer exopodite and the inner endopodite. The outer branch is generally longer and stouter compared to the inner namely endopodite. But in specialised forms of Oniscidea, in which the body assumes rolling habit both the branches are reduced.

COLLECTION AND PRESERVATION

The terrestrial Isopoda are found on land. They are also common in Mangrove forests and swampy areas. Several species of terrestrial Isopods are found in the garden underneath dead and decaying leaves and in the soil and a few forms occur in caves.

Terrestrial Isopods which live in damp places in the soil under decaying vegetation and underneath stones can be collected by small forceps and camel hair brush or by using baits.

ORIGIN AND DISTRIBUTION

Though Isopods are moderately an old group, their size and delicate structure have not been favourable for their preservation as fossils. Some of existing families of the sub-orders Flabellifera and Valvifera are found to occur in jurassic and later formations. All the earlier forms are aquatic in nature, mostly marine, from which freshwater and terrestrial Isopods have evolved.

The terrestrial forms of Isopods are known only from the upper Eocene and more recent formations. Even the earliest described Isopods are referable to the existing families namely Oniscidae etc.

Evolution of freshwater Isopods appears relatively simple with the exception of the family Asellidae. These forms appeared to have acquired a fresh water habitat comparatively in recent years and also evolved independently.

Asellids, however, obviously been inhabitants of freshwater and have undergone differentiation, with the formation of several genera and species. Since evolved from marine habitat, they are probably of old world origin and reached other parts of the globe subsequently.

As far as Oniscoidea is concerned, there has been very little evidence as to how different families have evolved and connected Phylogenetically.

Among the terrestrial oniscoids Isopod families the Ligiidae are regarded as the most primitive family on account of the structure

of their respective organs morphology of the head and other parts and from their amphibious habits. The latter characters may have been secondarily acquired, for they have legs which are specialised for terrestrial habits.

The members of the family Tylidae though somewhat primitive in character, are an aberrant lateral branch with some highly specialised characters. The problem of origin and distribution of the remaining terrestrial Isopods are more confusing and difficult though the members of the family Oniscidae appears quite highly evolved with distinct characters of its own.

FOOD AND FEEDING HABITS

Wood lice feed during nights mostly on vegetable matters with algae, fungi, moss, bark and any type of decaying vegetable and occasionally on animal matter. Those species which act commensal in ant nests, feed on faecal matter of the host. A few wood lice are carnivorous.

There is a possibility that the woodlice are capable of carrying and transmitting various parasites injurious to man.

ECONOMIC IMPORTANCE

Hitherto, the studies on economic importance of terrestrial Isopods received practically no attention in the country. Even among the Western countries, specially, different parts of Europe and North America, the attention received on the subject is far from adequate. There are a few published observations on the group which reveal considerable damage caused as such to horticulture and couple of agricultural plants. Some of these terrestrial species are reported to occur in orchid houses and in furneries. It is also observed in green houses and conservatories where it does considerable damage.

Several vegetable gardens comprising potatoes, field beans, cucumbers, lettuce, redish, mustard, mushroom and some fruits as straw-berry or other among which these Isopods are reported to have occurred in large numbers and acted as their pest.

Even cotton plants and lime trees, where it was stated to be damaging the barks (Collinge 1914), are not spared and it is reported to cause extensive damage specially cotton plants in America (Pierce).

Personal observation of the Author of a couple of species of Oniscidae Isopods in the roof garden at his residence specially among

horticultural plants do not indicate any damage as such, though their population is quite considerable under the flower pots and around.

CLASSIFICATION

In many sub-orders of the Isopoda the metasomatic appendages are unsatisfactory as a criterion for separating both the genera and the species from the fact that they exhibit too wide a range of variation except for the character of telson and uropoda due to

- (1) The great variation in adults.
- (2) The differences in two sexes.
- (3) The wide variation in the young.
- (4) Environmental and geographical differences.
- (5) Their non-homotypical nature and
- (6) A sixth but perhaps less important reason may be that these appendages occurring to their wide range of variation and function in the Crustacean, generally do not offer a sound morphological feature helpful in comparing and contrasting the various sub-classes and orders of the class Crustacea, whereas the form of the cephalon, the mesosome and their appendages do. The only real valuable feature of metasomic segments in most of the sub-classes is the last one, Telson and uropod. The classification of class Crustacea-terrestrial Isopoda is as follows dealt within this fauna.

Class : CRUSTACEA

Order : ISOPODA

Sub-order : ONISCOIDEA

Key's to the Families of ONISCOIDEA

1. Mandibles with well developed molar. Inner lobe of first maxilla with 3 plumose setae. ...
2. Uropoda elongate exposed, first antenna three jointed, mobile. ...
3. Flagellum of second antenna many jointed two penis. ...

Ligiidae

- | | | | |
|-----|--|-----|----------------|
| 4. | Flagellum of second antenna usually not more than six jointed. A single penis. | ... | Trichoniscidae |
| 2a. | Uropoda opercular, concealed under the telson. | | |
| | First antenna single jointed, immobile. | ... | Tylidae |
| 1a. | Mandibles without molar, its place taken by a brush-like seta or tuft of setae. | ... | |
| 5. | Inner lobe of first maxilla with two plumose setae. | ... | 6 |
| 6. | Maxillipede with palp large, well developed the inner plate acute. | ... | Detonidae |
| 7. | Maxillipede with palp small, feable, the inner plate truncated. | ... | 8 |
| 8. | Uropoda produced, reaching beyond Telson, which is usually narrow and conically produced. Usually unable to conglobate or roll into a complete ball. | ... | Oniscidae |
| 9. | Uropoda short, not reaching beyond telson, which is usually short and broad. Usually conglobate or able to roll up into complete ball. | ... | Armadillidae |
| 5a. | Inner lobe of first maxilla with 5-15 plumose setae. | ... | Eubellid |

Family : ONISCIDAE

1885. Oniscidae (Part) Budde-Lund. *Crust. Isop. Terr.* p. 75
1898. Oniscidae Sars, *Crustacea of Norway* 2 : 169,
1904. Oniscidae (Part) Budde Lund, *Revision Crust Isop. Terr.* p. 34
1905. Oniscidae Richardson *Bull. U. S. Nat. Mns*, 54 : 592
1932. Oniscidae-Barnard. *Ann. South African Mus.* 30 (2) : 224
1936. Oniscidae-Van Name *Bull, American Mus, Nat. Hist* 71 : 105.

Body oval or oblong with lateral parts of segment expanding, rather convex, scarcely contractile or conglobate. Eyes generally well developed and compound. Antennules small, second antenna slender with flagella of one to four joints.

Genus Oniscus is a very small genus, comprising of a few old world species one of which is reported in America. It is rather surprising that this mainly European species is not at all recorded, so far, from the Indian, even though efforts have been made to collect the terrestrial Isopods both intensively and extensively from different parts of the country, including the North-Western region, such as Kashmir including, Ladakh, Punjab, Haryana, Himachal Pradesh, Rajasthan and Western Uttar Pradesh from where palaearctic species are reported.

Keys to the Indian Genera of The Family ONISCIDAE

1. Flagellum of second antenna composed of two or three joints. ...
2. A external ramus of pleopods with no special respiratory organs. ...
- 1a. Flagellum of second antennae with three joints. ...
3. Pleon (abdomen) not much narrower than peraeon. The epimeral plates well developed. Uropoda long and cylindrical. ... *Alloniscus* Dana
4. Uropoda short, stout and non-cylindrical ... *Exalloniscus* Stebbing
- 3a. Pleon abruptly narrower than peraeon, the epimeral plates small. ... *Philoscia* Latrille
- 2a. External ramus of first and second pairs of pleopods furnished with respiratory organs, namely Trachaeae.
5. Flagellum of second pair of antenna two jointed. ...
6. Abdomen not abruptly narrower than thorax. Epimera of abdominal segments large.
7. Second antennae long, first joint of the flagellum generally longer than the second. Outer branch of Uropoda flattened. ... *Porcellio* Labrielle
- 7a. Second antennae considerably short, first joint of flagellum longer, outer branch of the uropoda cylindrical. ... *Ennurensis* Callenge

- 5a. First joint of flagellum of second antenna generally longer than the second, last abdominal segment reaches beyond the epimera of the preceding segment.
- 2b. The external ramus of the first and second Pleopods, rarely the third, with tracheae ... *Porcellionides*
Miers
- 2c. External ramus of five pairs of pleopods provided with tracheae.
8. Pleopods very small, their opercular rami more or less rectangular and devoid of air cavities. The first three segments of thorax with a row of blunt teeth on their posterior margin. Lateral margin with four to five large warts. Eyes small with ocelli arranged in three longitudinal rows.
9. Distal joint of flagellum of second antenna longer than its proximal. ... *Tracheoniscus*
Branelt
- 9a. Flagellum of two unequal joints. The proximal longer than distal. ... *Hemilepistus*
Budde-lund
- Thoracic segments provided with longitudinal carinae from end to end somewhat distinct and prominent.
- 9b. Flagellum short and pyramid shaped as long as the fifth segment and formed of two unequal parts, basal short and terminal conically tapering. Eyes absent. ... *Platyarthrus*
Vannams

Genus 1. *Alloniscus* Dana

1854. *Alloniscus* Dana, *Proc. Ac. Philad.*, 7 : 176.
1885. *Alloniscus* : Budde-Lund, *Crust. Isop. Terr.* : 224.
1904. *Arhina* : Budde-Lund, *Rev, Crust. Isop. Terr.* : 44.
1905. *Alloniscus* : Richardson, *Bull. U. S. Nat. Mus.*, 54 : 593.
1912. *Alloniscus* : Budde-Lund, *Trans. Linn. Soc. London*, 15 : 385.

1915. *Arhina* : Collinge, *Rec. Indian Mus. Calcutta*, **11** : 147.
 1916. *Alloniscus* : Chilton, *Mem. Indian Mus.*, Calcutta, **5** (5) : 474.
 1922. *Alloniscus* : Collinge, *J. Linn. Soc. London*, **35** : 108.
 1928. *Arhina* : Jackson, *Proc. Zool. Soc. London*, : 582.
 1932. *Alloniscus* : Barnard, *Ann. South Afr. Mus.*, **30** (2) : 231.

Characters : Body fairly convex, scarcely contractile. Head discrete and front of the head produced in the centre and at the sides into tubercles, the lateral being quite prominent. Epistome swollen and slightly carinated. Flagellum of Second pair of antennae three jointed, with three articles. Epimeral plates of thoracic segments small, but not much expanded. Abdomen not abruptly narrower than the thoracic segments. Pleural lamellae of the third, fourth and fifth segments large. Legs spinulose. Uropod, peduncle with outer edge entire.

Type-species : *Alloniscus coecus* Dollfus

Distribution : The genus contains a number of very closely related species distributed from California (United States) through Indo-Pacific region to Madagascar and South Africa. According to Budde-Lund, the genus is also found in many localities in the East Indies.

Keys to the Indian Species

1. Surface of the body smooth but for coloured thorax.
2. Head convex with a broad and prominent median lobe and lateral process broadly rounded. Greatest width half the length ...

Alloniscus pigmentatus

- 1a. Surface of the body tubercular all through but more prominent on the thoracic somites.
- 2a. Head with prominent median lobe and sub-ovate lateral lobes

Alloniscus barkulensis

1. *Alloniscus pigmentatus* Budde-Lund (Text figures 1 & 2 A—E)

1885. *Alloniscus pigmentatus* Budde-Lund, *Crustacea Isopoda Terrestria*, (Copenhagen), 227.
 1916. *Alloniscus pigmentatus* Chilton, *Mem. Indian Mus.*, Calcutta, **5** : 474.

General : Body oblong oval, strongly convex and about twice longer

than its greatest width. Surface completely smooth, but for the coloured patches.

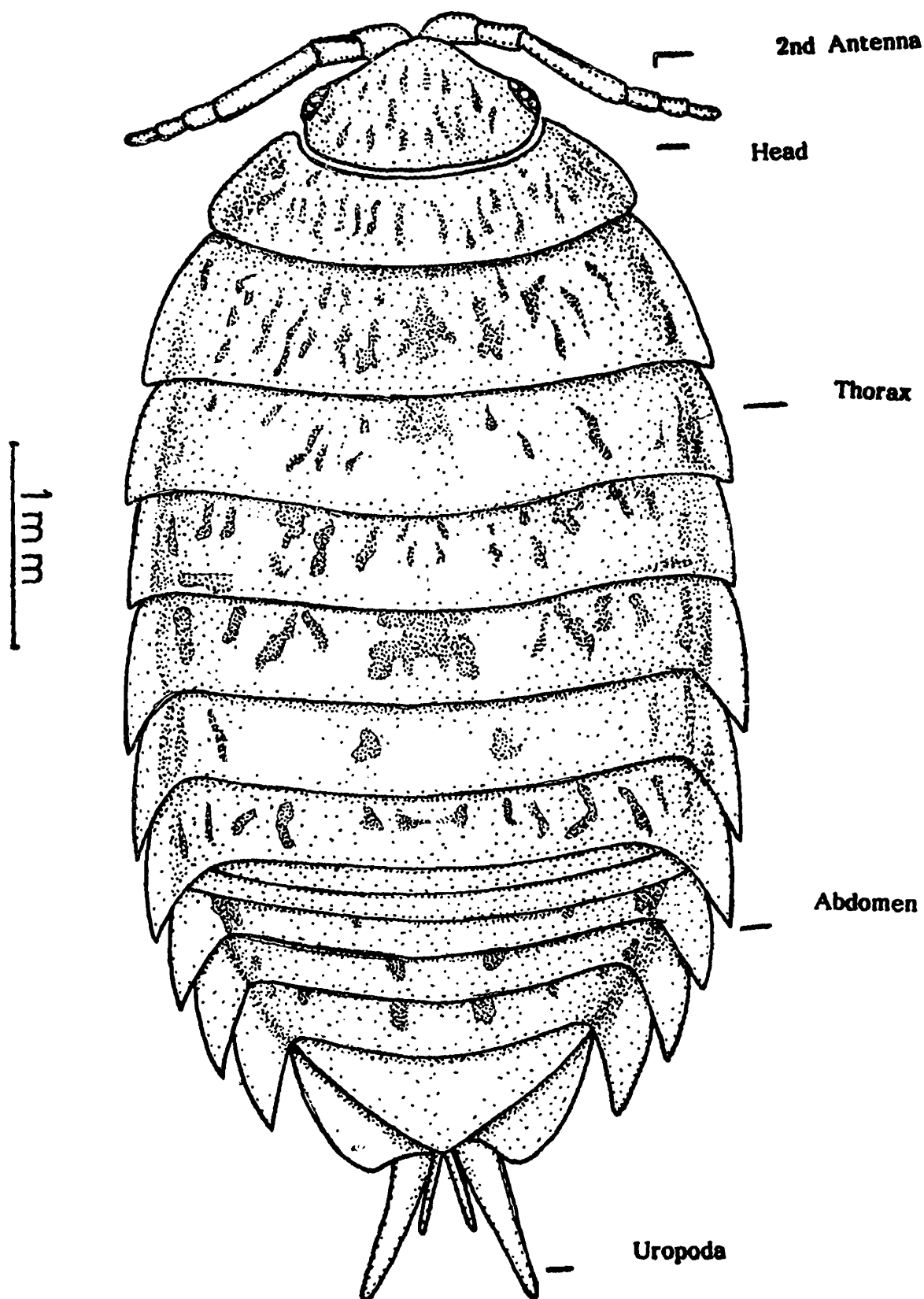


Fig. 1. *Alloniscus pigmentatus* Budde-lund Dorsal View,

Cephalon : Head small, convex, covered nearly half of its portion by the expanding lateral plates of the first thoracic somite. The anterior part, specially the middle portion developed into a broad

pointed median lobe and antero-lateral parts ending in an acute angle. Postero-lateral portion broadly rounded. Eyes well developed and located just behind the antero-lateral process.

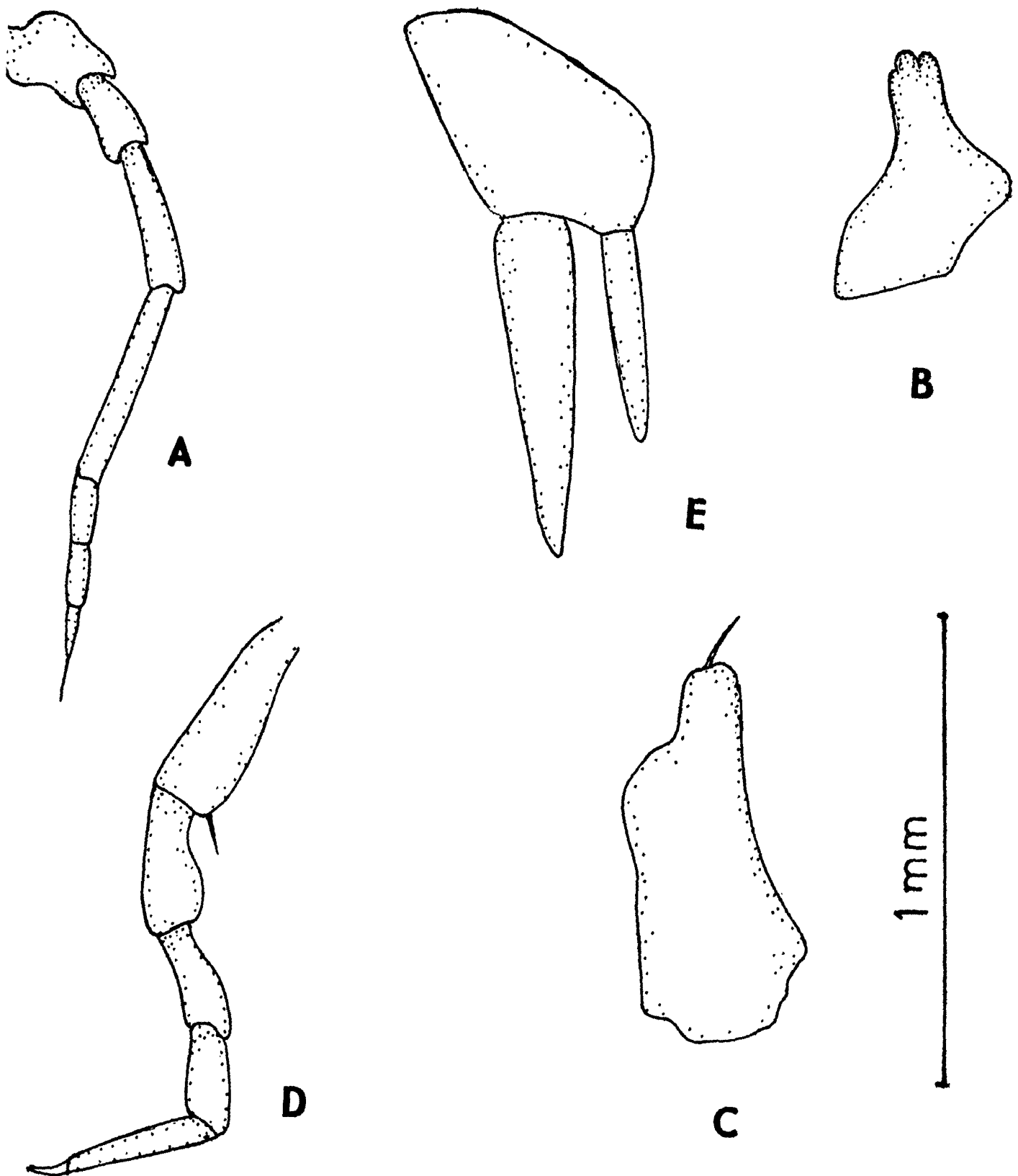


Fig. 2. *Alloniscus pigmentatus* Budde-lund
A. Second antenna, B. Mandible, C. Maxillipede, D. Second thoracic leg,
E. Uropoda.

Thorax : Strongly convex, all the somites sub-equal. Lateral plates of the first thoracic somite expanding anteriorly and enclose the posterior of the head. Postero-lateral process of the first and second thoracic somites broadly rounded ; those of the third to seventh gradually increasing in size and ending in an acute point.

Abdomen : About less than one-third of the thorax and convex. The first two somites small, sub-equal and lateral part tucked well within the expanding lateral plates of the last thoracic somite. Third to fifth thoracic segments slightly larger than the first two almost sub-equal, with their lateral plates expanding posteriorly in an acute process. Telson broadly triangular with its apex ending in an acute point.

Appendages : The first joints of Second antennae (Text fig. 2—A) sub-equal ; third and fourth joints longer than the first two and almost equal. The fifth joint longest of all and as long as the third and fourth together. Flagellum of three sub-equal joints, the distal ending in a style.

Basal plates of Uropod (Text fig. 2—E) extending almost to the apex of the Telson. Exopod stout and long and attached to the terminal joint of the basal plate. Endopod short attached with the antero-lateral part of the basal joint and extending about half in length of the exopod.

Colour deep dark-brown, with yellow mottled patches all over. Dark median patch thick extending from the Second thoracic somite to almost the tip of the Telson.

Distribution : Orissa, Andaman and Nicobar Islands, Lakshadweep Islands, India. Outside India the species is reported from Malaya and Singapore.

Remarks : Description based on a single female specimen measuring 15 mm. in length and 6.5 mm. greatest breadth.

These animals tolerate salt water and frequent the shore.

2. *Alloniscus barkulensis* (Collinge)

(Text Figure 3)

1915. *Arhina barkulensis* Collinge, *Rec. Indian Mus.*, 11 (2) : 147-148.

1916. *Alloniscus barkulensis* Chilton, *Mem. Indian Mus.*, 5 : 474.

General : Body oblong oval (Text fig. 3), greatest width little less

than half the length. Surface of body tubercular all through, but more so on all the thoracic somites. Dorsal surface deeply convex.

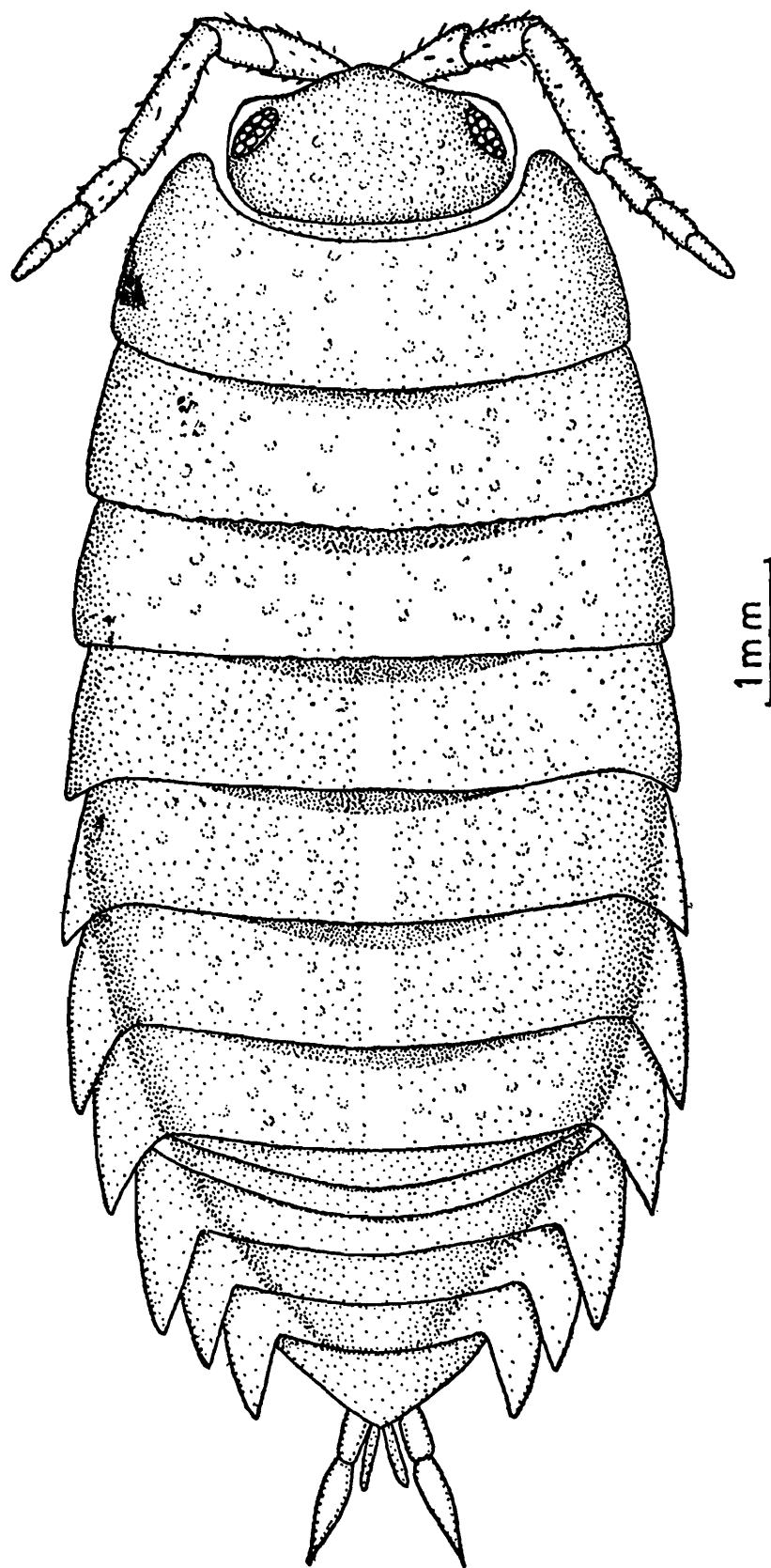


Fig. 3. *Alloniscus barkulensis* (Collinge) Dorsal view.

Cephalon : Head similar (Text fig. 4—A) to that of the genus *Alloniscus*, length being almost double of the greatest width, with lateral

lobes sub-acute and median lobe prominent. Surface of cephalon with minute tubercles. Eyes large, bulging and with large number of ocelli.

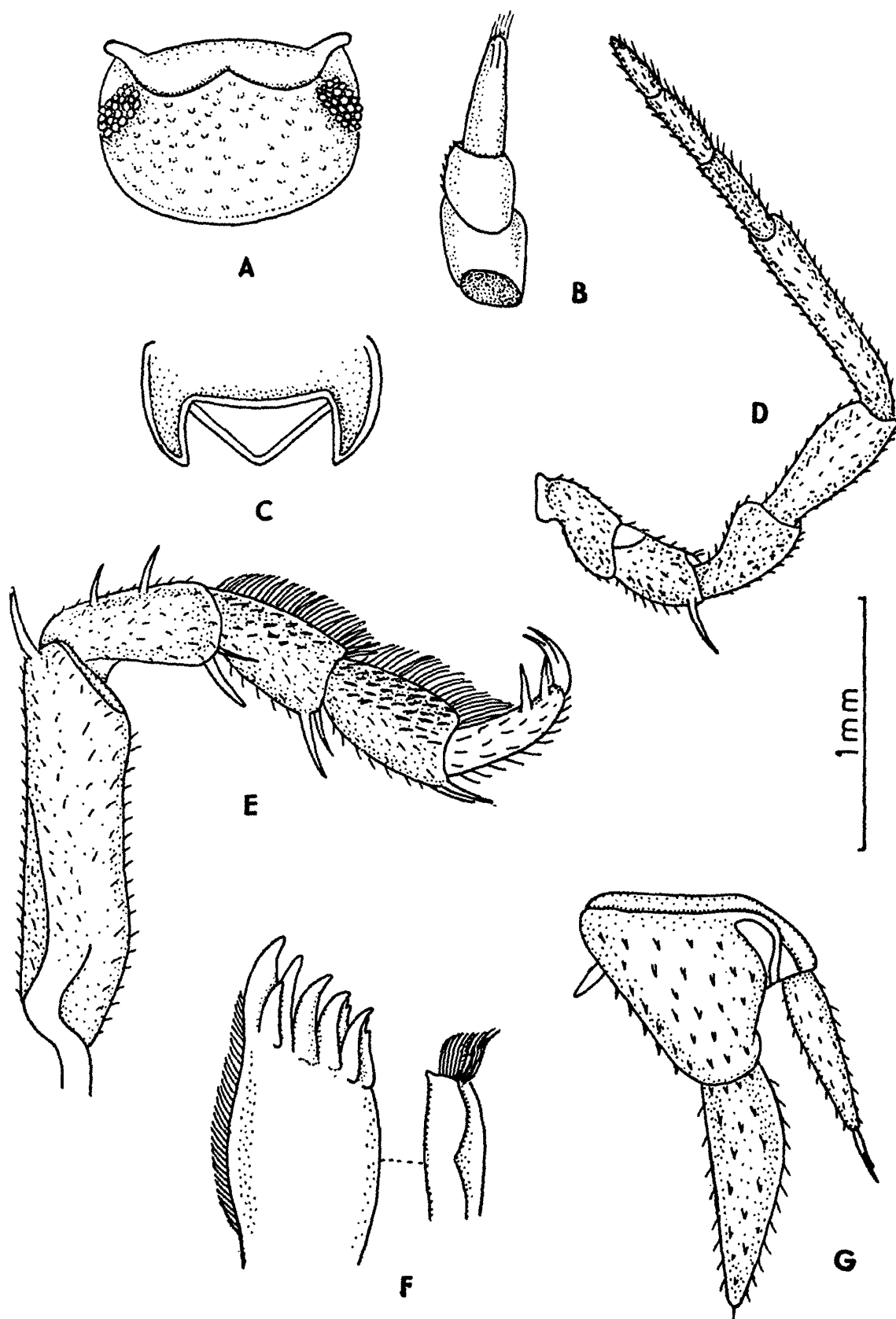


Fig. 4. *Alloniscus barkulensis* (Collinge)

A. Dorsal view of Cephalon, B. First Antenna, C. Telson with first abdominal segment, D. Second antenna, E. Second thoracic leg, F. First maxilla, terminal portion of inner and outer lobes, G. Left uropoda, dorsal view.

Thorax : The first somite widest of all and the lateral plates enclosing the head. Lateral plates of all other somites except the first one expanded ; 2nd to 4th less pronounced compared with the last three viz. 5th to 7th. The lateral plate of the 7th somite ending with a blunt and obtruse spine at its posterior extremity. All the thoracic somites tubercular with their posterior border appearing almost beeded.

Abdomen : Abdomen nearly a little over one-third of the total length. The first two segments covered underneath the last thoracic somite. The lateral plates of 3rd to 5th somites well developed with blunt posterolateral spine. Telson (Text fig. 4—C) sixth segment broadly triangular with an obtruse terminal extremity.

Appendages : Antennule (Text fig. 4—B) three jointed, the terminal joint having a number of bristle like setae at the apex and side. Antennae (Text fig. 4—D) short and stout, basal joint short, second and the third joints little longer than the basal almost sub-equal. Fourth and fifth longer than others ; third and fourth almost equal ; fifth which is as long as the flagellum. The three joints of flagellum almost sub-equal in length, terminal stylet slender and the whole appendage covered with short setae.

First maxilla (Text fig. 2—6) the outer lobe quite robust and terminating in eight stout spines. The inner lobe scroll like, the inner border partly overlapping the flat outer portion, terminally ending in setaceous spines.

Second maxilla a thin bilobed plate terminating in an inner dense tuft of setae and an outer tuft.

Maxillipedes, the outer palp terminating in a strong spine with two tufts of setae, at the base two other tufts arising from a slight eminence and a third pair still more inwardly. No spines on the inner palp, which fringed with short setae.

Thoracic appendages (Text fig. 2—5) stout and comparatively short, first joint almost in equal length to the next three, ending in a stout claw with lateral spines. 3rd, 4th and 5th joints on their inner side a dense mass of long setae with paired stouter spines on the outer side of the 2nd to 4th and on the innerside of the 5th joint.

Uropoda (Text fig. 2—7) extending beyond the telson. Basal plate sparsely covered with setae provided with a short blunt spine on the outer side and a raised portion extending across the proximal end to the inner side, beneath which the endopodite articulates. Exopod

somewhat conical in shape, more globose on the inner side, endopodite slender, terminating in two long setae.

Colour greenish-brown with yellow patches on the head and thoracic segments.

Maximum and minimum length and width of the specimens range from 11.5 mm. and 5 mm. to 4 mm. and 2 mm. respectively.

Type-locality : Under stones at the edge of Lake, Barkul, Lake Chilka, Orissa, INDIA, 22-7-1913, Coll. Dr. N. Annandale.

Syntypes : Three males and sixteen females in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8670/10.

Distribution : This species is, so far, known to occur from its type locality only.

Remarks : The genus *Arhina* was established by Budde-Lund to include a species which he at first considered belonged to *Alloniscus*. Collinge (1915) considered *Arhina* closely related to *Alloniscus*, an opinion with which Jackson (1928) concurred. Barnard (1932) is of the view that there has been no character by which the two genera can be separated seems to be indicated by the fact that the specimens from the Cilka Lake in India were described by Collinge in 1915 as a new species of *Arhina*, and in 1916 referred independently by Chilton to *Alloniscus*. The author agrees with the considered views of Barnard, as there has been no difference of characters of the two genera. In the present species viz. *Alloniscus barkulensis*, the specimens agree in characters, such as, flagella of 2nd antenna being three segmented; head with two lateral lobes and a median lobe more pronounced and other appendages viz. mandible, maxilla and the uropoda.

Alloniscus barkulensis (Collinge) differs from *A. pigmentatus* Budde-Lund with regard to the lateral lobes of the head, and having tubercles all over the body, more so pronounced at the posterior end of each thoracic somite.

Genus 2. *Exalloniscus* Stebbing

1911. *Exalloniscus* Stebbing, *Rec. Indian Mus.*, 6 (4) : 190-191.

Characters : Body oblong oval, scarcely tuberculate and not conglobate. Eyes wanting. Second pair of antennae short and stout and its flagellum with three joints. Mandibles with four or five stout

teeth divided between the cutting and its accessory plate. First maxilla with two short feathered setae occupying the apex of the inner-plate, the outer-plate being surrounded with smooth spines, seven in number, the distal part of its anterior margin setulose. The second maxillae with inner apical lobe much broader than outer and showing a group of setae. Maxillipedes, not very broad, the masticatory plate quadrate, its truncate distal border finally fringed. The legs with spines and with multified spices.

The first two pleopods in males almost similar in structure with those of *Alleniscus* Dana. The fifth pair gill-cover acute at the apex.

Telson broad with obtuse apex. Outer ramus of Uropod projecting beyond the telson and longer than the stout peduncle. The inner ramus hardly reaching half the length of the outer.

Type Species : *Exalloniscus coecus* (Dollfus), 191.

Distribution : Java and Sumatra (Indonesia); Malaysia and in Kerala State, India.

Keys to the Indian species of the Genus *Exalloniscus* Stebbing

The body-dorsal surface with five granulations.

Eyes wanting. Flagellum of three subequal joints.....

.....*Exalloniscus coecus* (fas)

3. *Exalloniscus coecus* (Dollfus)

(With Text fig. 5, 6 A—E 7 A—B)

1898. *Alloniscus coecus* Dollfus, in Weber's *Zool. Ergebn. einer Reise in Neiderl. Ost. Indien*, 5, 4 : 375., pl. 15, fig. 22.

1911. *Exalloniscus coecus* Stebbing, *Rec. Indian Mus.*, 6 (4) : 191.

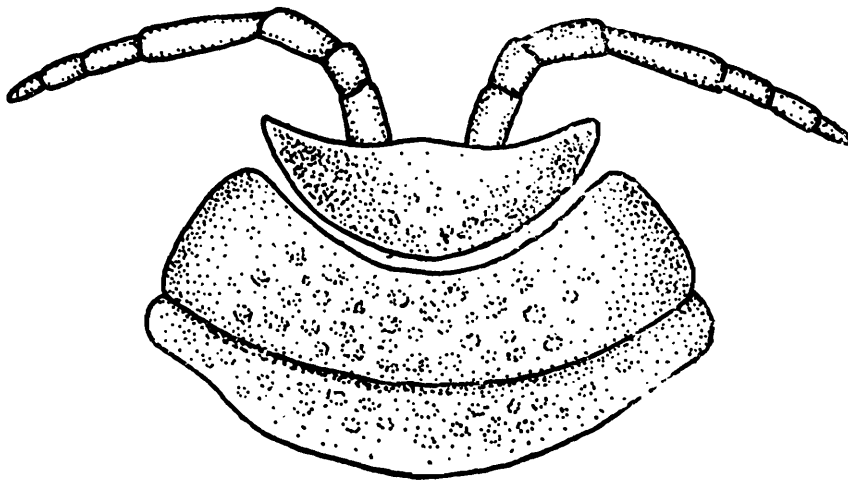
1936. *Exalloniscus coecus* Jackson, *Bull. Raffles Mus.*, 12 : 79.

General : Body broadly oval (Text fig. 1), convex and slightly depressed. Dorsal surface with fine granulations concentrating mostly in the anterior and lateral parts. Length more than double its greatest width.

Cephalon : Frontal line of Head sinuous, with a feeble median process and oblique subacute lateral sides. Eyes wanting.

Thorax : Except for the first thoracic segment a little longer, all other segments practically sub-equal. Lateral plates of all the segments end in a blunt process.

Abdomen : No demarcation between the last few thoracic somites with those of abdomen. The first two segments short and covered



1 mm

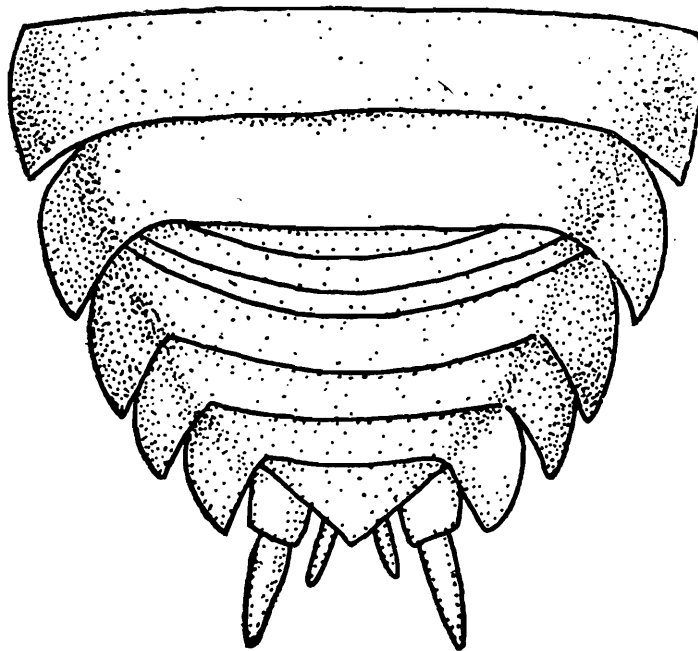


Fig. 5. *Exalloniscus coecus* (Dollfus) Dorsal view.

completely by the lateral expansions of the seventh thoracic somite. Third to fifth segments with broad recurved blunt points. The telson triangular with an obtuse apex.

Appendages : The first pair of antennae small, three jointed, the distal longer than the other two and conical. The second pair of antennae (Text fig. 2-1) comparatively short, the fifth joint longest

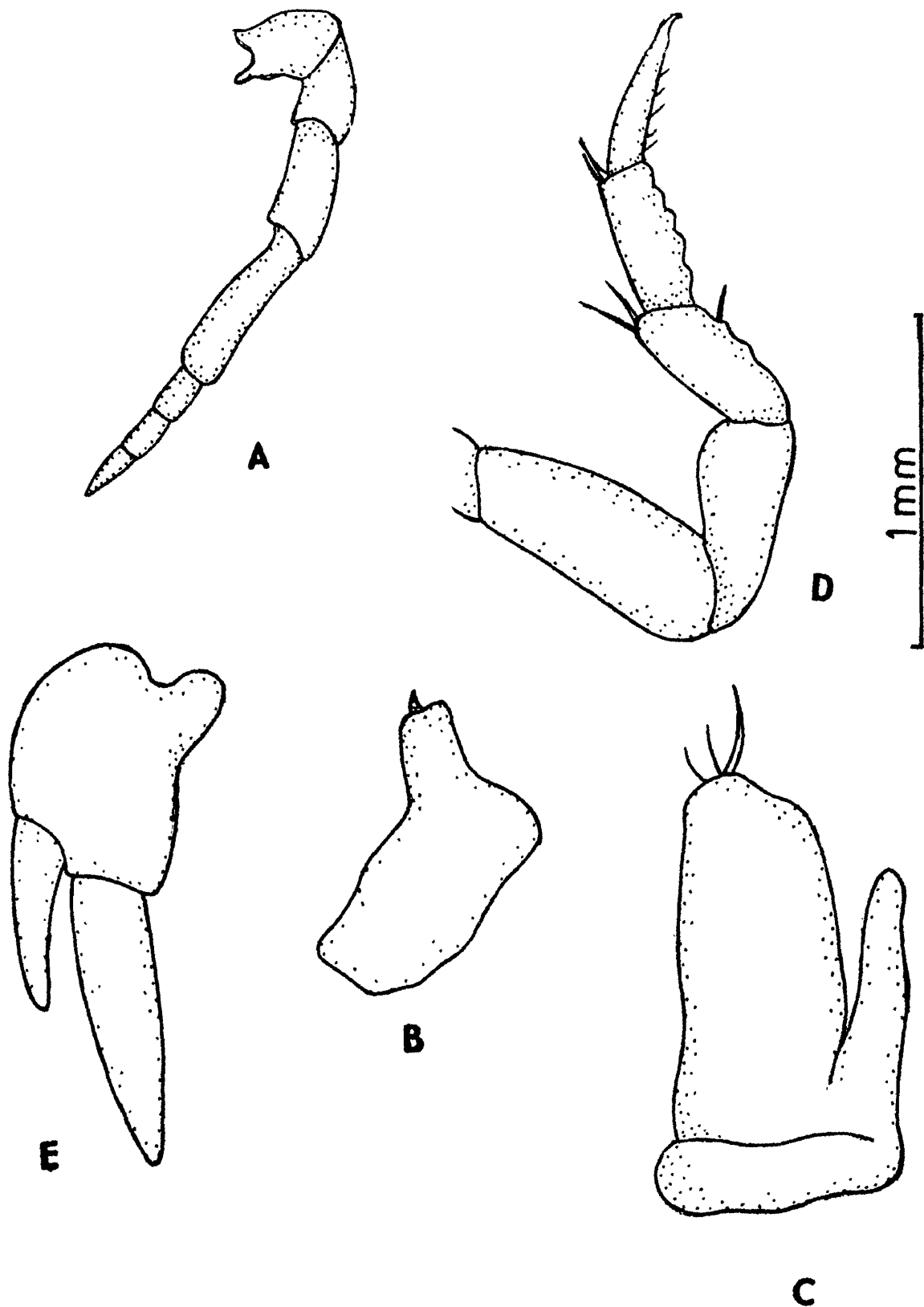


Fig. 6. *Exalloniscus coecus* (Dollfus)

A. Second antenna, B. Mandible, C. Maxillipede, D. Second thoracic leg, E. Uropoda.

of all. Flagellum consisting of three sub-equal joints, slightly shorter compared with the fifth.

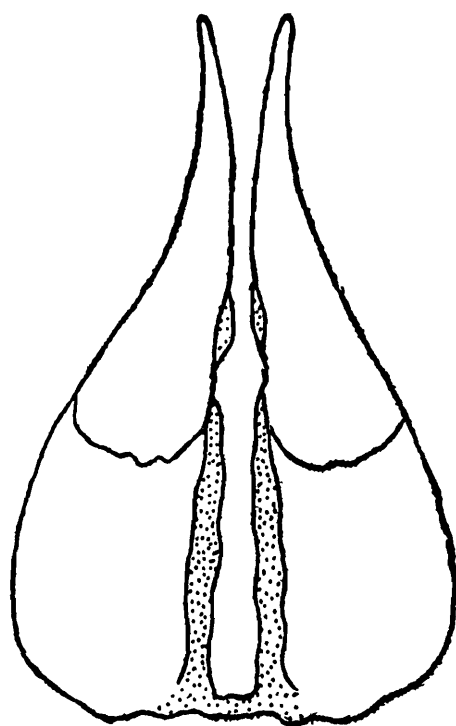
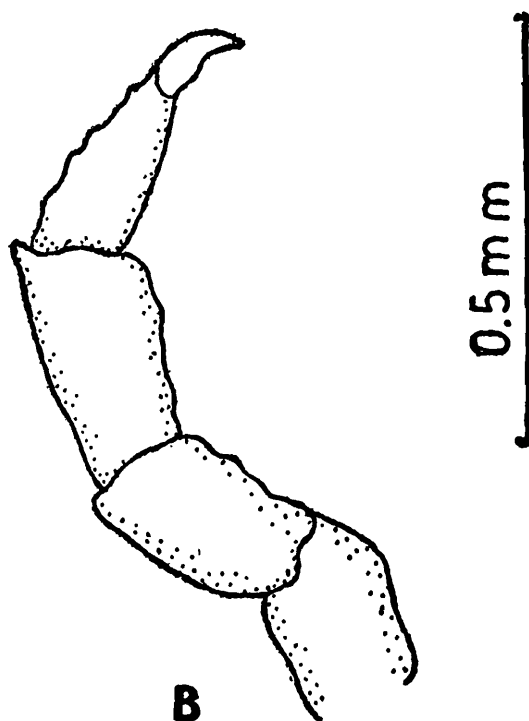
**A****B**

Fig. 7. *Exallaniscus coecus* (Dollfus)

A. First pleopod of male, B. Thoracic leg.

Uropod quite long, (Text fig. 2-5) lanceolate in structure, the outer exopod more than double the inner ramus (endopod). The endopodite also exceeding beyond the apex of telson.

Colour white.

Malsial Exart : Description based on authentically identified specimen of Dr. N. Annendale from Madathorai formerly Travancore, Kerala, bearing Reg. No. 7928/10.

Distribution : Java, Sumatra, Indonesia ; Kuala Legap, Plus Valley, Perak in Malaysia and in India from Madathorai (Kerala State).

Remarks : Though mouth parts differ less from the typical *Alleniscus*, the charesteric sinuous head, structure of maxillas and absence of eyes distinctly separates the species from the genus *Alloniscus*. Budde-Lund in his account of *Alloniscus brevis* expresses opinion that *A. coecus* of Dollfus probably does not belong to the genus *Alloniscus*. The author shares the views of Budde-Lund and Stebbing and places this species under the genus *Exalloniscus*.

Genus 3. *Philoscia* Latreille

- 1804. *Philoscia* Latreille, *Hist. Nat. Crust. Ins.*, 7 : 43.
- 1885. *Philoscia* Budde-Lund, *Crust. Isop. Terr.* : 207.
- 1899. *Philoscia* Sars, *Crust. Norway*, 2 : 172.
- 1908. *Philoscia* Verhoeff, *Arch. Biont.*, 2 : 343.
- 1917. *Philoscia* Collinge, *Ann. Nat. Mus.*, 3 : 576.
- 1932. *Philoscia* Barnard, *Ann. South Afr. Mus.*, 30 (2) : 235.
- 1936. *Philoscia* Van Name, *Bull. American Mus. Nat. Hist.*, 71 : 113.
- 1971. *Philoscia* Ramakrishna, *Rec. Zool. Surv. India*, Calcutta, 63 (1-4) : 182.

Characters : Body oval, fairly convex, very little or scarcely at all contractile. Cephalon rounded in front without any projecting lateral lobes. Second pair of antennae long and flagellum composed of three articles. Mandibles with only a single penicil behind the cutting edge. Legs very slender and greatly increasing in length posteriorly. Abdomen abruptly narrower than the thorax, with lateral parts of the third, fourth and fifth segments small and appressed. Eyes well developed and lateral. Opercular plates of the pleopoda without tracheae. Uropoda not much produced, with the inner ramus not attached so far in front of the outer branch.

This genus established during 1804 by Latreille, is closely related to *Oniscus*, with which it agrees in the triarticulate flagellum of the Second antennae but from which it is easily distinguishable by the far less

expanded lateral parts of the segments and abrupt narrow metasome compared with mesosome.

Type-species : *Philoscia muscorum* (Scopoli)

Distribution : Europe, North and South Africa, India, Bhutan, Burma, Pakistan, Sri Lanka, Malaya, China, Thailand and United States of America.

Keys to the Indian species of the Genus Philoscia

1. Body is smooth and convex. ...
2. Lateral plates of fifth to seventh somites prominent and ending in obtuse point. ...
3. Telson sub-triangular with acute tip. ...
4. Second antenna long, tender and exceeding half the length of the body. The first joint of flagellum equal to others combined. ...
5. Uropoda outer one lanceolate and inner shorter than less than half. ... *Philoscia muscorum* Seopah
- 2a. Lateral plates of fifth to seventh large and terminating in a sharp point. ...
- 3a. Telson sub-triangular and terminating in a blunt end and extending beyond the middle of the basal segment of the uropoda. ...
- 4a. Second antenna long, slender extending upto third thoracic somite. The first joint of flagellum longest, second and third being subequal. ...
- 5a. Outer ramus of uropoda longer than basal and tapers posteriorly. Inner ramus linear not reaching upto the middle of the exopodite. ...
6. Eyes very much reduced. ... *Philoscia dobakholi* Chopra
- 2b. Lateral plates of fifth to seventh thoracic somites expanded posteriorly, terminating in a acute spine. ...
- 3b. Telson broadly traingular terminating obtusely.

4b. Second antenna long, slender, flagellum the proximal long and the other two sub-equal.

5b. Exopodite of uropod long and pointed. Endopodite similar in shape but small. Eyes totally absent. ...

*Philoscia
moulmeinensis
Colbrige*

2c. Lateral plates of fifth and sixth thoracic somites ending in a long pointed spine and seventh with a wide triangular spine.

3c. Telson broadly triangular with its apex blunt.

4c. Second antenna long and slender. Flagellum joints of unequal sizes the proximal longer and the distal shortest.

5c. Exopodite of uropoda, long stout tapering distally. Endopodite half of exopodite. Eyes absent. ...

*Philoscia kempi
Colbrige*

2d. Lateral plates smooth and rounded posteriorly in the first four segments while the last three ending in a blunt process.

3d. The telson more than twice as wide as long with its apex obtusely triangular.

4d. Flagellum of second antenna three segmented and sub-equal, its length equates the fifth thoracic article.

5d. Outer ramus of uropoda about twice as long as the basal joint. The inner ramus cylindrical and extending upto middle of the outer one....

*Philoscia
javanensis* Richardson

1a. Body oblong, oval and covered with granules.

3e. Telson sub-triangular terminating in a blunt and rounded point, extending beyond basal segment of the uropod.

4e. Second antenna long extending upto fourth thoracic somite. First joint of flagellum longer and the second and third sub-equal.

- 5e. Outer ramus of uropod longer than the basal, stout and tapering. Inner ramus narrow, linear reaching middle of the outer ramus. ... *Philoscia lodnensis* Ramakrishna
- 2e. Head semi circular.
- 3f. Telson wide with a blunt end.
- 4f. Second antenna slender and joints of flagellum of different sizes, the proximal being longest.
- 5f. Basal plate of pleopoda small with deep groove on the under side extending along the inner border of the exopodite. ... *Philoscia tenuissima* Collinge
- 1b. Body elongate, oval.
- 2f. Head separate from thorax.
- 3g. Lateral parts of second and third thoracic segments expanded and ends in a blunt point, while those of fourth to seventh somites expanded and end in an acute point. Lateral plates of the last thoracic somite reaching upto fourth abdominal somite.
- 4g. First two joints of flagellum sub-equal and third being shorter.
- 5g. Outer ramus of uropod long, conical and tapering in an acute point-while the inner ramus short and cylindrical. ... *Philoscia indirae* Ramakrishna

4. *Philoscia muscorum* (Scopoli)

(Text figures 8)

1763. *Oniscus muscorum* Scopoli, *Entom. Larniolica*, p. 45.
1898. *Philoscia muscorum* Sars, *Crust. Norway*, 2 : 173-174.
1919. *Philoscia muscorum* Collinge, *Ann. Nat. Mus.*, 4 : 478.
1932. *Philoscia (Philoscia) muscorum* Barnard, *Ann. South Afr. Mus.* 30 (2) : 237-238.
1965. *Philoscia muscorum* Ramakrishna *Rec. zool. Surv. India*, 63 (1-4) : 182-183.

General : Body oblong-oval, gradually widening posteriorly, greatest width less than half the length of the total length. Dorsal surface moderately convex and smooth.

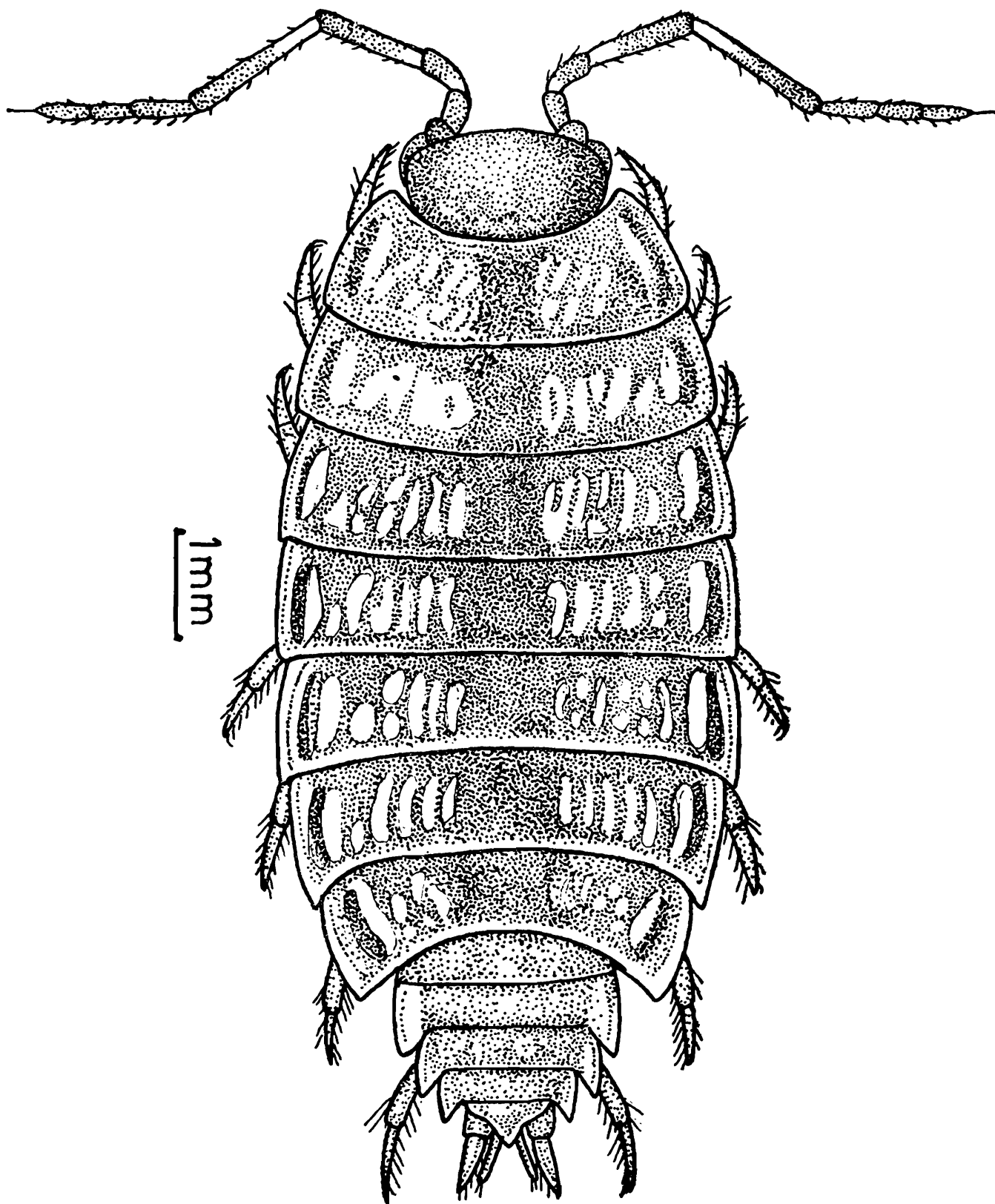


Fig. 8. *Philoscia muscorum* (Scopoli), Dorsal view.

Cephalon : Head oval, broader than long with frontal margin free of any lobes. Eyes well developed placed antero-lateral,

Thorax : The lateral plates of the first thoracic somite covering half of the posterior portion of Cephalan. Lateral plates of the first four thoracic segments not produced but smoothly rounded, while those of 5th to 7th prominent and terminating in obtuse points. The postero-lateral angle of the seventh segment reaching the end of third abdominal somite.

Abdomen : Abdomen small, rarely exceeding one-fifth of the length of the body and abruptly much narrower than the thorax. The first two segments very small and their lateral plates covered entirely by the seventh thoracic somite. The third to fifth segments having well developed lateral plates and sharp pointed. The telson sub-triangular flattened above and with an acute tip.

Appendages : The first antenna small with its terminal joint shorter than the basal one and conical in shape. The second antenna (Text fig. 3-4) slender, elongated and exceeding half the length of the body. Flagellum longer than the last peduncular joint and the first article almost equal in length to the other two combined.

Legs increasing in length posteriorly. The anterior pairs in male densely setous inside.

Outer branch of pleopods specially in males bluntly rounded and the outer margin sinuous.

Uropoda (Text Fig. 3-5) with (outer ramus) exopodite lanceolate ; endopodite slightly shorter and narrower and commencing a little distance away from the outer.

Colour of dorsal surface reddish brown with numerous irregular lighter patches on each side of the medium line and more regular series of similar patches on each side of the thorax and Cephalon. A median band along the back generally dark brown.

Length and breadth measure 8.5 and 3.5 mm. respectively.

Distribution : Though the species is fairly common in most of the European countries viz. United Kingdom, Denmark, Germany, Poland, Austria, France, Spain, Italy and Algeria and Natal in Africa, in India. It is only recorded from the Kameng Division of Arunachal Pradesh.

Material examp. : Description of this species is based on two specimens preserved in the National Zoological Collections of the Zoological Survey of India.

5. *Philoscia lodnensis* (Ramakrishna)

(Text Figs. 9A-I)

1969. *Philoscia lodnensis* Ramakrishna, *Bull. Syst. Zool.* Calcutta, 1 (2) : 67-70.

General : Body oblong oval (Text Fig. 9A-I), somewhat elongated, attaining greatest breadth at sixth segment of the thorax. Dorsal surface convex, covered with granules in the centre and fairly large number of tubercles arranged in two sub-median rows. Sides of thorax provided with a large tubercle, the number of other tubercles decreasing gradually towards the posterior end.

Cephalon : Cephalon very distinctly separated from the first thoracic somite and less than half as broad as long. Frontal margin smooth but slightly arched in the middle. Antero-lateral corners of the cephalon not produced at the anterior end into lateral projections. Postero-lateral parts smooth and rounded. Dorsal surface of the head studded with numerous tiny tubercles. Eyes situated in the antero-lateral angles of the head, comopside and formed of a small number of eye lappets.

Thorax : Thoracic somites large, arched across the width ; first segment longest, its anterior and posterior margins curved, the former rounded and projecting appreciably on either side of the head. Other segments sub-equal, fifth being the widest. Side plates of the first four segments rather very poorly developed, posteriorly rounded, those of the last three segments gradually increasing in size, posteriorly drawn out and terminating in sharp points. Those of the last thoracic somite reaching middle of the third abdominal segment.

Abdomen : Abdomen comparatively small, a little less than one-sixth the total length of the body, much narrower than the thorax. All the six somites distinct, the first and second appreciably smaller than the rest, the last being the largest. Lateral parts of abdominal somites smooth and not projecting posteriorly. Terminal segment sub-triangular in shape, terminating posteriorly in a blunt and rounded point and extending beyond the middle of the basal segment of the uropod.

Appendages : Antennules reduced, three segmented, with basal segment broad, second short and the terminal longer than the basal. Antennae (Text Fig. 9B) very long and slender, almost reaching the beginning of the fourth thoracic somite, when fully extended back. Peduncular joints not grooved ventrally ; first joint short ; second and

third also short ; fourth almost equal to the three basal segments ; fifth the longest, about three times longer than the last peduncular segment, three segmented, with the first segment longest, and second

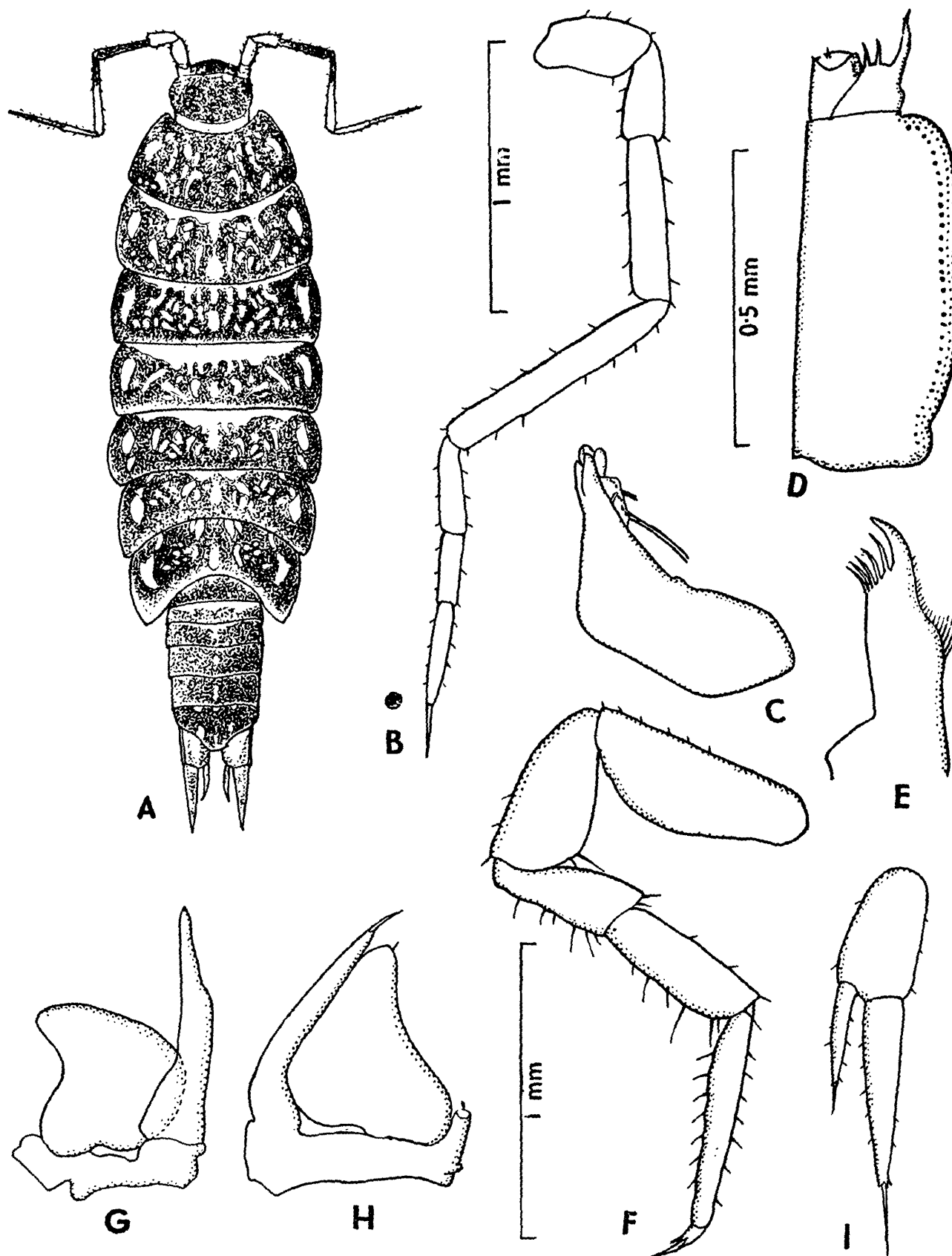


Fig. 9. *Philoscina lodnensis* (Ramakrishna)

A. Dorsal view ; B. Antenna ; C. Mandibles ; D. Maxilliped ; E. Maxilla ; F. Leg ; G. First pair of pleopods ; H. Second pair of pleopods ; I. Uropod.

and third being sub-equal. Except for the first three basal segments, all the other segments, including the flagellum, provided with cilia along their margins, and the terminal flagellar segment provided with a stout styliform bristle.

Outer lobe of the first maxilla (Text Fig. 9E) terminating in six large curved spines, the outer being the longest and stoutest. Outer margin of maxilla behind the outer spine deeply setose. Mandibles (Text Fig. 9C) provided with double row of strong, chitinous teeth at the apex, a membranous lappet and two penicils arising from the latter. Maxilliped (Text Fig. 9D) with outer palp terminating in a large multispinous process, with two spines on the inner side and a large spine on its outer side ; inner palp broad, with one tiny spine in the middle.

Legs (Text Fig. 9F) long and stout, increasing in size from the first to the last, all markedly setaceous, last pair being equally developed in both sexes. First pair of pleopods in the male (Text Fig. 9G) with exopodite a little longer than the length of the endopodite ; the former a rectangular plate, the latter with basal half some what broad and provided with muscles, the distal half tapering and terminating in a rounded point. Second pleopods (Text Fig. 9H) of male with exopodite sub-triangular, its apex bluntly rounded ; the endopodite consisting of the usual two joints, a broad basal one followed by a long and narrow distal curved joint ending in an acute point and extending a little beyond the tip of the exopodite.

Uropod (Text Fig. 9I) with basal segment more or less rectangular, extending considerably beyond the end of the telson. Inner ramus narrow, linear, reaching the middle of the exopodite, provided with setae and terminating in a small tuft of long hairs. Outer ramus considerably longer than the basal segment, stout at the base and tapering at the tip and ending in an acute point.

Colour of the body almost dark brown throughout the dorsal surface, with white opaque patches arranged in lateral and sub-median rows. The head and abdomen are darker as compared with the thoracic region. Colour combination of the second antenna characteristic with the basal three segments, the distal half of the fifth, the first segment of the flagellum and its tip creamy white, while the rest of the peduncular segments and flagella dark brown.

Length and breadth being 11.5 and 4.00 mm. respectively.

Type-locality : Lodna colliery, 13 km. from Dhanbad, Bihar, INDIA ex a pit and surrounding galleries, 27.5.1964 (S. A. Azeez Coll.).
Holotype and *Paratypes* : a female a male and two females respectively in the National Zoological Collections, Zoological Survey of India, Calcutta. Regd. Nos. C. 4611/1 and C. 4612/1 respectively.

Distribution : In addition to the type locality, the species has been recorded from Arunachal Pradesh, Assam, Meghalaya, Manipur, Madhya Pradesh, Rajasthan, Orissa, West Bengal, Kerala, Tamil Nadu, Karnataka, Maharashtra and Goa in India, Bhutan, Burma, Malaya, Singapore, Hong Kong and China from outside.

Remarks : This species closely resembles *Philoscia javanensis* Richardson, (1972) but it differs from the same in the following characters :

	<i>Philoscia lodnensis</i>	<i>P. javanensis</i>
Head	Triangular	Oval
Body (Thorax)	Elongate	Oval and stout
Flagella of the 2nd Antenna	First longest, second and the third Sub-equal	All the three segments of the flagella are sub-equal
Colour	No yellow patches on the lateral sides of the thorax	Dark brown with circular yellow patches on the lateral sides of all thoracic segment.

6. *Philoscia dobakholi* Chopra

(Text Figs. 10 & 11)

1924. *Philoscia dobakholi* Chopra, *Rec. Indian Mus.* 26 (1) : 54-57.

1975. *Philoscia dobakholi* Ramakrishna, *Rec. Zool. Surv. India*, 68 : 297-303.

General : Body oblong-oval increasing gradually in width from the anterior end, attaining its greatest width at about the posterior end of the thorax. Unlike other species of the genus, the dorsal surface convex, shining, smooth and not provided with any tubercles or granules.

Cephalon : The head distinctly separated from the thorax and less than half as broad as long. Frontal margin regular and slightly arched.

Median lobe absent. Antero-lateral corners of the cephalon rounded and not produced. Eyes very much reduced, composite and formed of small number of eye-spots close to each other and situated in the antero-lateral angles of the head.

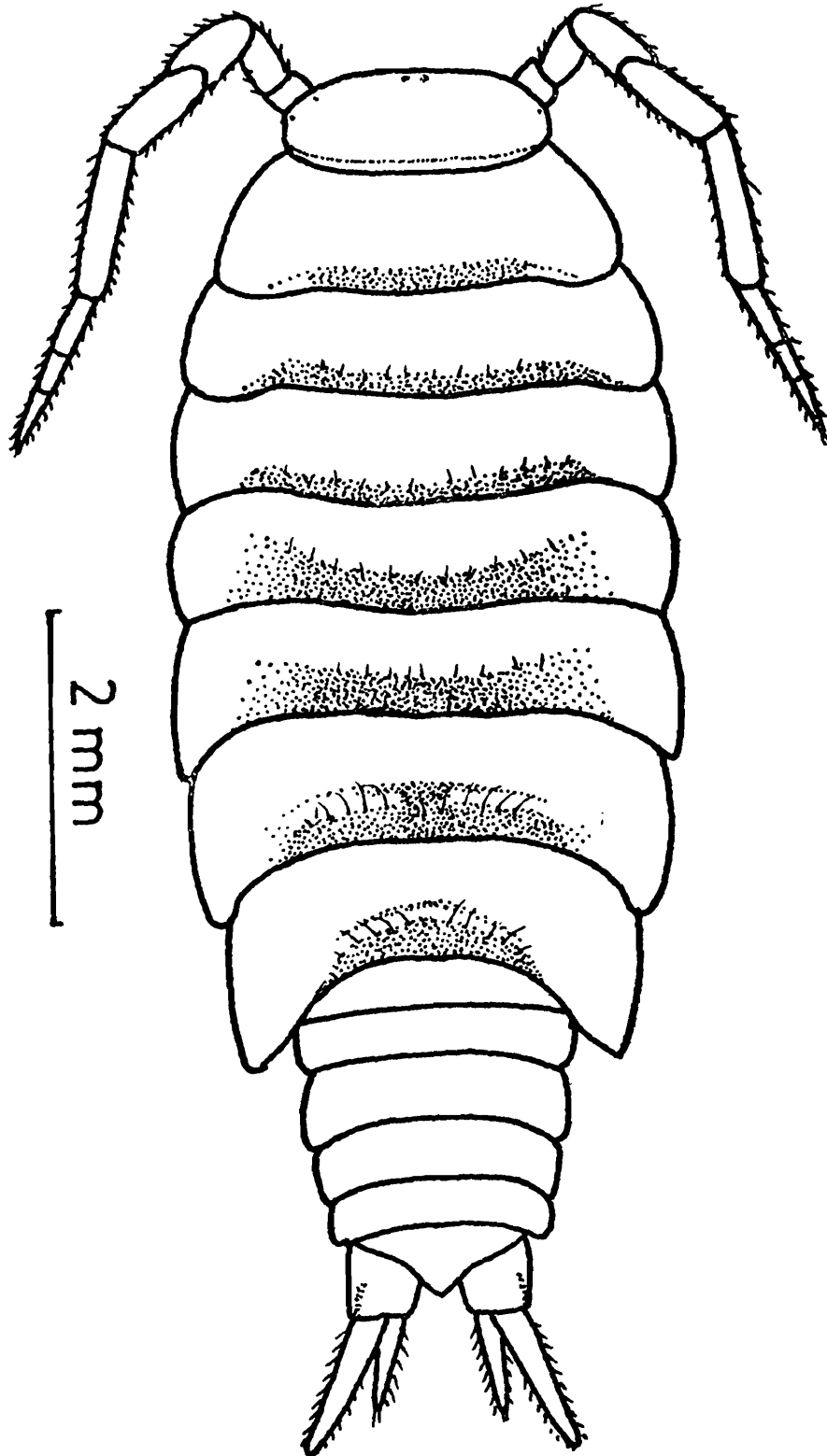


Fig. 10. *Philoscia dobakholi* Chopra, Dorsal view.

Thorax : Thoracic segments large, slightly convex from side to side. The first thoracic somite longer compared with others, with strongly curved anterior and posterior margins. Other somites almost

sub-equal fifth and sixth being widest. Epimeral plates of the first three somites poorly developed with rounded margins, unlike those of the last four gradually increasing in size, posteriorly drawn and terminating in somewhat sharp points. The last epimeral plate extending beyond the posterior margin of the third abdominal segment.

Abdomen : Pleon small and abruptly narrower than thorax, about one-fourth of the total length of the body. Its six somites distinct. The first smaller than the rest, with its lateral parts completely covered by the seventh thoracic segment. Lateral parts of third, fourth and fifth somites small and slightly projecting posteriorly. The sixth segment of almost equal length as the fifth, sub-triangular in shape, and terminating in a blunt point towards the posterior end. Terminal segment extending a little beyond the middle of the basal segment of the uropod.

Appendages : Antennules (Text Fig. 11-A) short, three segmented, with two basal segments broad ; second comparatively short ; terminal longer than the basal, conically tapering, provided with cilia along its margin with a tuft of two or three longer cilia at the end.

Anatennae (Text Fig. 11-B) long and slender, touching the third thoracic segment when extended back. Peduncular joints not grooved ventrally. First, second and third joints short ; fourth as long as the first three ; fifth longest of all. Flagellum longer than the last peduncular joint, three segmented, with the first segment longest, second and third being sub-equal. All segments sparsely provided with cilia along their margins and the terminal joint with a stout styliiform bristle.

Outer lobe of the first maxilla (Text fig. 11-C) terminating in four large curved spines, the outermost being the largest. Outer margin of maxilla deeply setose. Inner lobe rounded and provided with two large setose spines.

Second maxilla thin and plate like, terminating distally in two lobes ; outer lobe larger and the inner terminating in a dense mass of setae.

Mandible provided with a double row of chitinous teeth, a membranous lappet and two penicils arising from the surface of the latter.

Maxilliped with outer palp terminating in a large multispinous process, with about five spines on its inner side and a small spine on its outer side near the base. Inner palp broad, its anterior margin fringed

with fine setae. Two spines at the base of the outer palp ; a long one near the inner margin and a shorter one about the middle.

Legs long and slender, increasing in size gradually, all setaceous.

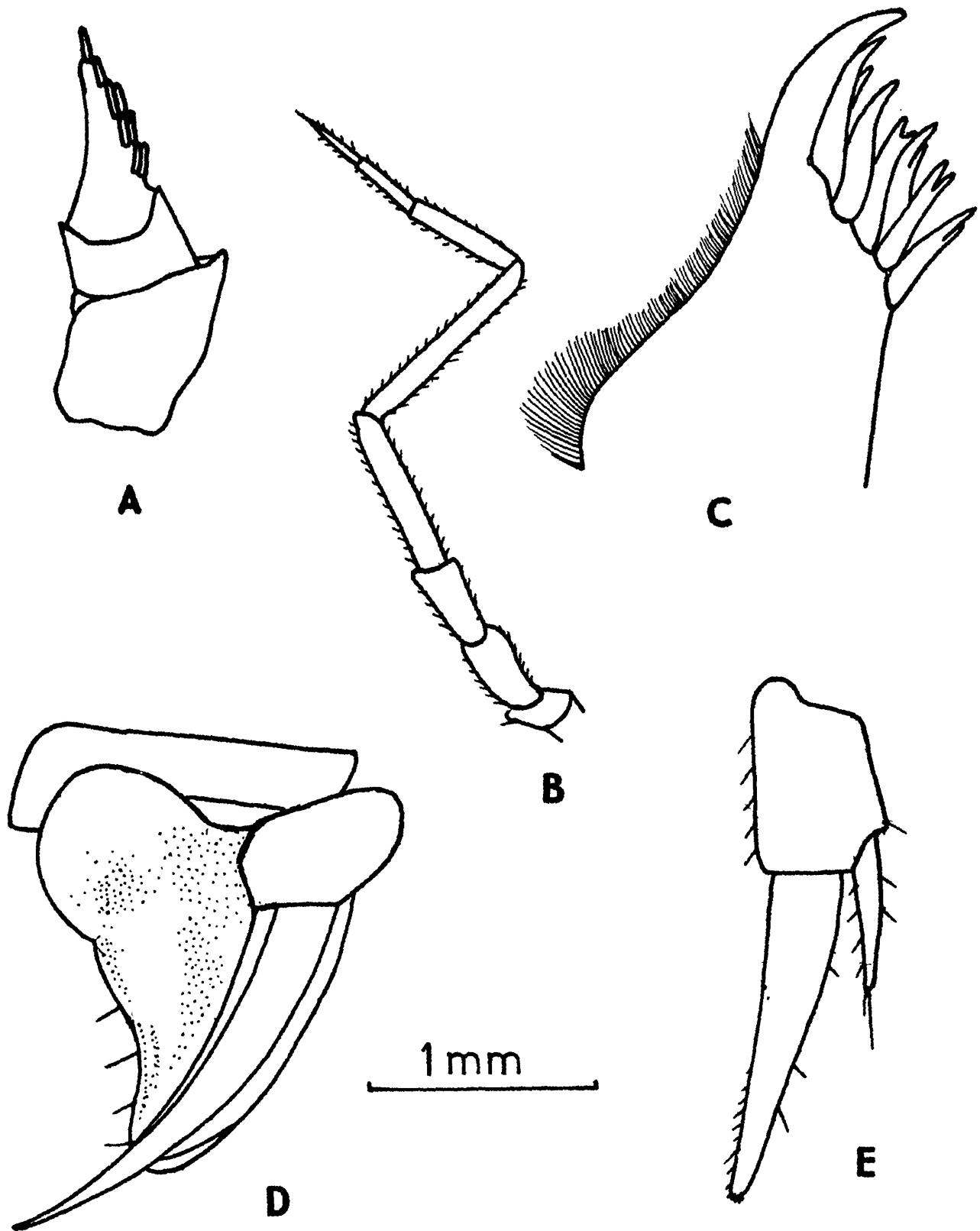


Fig. 11. *Philoscia dobakholi* Chopra

A. Antennule, B. Antenna, C. Terminal partion of outer lobe of the First Maxilla, D. Second pleopod ; E. Uropod.

Carpus swollen in anterior pairs, last pair being equally developed in both sexes.

Opercular rami of none of the pleopods provided with air-cavities, those of the anterior pairs somewhat bilobed in both male and females. First pair of pleopods in the male with endopod longer than exopod, the former with the basal portion somewhat broad and provided with a powerful muscle, the distal half tapering and terminating in an acute point ; the exopodite plate-like and sub-triangular, provided with a few spines along its outer margin. Second pleopod of male (Text Fig. 11-D) with the exopodite sub-triangular, its apex bluntly rounded, provided with a few spines along its outer margin, the endopodite consisting of the usual two joints, a broad basal followed by a long and narrow distal joint, curved and ending in a fine point and extending beyond the terminal portion of the exopodite.

Uropod (Text fig. 11-E) with basal segment more or less rectangular, extending considerably beyond the telson, setaceous and provided with a lateral expansion at the base of which the inner ramus articulates ; the latter narrow, linear, not reaching upto the middle of the exopodite, provided with setae and terminating in a small tuft of long setae. Outer ramus about the same length in both the sexes ; considerably longer than the basal, tapering posteriorly, ending in a blunt point and provided with hairs along the margins.

Colour white, with lateral margins of the thorax and the abdomen of a slightly darker shade than the rest of the body. Colour little less bleached in specimens from the outer part of the cave than those attained at greater depths.

Length and breadth of specimens ranging between 10 and 3 mm. and 5 and 2 mm. respectively.

Type-locality : Siju Cave, Garo Hills, Assam, (Meghalaya), INDIA, 800-1200 ft. from the entrance, February, 1922 (Colls. S. Kemp and B. N. Chopra).

Syntypes : 3 males and 8 females in the National Zoological Collections, Zoological Survey of India, Calcutta. Regd. No. C. 552/1.

Distribution : This species is, so far, known from the type locality only from 800 ft. to 3600 ft. from the entrance of the cave.

Remarks : The specific name refers to the Garo name of the cave, 'Dobakhol' meaning 'bat cave'.

7. *Philoscia moulmeinensis* (Collinge)

(Text figures 12 & 13)

1914. *Burmoniscus moulmeinensis* Collinge, *Rec. Indian Mus.*, 8 (6) : 466-467.
1980. *Philoscia moulmeinensis* Ramakrishna, *J. zool. Soc. India*, 29 (1 & 2) : 86-87.

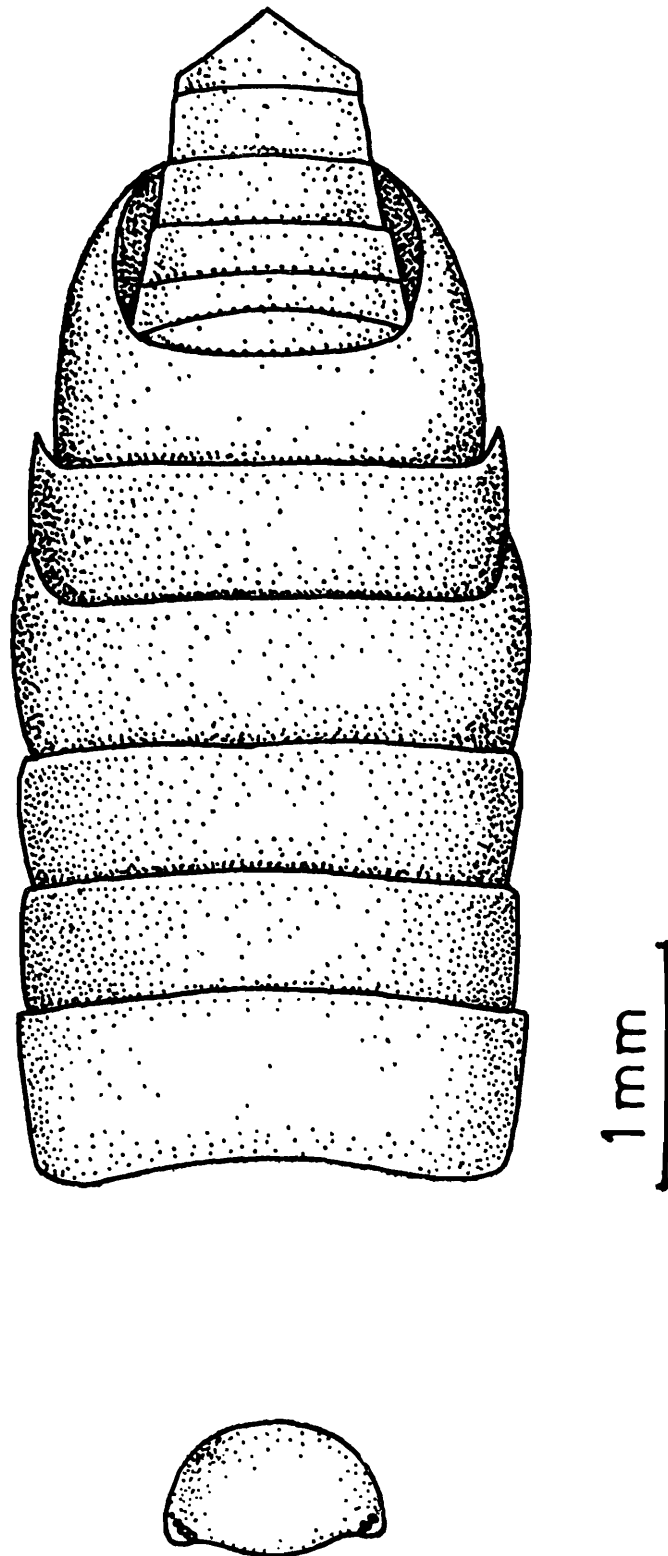


Fig 12. *Philoscia moulmeinensis* (Collinge), Dorsal view.

General : Body oblong oval (Text fig. 12) strongly convex dorsally and about three times longer than broad. Surface perfectly smooth.

Cephalon : Head small enclosed laterally by the lateral plates of the first somite of the thorax. Eyes totally absent indicating cavernicolous environment from which the material was collected.

Thorax : All the thoracic somites wider, the first being widest of all others. Lateral plates of the first somite covering the head partly. Epimeral plates of the first to fourth somites little expanded. However, the lateral plates of 5th to 7th somites expanding posteriorly, gradually increasing in size, and terminating in an acute spine, specially in the 7th.

Abdomen : Metasome abruptly narrower than mesosome, a characteristic feature of the genus *Philoscia*. First somite smallest, second to fifth gradually increasing in size. The first three segments covered by the lateral plates of the last thoracic somite. Telson broadly triangular with its apex ending obtusely.

Appendages : The antennules short but three jointed. Basal joint fairly broad, second shorter and the terminal shortest of all. Second antenna (Text fig. 13-A) slender, elongated, with its flagellum having three joints, the proximal longest of all, the second and third being almost sub-equal.

Mandibles (Text fig. 13-B) small and beneath the teeth is a single palp terminating in setose bristles.

First maxilla (Text fig. 13-C) outer lobe terminating in eight spines, the outer being stout and strong, the four innermost bifurcated. The inner lobe ending in a number of small and fine spines. Second maxilla thin and flexible, on the outer side produced into a tooth-like plate, and a smaller tooth on the inner side, between which, a palp terminating in setose bristles.

Thoracic appendages (Text fig. 13-D) elongate with simple and plumose spines on the protopodite.

Uropoda (Text fig. 13-E) basal plate flattened and extending beyond the telson. Exopodite long and pointed, endopodite similar in shape, but smaller.

Colour of the body deep brown.

Lectotype (female) 6 mm. and 2mm. in length and breadth respectively.

Type-Locality : Farm Caves near Moulmein, in depths of large caves, BURMA, Coll. Dr. F. H. Gravely.

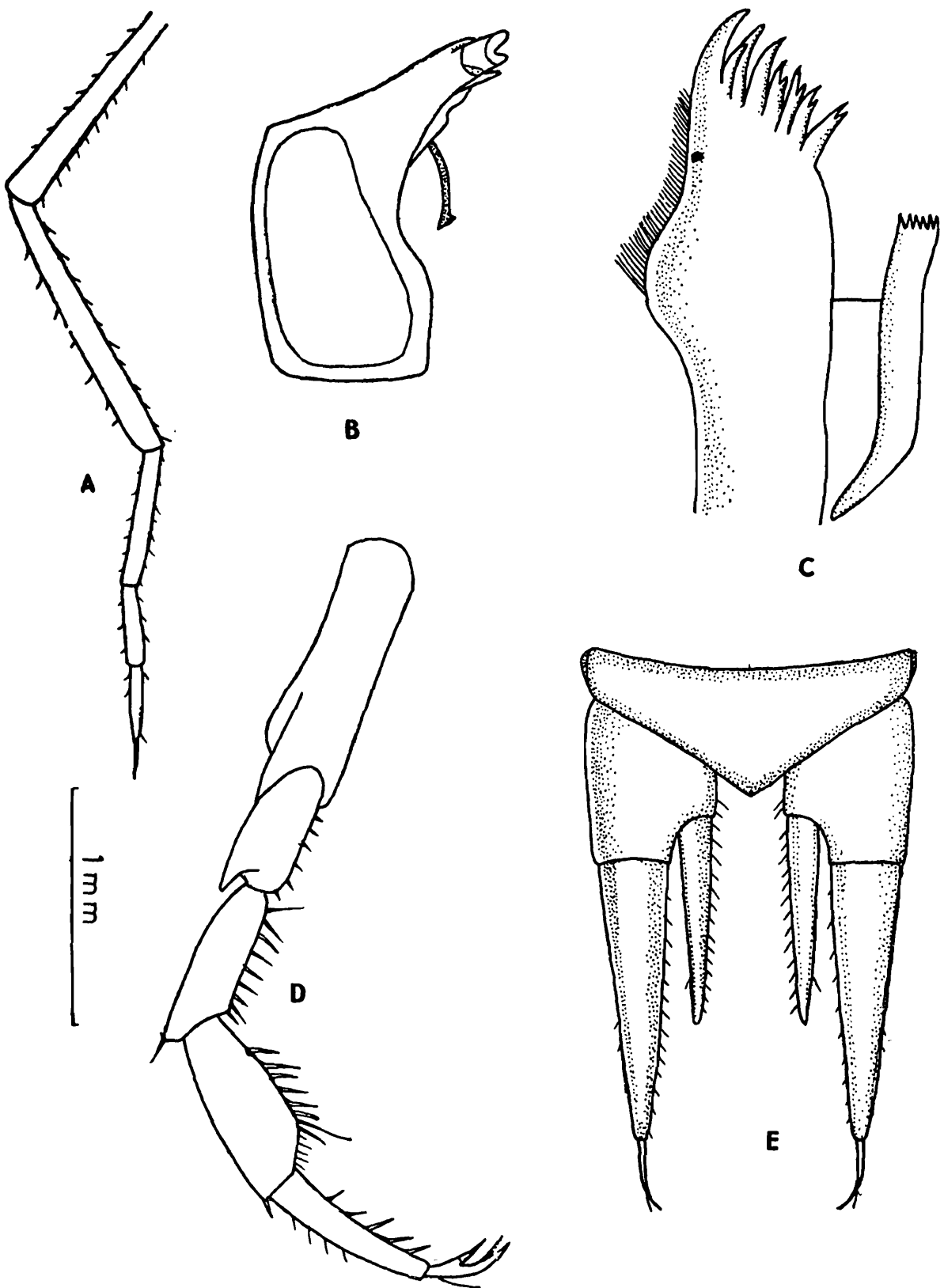


Fig. 13. *Philoscia moulmeinensis* (Collinge)

A. Second antenna, B. Mandible, C. First maxilla, inner and outer lobes, D. Second thoracic leg, E. Telson and uropoda.

Lectotype : Female specimen in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. C. 1462/2.

Paralectotype : One specimen with the same data as the Lectotype and deposited in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8079/10.

Distribution : This species, is so far known from its type locality only.

Remarks : The genus *Burmoniscus* was erected by Collinge (1914) to accommodate the two specimens of *Burmoniscus moulmein* Collinge collected from the Farm Caves near Moulmein, Burma. Subsequently, during 1916, Collinge described yet another species namely, *B. kemp*, the type material of which were obtained by Dr. Kemp from Maosmai Caves, Cherrapunji, Assam. Collinge did not furnish the diagnostic characters of the new genus when he dealt with his first species, as the material at his disposal was inadequate. However, while adding the second species to the genus, he dealt with the diagnostic characters of the genus, but never designated the type species.

From the various characters of the two species referred to above, such as the body form, absence of any frontal lobes on the head, three jointed flagella of the second antennae, shape and size of the metasome and telson and finally the uropoda, the new genus is congeneric with the already well established genus viz. *Philoscia* Latreille. In fact, while describing the diagnostic characters and discussing the affinities of the new genus, Collinge himself pointed out that "in the form of Cephalon, the mesosome, and the metasome and the uropoda, *Burmoniscus* undoubtedly shows a remote relationship with *Philoscia*, at least the Asiatic *Philoscias* although these also are, as yet only imperfectly understood". From the above statement too, it is obvious that the new genus was close to *Philoscia*, but on account of inadequate knowledge and literature on the group, he kept content with the situation and described *Burmoniscus* as new genus. Ramakrishna (1980) considered on the basis of characters propounded above, that the genus *Burmoniscus* is congeneric with the established genus *Philoscia* Latreille.

8. *Philoscia kemp* (Collinge)

(Text figure 14-15)

1916. *Burmoniscus kemp*, Collinge, *Rec. Indian Mus.*, 12 (3) : 127-128.
1980. *Philoscia kemp* Ramakrishna, *J. zool. Soc. India*, 29 (1 & 2) : 86-87.

General : Body elongate oval, slightly convex, (Text fig. 14) about three times longer than broad. Surface smooth.

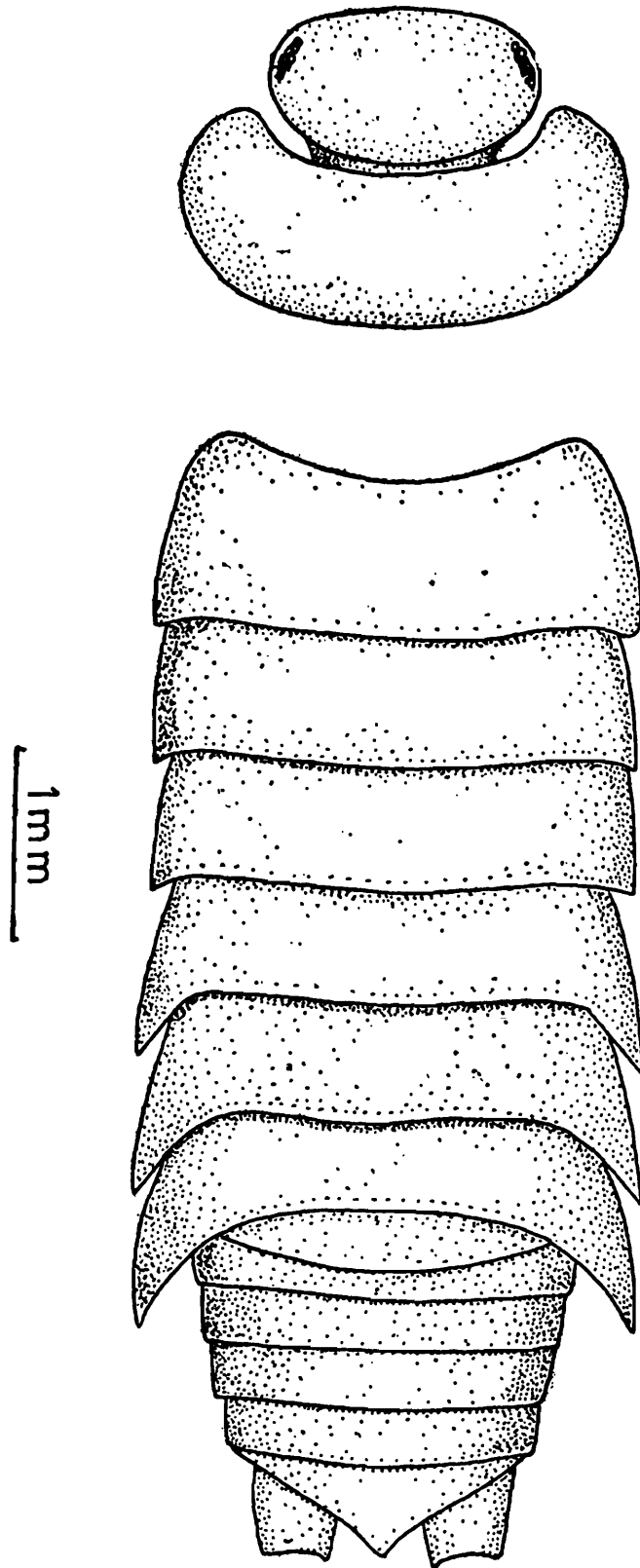


Fig. 14. *Philoscia kempī* (Collinge), Dorsal view.

Cephalon : Head (Text fig. 15-A) larger than in *Philoscia moulmeinensis* (Collinge), about twice wider than long. Partly flanked by the lateral plates of the first thoracic somite, emarginate. Median and lateral lobes absent indicating the generic character of *Philoscia*. Eyes absent.

Thorax : Thoracic somites wider than long, the first widest of all, covering one-third portion of the cephalon. Lateral plates of the first

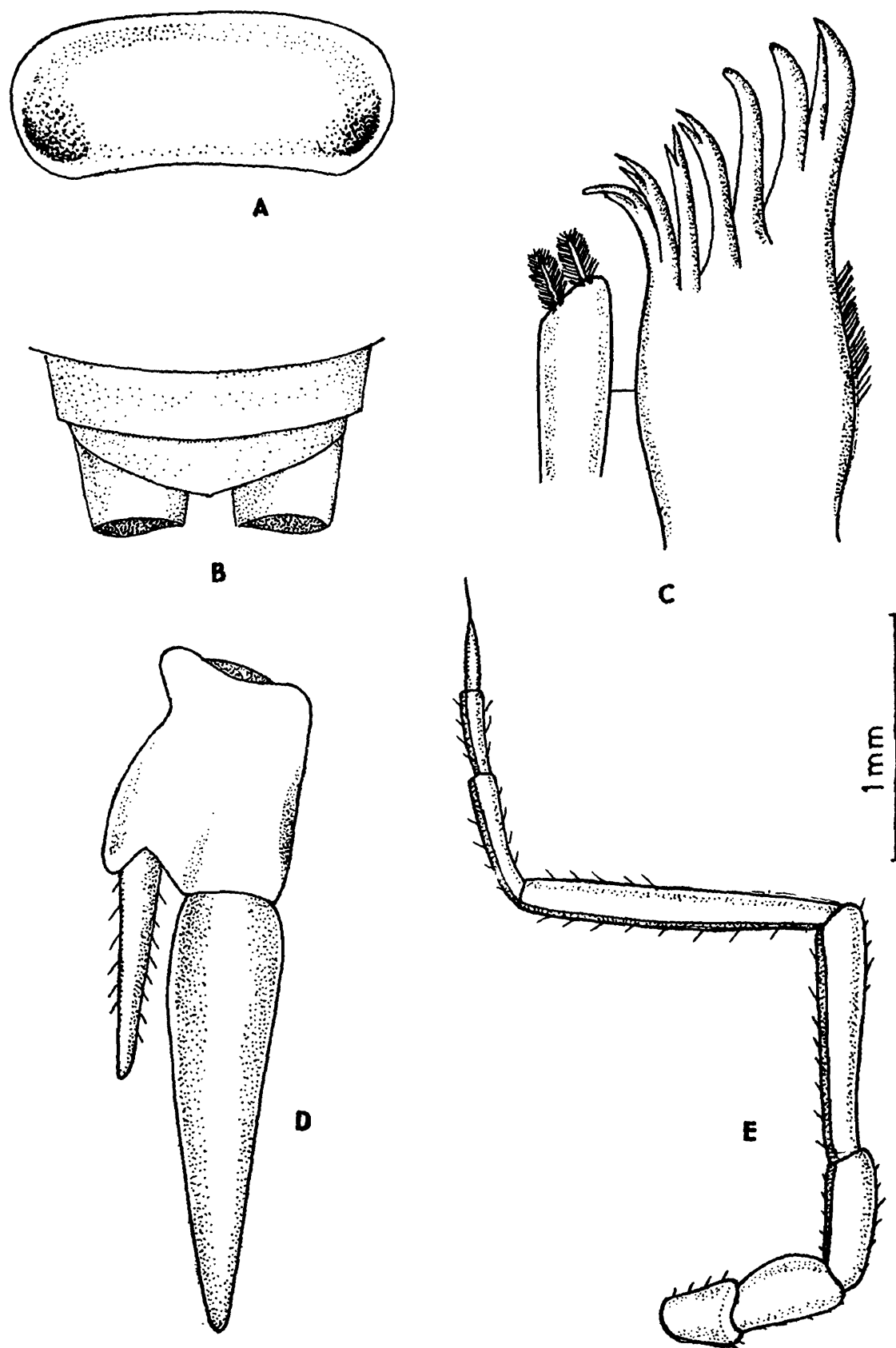


Fig. 15. *Philoscia kemp (Collinge)*

A. Dorsal view of Cephalon, B. Last segment of abdomen, telson and the basal plates of the Uropoda, C. First maxilla, Terminal portion of inner and outer lobes, D. Right Uropoda—dorsal view, E. Second antenna.

somite rounded at its posterior extremity, those of 2nd to 4th somites drawn into an angle, fifth and sixth ending in a long pointed spine and the seventh somite with a wide triangular acute spine.

Abdomen : Metasome abruptly narrower than the thorax, gradually tapering towards the posterior end. First two segments short and covered by the lateral plates of the last thoracic somite. Telson (Text fig. 15-B) broadly triangular with its apex blunt.

Appendages : Second antennae (Text fig. 15-E) slender, elongated, especially the fourth and fifth joints. Basal plate small, the second and third joints of subequal size, the fourth longer than the second and third, fifth the longest of all. Flagellum consisting of three joints, the proximal longest and the distal shortest of all, terminal joint with long fine style.

First maxilla (Text fig. 15-C) outer lobe terminating in four long and stout curved spines and four inner ones deeply bifurcated, inner lobe rounded terminally with two setose spines. Second maxilla thin and flexible, somewhat thicker on the inner side. On the outer side produced into a thin plate with radiating thickened arms, anteriorly terminating as a flattened tooth, and a smaller one on the inner side. Between the two the inner lobe forms a brush-like mass of setae.

Maxillipedes poorly developed, the inner lobe being larger.

Uropoda (Text fig. 15-D) with elongated somewhat flattened basal plate extending beyond the telson, dorsally grooved between points of articulation of exopodite. Exopodite long, stout, tapering distally. Endopodite nearly half in length of the exopodite, short and slender.

Colour light brown with darker pigmented network.

Length and breadth of the Lectotype 7.5 and 2.5 mm. respectively.

Type-locality : Male. Maosmai Cave, Cherrapunji, Assam, ca. 4000 ft., October 1914, Collector : Dr. S. W. Kemp.

Lectotype : Male specimen in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. C. 1463/2.

Paralectotypes : Four specimens with the same data as the Lectotype, in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8918/10.

Distribution : *Philoscia kempi* (Collinge) is so far, known to occur from its type locality.

Remarks : *Philoscia kempi* differs from *Philoscia moulmeinensis*

(Collinge) in having an elongate oval body and in the size and shape, larger cephalon, in the more elongated form of the spines of the outer lobe of the maxillae. It also differs from it in that the second maxilla is quite unlike that in *B. moulmeinensis* and the basal plate of the uropoda, which is longer and flattened and presence of lateral ridge on the outer side of the exopodite, and finally in the shape and size of the Telson.

The material was collected from an environment which happened to be in total darkness. Except for the absence of eyes, both the species as above, viz. *P. kempfi* and *P. moulmeinensis*, are darker in pigment and does not indicate any cave inhabiting characters, in spite of the fact that they live in deeper caves in total darkness unlike in *Philoscia dobakholi* Copra, which shows great modification.

9. *Philoscia tenuissima* Collinge

(Text Figures 16 A-G)

1915. *Philoscia tenuissima* Collinge, *Rec. Indian Mus.*, **11** (2) : 145.

1969. *Philoscia tenuissima* Ramakrishna, *Bull. syst. zool.*, **1** (2) : 67-70.

General : Body oblong oval, convex to a little extent, with its greatest breadth about one-third its length close to the sixth segment of the thorax, Surface smooth but with fine granules scattered all over the body.

Cephalon : Head semicircular with postero-lateral regions gradually converging towards the distal end. Anterior part without any lobes characteristic of the genus *Philoscia*. Eyes well developed with large ocelli and situated dorso-laterally (16-A). The head convex above, hornybrown in colour with light greyish patches.

Thorax : Mesosome somites large, sub-equal in width, lateral plates well expanded with an acute spine at its posteriolateral margin.

Abdomen : Abdomen abruptly shorter than the mesosome, a character consistent with the genus *Philoscia*, less than one-third of the body. Lateral plates of the first two segments almost concealed under the last thoracic somite, third to fifth segments of sub-equal width, and the sixth, namely the telson is wider than the previous segments and produced to a blunt point in the median line posteriorly.

Appendages : Antennule small, 3-jointed basal joint large. Antennae (Text-fig. 16-C) slender second and third segments almost equal, fourth

longer, the fifth segment longest of all and almost equal in length with the second and third together. Flagellum three-jointed, of different

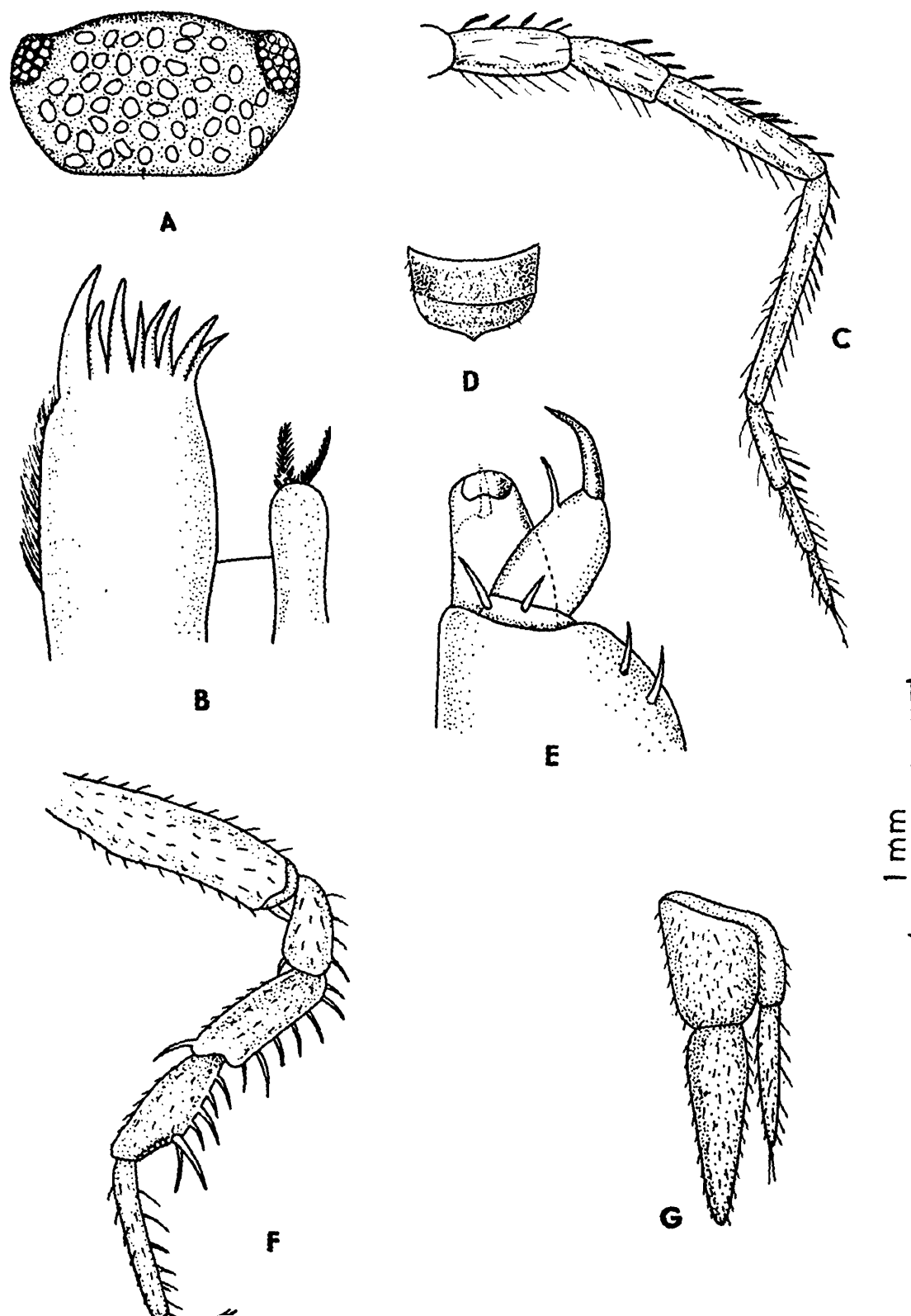


Fig. 16. *Philoscia tenuissima* Collinge

A. Dorsal view of Cephalon, B. First maxilla, terminal portions of inner and outer lobes, C. Second antenna, D. Telson with last abdominal segment, E. Maxillipede, terminal portion, F. Second thoracic leg, G. Dorsal view of left uropoda.

lengths, the first segment being the longest compared with others, the last ending in a style setaceous.

First maxilla (Text-fig. 16-B) consisting of two lobes, the outer lobe terminating in three stout, curved spines and five smaller inner ones ; the inner lobe terminates in two setaceous spines. Second maxilla thin, plate-like, bilobed distally, inner division terminating in fairly long setae.

Maxillipedes (Text-fig. 16-E) with elongated palps, outer one ending a multispinous process and a single large spine ; inner palp somewhat cone shaped, sunken at the apex, with tooth-like spine on the inner border and a long pointed one arising from the base of the concavity and four small tooth-like spines on the outer border.

Thoracic legs (Text-fig. 16-F) comparatively short, setaceous, 5th joint and claw elongated, fourth joint with two spines on the inner border with obtuse plumose apices.

Uropoda (Text. fig. 16-G) extending beyond the telson, basal plate small with deep groove on the underside which also extends along the inner border of the exopodite, the endopodite is also grooved on its ventral side. Telson (Text-fig. 16-D) short and broad produced to a blunt point in the median line posteriorly.

Colour of the specimens horny-brown with light greyish markings.

Length of the longest specimen 6.5 mm.

Type-locality : Museum compound, Madras Town, Tamil Nadu, INDIA, October, 1913, Coll. Dr. N. Annandale.

Syntypes : Couple of specimens all fragmented in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8668/10.

Distribution : *Philoscia tenuissima*, is, so far, known from its type locality only.

Remarks : This species is distinct from other species of the genus *Philoscia* with its peculiar shaped cephalon, abdomen, with special reference to the size and shape of the telson, the flagella, specially its size of the three joint, and other mouth parts.

10. *Philoscia indirae* Sp. nov.

(Text figure 17)

General : Body elongate-oval (Text fig. 17), strongly convex,

smooth, attaining greatest breadth between the 5th and 6th segments of the thorax and a little less than half of its total length.

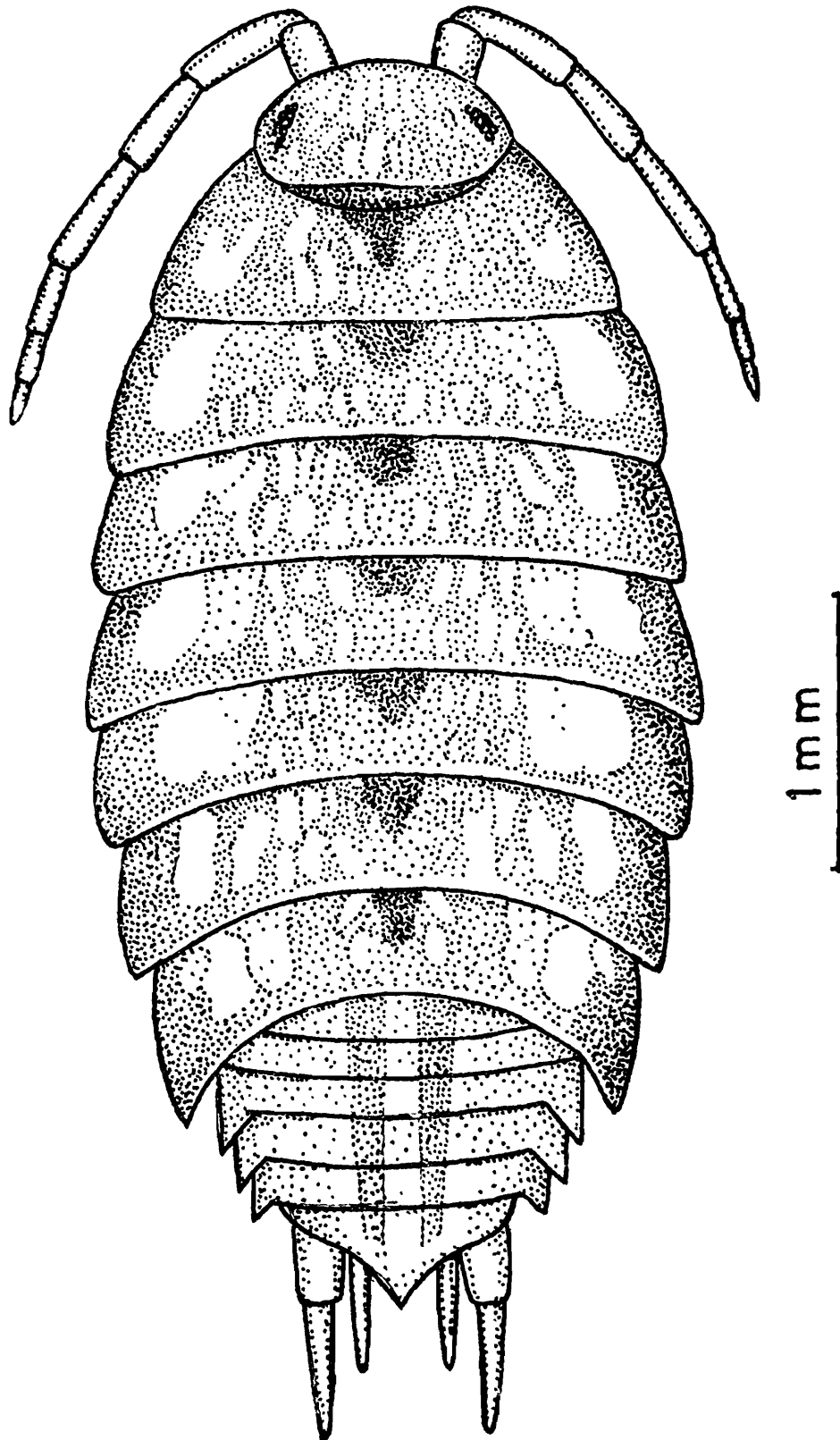


Fig. 17. *Philoscia Indirae* Sp. nov., Dorsal view.

Cephalon : Head very distinctly separate from the first thoracic somite, transversely oval and a little over twice wider than long. Frontal margin smooth but slightly arched in the middle. Postero-

lateral parts round and smooth. Posterior margin almost straight and parallel to the first thoracic somite. Eyes small and situated in the centro-lateral angles of the head.

Thorax : Thoracic somites large and gradually widening towards the posterior end. First somite longest of all and epimeral plates not expanded. The lateral parts of second and third thoracic segments slightly expanded but ends in a blunt point ; while those of the fourth to seventh somites expanded very much, gradually increasing and ending in an acute point. The lateral parts of the last thoracic somite almost reaching the fourth abdominal segment.

Abdomen : Pleon abruptly small, about one-fifth of the total length of the body, much narrower than the thorax. All segments distinct ; the first and second small and tucked underneath the lateral parts of the last thoracic somit. Those of the third to fifth segments gradually increasing in size and their lateral parts expanding and ending in a sharp point. Telson triangular, terminating posteriorly in a blunt point and extending up to the last quarter of the basal segment of the uropod.

Appendages : Antennules small, almost rudimentary and inconspicuous. Antennae (Text fig. 17) long, slender, almost reaching the end of the second thoracic somite when fully extended backwards. First and second joints short ; third almost equal to the first and second combined ; third and fourth almost subequal ; fifth joint longest of all, flagellum consisting of three articles with the first and second almost equal, the third articles being little shorter than the other two and provided with a stylet.

Seventh pair of legs fairly long, stout, with penultimate joint thin and longest of all the joints. The dactylus short, curved, and ending in an acute process.

Uropoda (Text fig. 17) with basal segment more or less rectangular, extending beyond the terminus of the telson. Outer ramus long and conical tapering in an acute point. Inner ramus short and cylindrical and attached to the posterior and central portion of the basal joint.

Colour of the body creamy white throughout on the dorsal surface, with irregular reticulate brown lines. However, there are three rows of irregular shaped dark patches, one median and two laterally placed on all the thoracic segments. Telson has two lateral dark brown patches. The dark brown patches are more prominent in the anterior

segments and gradually reduce in size and fade as one approaches the posterior segments.

Length and greatest breadth of the holotype (female) being 11.25 and 5.00 mm. respectively.

Type Specimen : A female, Holotype collected from the bamboo leaf litter, on the way to Kunti River, Silent Valley, Kerala, INDIA. Holotype deposited in the Collections of the Zoological Survey of India, Calcutta with Register No. C. 3521/2.

Remarks : This species differs from other species of the genus *Philoscia* described, so far, in the size and shape of the head, thorax and abdomen, colouration, appendages, specially the flagellum of the second antenna.

This species is named after my wife, Smt. Indira Ramkrishna.

11. *Philoscia javanensis* Richardson

(Text-fig. 18)

1922. *Philoscia. javanensis* Richardson, *Proc. U. S. Nat. Mus.*, 60 (24) : 1-7.

General : Body oblong-oval, nearly twice as long as broad and dorsal surface smooth.

Cephalon : Head about twice (Text fig. 1) as wide as long, with frontal margin almost straight, characteristic feature of the genus. Eyes small and well behind the antero-lateral angles of the head showing but very little in the dorsal view.

Thorax : The segments of the thorax almost equal in size, except for the first longer than all others. Lateral plates smooth and rounded posteriorly in the first four segments ; while those of the last three segments ending in a blunt process.

Abdomen : Pleon abruptly narrower compared with thoracic segments and gradually tapering. The first two segments small, almost sub-equal and shorter than the other segments. The seventh thoracic somite extending beyond the middle of the third abdominal segment ; lateral plate covering completely the first two segments. The terminal segment (telson) (Text fig. 18) more than twice as wide as long with its apex obtusely triangular.

Appendages : The first pair of antennae small and three jointed. The second pair of antennae slender and long ; the first three joints

short, the first two being sub-equal ; the third almost double of the two put together ; the fourth longer than third ; the fifth longest of all. Flagellum consisting of three sub-equal joints and as long as the fifth article.

The Uropods short, the basal joint extending a little distance beyond

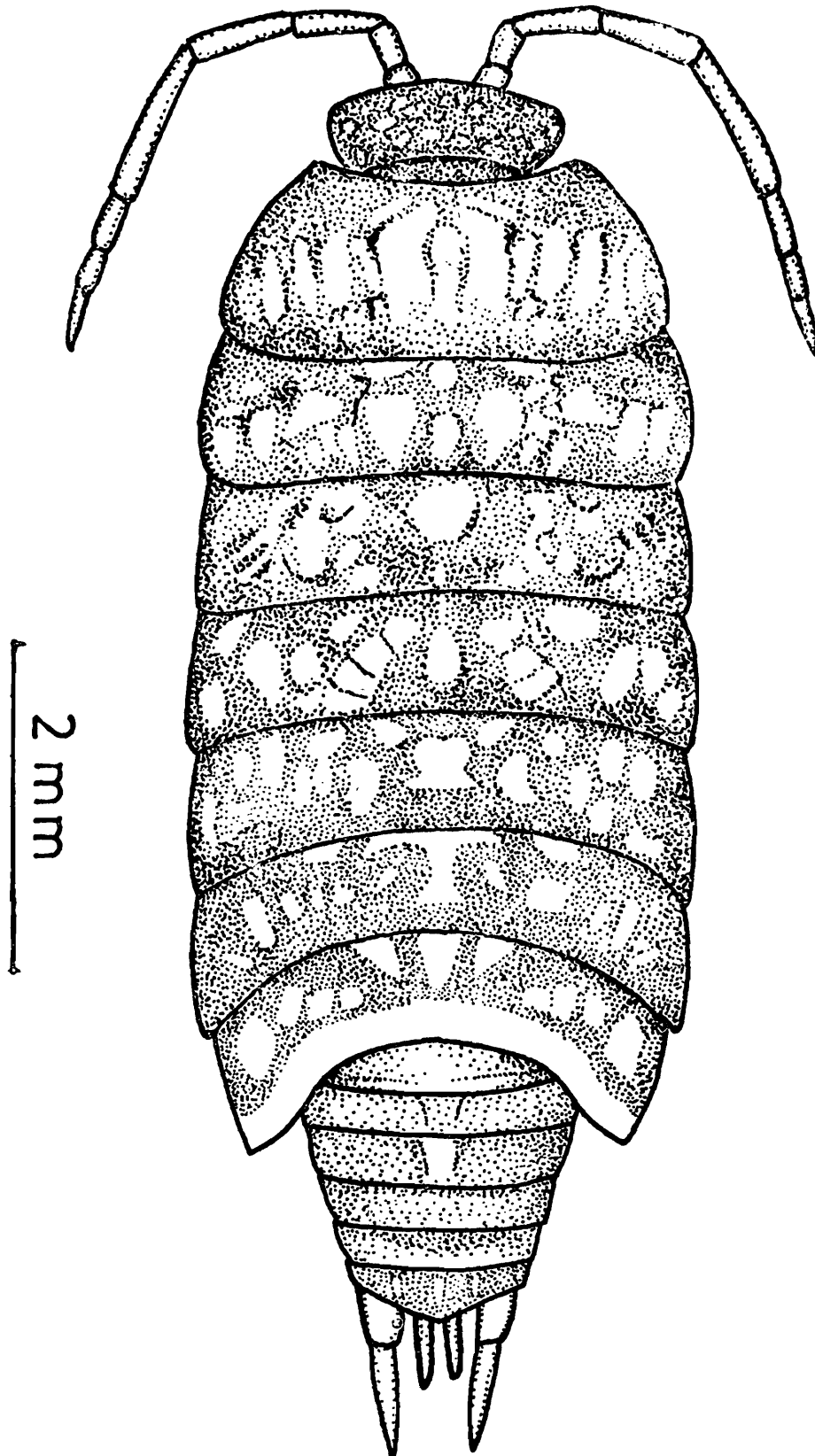


Fig. 18. *Philoscia javanensis* Richardson, Dorsal view.

the terminal segment of the abdomen. The outer ramus (Exopod) about twice as the basal joint ; the inner branch cylindrical and extending, to the middle of the outer one.

Colour uniformly brown, with somewhat mottled appearance of lighter darker brown. The terminal segment of the abdomen possessing three elongate spots of light brown, one in the middle and one on either side.

Type : The type is in the United States National Museum (Cat. No. 54477).

The description based on specimen preserved in the National Zoological Collections of the Zoological Survey of India, measuring length and greatest breadth 6.00 and 3.00 mm. respectively, Reg. No. C. 3654/2.

Distribution : This species, originally collected from Zamarang and Djolja in Java (Indonesia is now recorded for the first time in Assam, Arunachal Pradesh, West Bengal, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh, Haryana, Silent Valley in Kerala, Tamil Nadu, Karnataka, Goa and Nicobar-Islands. Outside India, it is recorded from Bhutan and Burma.

Genus 4. *Porcellio* Latreille

- 1804. *Porcellio* Latreille, *Hist. Nat. Crust. Inst.*, 7 : 45.
- 1885. *Porcellio* Budde-Lund, *Crust. Isop. Terr.*, 82.
- 1898. *Porcellio* Sars, *Crust. Norway*, 2 : 176.
- 1905. *Porcellio* Richardson, *Bull. United States Nat. Mus.*, Washington, 54 : 611.
- 1932. *Porcellio* Barnard, *Ann. South African Mus.*, 30 (2) : 251.
- 1936. *Porcellio* Van Name, *Bull. American Mus. Nat. Hist.*, New York, 71 : 226.
- 1971. *Porcellio*, Ramakrishna, *Rec. Indian Mus.*, Calcutta, 63 (1-4) : 181.
- 1975. *Porcellie* Ramakrishna, *Br. B. S. Chauhan Comm.* vol. 198.

Characters : Body oval, less convex, with lateral parts expanded. Cephalon partly flanked by the lateral plates of the first thoracic segment, Lateral lobes of the head well developed, whereas the frontal lobe more or less projecting. Abdomen not abruptly contracted and

epimeral plates of third to fifth segments prominent and recurved, telson conically produced. Eyes well developed and sub-dorsal.

Flagellum of Second antenna biramous, the two joints being subequal or slightly vary in length. Mandible with several penicils between the cutting plates and the molar penicil. Legs gradually increasing in length posteriorly and the last pair of male sometimes slightly differing from the female. Opercular plates of the first two pairs of pleopoda and sometimes of all the three succeeding pairs of pleopoda and sometimes of all the three succeeding pairs provided with tracheae. Uropoda projecting, outer branch lanceolate, the inner smaller linear and originating far in front of the former.

Type Species : Porcellio scaber Latreille, 1804.

Distribution : North and South America, Greater parts of Europe, Africa, Turkey Pakistan, India, Bhutan, Burma, Sri Lanka, Indonesia, Thailand, China, Japan, New Guinea and Australia. Thus, the species seems to be very common all over the world.

Keys to the Indian species of the Genus *Porcellio*

1. Body oval
2. Dorsal surface convex and covered with fine granules spread specially along sides of the thoracic somites and with large tubercles arranged in two sub median rows.
3. Cephalon surface beset with larger tubercles.
4. Flagellum of two unequal joints cave dwelling from *...Porcellio assamensis*
- 2.a. Dorsal surface covered with minute spines arranged irregularly.
- 3.a. Cephalon convex and covered with say one-third by the lateral plates of the first thoracic somite.
- 4.a. Opercular rami of all the pairs of pleopods with air cavities *... Porcellio spinicornis*
- 1.a. Body oblong oval
- 2.b. Dorsal surface partially convex. Thoracic somites covered with four rows of blunt spines, excepting first segment bearing three such rows.

- 3.b. Head studded with tubercles.
- 5. Flagellum consists of two unequal joints.
- 6. Uropoda extending considerably beyond telson
in an acute point ... *Porcellio ganesa*
- 2.c. Dorsal surface convex and rough due to
presence of numerous tubercles
- 3.c. Cephalon distinct from thorax with lateral lobes
large and rounded and front lobe less prominent.
- 4.b. Opercular plates of only two anterior pairs of
pleopods with air cavities.
- 5.a. Flagellum of two unequal joints ... *Porcellio scaber*
- 2.d. Dorsal surface smooth all through.
- 3.d. Cephalon with well developed lateral lobes.
Frontal lobe obtusely triangular.
- 5.b. Flagellum of two joints of equal length.
- 6.a. Uropoda extending upto telson ... *Porcellio laevis*
- 3.e. Head quadrangular. Frontal margin developed
into two prominent lobes and median lobe with
its apex terminating in a broad process as in—
... *Porcellio assamensis*
- 5.c. Flagellum of two unequal joints.
- 7. First maxilla with outer lobe terminating in four
strong curved spines and five smaller ones.
Inner lobe with two setaceous spines ... *Porcellio rotundus*.
- 2.e. Dorsal surface smooth but for the prominent
tubercles on the head and so also thorax.
- 5.d. Flagellum of two equal joints—*Porcellio insii*.
- 2.f. Dorsal surface with slightly raised tubercle.
- 3.f. Head with frontal and lateral lobes characteristic
of Genus *Porcellio*.
- 5.e. Flagellum of two unequal joints.
- 7.a. First maxilla terminating in four curved spines
and four smaller ones with bifid termination—
... *Porcellio carinatus*
- 2.g. Dorsal surface smooth excepting the surface of
head which is tubercular.

- 7.b. First maxilla consisting of two lobes terminating in three long and one short spine on the outer side and the inner side with a smaller and stout spine ... *Porcellio hispidus*
- 2.h. Dorsal surface smooth with minute hairs. Eyes large, oval with about 24 ocelli.
- 4.c. Flagellum with unequal joints.
- 5.f. All the pleopods are pseudo tracheate.
- 6.b. Uropoda extending beyond telson.
- 8. Telson twice as broad as long acuminate and extend upto the end of propoda of uropoda ...
Porcellio Karokorum
- 2.1. Dorsal surface strongly convex and smooth. Eyes with several black ocelli.
- 4.d. Flagellum of two equal joints.
- 6.c. Uropoda extending three times as long as telson,
- 8.a. Telson long triangular convex blunt spine beyond the propodite of Uropoda ... *Porcellio mercandicus*
- 2.j. Dorsal surface convex and granular in the middle of the segments.
- 4.e. Opercular plates of all pleopods with air cavities.
- 6.d. Uropoda of moderate size extending to the tip of telson.
- 8.b. Telson as long as broad at its base ... *Porcellio ratzburgi*

12. *Porcellio assamensis* Chopra

(Text Figs. 19 & 20)

- 1924. *Porcellio assamensis* Chopra, *Rec. Indian Mus.*, 26 (1) : 51-53,
- 1965. *Porcellio assamensis* Ramakrishna, *Rec. zool. Surv. India*, Calcutta, 63 (1-4) : 181-182.
- 1975. *Porcellio assamensis* Ramakrishna, *Rec. zool. Surv. India*, Calcutta, 68 : 207-303.

General : Body oval, elongated, with its greatest breadth less than half its length. Dorsal surface slightly convex and covered with fine granules aggregated specially along the sides of the thoracic somites and with large tubercles arranged in two sub-median rows.

Cephalon : Cephalon distinctly separated from the first thoracic somite and surrounded to some extent by the forwardly projecting lateral parts of the first thoracic segment. Anterior margin conically

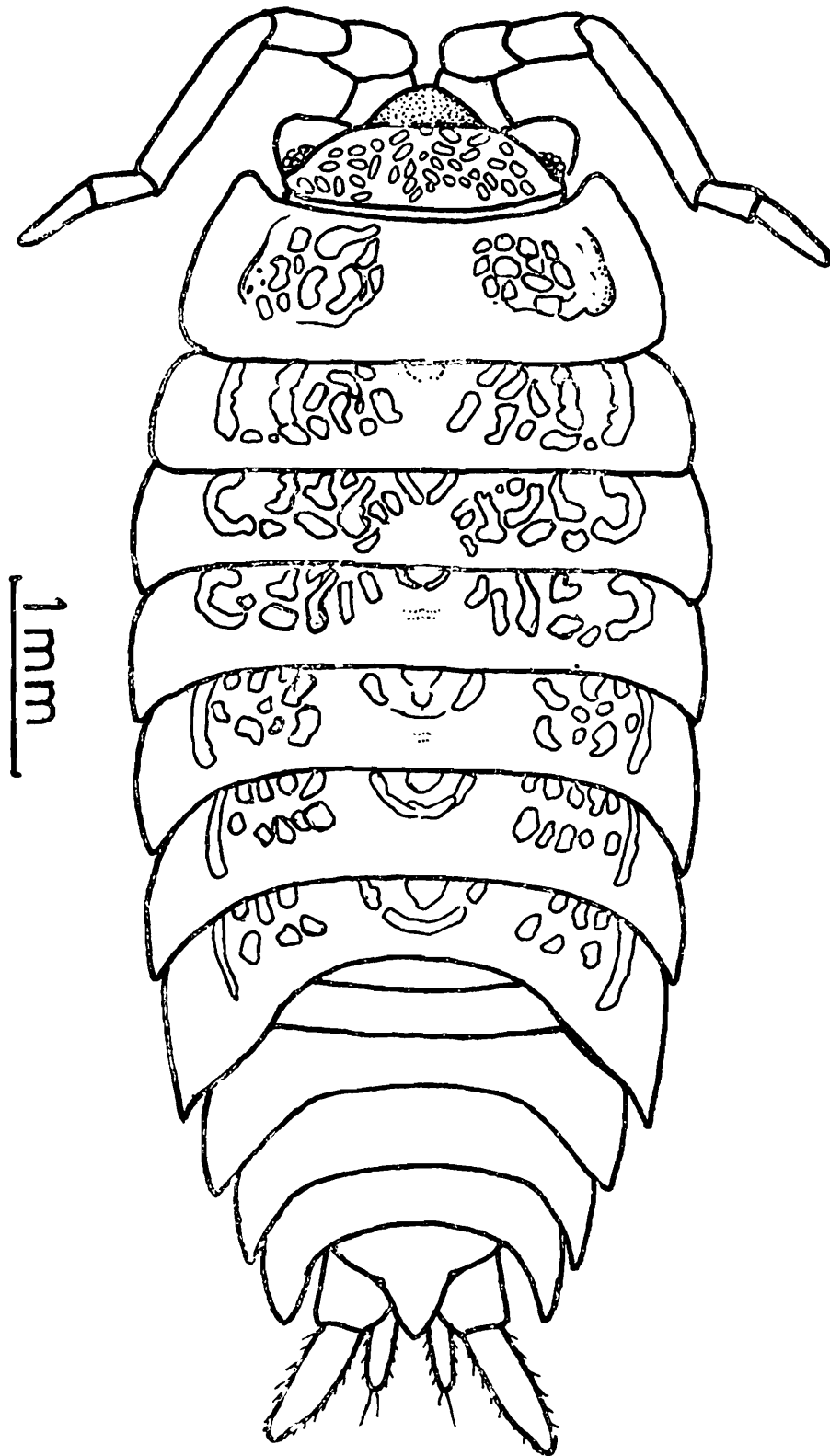


Fig. 19. *Porcellio assamensis* Chopra, Dorsal view.

produced in the middle with lateral lobes large, prominent and bluntly rounded at their free margins. Surface of the cephalon beset

with large tubercles. Eyes well developed oval, and situated at the sides of the cephalon at the base of the lateral lobes.

Thorax : Thoracic somites large, sub-equal, their lateral parts prominent, leaf-like and subcontiguous, those of the first segment projecting anteriorly so as to enclose the cephalon on its sides, and extending almost as far as the base of the lateral lobes. Lateral parts of the anterior three somites terminating behind bluntly, while those of the last four more or less acutely.

Abdomen : Abdomen less than half the length of the thorax and slightly narrower. All the six segments distinct, the first two considerably shorter than the rest, their lateral parts completely covered by the seventh thoracic somite. Lateral parts of the third, fourth and fifth segments well developed, narrow, lamellar and strongly curved backwards ; those of the last / extending beyond the middle of the terminal segment. Sixth segment triangular with apex drawn out posteriorly in a long pointed process ; length somewhat less than breadth at the base.

Appendages : Antennules (Text fig. 20-A) small, insignificant, three segmented, with second proportionately small, terminal segment shorter than the basal, conically tapering and provided with a small number of apical cilia.

Antennae (Text Fig. 20-C) short and rather strongly built, hardly ever reaching beyond the end of the second thoracic segment when fully turned backwards. Peduncular segments, especially the first four, deeply grooved on the ventral side ; first three short, fourth about one and half times longer than the third, fifth segment longest, more than twice the length of the third. Flagellum shorter than the last peduncular joint ; two segmented, with the terminal segment considerably more than twice the length of the basal. All antennal segments covered with hairs, peduncular somewhat sparsely, compared with flagellar. Last flagellar segment provided with a stout styliiform bristle at its tip, dividing distally in a compact penicil of fine setae.

Outer lobe of maxilla terminating in four large incurved spines, the outermost the largest, and the four shorter spines bifid at their extremities. Part of the outer margin behind the outermost large spine deeply setose.

Mandibles with a double row of strongly chitinous teeth at the apex, a membranous hairy lappet behind, followed by a number of penicils.

Maxilliped with the outer palp terminating in a large multispinous process, with one or two small spines on its outer side, and two large and two small ones on the inner side. Inner palp broad, with three blunt spines having broad bases and one large pointed spine in the middle. A large pointed spine at the base of the outer palp and a smaller one about its middle. Outer margin of maxilliped behind the palp provided with a number of short spines.

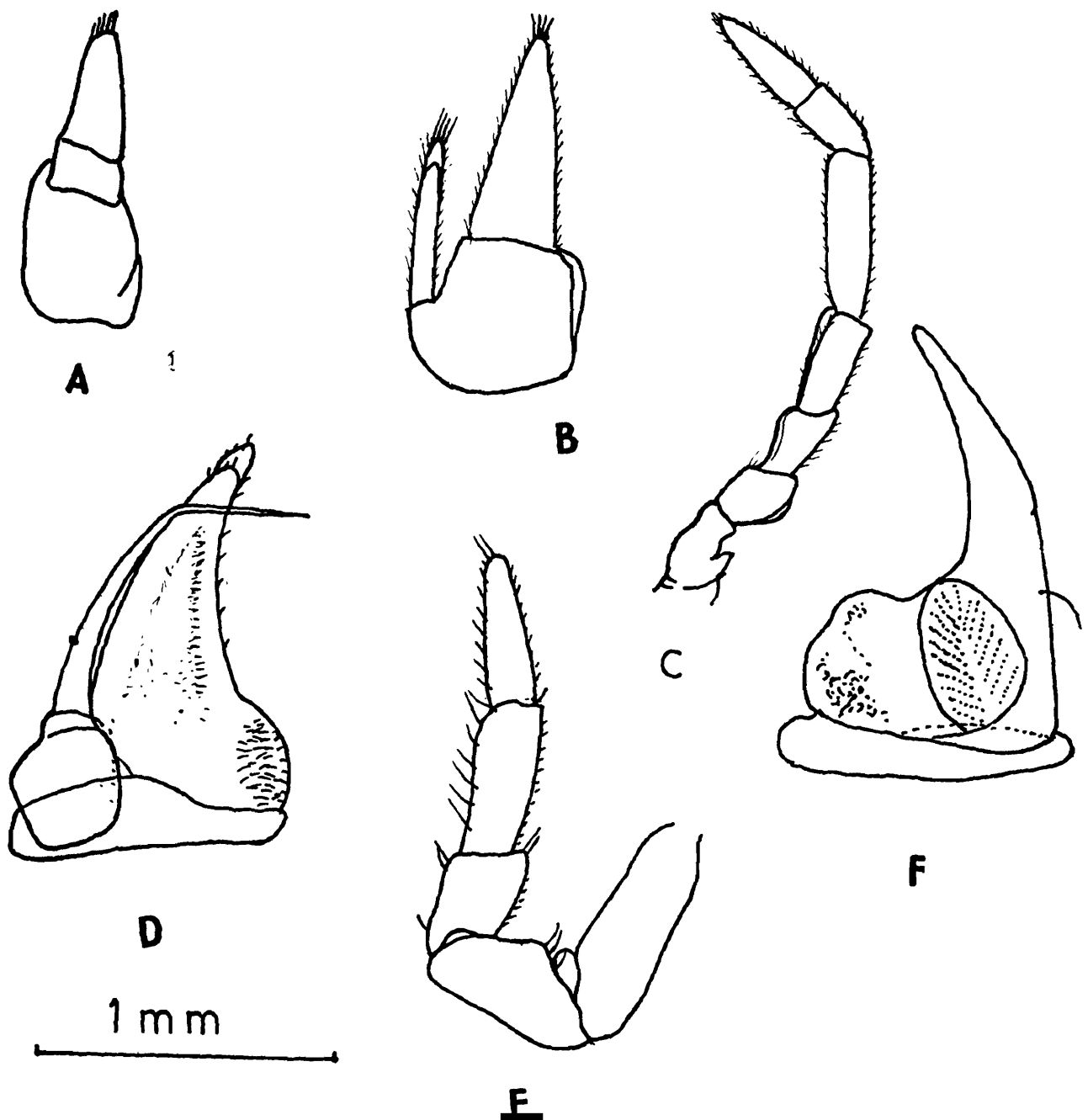


FIG. 20. *Porcellio assamensis* A. Antennule, B. Uropoda, C. Antenna, D. Second pleopod of male, E. Thoracic leg, F. First pleopod of male.

Legs (Text Fig. 20-E) increasing in size from the first to the last ; last pair in male hardly stouter than in female, with the carpal joint dilated. All legs deeply setaceous.

Opercular rami of all the five pairs of pleopods provided with trachase, the first two pairs in the female somewhat bilobed. First pleopod (Text Fig. 20-F) of male with exopodite less than half the length of endopodite ; the former a rectangular plate, the latter with the basal half broad, provided with powerful muscles and with distal half narrowing to an acute point. Second pleopod of male (Text Fig. 20-D) with its exopod longer than that of the first, triangular, its apex pointed, the endopod consisting of a broad rounded basal joint followed by a long narrow second joint curving outwards to acute point, and reaching considerably beyond the end of the exopod.

Uropoda (Text Fig. 20-B) extending quite considerably beyond the telson ; basal segment flattened dorso-ventrally, narrower posteriorly than at its anterior margin and extending upto about the middle of the telson. The inner ramus narrow, linear, arising from the inner lateral corner of the basal plate, setaceous and terminating in a tuft of about four long setae. Outer ramus longer in male than in the female, articulating at the posterior margin of the basal plate, broad at the base, fairly thick tapering to an acute point, considerably longer than the basal joint provided with setae along the margins and terminated by about six long hairs.

Colour dark brown with white opaque patches arranged sub-medianally on the thorax. Length and breadth of specimens ranging between 8 and 3 mm. and 5 and 2 mm. respectively.

Type-locality : Mlawail Examul Siju Cave, Garo Hills, Assam (Meghalaya), INDIA, 400 ft. from entrance, February, 1922 (Colls. S. Kemp and B. N. Chopra. Syntypes : a male and 8 females in the National Zoological Collections, Zoological Survey of India, Calcutta. Regd. No. C. 555/1.

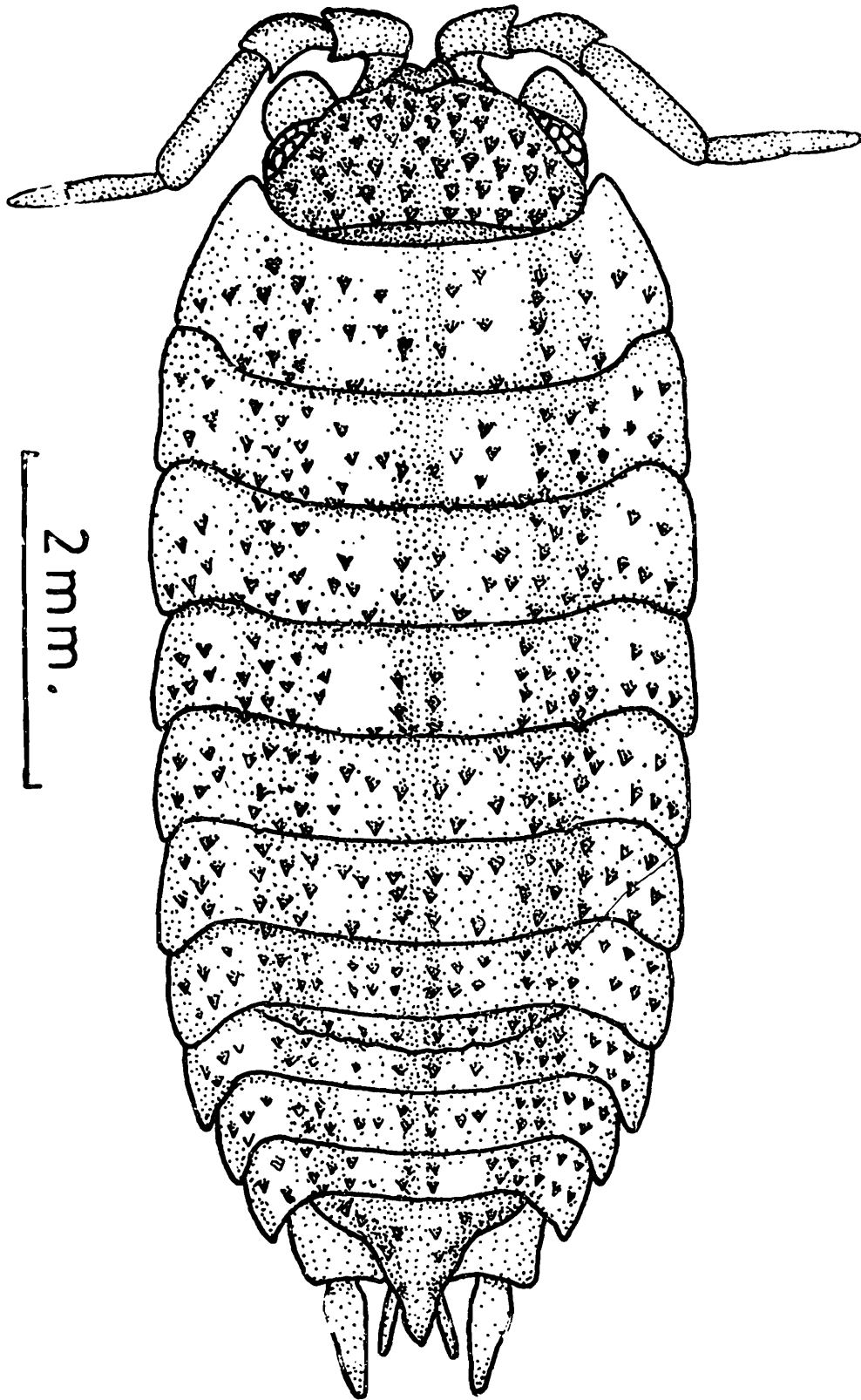
Distribution : In addition to the type locality, the species has now been recorded from Arunachal Pradesh, Assam, Manipur, Bihar, Orissa, Madhya Pradesh, West Bengal, Kerala, Tamil Nadu, Karnataka, Goa and Andaman and Nicobar Islands in India ; Bhutan and Burma from outside.

Remarks : *Porcellio assamensis* Chopra although reported from the Siju Cave, does not extend beyond 450 feet from the entrance. This species resembles *Porcellio maculipennis* Budde lund, but it is quite distinct from the brief description that I can make out.

13. *Porcellio spinicornis* (Say)

Text figures 21 & 22)

1818. *Porcellio spinicornis* Say, *Jour. Ac. Nat. Sci. Philadelphia*,
1 : 431-432.
1885. *Porcello spinicornis* Budde-Lund, *Crust. Isop. Terrestria* : 123-
125.

Fig. 21. *Porcellio spinicornis* Say, Dorsal view.

1905. *Porcellio spinicornis* Richardson, *Bull United States Nat. Mus.*, 54 : 619-621.

General : Body oval (Text fig. 21) and nearly twice as long as broad. Dorsal surface convex and with minute spines arranged irregularly.

Cephalon : Head almost twice as long as wide, convex and covered partially (say one-third) by the lateral plates of the first thoracic somite. The frontal portion with two prominent lateral lobes and a less pronounced median lobe. Surface with large tubercles compared with those of other parts of the body. Eyes large and antero-lateral almost immediately behind the lateral lobes.

Thorax : All the segments of mesosome almost equal in size except for the first one longer than others. The lateral plates uniform in all the segments.

Abdomen : The abdomen almost as wide as the thorax. The first two segments narrow and their lateral plates covered by the lateral plates of the last thoracic somite. Fourth and fifth segments subequal and their lateral plates recurved ending in an acute blunt spine. The telson triangular with its apex produced to a long narrow process rounded at the extremity. The terminal segment wider compared with its length.

Appendages : The first pair of antennae rudimentary. The second antennae (Text Fig 22-B) long and slender. The basal joint shortest ; the second and the third articles subequal and each of them twice as long as the first ; the fourth one and half times as long as the third. The fifth joint longest of all. The flagellum consisting of two articles, the proximal one and half times longer than the distal. The Second antennae extending upto margin of the third thoracic segment. The second joint of the second antenna provided with a spine like process on its inner margin and quite conspicuous.

The peduncles of Uropoda (Text Fig. 22-C) extending almost to the extremity of the terminal segment of the body. The exopodite thick about twice as long as the endopodite. The latter small linear extending beyond the telson.

Colour : Colour of dorsal surface yellowish grey, variegated with dark brown patches which are generally arranged in five longitudinal rows on the mesosome. Cephalon and middle part of metasome uniformly bluish.

The adult female measures 14 and 6.8 mm. in length and width respectively.

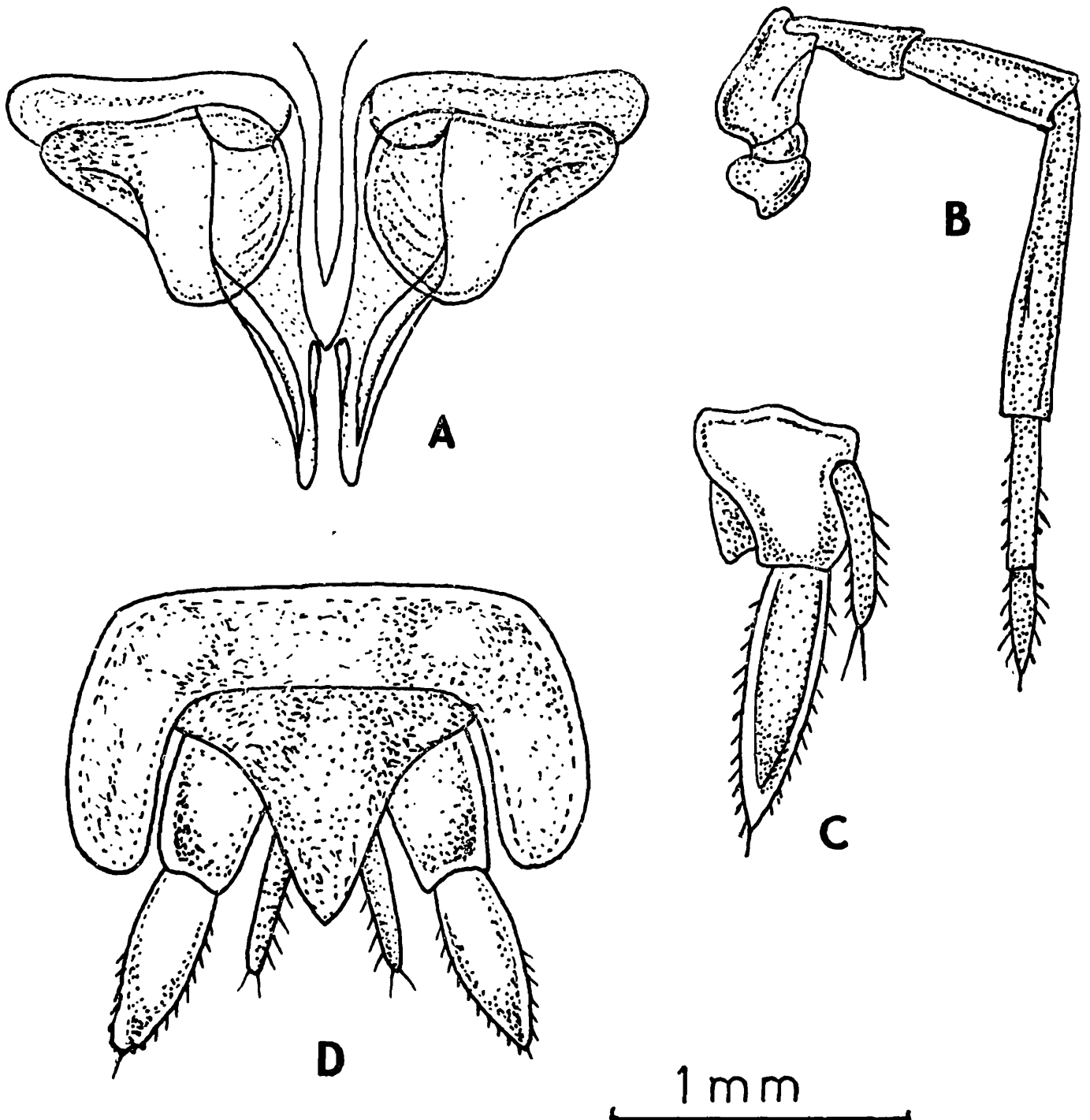


Fig. 22. *Porcellio spinicornis* Say

A. First pleopod of male, B. Second antenna, C. Uropoda, D. Dorsal segments of abdomen and uropoda.

Distribution : Fairly common in northern and central Europe ; north-eastern America ; and in India, this species has been recorded so far, from Orissa, Chhota Nagpur in Bihar, Madhya Pradesh, Tamil Nadu in Peninsular India, Maharashtra, Rajasthan, Haryana and Himachal Pradesh in northern India.

14. **Porcellio ganesa** Ramakrishna

(Text Fig. 23)

1975. *Porcellio ganesa* Ramakrishna, Dr. B. S. Chauhan Comm. Vol 197-202.

General : Body oblong-oval (Text Fig. 23-A) with its greatest breadth markedly less than half its length. Dorsal surface partially convex and thoracic somites covered with two rows of blunt spines generally arranged in straight lines, except the first sement bearing three such rows. Sub-median and lateral sides of thoracic segments provided with light brown patches.

Cephalon : Cephalon distinctly separated from the first thoracic somite and surrounded to a great extent by the forwardly projecting lateral parts of the first segment. Head dark brown in colour and studded with rows of tubercles. Anterior margin of Cephalon produced into three lobes, the median lobe being less produced than the laterals and slightly notched in the centre. The two lateral lobes large, prominent and bluntly rounded at their free margins. Eyes well developed, oval, situated at the sides of the head at the base of the lateral lobes.

Thorax : Thoracic segments large, sub-equal, convex from side, their lateral parts prominent, lamellar, not overlapping each other. Those of the first segment projecting anteriorly so as to enclose half the portion of the head on its sides and extending as far as rhe base of the eyes. Lateral parts of the anterior two segments terminating behind bluntly and those of the last five more or lèss acutely,

Abdomen : Abdomen nearly one-third the length of the thorax and comparatively much narrower, generally tapering towards the posterior end. All the six segments distinct, the first two considerably shorter than others, their lateral parts of the third, fourth and fifth segments well developed, narrow, lamellar and strongly curved backwards, those of the penultimate extending little shorter than the terminal segment. Sixth segment (Text-fig. 23-A) triangular, with apex drawn out posteriorly in a long pointed process,

Appendages : Antennule small, insignificant, three segmented with second segment small, terminal smaller than the basai, conically tapering and provided with a few apical cilia.

Antenna (Text Fig. 23-B) somewhat long and rather strongly built,

reaching as far as the middle of the second thoracic segment when fully turned backwards. All the peduncular segments deeply grooved ventrally, first three short, fourth little longer than the third, fifth longest almost thrice the length of the third, Flagellum slightly shorter

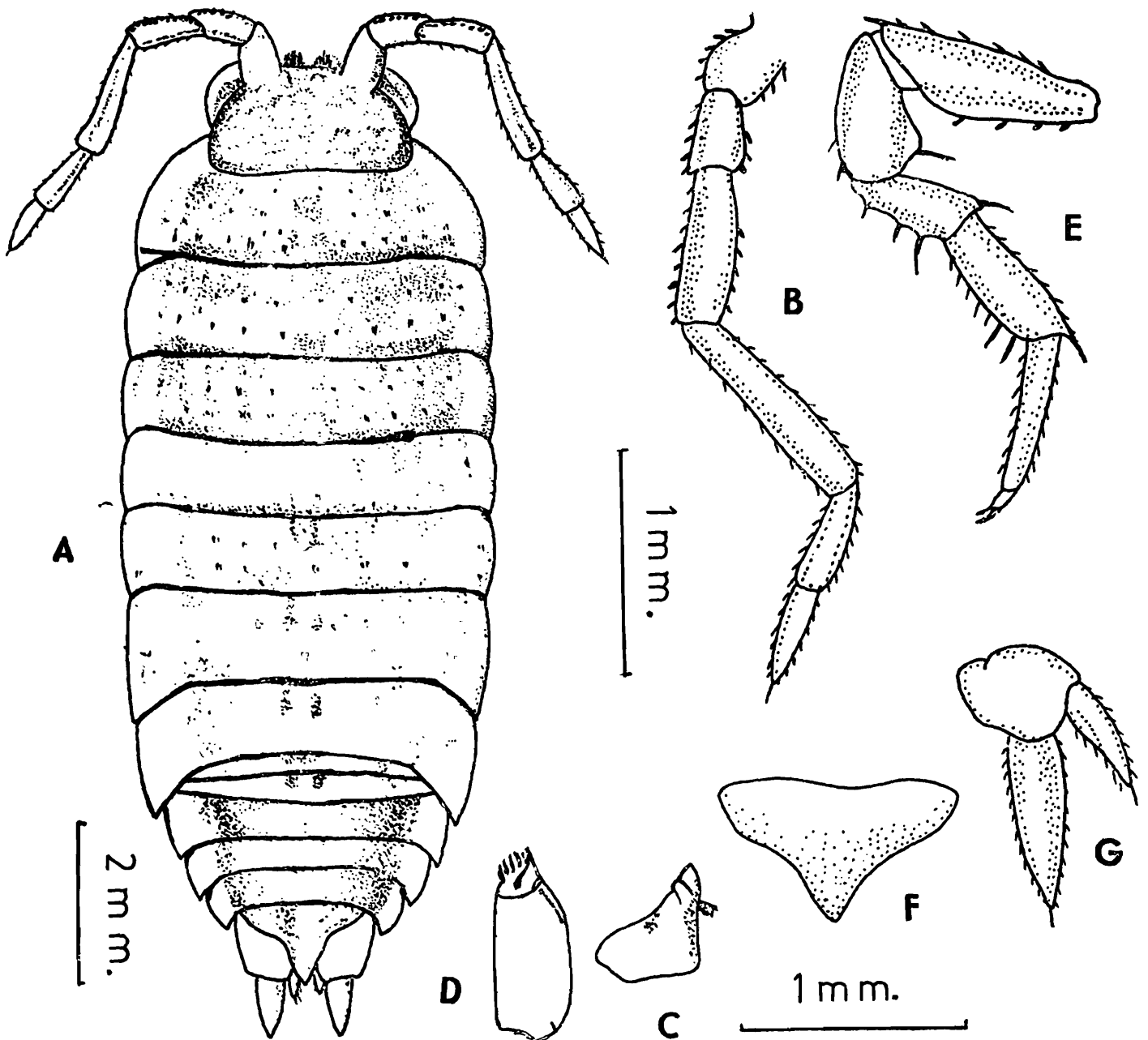


Fig. 23. *Porcellio ganesa* Ramakrishna

A. Dorsal view, B. Second antenna, C. Mandible, D. First maxilla, E. Second thoracic leg, F. Telson, G. Uropoda.

than the peduncular joint, two segmented with terminal segment almost three-fourths of the basal. All the antennal segments covered with hairs—peduncular somewhat sparsely, flagellar more densely. Last flagellar segment provided at its tip with stout styliform bristle.

Outer palp of maxilliped (Text Fig. 23-D) terminating in four spines of which the first, second and fourth large and incurved, the outermost

largest and bifid at its extremity. Inner palp broad with two sharp tooth-like spines,

Mandible (Text Fig. 23-C) with double rows or strongly chitinous teeth at the apex followed by a number of penicils.

Outer lobe of maxilla terminating in four large spines incurved, the outermost being the largest and the outer margin behind the large spine deeply setose, The second maxilla terminating with two large setose tuft like structures.

Legs (Text Fig. 23-E) increasing in size from the first to last. All the legs strongly setaceous, specially the last two digits.

Opercular rami of all the five pairs of pleopods provided with air cavities. First pleopod of male with exopodite almost as long as endopodite, the former an uneven plate, the latter with the basal half broad, provided with powerful muscles and the distant half narrowing to an acute point provided with bristle like hairs on the internal side. The male organ is single and tapering almost half as long as endopodite. The second pleopod of male with its exopod longer than that of the first triangular, its apex pointed, outer margin provided with a few short spines. The endopod consisting of a broad, rounded basal joint, followed by a long narrow second joint tapering to an acute point reaching considerably beyond the end of the exopod.

Uropod (Text Fig. 23-G) extending considerably beyond the telson, basal segment flattened dorsoventrally, narrower posteriorly than at its anterior margin and extending almost as far as the terminal portion of the telson ; the inner ramus narrow, linear arising from the inner lateral corner of the basal plate, extending as far as the middle of the outer ramus, setaceous. Outer ramus distinctly longer, articulating at the posterior margin of the basal plate, broad at the base, tapering to an acute point, considerably longer than the basal joint and provided with setae along the margins.

Colour creamy white on the dorsal surface with dark brown patches arranged sub-medianally and laterally on the thorax. The colour of the Cephalon and pleon completely dark-brown.

Length and greatest breadth being 10.5 and 3.7 mm. respectively.

Type-locality : Station 2, Tolla Berra, about 5 kms. from Pokran on Ramdeora road, Rajasthan, INDIA. Holotype : A male and Paratypes : Four males and ten females in the National Zoological

Collections Zoological Survey of India, Calcutta with Reg. Nos, C. 1198/2 and 1199/2 respectively.

Distribution : Apart from its type locality and other areas in Rajasthan, the species is also recorded from Maharashtra, Andhra Pradesh and Tamil Nadu, in India, and Pakistan outside,

Remarks : This species resembles *Porcellio spinicornis* to some extent, specially in the shape and size of the body. But it differs from the above in the colour pattern of the cephalon, thorax and the abdomen ; presence of three and two rows of spines generally arranged in straight lines on the dorsal surface of the first and subsequent thoracic somites respectively ; disposition of appendages namely, antenna, mandible, maxilla, maxilliped, first and second pleopod of male and the uropod. It also differs from *P. spinicornis* in the size and shape of the sixth segment of the abdomen.

15. *Porcellio scaber* Latreille

(Text Figs. 24 & 25)

1804. *Porcellio scaber* Latreille, *Hist. Nat. Crust. Inst.*, 7 : 45.

1885. *Porcellio scaber*, Budde-Lund, *Crust. Isop. Terr.* p. 129.

1936. *Porcellio scaber* Van Name, *Bull. American Mus. Nat. Hist.*, 71 : 226-229.

General : Body oblong oval (Text fig. 24) about twice as long as broad. Dorsal surface of carapace convex and quite rough due to presence of numerous rounded tubercles.

Cephalon : Head distinct from the thorax, twice as wide as long, with lateral lobes large and rounded, frontal lobe less prominent and obtusely triangular. Epimeral plates of the first thoracic somite covering nearly half of the head. Eyes fairly small, round and composite, and well behind the lateral lobes.

Thorax : First segment slightly broader in comparison with others. Lateral plates of thoracic somites of moderate size, with posterior ends acutely produced. Thorax about more than half of the total length of the body.

Abdomen : Metasome about one-fourth the total length of the body. The first two segments short and concealed by the lateral plates of the last thoracic somite. The lateral plates (epimeral) of third to fifth segments strongly recurved. The telson rather produced and terminating in an acute point slightly grooved dorsally.

Appendages : The first pair of antennae rudimentary and inconspicuous, and consisting of three joints. The second antenna

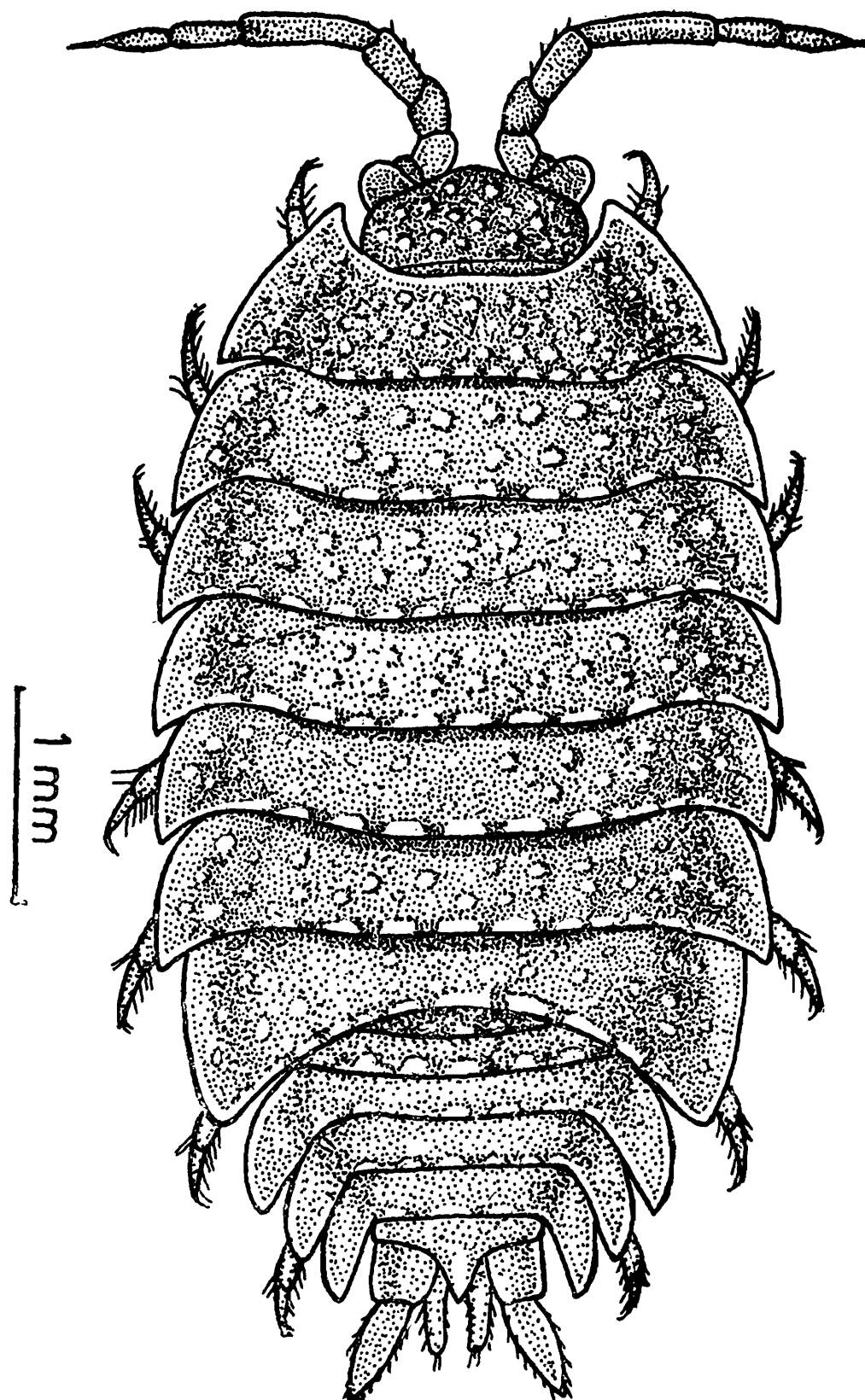


Fig. 24. *Porcellio scaber* Latreille, Dorsal view.

(Text fig. 25-A) less slender, scarcely attaining half the length of the body. The basal joint short ; the second about one and half times as the first ; third equals the second ; fourth nearly twice the length of

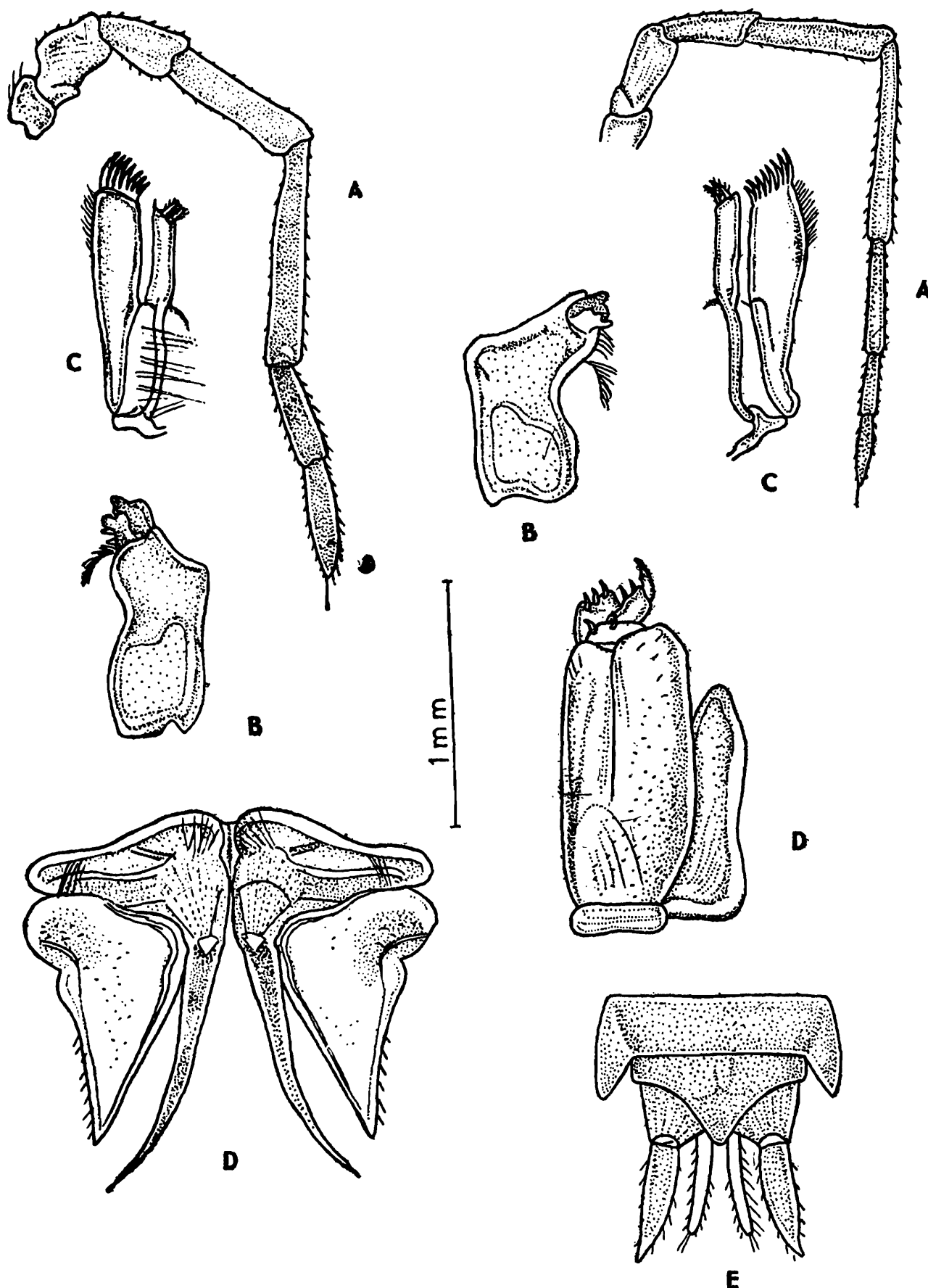


Fig. 25. *Porcellio scaber* Latreille

A. Second antenna, B. Mandible, C. First maxilla with inner and outer lobes, D. First pleopod of male.

Fig. 26. *Philoscia muscorum* (Scopoli)

A. Second antenna, B. Mandible, C. First maxilla, terminal portion of outer and inner lobes, D. First maxillipede with outer and inner lobes, E. Telson with last abdominal segment and uropoda,

the third joint; the fifth longest of all. The flagella composed of two and almost equal joints. Four of the inner spines on the outer lobe of the first maxillae bifid. The second pair of walking legs scarcely different in the two sexes. Opercular plates of only the two anterior pairs of pleopods with air cavities.

Uropoda extending beyond the tip of the telson. The basal joint of outer ramus stout and the second broad and lanceolate, extending beyond the sixth abdominal segment. The inner ramus short and extending upto the tip of the telson.

Colour of dorsal surface generally and uniformly greyish black, sometimes however, lighter and variegated with irregular patches, more rarely black with side plates light yellowish.

Distribution : Of all the Oniscid leopods, this species is perhaps the most common and widely distributed. The species occurs in most parts of Europe, North America, Mexico, South Africa, St. Helena, (South Atlantic Ocean), Pakistan, Sri Lanka and Thailand. In India, *Porcellio scaber* occurs in Assam, Meghalaya, West Bengal, Orissa, Madhya Pradesh, Himachal Pradesh, Haryana, Punjab, Rajasthan, Maharashtra, Karnataka and Tamil Nadu.

Remarks : Description of this species is based on a female specimen measuring 12 mm. (Reg. No. C. 3961/1. Zoological Survey of India, Calcutta).

16. *Porcellio laevis* Latreille

(Text Figs. 27 & 28)

1804. *Porcellio laevis*, Latreille, *Hist. Nat. Crust. Inst.*, 7 p. 46.

1885. *Porcellio laevis*, Budde-Lund, *Crust. Isop. Terr.* p. 138.

1932. *Porcellio* (*Mesoporcellio*) *laevis*, Barnard, *Ann. South African Mus.*, 30 (2) : 253-254.

1936. *Porcellio laevis*, Van Name, *Bull. Amer. Mus. Nat. Hist.* 71 : 229-232.

General : Body oblong-oval (Text fig. 27), slightly convex, surface completely smooth. Greatest width slightly exceeding half the length.

Cephalon : Head with lateral lobes well developed and rounded and the frontal lobe obtusely triangular. Eyes with several ocelli just behind the lateral lobes.

Thorax : The first thoracic somite larger than others. Its lateral

plates covering more than three-fourths of the head. Lateral plates (epimera) of all other segments slightly produced, fifth to seventh segments ending laterally in an acute point.

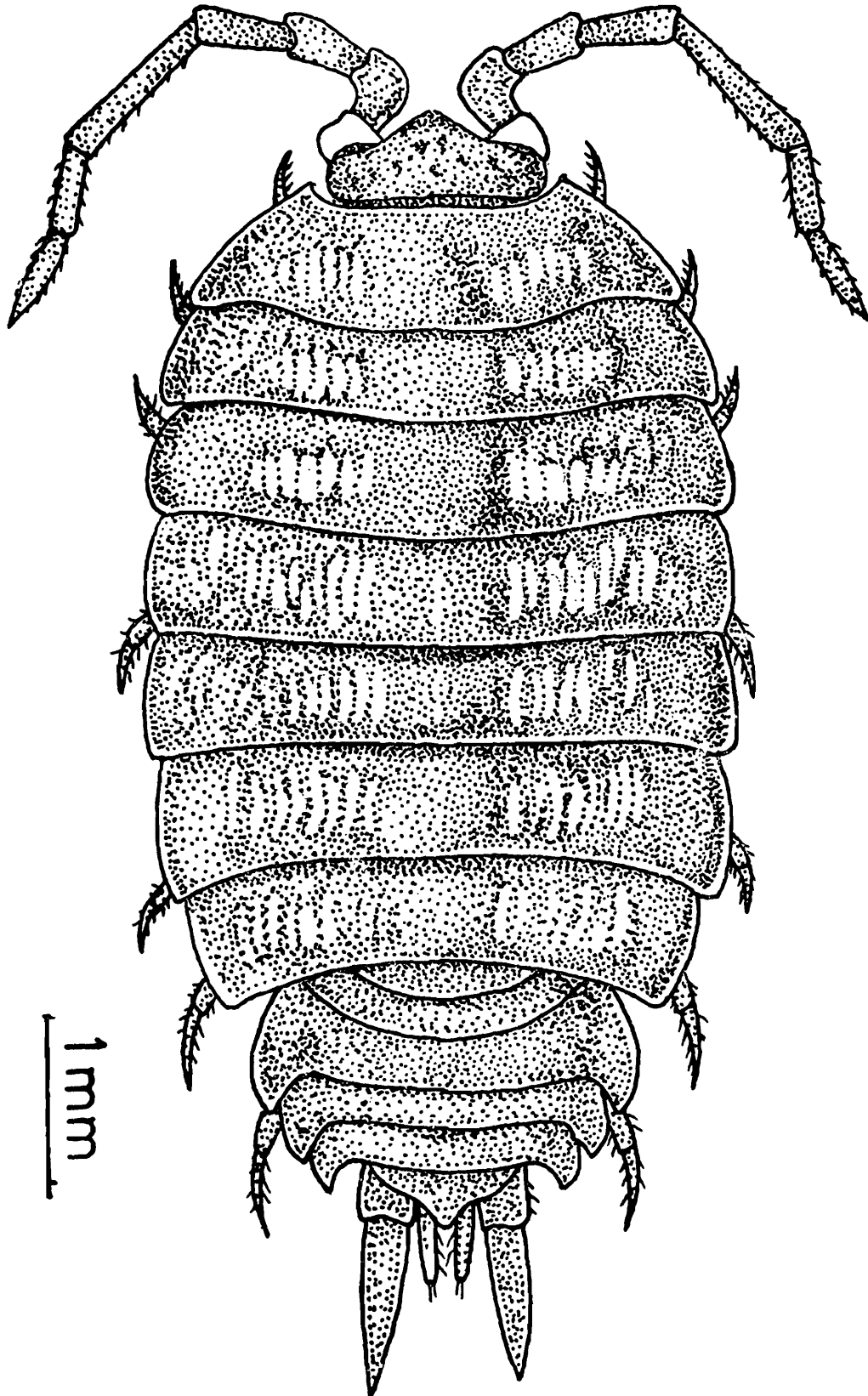


Fig. 27. *Porcellio laevis* Latreille, Dorsal view.

Abdomen : The abdomen slightly narrower than thorax, attaining little less than one-fourth of the total length of the body. The first

two segments short with their lateral plates covered completely by the lateral extension of the last thoracic somite. The other three segments

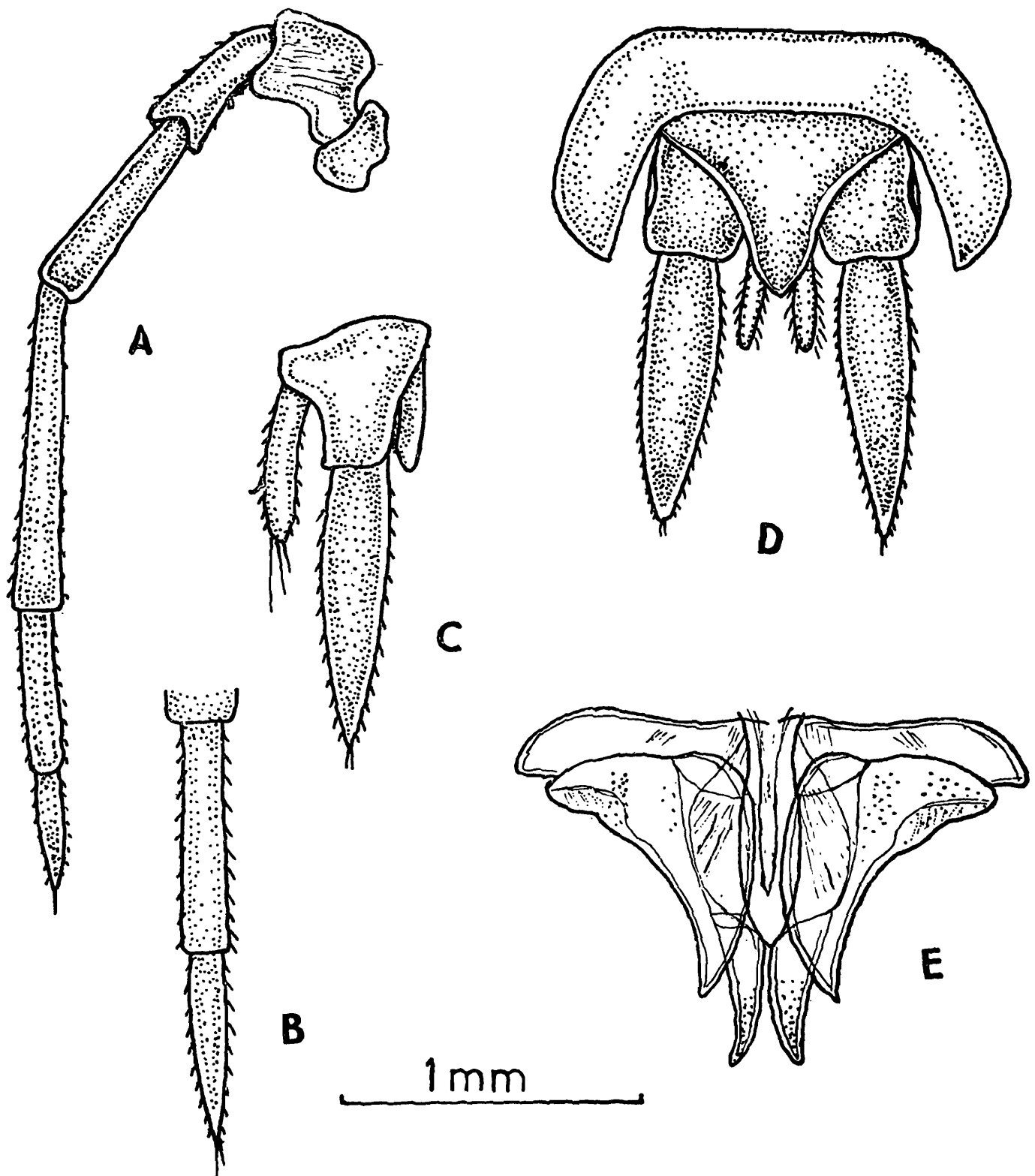


Fig. 28. *Porcellio laevis* Latreille

A. Second antenna, B. Flagellum, C. Uropoda, D. Last two segments of abdomen and uropods, E. First pleopod of male.

(third to fifth) large, their epimeral plates extending and slightly recurved. Telson broader than long, its apex acutely pointed, and extending slightly beyond the basal segment of the Uropoda.

Appendages : The first pair of antennae small and inconspicuous. Second pair of antennae (Text fig 28-A) slender, about almost half the length of the body, the basal short, triangular, the second and third joints almost equal in length, fourth longer, fifth longest of all. The flagellum (Text fig. 28-B) almost equal in length with the fifth joint, the proximal article longer than the distal one. Last pair of legs differ but little in the two sexes. Opercular plates of only the two anterior pairs of pleopoda with the air cavities.

The basal joint of Uropoda (Text fig. 28-C) extending upto the tip of the sixth abdominal segment. The inner ramus short and about half in length of the outer. The outer ramus stout, tubular and extending beyond the extremity of the telson.

Colour of dorsal surface dark grey, with dark patches more pronounced towards the abdominal segments. The segments of the thorax having on each side of the median line an assemblage of lighter yellow wavy stripes. Lower surface and legs pale yellow.

Distribution : *Porcellio laevis* Latreille is a widely distributed species known from different parts of Europe, Africa, Middle and South East Asia, North and South America. In India, this species is known to occur in West Bengal, Bihar Madhya Pradesh, Uttar Pradesh, Punjab, Rajasthan, Gujarat, Maharashtra and Tamil Nadu.

Remarks : Description of this species is based on a male specimen collected from Balasmand, 8 Kms. north west of Jodhpur, Rajasthan, India, with Register No. C. 4119/1.

17. *Porcellio rotungus* (Collinge)

(Text fig. 29, 30)

1916. *Rotungus pictus* Collinge, Rec. Indian Mus., 8 (9) : 544-545.

General : Body oblong oval/convex and length about twice its greatest width. Surface smooth all through.

Cephalon : Head quadrangular, about four times longer than wide. Frontal margin developing into two prominent lateral lobes, its distal and broadly rounded and a triangular median lobe with its apex terminating in a broad process, comparable with those of *Porcellio assamensis* Chopra. The lateral plates of the first thoracic somite covering the posterior and lateral portion about two-thirds of the head. Eyes large and dorso-lateral.

Thorax : First thoracic somite wider than all others, enveloping

the head by its lateral plates. All other somites subequal. The lateral plates of the first two somites drawn posteriorly terminating in an acute point ; those of the third and fourth moderately drawn posteriorly ending in a broad process and the rest of the somites, namely, fifth to seventh terminating in an acute point as in the first two.

Abdomen : Metasome narrower than the mesosome, the first two somites small, narrow and covered by the lateral plates of the last thoracic somite. Third to fifth somites subequal in width, their lateral plates drawn posteriorly and terminating in an acute process. Telson elongate, broadly triangular, posterior margin truncate, with its apex terminating in a broad rounded process.

Appendages : Second antennae (Text fig. 29) long, cylindrical, basal joint smallest. Fourth joint longer than the second and the third, fifth being the longest of all. Flagellum two jointed, the proximal very short expanding distally, the distal joint nearly three times as long as the proximal, terminating in a style.

First maxilla with outer lobe terminating in four strong curved spines, and five smaller ones. The inner lobe narrow, flat with two setaceous spines on the inner border.

Maxillipedes with small lobes, outer lobe terminating in a multispinous process and five fine curved spines, the inner lobe with two small spines at each side and two larger ones on the ventral surface.

Uropoda extending beyond the telson, basal plate convex dorsally and flattened ventrally, broader anteriorly than posteriorly. Exopodite cuniform, sparsely setaceous, articulating at the posterior margin of the basal plate. Endopodite larger than exopodite, rudder shaped, setae long and prominent.

Colour Light brown with yellow mottles.

Length and greatest breadth of the female Lectotype 7.5 and 4 mm. respectively.

Type-Locality : Kobo, Abor country, 400 ft., 30.11.1911—8.12.1911. Under bark. Coll : Dr. S. W. Kemp.

Lectotype : A female specimen in the National Collections of the Zoological Survey of India, Calcutta. Reg. No. C. 380 g 2.

Paralectotypes : Five females and others damaged, in the National

Collections of the Zoological Survey of India, Calcutta. Reg. No. 8084/10.

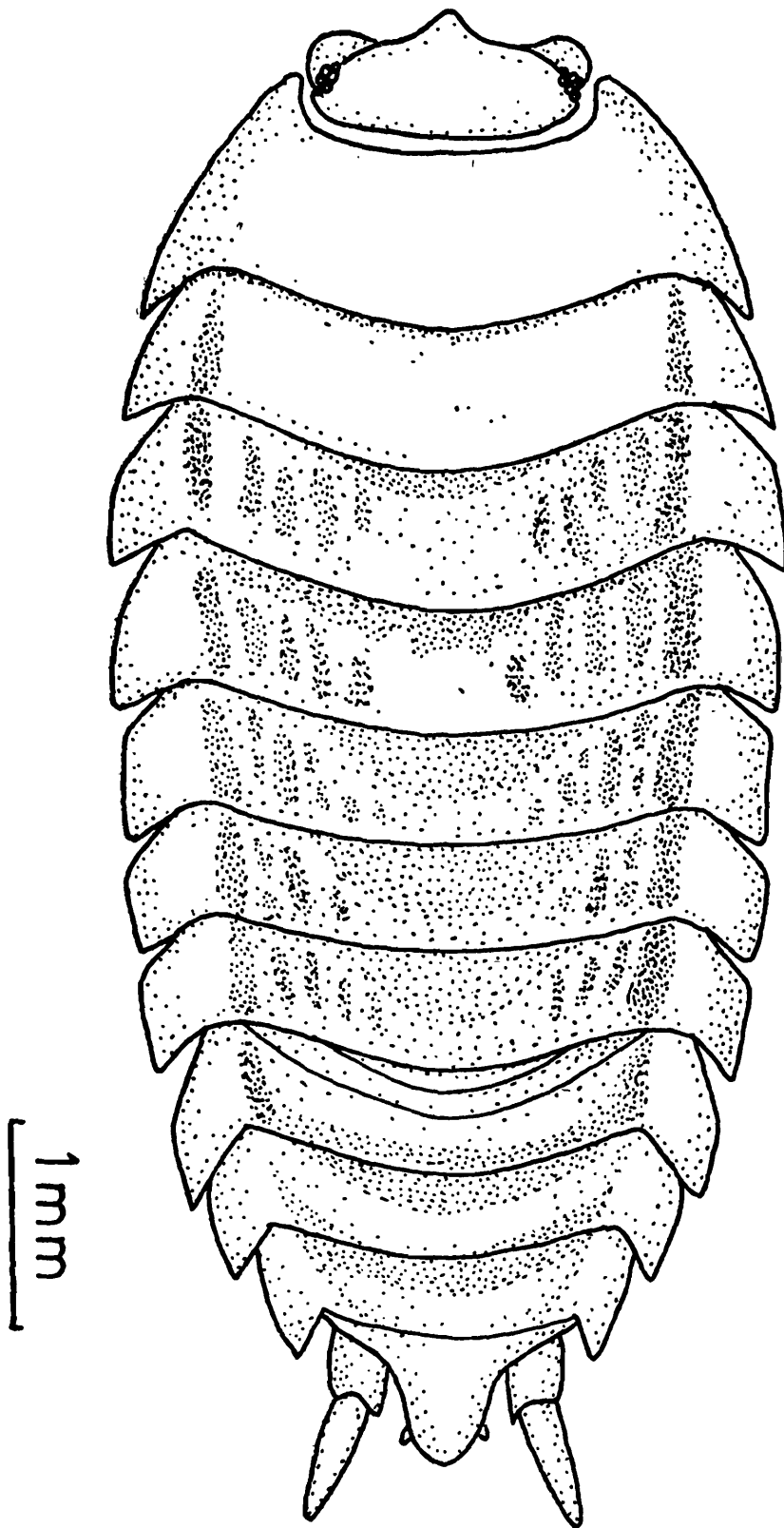


Fig. 29. *Porcellio retungus* (Collinge) : Dorsal view.

Distribution : This species, is so far, known from its type locality only.

Remarks : Collinge established the genus *Rotungus* to include his

species *Rotungus pictus* collected from Kobo in the Abor country. The generic characters given under the same viz. the Cephalon with two

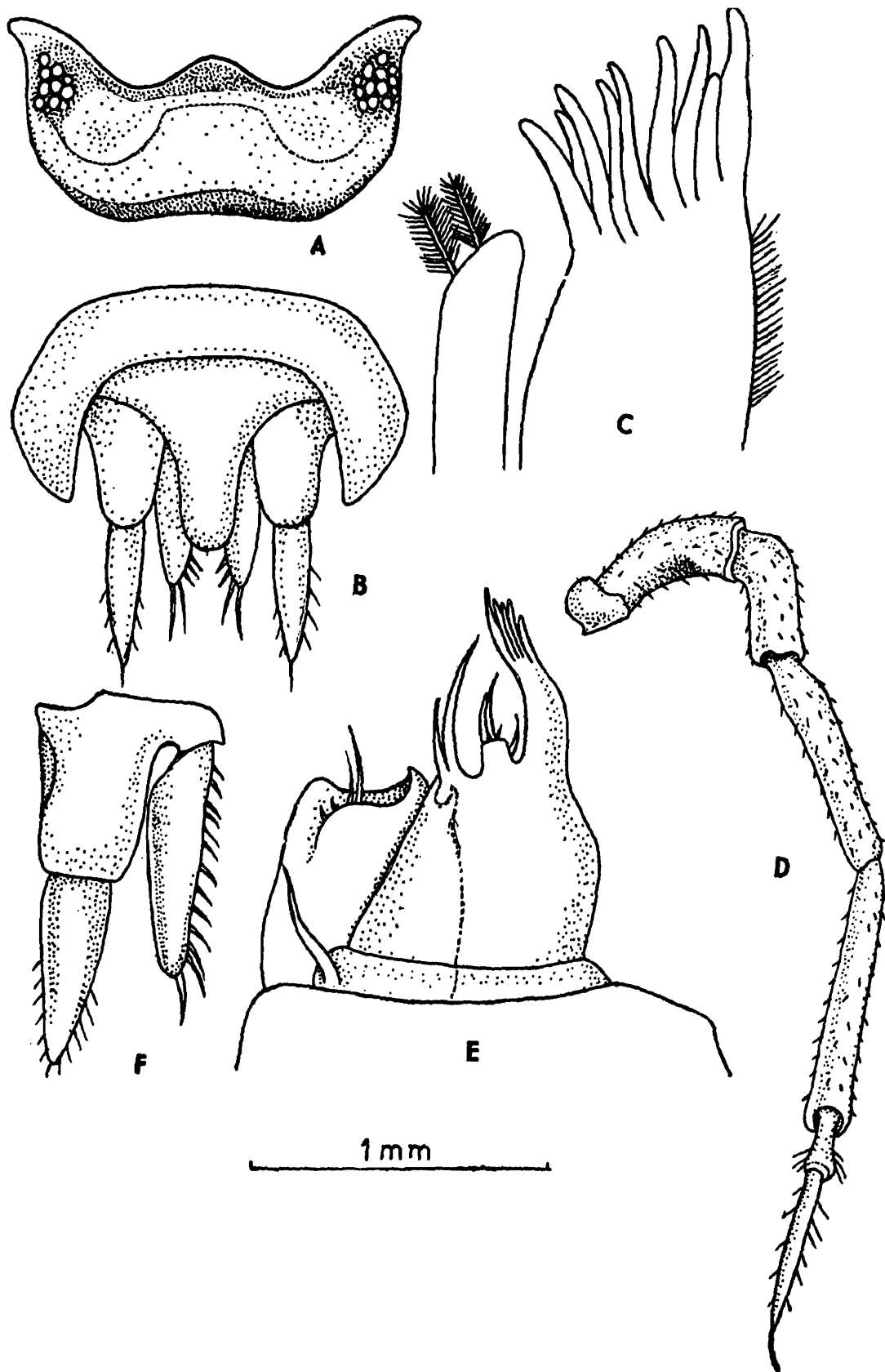


Fig. 30. *Porcellio retungus* (Collinge); a. Dorsal view of Cephalon (head); b. Last metasomic segment with telson and uropods; c. First maxilla, terminal portion of the inner and outer lobes; d. Second antenna (Right); e. Left maxillipede, terminal portion; f. Left uropoda, dorsal view.

lateral and a median lobes, two jointed second antennae, first maxillae with outer lobe terminating in a series of curved spines, inner lobe narrow and flat, segments of mesosome and their disposition, slightly narrow metasome with its posteriorly drawn lateral plates, the telson, and the uropoda clearly indicate that the species belongs to the genus *Porcellio*.

From the Syntypic series consisting of six females, the author has selected a Lectotype.

The author, further, has given the species the generic name suggested by Collinge viz. *rotungus* as the species *P. pictus* is preoccupied.

18. *Porcellie immsi* (Collinge)

(Text figures 31)

1914. *Porcellio immsi* Collinge, *Ann. Mag. Hist. London*, 14 (8) : 206-208.

1915. *Hemiporcellio immsi*, Collinge, *Rec. Indian Mus.*, Calcutta, 11 (2) : 146.

General : Body oblong-oval (Text fig. 31) slightly convex, and little more than twice longer its greatest breadth. Surface smooth, but for the prominent tubercles on the head. Metasome slightly narrower than the mesosome.

Cephalon : Head small with prominent lateral and broad median lobes, Text fig. 31). The lateral lobes well developed compared with the median. Surface of head with numerous large sized tubercles. Lateral portions of the head covered by the expanding lateral plates of the first thoracic segment. Postero-lateral sides broadly rounded. Eyes well developed and sublateral.

Thorax : Slightly convex, all the somites subequal. Postero-lateral process of the first two segments broadly rounded ; those of the third to seventh segments gradually expanding and ending in a broad point. The lateral plates of the first segment covering half the portion of the head. Surface covered with fine tubercles.

Abdomen : About less than one-third of the thorax and convex. The first two somites small and lateral parts tucked well within the expanding lateral plates of the last thoracic somite. Third to fifth segments larger, almost subequal with their lateral plates expanding

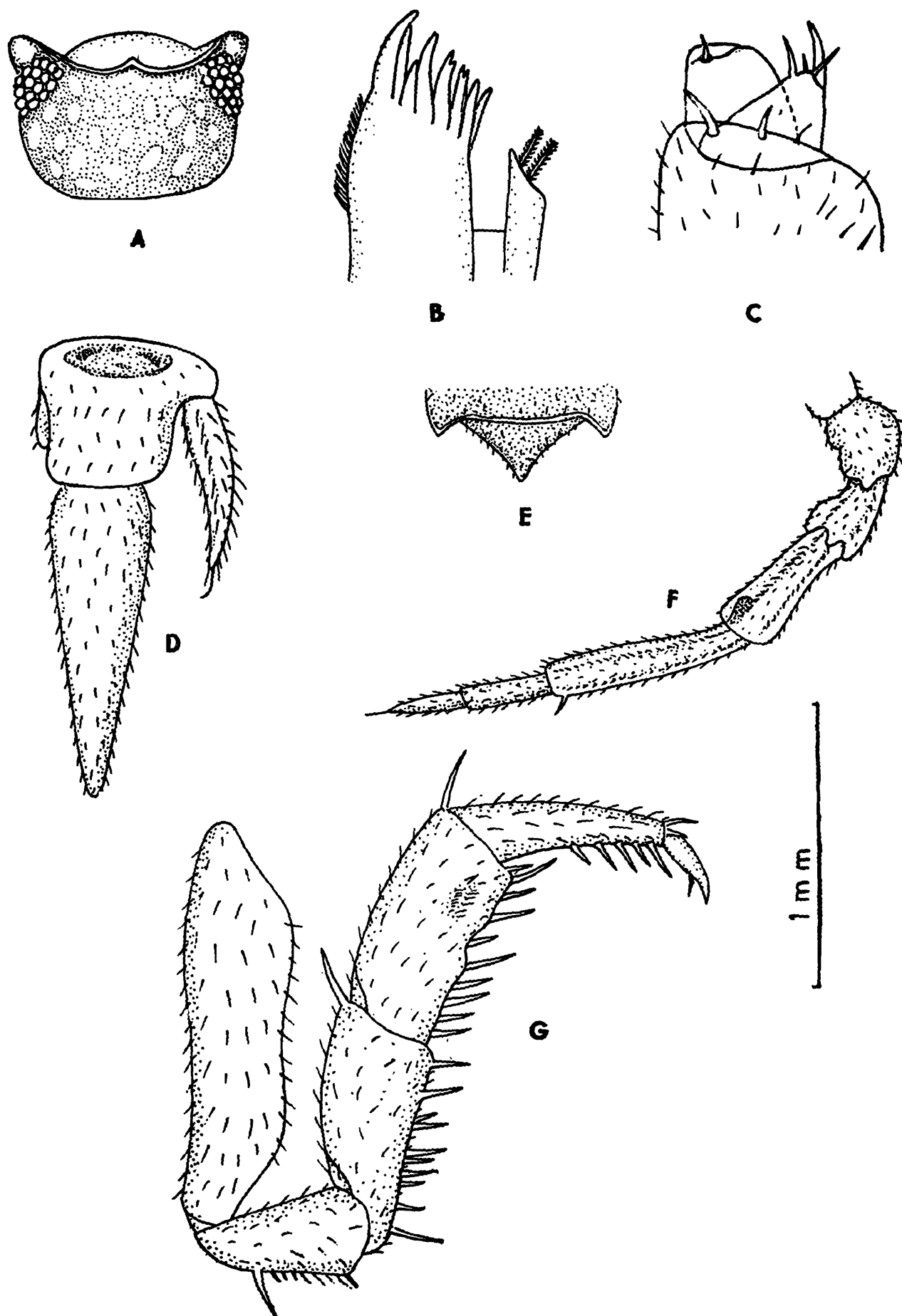


Fig. 31. *Porcellio Immsi* (Collinge): a. Dorsal view of the head; b. First maxilla, terminal portion of outer and inner lobes; c. Terminal portion of maxilliped; d. Uropod of left side; e. Telson with part of somites; f. Second antenna; g. Second thoracic appendages.

posteriorly in an acute process. Telson short, broadly triangular and terminating in blunt point.

Appendages : Antennule small and three jointed. Antennae (Text fig. 6) slender with second to fifth joints carinated. Second and third joints small and subequal : fourth longer than the third and fifth longest of all. Flagellum two jointed and almost subequal. Mandible and first Maxillae typical of the genus. Second maxillae thin and plate-like the inner lobe terminating in a dense mass of setae, while the outer lobe devoid of setae. Maxillipede with outer plate terminating in a short blunt spine. With three smaller ones, the inner palp with a single spine only. Thoracic appendages (Text figs 7) comparatively short and thick, the three terminal joints with short spines ; the third and fourth provided with a series of tooth-like projections on the terminal boarder and the fourth with an anterior face lined with fine short hairlike setae.

Uropoda (Text fig. 4) expanding beyond the telson ; basal plate small and cube-like with raised portions on the outer and inner sides. Exopodite nearly three times the length of the basal plate, conical and setose ; endopodite slightly curved and covered with long setae, slightly more than half the length of the exopodite.

Colour dark brown. The thoracic segments are a horny brown with yellowish lateral patches. The abdominal segments are a uniform dark brown.

Type-locality : Allahabad, Uttar Pradesh, India, *Paratypes* : Examined two, specimens from the collections of the British Museum (Natural History), London.

Distribution : This species is, so far, known from its type locality only.

Remarks : Collinge (1914) established this species, but later during 1915 referred it to the new genus viz. *Hemiporcellio* and also added to it two other species namely, *H. carinatus* and *H. hispidus* collected from the shores of the Chilka Lake, Orissa. Chilton (1916) recognised *Hemiporcellio* as distinct from *Porcellio* and referred to Collinge's *H. carinatus* two specimens collected from an Island in the Chilka lake.

However, no diagnosis of the genus *Hemiporcellio* as distinct from that of *Porcellio* has hitherto been furnished. On examination of both Collinge's and Chilton's material, the author has not been able to

find any strongly marked characters by which the two genera viz. *Porcellio* and *Hemiporcellio* can be distinguished. Here the author agrees with the views of Chopra (1924) and refer the two species of *Hemiporcellio* under the genus *Porcellio* and also retain the original Status of *Porcellio immsi*.

19. *Porcellio carinatus* (Collinge)

(Text Figures 32-33)

1915. *Hemiporcellio carinatus* Collinge, *Rec. Indian Mus.*, 11(2) : 145-146.

1916. *Hemiporcellio carinatus* Chilton, *Mem. Indian Mus.*, 5 (5) : 477-478.

1924. *Hemiporcellio carinatus* Chopra, *Rec. Indian Mus.*, 26(1) : 50.

General : Body oblong oval, about thrice longer than broad. Surface practically smooth, except for the Cephalon provided with broad tubercles.

Cephalon : Head (Text fig. 32) wider, about three and half times wider than long, with three dorsal lobes characteristic of the genus *Porcellio*. Lateral lobes large, rounded and prominent, median lobe broadly semicircular in shape. Eyes large, prominent, and placed well behind the lateral lobes of head. Surface of cephalon with slightly raised tubercles.

Thorax : Mesosome largest part of the body with lateral-plates gradually expanding towards the posterior end. The last three somites namely, 5th to 7th wider compared with others, produced backwardly and terminating in blunt spine.

Abdomen : Narrower than mesosome and a little less than a third of the body. The first two somites small compared with others and concealed by the lateral-plates of the 7th thoracic somite. Third to fifth somite prominent and lateral-plates well developed ending posteriorly in an acute spine. Telson (Text-fig. 33-d) broadly triangular and its apex sub-acute.

Appendages : Antennule very small and three jointed. Second antenna (Text-fig. 33-b) elongate, with well marked carination on the dorsal side of 3rd to 5th joints. Basal two joints small, third joint cup shaped, fifth as long as the preceeding two viz. third and fourth. Flagellum two jointed, the proximal joint longer than the other.

Outer palp of first maxilla (Text-fig. 33-a) terminating in four curved spines and four smaller ones with bifid terminations. Inner lobe with short, blunt spine on the outer side of two setaceous spines on the inner side.

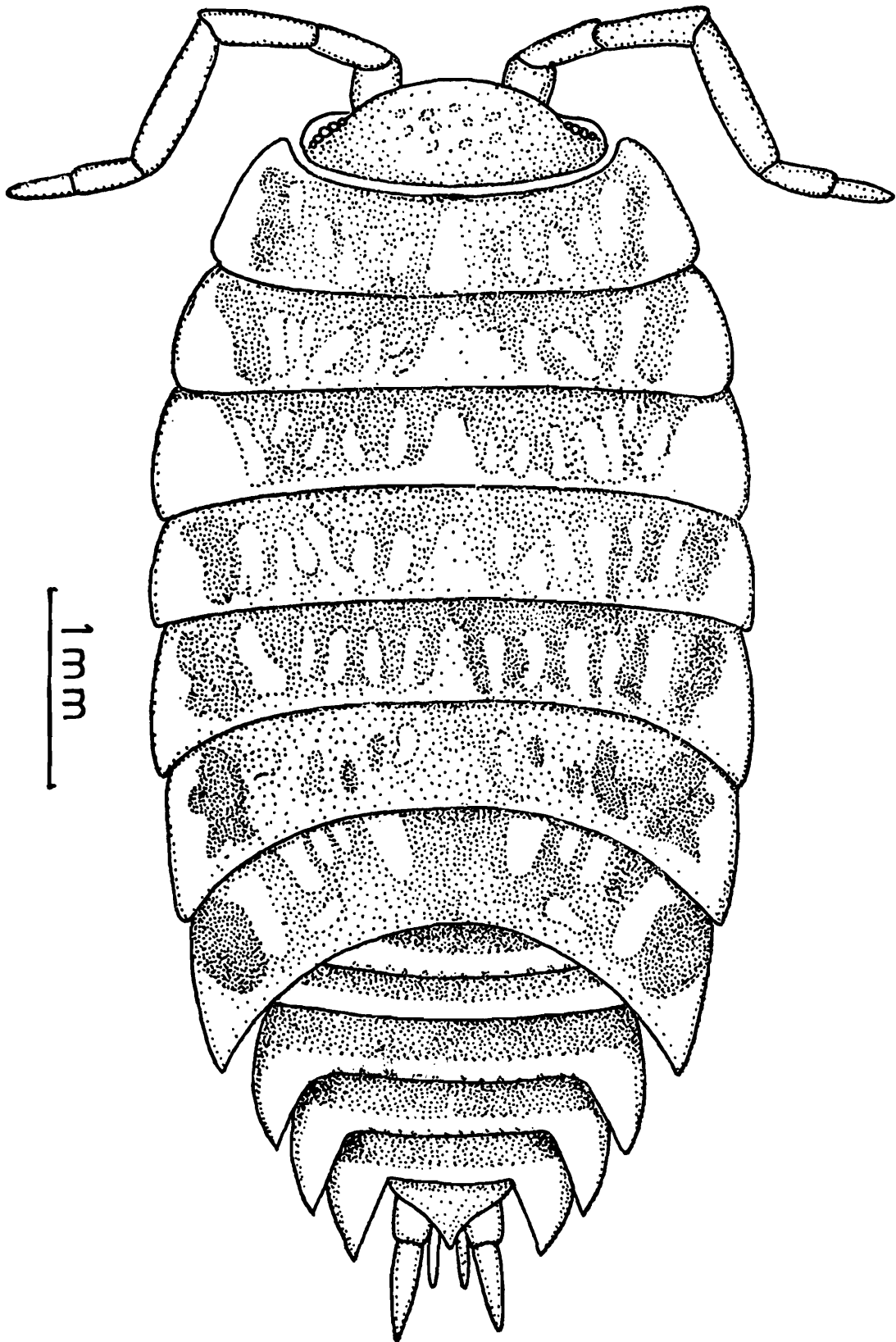


Fig. 32. *Porcellio carinatus* (Collinge) : Dorsal view.

Second Maxillae thin, plate-like, bilobed and inner lobe setaceous.

Maxillipedes (Text-fig, 33-c) outer palp with multispinous process on the outer side and three long spines internal to this. Inner palp with two spines and four small teeth-like processes on the margin.

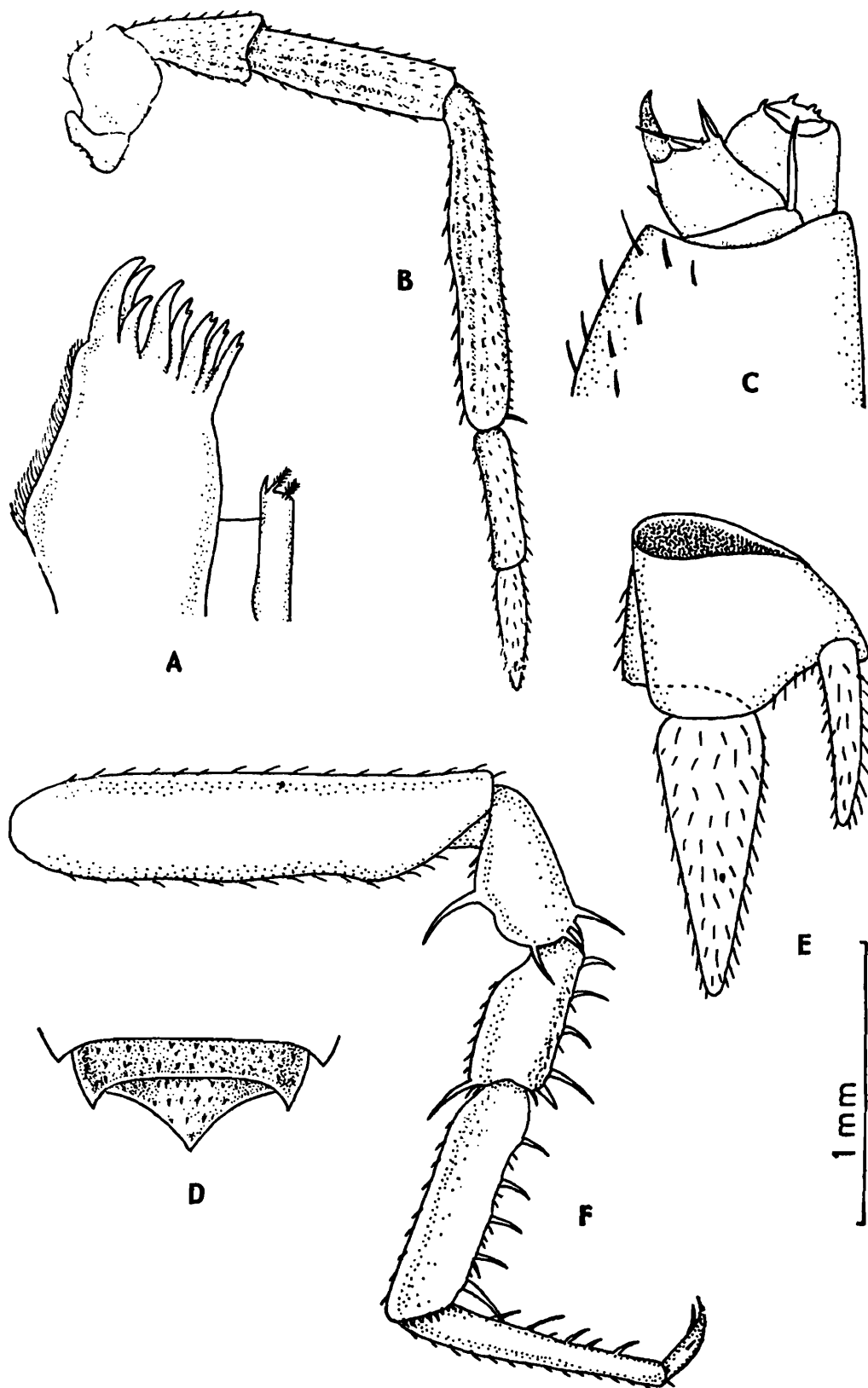


Fig. 33. *Porcellio carinatus* Collinge : a. First maxilla, terminal portion of inner and outer lobes ; b. Second antenna ; c. Maxillipede, terminal portion ; d. Last abdominal segments with telson ; e. Second thoracic appendage ; f. Left uropoda.

Thoracic legs (Text-fig. 33-e) fringed with stout spines on the inner side of the three distal joints, the last joint ending in a claw.

Uropoda (Text-fig. 33-f) extending beyond telson, basal plate with lateral extensions dorsally and ventrally ; with the former, the slightly curved endopodite articulating. The exopodite, cuniform shaped, articulating with the basal plate.

Colour greyish brown, cephalon and mesosome usually darker and lateral-plates of mesosome with dark patch uniformly a blakish-brown.

Length and width of specimens ranging between 8 mm. 3 mm. and 5 mm. and 2 mm. respectively.

Type-locality : Under stones and dead water weeds at the edge of Chilka Lake, Rambha, Orissa, India, 27.12.1913, Coll. Dr. N. Annandale.

Material examined syntypes : Nine complete specimens (5 males and 4 females) in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8692/10.

Distribution : This species is, so far, restricted to its type locality only.

Remarks : Collinge (1915) erected the genus *Hemiporcellio* to accommodate his two species viz. *Hemiporcellio carinatus* and *Hemiporcellio hispidus* both collected from Chilka Lake in Orissa. He later (1915) referred his earlier species namely, *Porcellio immsi* also to the genus *Hemiporcellio*. Chilton (1916) recognised the genus *Hemiporcellio* and referred two specimens collected from the Chilka Lake to *H. carinatus*. However, both Collinge and Chilton did not provide any diagnostic character of the genus *Hemiporcellio*. The author after examination of the specimens agrees with the strong views expressed by Chopra (1924) that there has been no marked characters by which the two genera can be easily distinguished. The three lobes of the head, 2 jointed flagella, telson, uropoda and the shape and size of the specimens at the author's disposal, clearly indicate that this species belong to the genus *Porcellio*.

This species differs from *Porcellio immsi* Collinge in the form of antennae, in the anterior margin of the cephalon, which is continuous, and in the form of the uropoda.

20. *Porcellio hispidus* (Collinge)

(Text Fig. 34)

1915. *Hemiporeellio hispidus* Collinge, *Rec. Indian Mus.*, 11 (2) ; 146-147.

1924. *Hemiporcellio hispidus* Chopra, *Rec. Indian Mus.*, 26 (1) : 50.

General : Body oblong-oval, slightly convex. Length nearly double the greatest width. Surface smooth, except for the Cephalon tubercular.

Cephalon : Head (Text fig. 34-a) about two-and-half times wider than long, strongly convex, with three lobes, two lateral and a median, characteristic of the genus *porcellio*. Lateral lobes large, broadly semicircular in outline, the median lobe produced forward, but falling short of the two lateral lobes. Surface of cephalon tubercular. Eyes large, with several ocelli and placed just behind the distal half of the lateral lobes.

Thorax : Thoracic somites broad, well developed. Lateral-plates gradually expanding posteriorly. First somite wider than all others, enclosing half the length of the Cephalon. Lateral-plates of 5th to 7th somites expanding posteriorly in a blunt point. Surface smooth with yellowish patches.

Abdomen : Metasome narrower than mesosome. First two segments small and covered by the lateral-plates of the last thoracic somite. 3rd to 5th somites prominent and their lateral-plates expanding posteriorly in an acute point. Telson triangular (Text fig. 34-g) with its apex pointed and extending well beyond the basal plate of the uropod.

Appendages : First antenna small, 3 jointed, basal joint prominent. Second antenna (Text fig. 3) short and stout extending hardly to the 2nd thoracic somite when stretched behind. 2nd and 3rd joints equal to the fourth and fifth joint longest of all. Flagellum two jointed as long as the fifth joint. The distal joint longer than the proximal.

First maxilla (Text fig. 34-f) consisting of two lobes, the outer lobe terminating in three in their long and one stout and short spine on the outer side and on the inner side with four smaller ones and one short spine. The inner lobe terminating in two setaceous spines.

Maxillipede (Text fig. 34-b) outer palp with multispinous process on the outer side and three spines internal to this. Inner palp with a single spine and three teeth-like marginal processes.

Thoracic appendages (Text fig. 34-e) short, with the first and the second joints grooved on their outside, the three terminal joints fringed

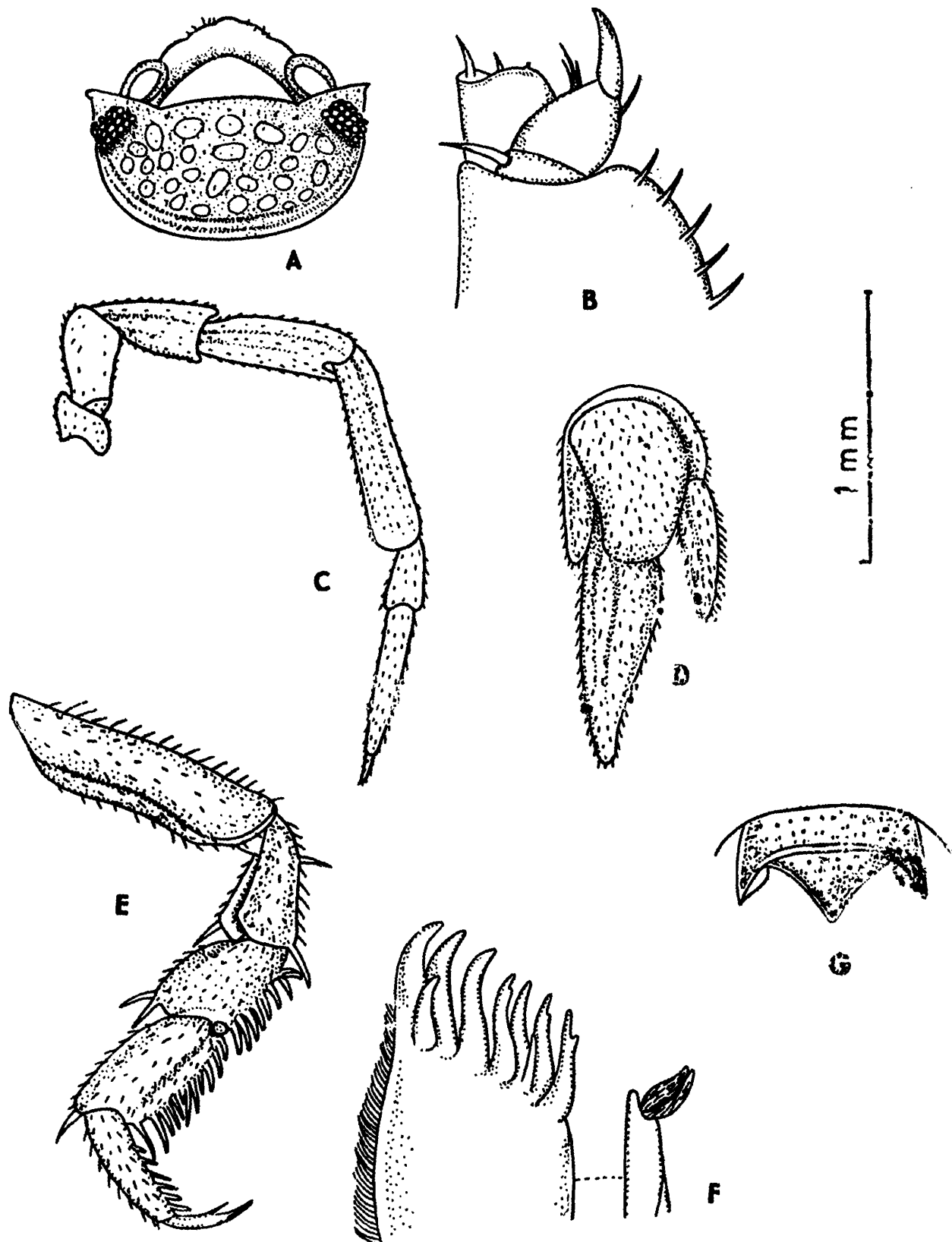


Fig. 34. *Porcellio hispidus* (Collinge) : A. Cephalon, dorsal view ; B. Maxillipede, terminal portion ; C. Second antenna ; D. Left uropoda, dorsal view ; E. Second thoracic appendage ; F. First maxilla, terminal portion of inner and outer lobes ; G. Telson with abdominal segments.

with stout spines with bifid termination. The entire appendage covered with fine hair-like setae.

Uropoda (Text fig. 34-d) extending beyond the telson and covered with fine setae, basal plate with lateral extensions, exopodite cuniform and grooved on the outer side endopodite triangular in shape.

Colour dark-brown with yellowish patches on the thoracic somites. Head and metasome slightly darker in shade compared with other parts of the body.

Length and width of largest specimen 7 and 3 mm.

Type-locality : Satpara, Chilka Lake, Orissa, India, 17.9.1913, Coll. N. Annandale.

Material examined : *Type-Syntypes* : A male and a female in the National Collections of the Zoological Survey of India, Calcutta, Regd. No. 8635/10.

Distribution ; *Porcellio hispidus* (Collinge) is, so far, known only from its type locality.

Remarks : As stated under the species *Porcellio carinatus* (Collinge), this was originally included under the genus *Hemiporcellio* by Collinge, who established the same in 1915. Since the author does not find any character that distinguishes the two genera viz. *Hemiporcellio* and *Porcellio*, the same has been placed under the genus *Porcellio* under the law of priority.

H. hispidus described as a terrestrial species and its occurrence on the shore of the lake is probably accidental, as several other species of the family oniscidae, though really terrestrial, are occasionally found very close to high water-mark on the sea coast.

21. *Porcellio karakorum* (Jackson)

(Text Figs. 35, 36 a-e)

1935. *Protracheoniscus* (*Protracheoniscus*) *karakorum* Jackson, P. C. Visser, *Wiss. Ergeb. Niederl. Exped. Karakorum*, 1 : 162-167. (11 figs.)

General : Body oblong-oval convex and about three times longer than broad. Surface smooth, shiny with minute hairs.

Cephalon : Head (Text fig. 36-a) approximately four times wider than long, convex from side to side and covered postero-laterally by the

lateral extension of the first thoracic somite. Frontal portion consisting of three lobes, well marked and with broadly triangular

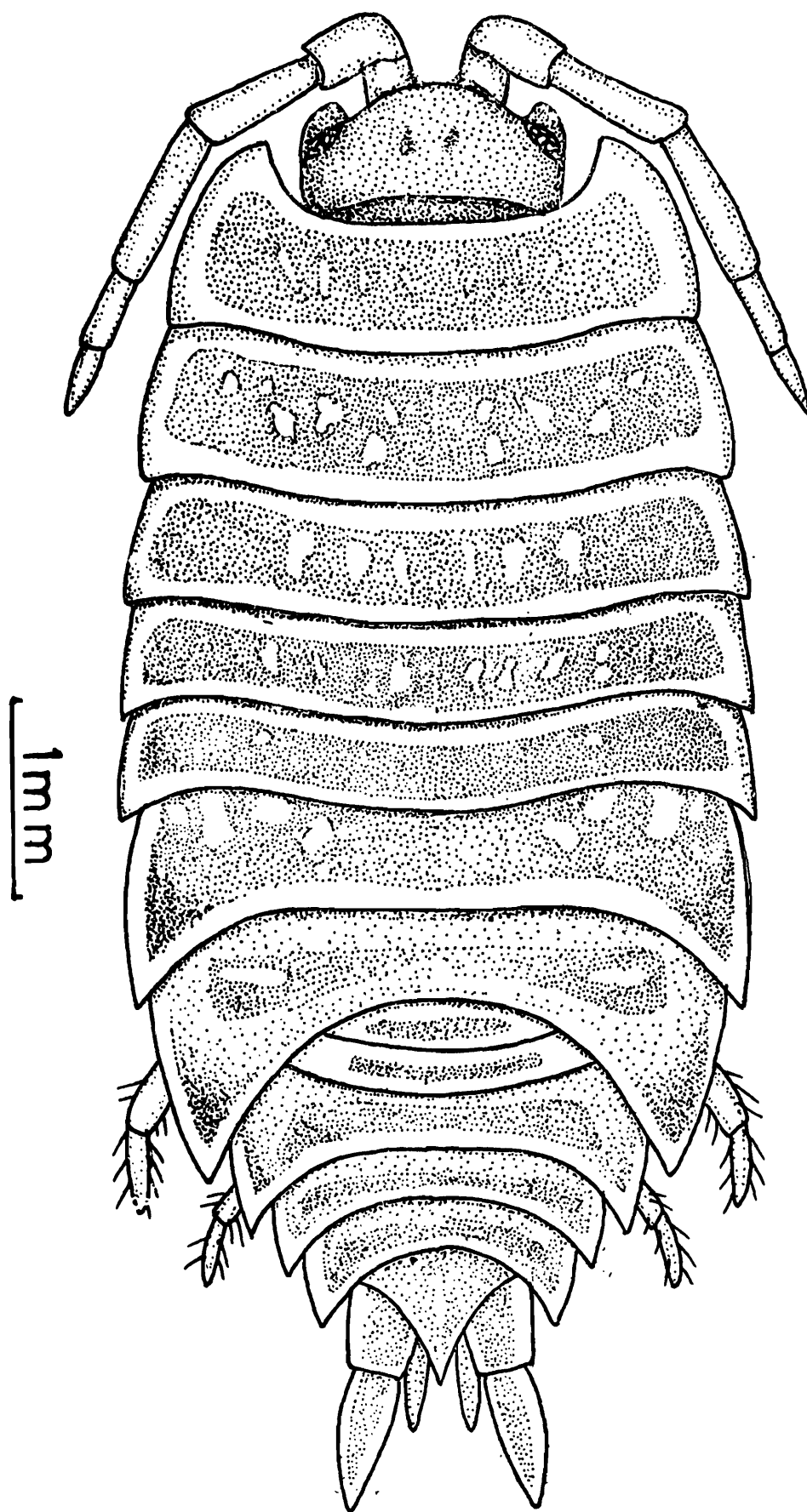


Fig. 35. *Porcellio karakorum* (Jackson) : Dorsal view.

median lobe and two lateral lobes large and evenly arched. Eyes behind the lateral lobes, large oval and convex with about 24 ocelli.

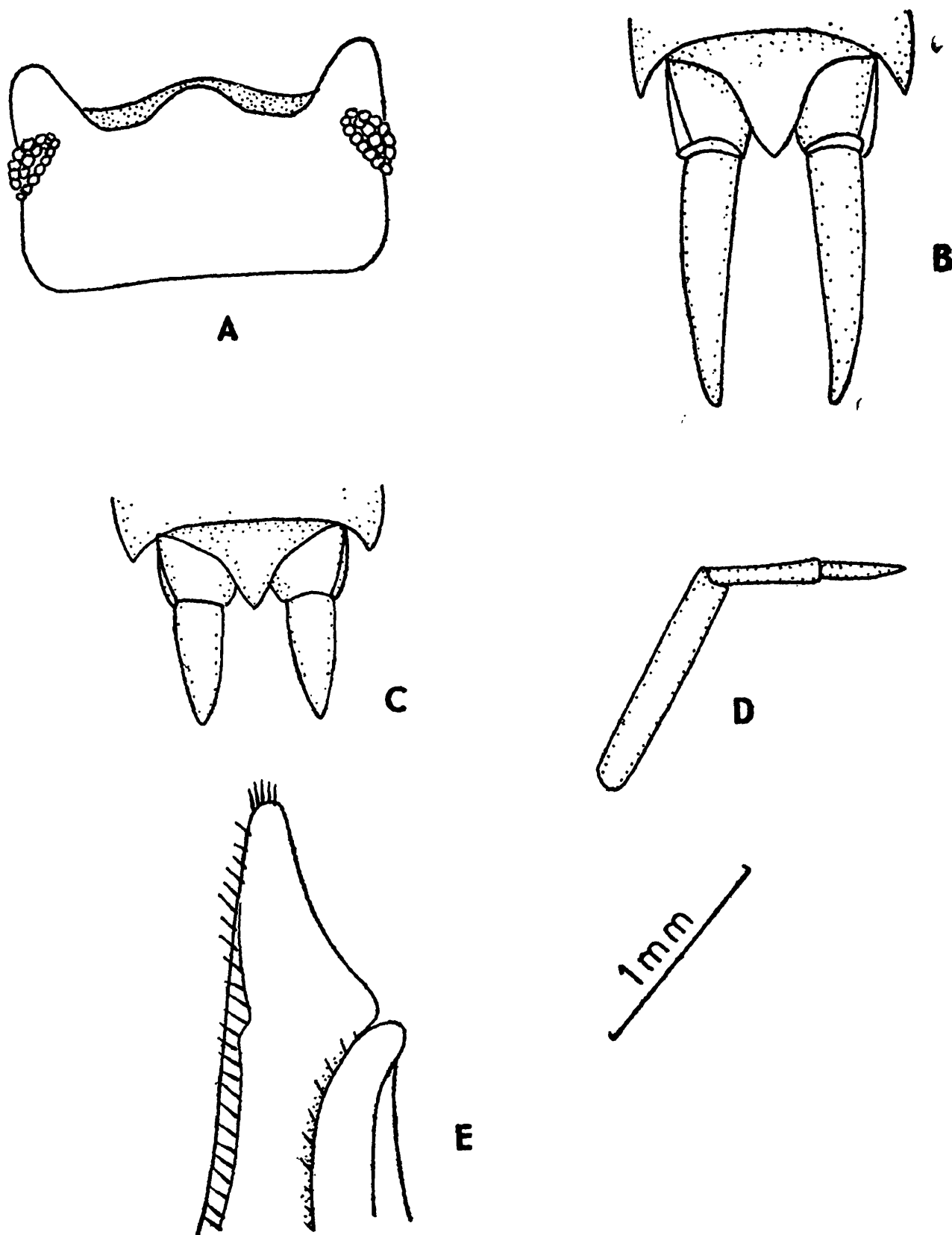


Fig. 36. *Porcellio karakorum* (Jackson): A. Dorsal view of the Cephalon; B. Telson, with pleopod of male; C. Telson with uropoda of female; D. Second antenna (fifth joint) with Flagellum; E. First endopod.

Thorax : Longer than broad, convex and all the segments almost of equal length. Epimera of the first three segments not at all produced backwards, that of the fourth slightly produced bluntly and those of the fifth to seventh segments gradually increasing in size and drawn out to a blunt spine like processes.

Abdomen : Not abruptly contracted, but slightly narrower compared with the thoracic somites. The first two segments short and laterally covered by the extended portion of the last thoracic somite. Third to fifth segments of almost equal length, fifth segment being shorter than telson. The lateral extension of epimera of third to fifth segments sharply drawn back. Telson twice as broad as long, sides concave, sharply acuminate, sulcate and reaching upto the end of the propoda of the Uropoda.

Appendages : Antennae moderately long (Text fig. 36-d) and stout, when extended backwards covers half across the third somite of the thorax in males. The first two joints as long as the third, cup shaped distally. Fourth joint about one and half times longer than the third and the fifth longest of all. Flagellum consisting of two joints stout and long and subequal with the fifth joint. The proximal flagellular joint longer than the distal one.

Legs long and stout with a sharp curved spine at its distal proximity. The first two pairs of legs of male provided with setose pads. All the pleopods pseudotracheate. The outer lobe of the first pleopod of male (Text fig. 36-b) with truncated tip and the inner lobe with conical end projecting well beyond the termination of grove, provided with rows of hairs on the inner edge.

Uropoda the outer ramus or exopod very long, moderately stout and extending beyond the telson, dagger shaped and more than double the total length of the base. The inner ramus (endopod) short, laterally compressed and slightly exceeding the basal joint and equal in length to the tip of the telson.

Colour : Colour of individuals variable in character. Males on the whole are black or very dark and the females lighter or even devoid of any dark pigment. Females lighter than male, a greyish brown and yellow beneath.

Cotypes : Thirteen specimens examined. Measurements vary 14 to 7.5 mm. long and 5.5 to 4.5 mm. broad. Types are deposited in the Zoological Museum, Amsterdam, Netherlands.

Distribution : Jackson described this species based on material collected from Nubra valley (3060 m.) Shylok valley (4150-4500 m.) and Khardung valley (4000 to 4500 m.) during 1929 and 1930.

Remarks : This species differs from *P. asiaticus* in its narrower size, larger eyes, median lobe of cephalon more triangular and lateral lobes being larger, the antennae are shorter and the proportion of the flagellular joints being different.

22. *Porcollio marcandicus* (Uljanin)

(Text Fig. 37)

1875. *Porcellio marcandicus* Uljanin, *Izvestija Imperatorskago Obschtschestva ljubitelej jestestoznanija, antropologii inetnografii*, 11 : 6.

1885. *Metaponorthus marcandicus* Budde-Lund, *Crustacea Isopoda Terrestria*, Copenhagen—1894. *Ann. Mus. Civ. di Storia Nat.*, 34 (2) : 14.

General : Body oblong-oval, about twice as long as broad, strongly convex and smooth.

Cephalon : Head thrice wider than long, convex and smooth, but marked with irregular yellow patches interspersed with light brown markings. Front consisting of two large, antero-lateral arched lobes and a broad median lobe triangular in shape. Eyes large just behind the lateral lobes with several black ocelli.

Thorax : Longer than broad, convex. Except for the first somite, all others of equal size. The anterolateral extensions of the first thoracic somite covering nearly half the length of the head. Epimera of the first three thoracic somites bluntly rounded, while those of the fourth to seventh extending gradually and terminating in a blunt but acute spine.

Abdomen : First two segments small, lateral parts of which tucked inside the lateral epimeral extensions of the last thoracic segment. The third to fifth segments almost of the same size. The epimera of the later three segments expanded considerably and terminating in an acute spine.

Telson long, triangular and convex. The distal blunt spine extending a little beyond the propodite of the Uropoda.

Appehdages : Antennae long and slender, extending upto third somite of the thorax wen stretched backwards. The second and third

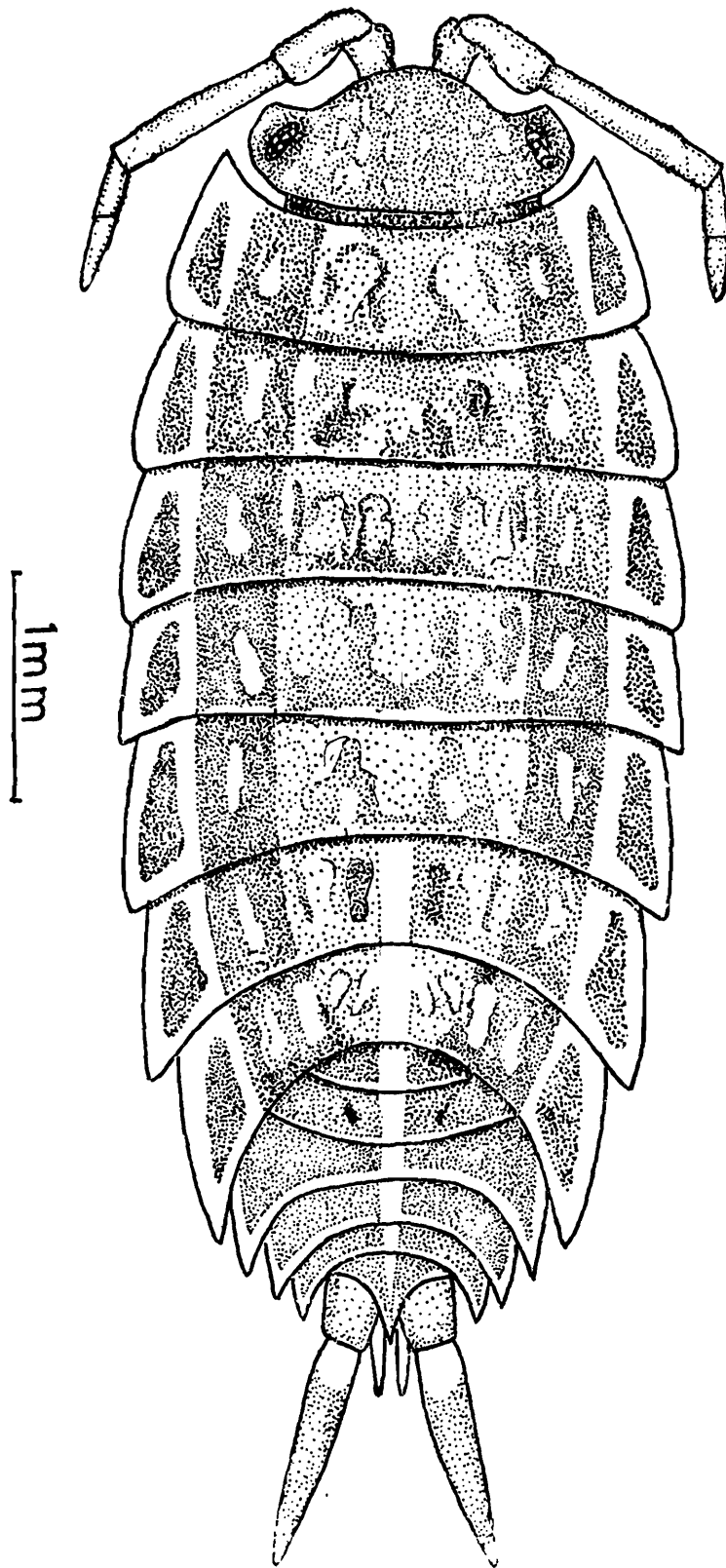


Fig. 37. *Porcellio marcadicus* Uljanin : Dorsal view.

joints subequal, the latter cup-shaped. The fourth joint longer than the third and the fifth longest of all and cylindrical. The flagella

almost equal in length with the fifth joint and both the flagellular palps of almost equal size.

Walking legs short and stout increasing gradually in size. The second joint being the longest of all. Dactylus as long as the fifth joint and terminating with a sharp curved spine.

Uropod stout and cone shaped, specially the exopod ; extending three times as long as the telson. Basal joint stout and cylindrical, falls little short of the telson. Exopods stout and cone-shaped. Endopods short, uniformly slender and extending well beyond the basal joint and one-third the length of the exopod.

Colour uniformly dark brown on the dorsal surface with irregular yellow patches all over including the head and except for the abdomen. Epimera with very dark brown oval patches surrounded by creamy-yellowish streaks. Abdomen dark brown with yellow streaks in the middle.

Material : One male specimen measuring 9.0 and 4 mm. in length and breadth respectively, collected between Karghalik and Yarkand, 1330 m., 17-22.10.1929, Karakorum Expedition, 1929. Deposited in the Zoological Museum, Amsterdam, Netherlands.

Distribution : Kashmir (India) and Turkestan (Turkey).

23. *Porcellio ratzeburgii* Brandt

(Text-figs 38 a-d)

General : Body oblong-oval, (Text fig. 38-a) with sides parallel. Dorsal surface convex and granulate in the middle of the segments.

Cephalon : Head with three prominent lobes (Text fig. 38-b), the lateral large and rounded at their distal ends while the median frontal lobe very prominent and semicircular in outline. Head almost completely covered by the lateral plates of the first segment of thorax. The eyes large and antero-lateral.

Thorax All the segments of equal size. Their lateral plates large and their postero-lateral ending acuminate.

Abdomen : Abdomen scarcely one-fourth of the body total length. The first two segments narrow and covered by the expanding lateral part of the seventh thoracic somite. Third to fifth segments prominent

and recurved. The Telson (Text fig. 38-c) as long as broad at its base, the distal part conically produced.

Appendages : Second antennae slender slightly shorter than half the length of the body when produced backwards. The first two joints short ; third longer, fourth and fifth almost sub-equal. Flagellum (Text fig. 38-d) little shorter than the fifth joint ; the distal

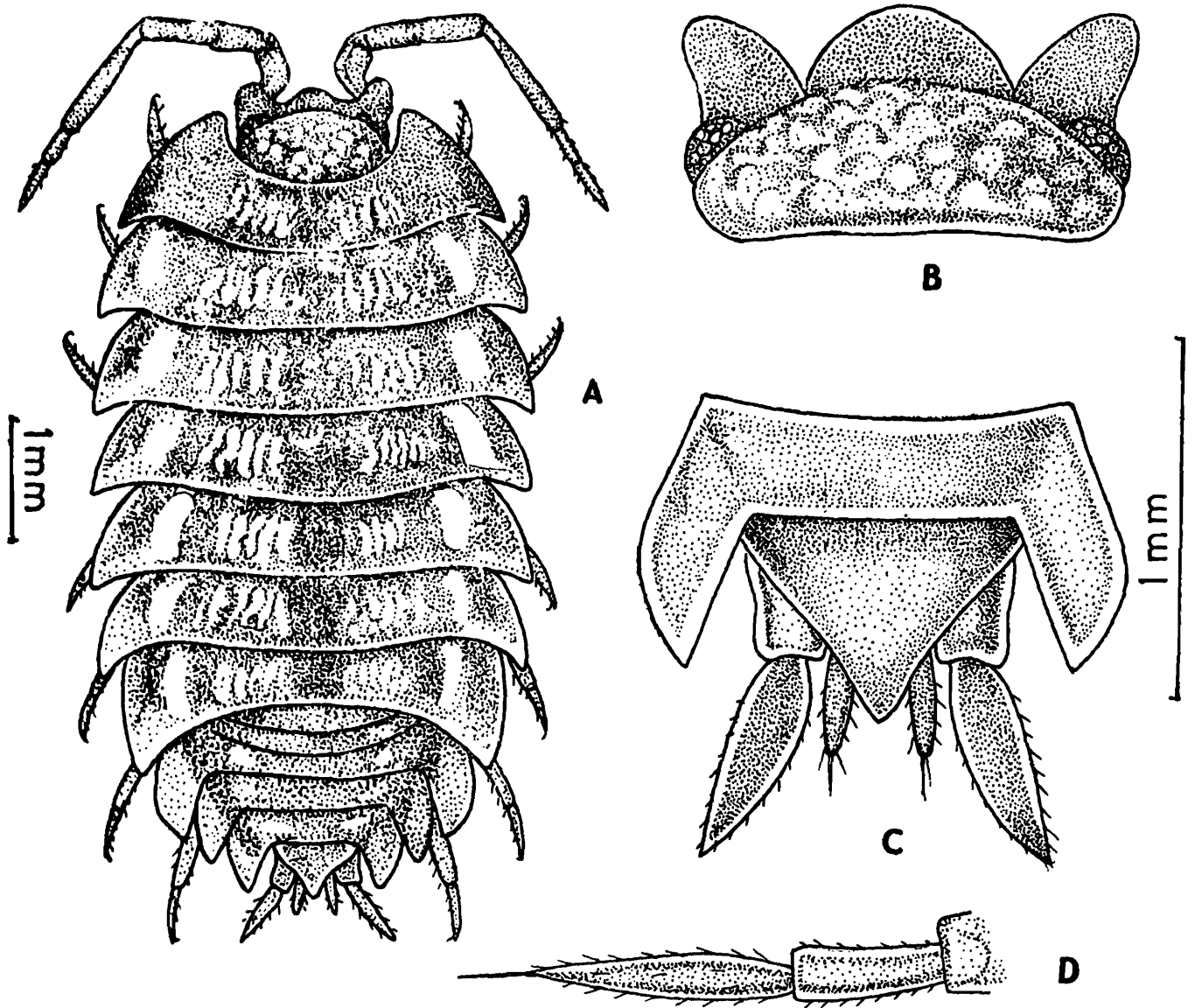


Fig. 38. *Porcellio ratzeburgi* Brandt : A. Dorsal view ; B. Cephalon with median and lateral lobes ; C. Telson with last abdominal segments and uropoda ; D. Second antenna (part).

article being longer than the proximal. Opercular plates of all pleopods provided with air cavities.

Uropoda of moderate size, the outer ramus short and shorter than the telson ; the inner ramus very short, cylindrical exceeding the tip of the telson.

Colour of dorsal surface dark grey with regular whitish patches on the sides, at the base of internal plates with wavy stripes on each side of the median line, the edges of the lateral being light yellow.

Remarks : Description of the specimen based on the preserved material in the collections of the Zoological Survey of India. Length and greatest width of the specimen being 10.5 and 5.1 mm. respectively.

Distribution : Common in Central parts of Europe, Norway, China, Japan and recorded for the first time in Himachal Pradesh, Haryana and West Bengal in India.

Genus 5. *Ennurensis* Collinge

1915. *Ennurensis*, Collinge, *Rec. Indian Museum*—11(2) : 142.

Characters : Body oblong oval with convex surface. Head pentagonal, lateral lobes small, and no median lobes. Abdomen about one-fourth of the total length gradually reducing as the genus *Porcellio*. Second antenna short and stout with flagellum two jointed, narrow and linear. Proximal part longer than the distal. First maxilla terminates in four stout slightly incurved spines and several smaller ones. Second maxilla bilobed and setaceous. Thoracic leg is rather short, claws long. Uropoda extending beyond telson.

Ennurensis Collinge resembles *Alloniscus* in the form and structure of the body and the head but differs from the same with reference to the flagellar segments of the second antenna and the shape, size of the telson.

Type species : *Ennurensis hispidus*, Collinge

Distribution : (1) Ennore near Madras. (2) Mandapam, pamban passage, Tamil Nadu, South India.

Keys to the Indian species of the Genus Ennurensis

Head or cephalon almost pentangular. Flagellum of two joints of unequal sizes. Uropoda extending beyond the telson. Setose and each terminating in a fine spine.

... *Ennurensis hispidus*.

24. *Ennurensis hispidus* Collinge (Text Figs. 39-40)

1915. *Ennurensis hispidus* Collinge, *Rec. Indian Mus.*, 11 (2) : 143-144.

General : Body oblong oval, (Text-fig. 39) with convex surface gradually increasing in width from the anterior mesosome somites and attaining greatest width in the middle almost approximating the 4th thoracic somite. Length being somewhat less than two times the greatest width.

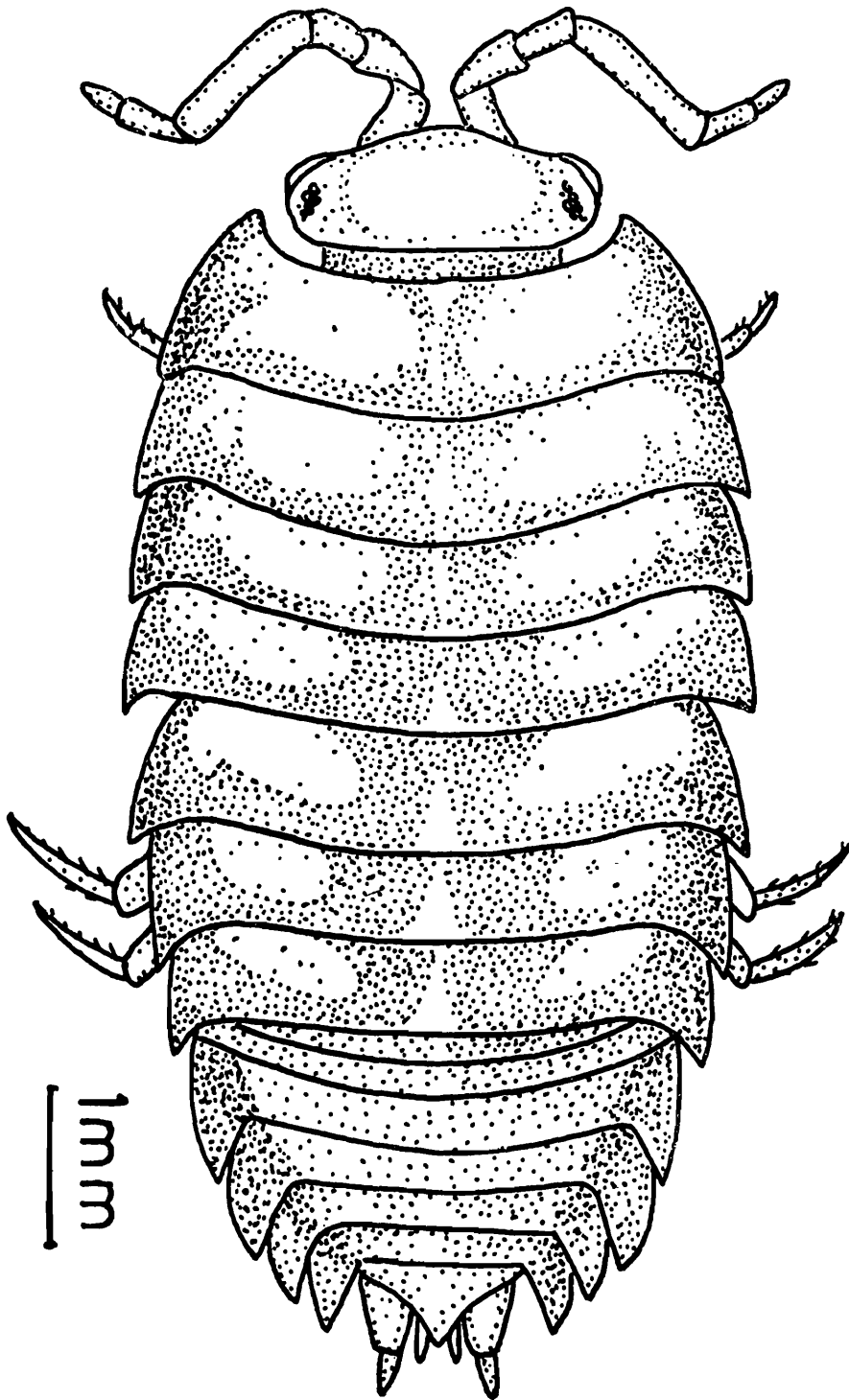


Fig. 39. *Ennurensis hispidus* (Collinge) : Dorsal view.

Cephalon : Head (Text-fig. 39) pentangular, distinct from thorax, convex, fairly long and almost smooth. Lateral lobes small, no median lobe but frontal margin raised as in the genus *Alloniscus*. Eyes on large and dorso-lateral.

Thorax : First thoracic somite widest of all the segments. Others gradually decreasing in width posteriorly. Lateral plates of thoracic segments prominent and epimera provided with blunt spine posteriorly.

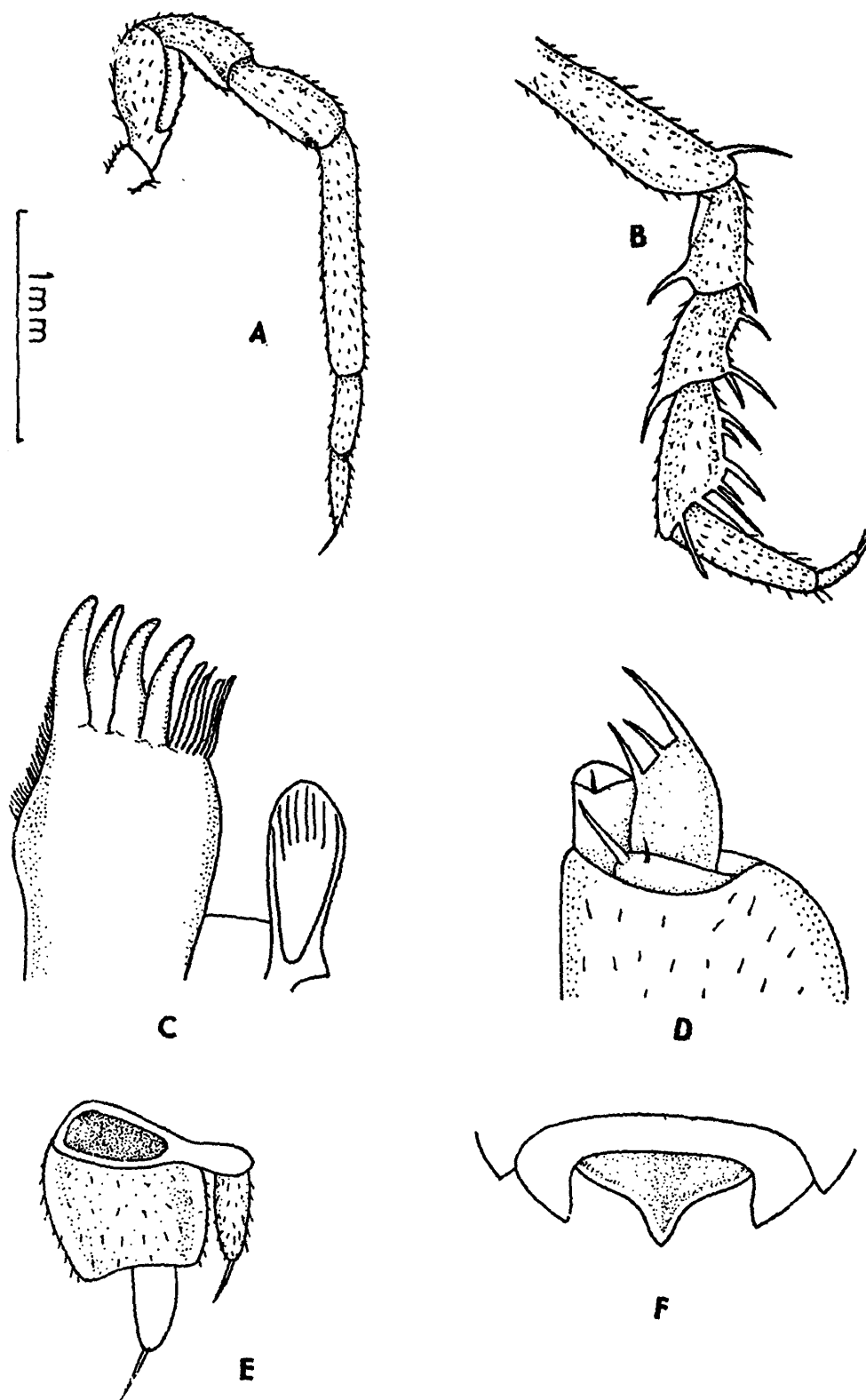


Fig. 40. *Ennurensis hispidus* (Collinge) : A. Second antenna ; B. Second thoracic leg ; C. First maxilla, terminal portion of inner and outer lobes ; D. Maxillipede, terminal portion ; E. Left uropoda, dorsal view ; F. Last abdominal segment with telson.

Abdomen : Abdomen about one-fourth of the body length

gradually reducing as in the genus *Porcellio* and not abruptly shortened. Lateral plates of 3rd to 5th somites being prominent, the first two being submerged underneath the last thoracic somite. Telson (Text-figs. 40-f) extending a little beyond the basal segment of Uropoda and triangular with antero. Lateral portions extended, apex being sub-acute.

Appendages : Antennule small and 3 three jointed. Second antenna (Text-fig. 40-a) short and stout with its basal segment shortest of all, the second as long as the third and fourth segments together, fifth longest of all the segments and tubular. Flagellum two jointed, narrow and linear, proximal part longer than the distal. 2nd to 4th segments characterised by deep groove on their inner border. First maxilla (Text-fig. 40-c) the outer lobe terminates in four stout, slightly incurved spines and seven smaller ones ; inner lobe thin and spoon shaped terminally, proximally thickened. Second maxilla thin, plate-like, bilobed distally and setaceous. Maxillipede (Text-fig. 40-d) with elongated palps, outer one terminating in multispinous process and two inner spines, inner palp with single spine. Thoracic legs (Text-fig. 40-b) rather short, fringed on the inner side with few stout spines, claws long. Uropoda (Text-fig. 40-e) extending beyond the telson, basal plate convex both sides with lateral expansions ; exopodite and endopodite small and sub-equal in length, setose and each terminating in a fine spine.

The body smooth throughout marked by slight bark-brown patches in the median and lateral sides with yellowish patches in-between and posterior margins of thorax and abdomen. The posterior middle portion of the head also light dark brown in colour. Males darker in shade compared with the females.

Length and breadth of the specimens ranging between 7 and 4 mm. and 4 and 3 mm. respectively.

Type-locality : Ennur, near Madras, Tamil Nadu, India, under stones on the sand, October 1913, Coll. Dr. F. H. Gravely.

Material examined : *Syntypes* : 3 males and 5 females in the National Zoological Collections, Zoological Survey of India, Calcutta. Regd. No. 8671/10.

Distribution : This species is known only from the type locality, so far, in addition to Mandapam, Pamban passage, Tamil Nadu.

Remarks : *Ennurensis hispidus* Collinge resembles *Alloniscus* in the form and structure of the body and the head, but differs from the same

with regard to (i) two flagellar segment of the second antenna and (ii) the shape and size of the telson (6th abdominal segment), uropod and other characters.

Collinge while describing this new species designated type material collected from two different localities viz. (i) Ennur near Madras and (ii) Mandapam, Pamban passage with Reg. nos. 8671/10 and 8605/10 respectively. The author has examined all the specimens contained in the two vials and designates *Syntypes* consisting of 3 males and 5 females contained in vial bearing Reg. No. 8671/10, as they bear very close resemblance with the original description of Collinge.

Genus 6. *Porcellionides* Miers

- 1877. *Porcellionides* Miers, *Proc. Zool. Soc.* London 668, 676.
- 1879. *Metoponorthus*, Budde-Lund, *Prosp. Crust. Isop. Terr.* 4.
- 1898. *Metoponorthus*, Sars, *Crust. Norway*, 2 : 183.
- 1905. *Metoponorthus* Richardson, *Bull. United. States Nat. Mus.*, 54 : 625.
- 1911. *Porcellionides* Stebbing, *Rec. Indian Mus.*, Calcutta 6 (2) : 188.
- 1928. *Porcellionides* Jackson, *Proc. Zool. Soc.* London, 1 : 584.
- 1932. *Porcellionides* Barnard, *Ann. South African Mus.*, 30 (2) : 254,
- 1975. *Porcellionides* Ramakrishna, *Rec. Indian Mus.*, Calcutta 68 : 301.

Characters : Body oblong-oval smooth or granulate, less convex and scarcely contractile. Head discrete, lateral lobes small and frontal lobe obsolete, vertical marginal line extending to the lateral lobes. Eyes prominent and sub-lateral. The thoracic epimera less expanded. Abdomen abruptly narrower than the thorax, with lateral parts of the third, fourth and fifth segments small and oppressed ; terminal segment (telson) short, triangular, not produced.

Second antenna long, flagellum composed of two joints, the first joint considerably longer than the second. Opercular plates of the first two pairs of pleopods provided with tracheae, rarely those of the third. Inner branch of the uropoda inserted far in front of the outer branch Peduncle of the uropod externally grooved.

Stebbing (1911) has substantiated as to why *Porcellionides* must replace the name *Metoponorthus* and the author as such finds no need to repeat.

Type Species : Porcellionides pruinosus (Brandt).

Distribution : Greater part of Europe, Africa, North and South America, Madagascar, Sumatra (Indonesia) and India.

*Keys to the Identification of Indian Species of the Genus
Porcellionides*

1. Body surface mostly granular.
2. Head quadrangular frontal margin straight with extremely small lobes, lateral parts of third to fifth segments of abdomen small and recurved.
3. Elagellum of second antenna with two joints the proximal twice as long as the distal one. ... *Porcellionides pruinosus*.
- 1a. Body surface most smooth.
- 2a. Head with slightly produced lateral lobes and median semi-circular. Lateral parts of third and fifth segments of abdomen large and recurved.
- 3a. Flagellum with two joints, the proximal being longer than its distal joint.
4. Uropod long, stout and cylindrical. Exopodite proceeding well beyond the telson. Endopod small extending a little of the terminal segment. ... *Porcellionides asiaticus*.

25. *Porcellionides pruinosus* (Brandt)

(Text figures 41, 42 a-e)

1833. *Porcellio pruinosus* Brandt, *Bull. de la Soc. Imp. d. Natrualistes de Moscou*, 6 : 19.
1840. *Porcellio truncatus* M. Edwards, *Hist. Nat. des Crust* 3 : 171.
1877. *Porcellionides flavo-vittatus* Miers, *Proc. Zool. Soc. London*, p. 669.
1885. *Metaponorthus pruinosus* Budde-Lund, *Crust. Isop. Terr.* p. 169.
1898. *Metaponorthus pruinosus* Sars, *Crust. Norway*, 2 : 184.
1910. *Metaponorthus pruinosus* Stebbing, *Gen. Cat. South Afr. Crust.* p. 440.

1911. *Porcellionides pruinosus* Stebbing, *Rec. Indian Mus.* 6 : 189.
1920. *Porcellionides pruinosus* Collinge, *Ann. Nat. Mus.* 4 : 479.
1922. *Metoponorthus pruinosus* Wahrberg, *Ark. Zool.*, 15 : 6.

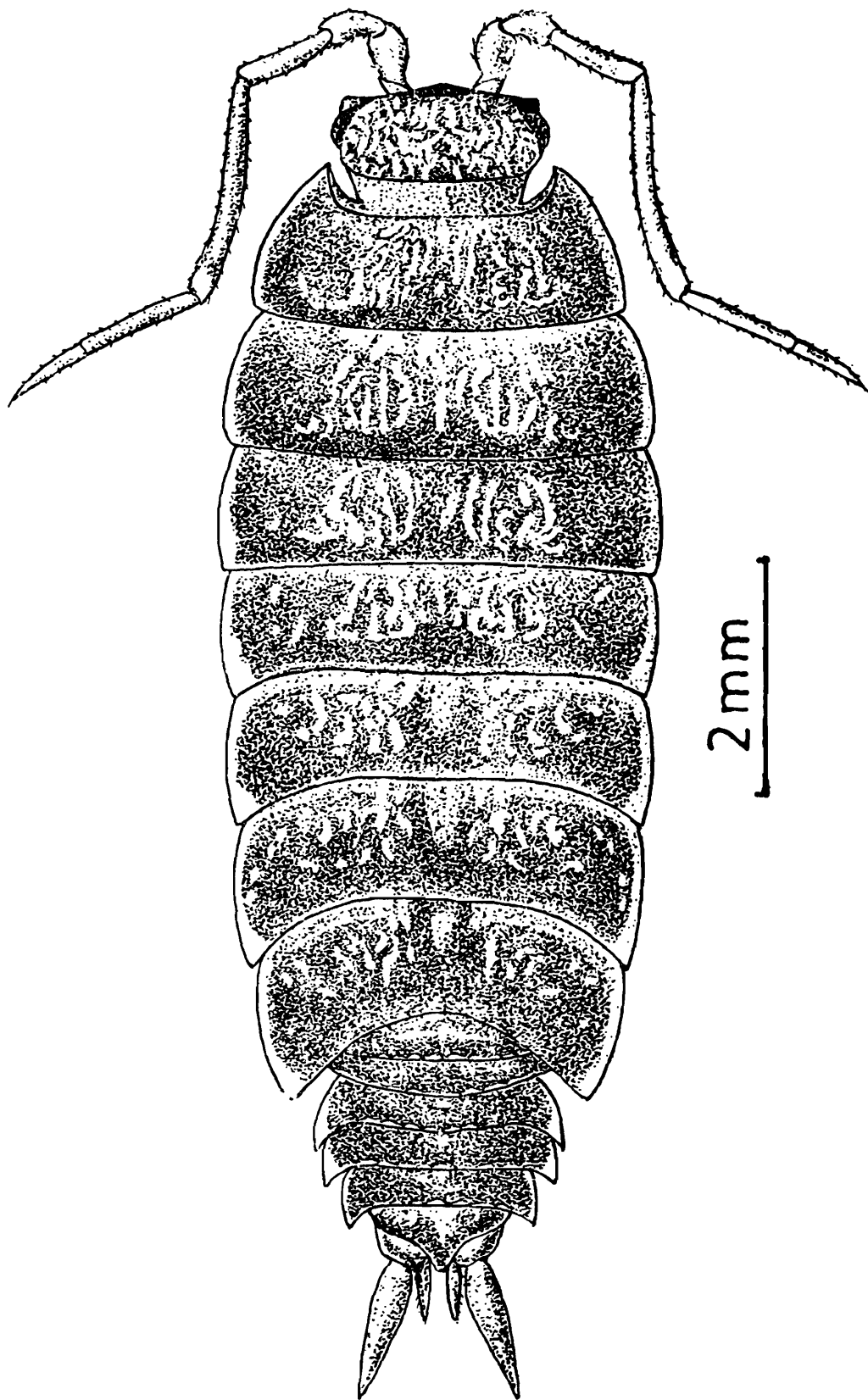


Fig. 41. *Porcellionides pruinosus* (Brandt) : Dorsal view.

1932. *Porcellionides pruinosus* Barnard, *Ann. South African Mus.*, 30 (2) : 255.

1936. *Porcellionides pruinosus* Van Name, *Bull. American Mus. Nat. Hist.*, **71** : 238.

1971. *Porcellionides pruinosus* Ramakrishna, *Rec. zool. Surv. India*, **63** (1-4) : 183.

General : Body oblong-oval (Text fig. 41) more than twice as long as broad, dorsal surface but slightly convex and smooth, though exhibiting a very fine granulation.

Cephalon : Head quadrangular almost twice as broad as long, lateral lobes extremely small. Frontal margin straight. Eyes small, lateral and just posterior to the lateral lobes. About 50% of the posterior portion of the head covered on the sides by the lateral extension of the first thoracic somite.

Thorax : The first segment of mesosome fairly broad compared with other segments. Side plates of the first three anterior segments scarcely projecting laterally. Lateral plates of fourth to seventh segments somewhat larger with posterior corners obtusely acuminate.

Abdomen : Metasome (Text fig. 42-a) not attaining one-fourth the length of the body and narrower than thorax. Epimeral plates of the first two anterior segments covered by the lateral extensions of the last thoracic somite. Those of the third to fifth segments comparatively small and recurved. Telson nearly twice as broad at the base as long, sub-triangular and the tip obtusely pointed.

Appendages : The first pair of antennae small and not distinct. The second pair fairly slender extending upto fourth thoracic somite when extended backwards and long (Text fig. 42-b). The first joint short ; the second twice as long as the first ; the third subequal with the second ; the fourth twice the length of the third joint ; the fifth longest of all and about one and a half times longer of the fourth. Flagellum consisting of two articles, the proximal twice as long as the distal one.

Legs slender, slightly spinose internally. Their length gradually increasing from the first to seventh.

Opercular plates of the first two pairs of pleopods with air cavities and somewhat of different shapes in the two sexes. In the male, the first pleopod modified. (Text fig. 42-c, d).

Uropoda (Text-fig-42-e) with outer ramus approximately twice as long as the basal joint ; the inner ramus short, cylindrical and extending scarcely upto the middle of the outer.

Colour of dorsal surface slaty grey, faintly mottled. Margins of Meso and Metasome segments sometimes pale. Legs and antennae greyish, with white markings. Preserved specimens fade to a reddish brown colour.

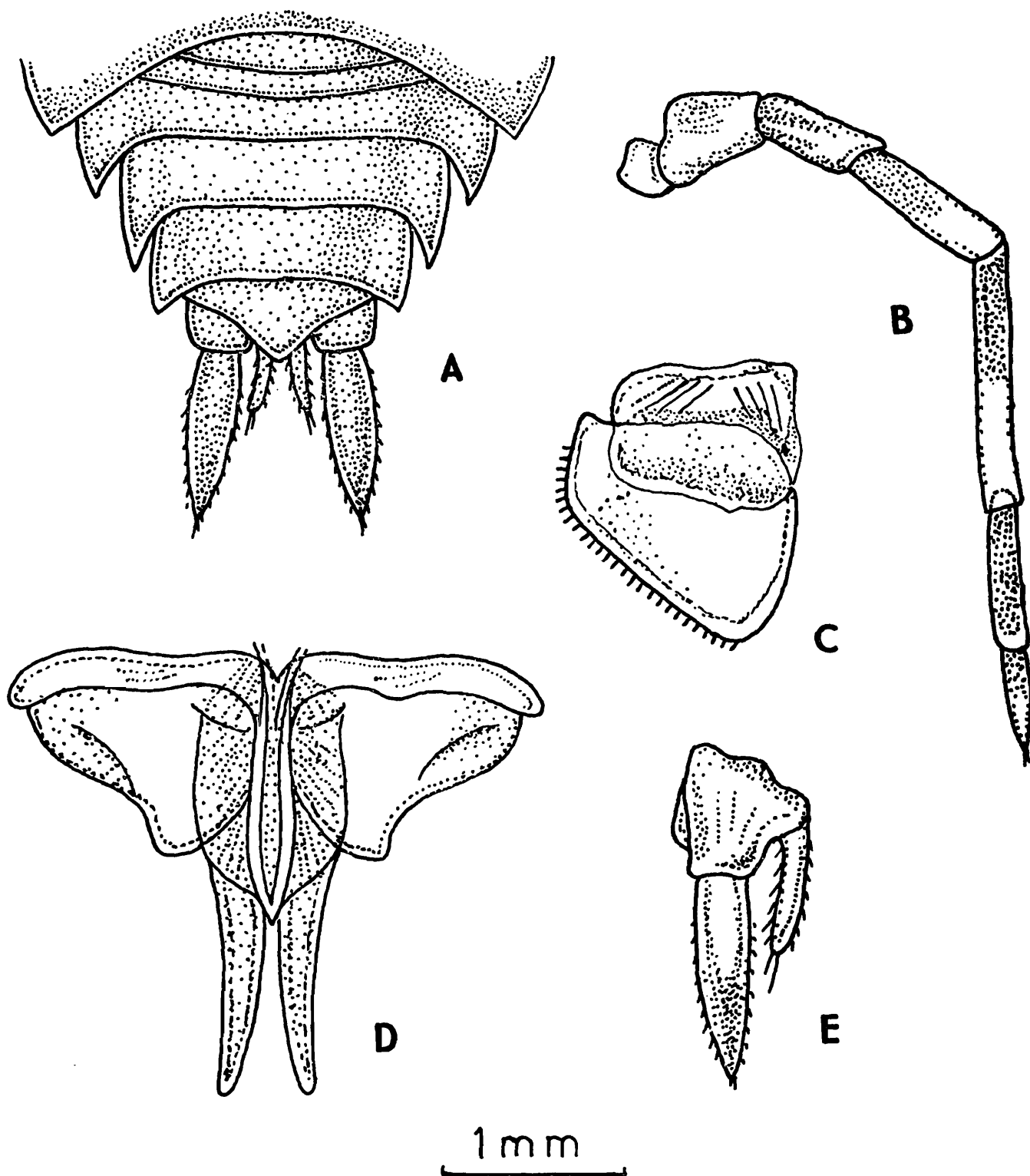


Fig. 42. *Porcellionides pruinosus* (Brandt) : A. Abdomen with uropoda ; B. Second antenna ; C. Third pleopod of female ; D. First pleopod of male ; E. Uropod.

Distribution : This species is cosmopolitan and found to occur in greater parts of Europe, North and South Africa, North and South

America, Madagaskar, Indonesia, India and Pakistan. In India, *P. pruinus* is fairly common in parts of Assam, Meghalaya, Bihar, West Bedgal, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh, Haryana, Punjab, Rajasthan and insular region namely Andaman and Nicobar and Lakshadweep Islands. This species is significantly absent from Peninsular India.

Remarks : The description of this species is based on an authentically identified female specimen measuring 7.5 and 3.25 mm. in total length and mamimum breadth respectively, collected from an agricultural garden, Kadmat, Lakshadweep Islands. It is easily recognisable by oblong, flattened body, and abruptly contracted metasome and long and slender second antennae.

26. *Porcellionides asiaticus* (Uljanin)

1875. *Porcellio asiaticus* Uljanin, *Crustacea of Turkestan*, pp. 15, 3, figs. 11-22.
1879. *Metaponorthus asiaticus* Budde-Lund, *Prospectus Isopodem Terrestrium*, p. 4
1885. *Metaponorthus orientalis* Budde-Lund, *Crustacea Isopoda Terrestria*, p. 162.
1911. *Porcellionides asiaticus* Stebbing, *Rec. Indian Mus*, 6 (4) : 190.

General : Body oblong-oval almost twice as long as its greatest width convex, surface practically smooth all over.

Cephalon : Head, distinct from the thorax, with slightly produced lateral lobes and the median semicircular. The lateral expansions of the first thoracic somites practically covering three-fourths of the head. Eyes large with several ocelli and antero-laterak. Head about two and a half to three times as long as wide.

Thorax : The first segment longest compared with others. The lateral plates of the first three segments absolutely rounded, while those of the other four posterior slightly psoduced in an obtuse point.

Abdomen : The Pelon not, abruptly narrower than the thotacic segments. The first two quite narrow and covering the lateral extensions of the seventh thoracic somite. Third to fifth segments large and their lateral parts recurved ending in an acute point. The telson sinuous on its sides, broadly triangular ending in an obtuse spine.

Appendages : The first antennae small and three jointed. The second pair of antennae long, stout, extending to almost half of the third thoracic segment when stretched backwards. The basal joint whort, the second almost sub-equal of the first with proximal projection ; the third hour glass shaped ; the fourth one and half times longer than the third ; the fifth joint longest of all including the flagellum. The flagellum consisting of two articles, the proximal being longer than its distal article.

Uropoda long, stout and cylindrical. The basal joint quadrangular and its expodite commencing almost at the tip of the telson and proceeding well beyond. The endopods correspondingly minute, extending a little off of the terminal segment of the abdomen.

Colour light brown althrough. Description based on the material in the National Zoological Collections of the Zoological Survey of India, its measurement being 14.5 and 7.0 mm. long and wide respectively.

Distribution : This species was earlier reported from different parts of Europe, Central Asian parts of Russia and from Peking in China. In India, this species has been recorded from Lucknow (Uttar Pradesh) only.

Remarks : Uljanin in 1875 described *Porcellio asiaticus* and *Porcellio orientalis* as two distinct species based on measurements of male, difference in length being very insignificant. Budde-Lund united the two species as merely colour varieties, while he adopts the specific name *asiaticus* in his earlier work, he in 1885 makes this synonym of *orientalis* although *P. asiaticus* has precedence both in Uljanin's text and plates. The author agrees with the views of Budde-Lund in merging the two species.

Genus 7. *Tracheoniscus* (Brandt)

- 1833. *Porcellio* Brandt, *Consp. monogr. Crust. Isop. Terrestria* : 75.
- 1870. *Porcellio*, Budde-Lund, *Nat. Tidskv* (3), 7-238.
- 1899. *Porcellio* Sars *Crust. of Norway* : 2
- 1909. *Trachelipus*, Budde-Lund. *Zool. Y. Zanthr Ergebü Farchimgrs in Westl Y. Zanthr Sudafrika*. 2 : 53-70.
- 1917. *Tracheoniscus*, Verhoeff. *Sitzungsher, Ges. Nat. of Freunde*, Berlin, 195-223.
- 1936. *Tracheoniscus* Van-Name, *Bull Amer. Museum of Natl. History* 71 : 261.

Characters : Body oval, dorsal surface rather convex with tubercles. Head with lateral lobes well developed. Frontal lobe rounded and obtuse. Eyes well developed with thoracic somites of equal size. Abdomen rarely one-fourth of the length of the body. Telson broadly triangular and terminates in an acute point.

Opercular plates of pleopods with air cavities. Uropods extending well beyond the tip of the telson. Males are distinguished from female with pleopods modified and also in colour.

Type species : *Tracheoniscus rathkei* Verhoeff.

Distribution : Common in Europe including in Norway, Southern Russia, and America. Genus is of common occurrence in almost all the states of eastern, western, northern and some southern states of peninsular India.

Key to the Indian species of the Genus Tracheoniscus

Body oval with the dorsal surface tubercular.
Head with lateral lobes well developed and rounded. The frontal obtusely semi circular.
Opercular plates of all pleopods with air cavities.
Flagellum equal in length of the last peduncular joint.

... *Tracheoniscus rathkei*.

27. *Tracheoniscus rathkei* (Brandt)

(Text figs. 43, 44 a-e)

- 1833. *Porcellio rathkei* Brandt, *Consp. monogr. Crust. Isop. Terrestria* : 15.
- 1810. *Porcellio rathkei* Milne-Edwards, *Hist. Nat. des Crust.*, 3 : 170.
- 1870. *Porcellio trilineatus* Budde Lund, *Nat. Tidskr.* (3), : 239.
- 1885. *Porcellio rathkei* Budde-Lund, *Crust. Isop. Terrestria* : 85-87.
- 1899. *Porcellio rathkei* Sars, *Crust. of Norway*, 2 : 180-181.
- 1905. *Porcellio rathkei* Richardson, *Bull. United States Nat. Mus.*, 54 : 617-619.
- 1909. *Trachelipus rathkei* Budde-Lund, *Isopoda* (Land Isopoden). In : Schultze, *Zool. Y. anthr. Ergebu, Forschungs in West 1. Y. Zentr. Sudafrika*, 2 : 53-70.
- 1917. *Tracheoniscus rathkei* Verhoeff, *Sitzungsher. Ges. Naturf. Freunde*, Berlin, 195-223.
- 1936. *Tracheoniscus rathkei* Van Name, *Bull. American Mus. Nat. Hist.*, 71 : 262-264.

General : Body oval (Text fig. 43), a little more than twice as long as broad, somewhat broader in female than male. Dorsal surface rather convex and with tubercles.

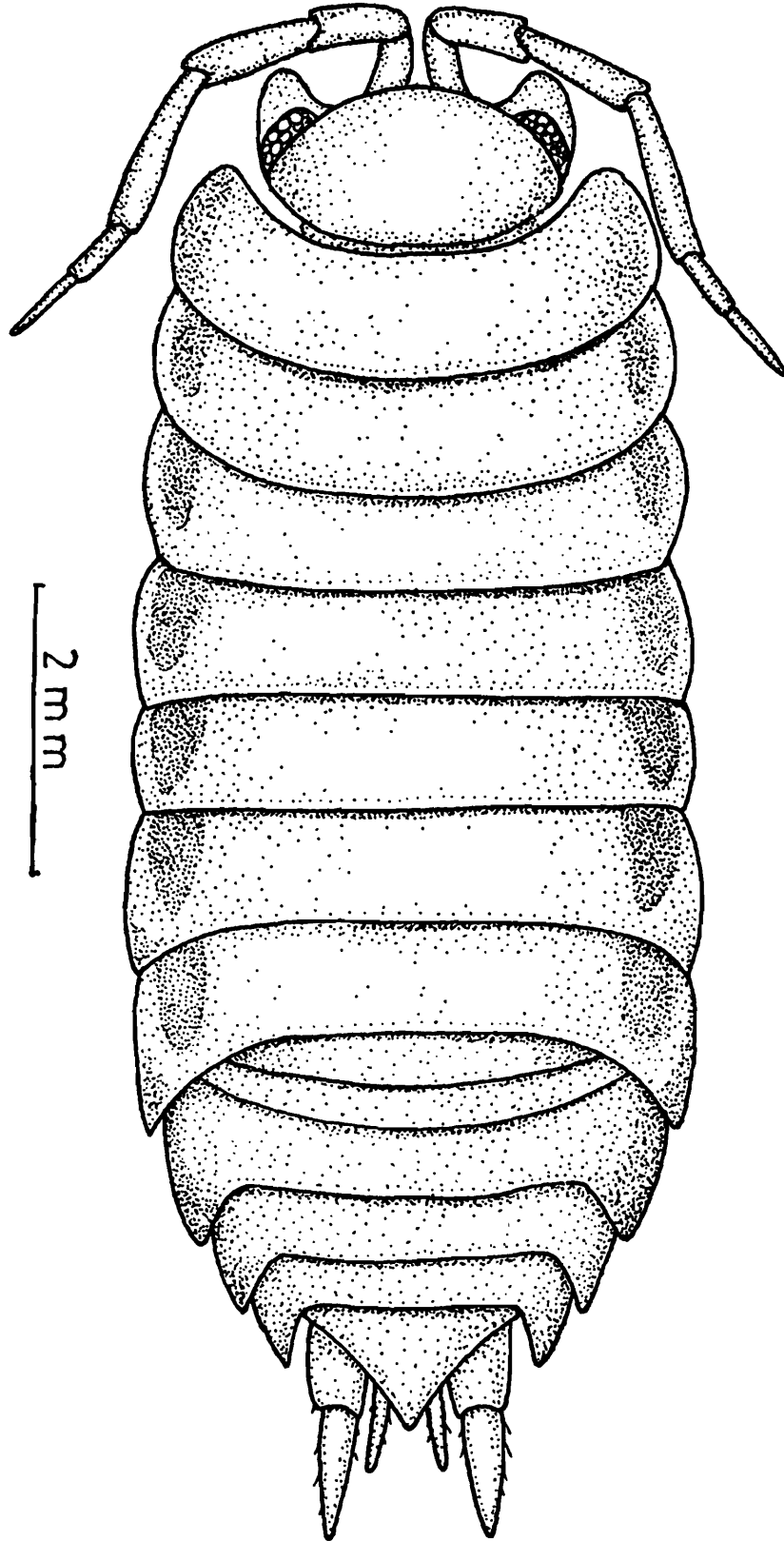


Fig. 43. *Tracheonicus rathkei* (Brandt) : Dorsal view.

Cephalon : Head with the lateral lobes well developed, rounded ; frontal lobe obtusely semi-circular. Eyes well developed and situated antero-lateral, behind the lateral lobes.

Thorax : All the segments of the same size, the antero-lateral lobes of the first segment covering almost half of Cephalon. Lateral plates of mesosome of moderate size without much expansion and posterior corners obtusely acuminate.

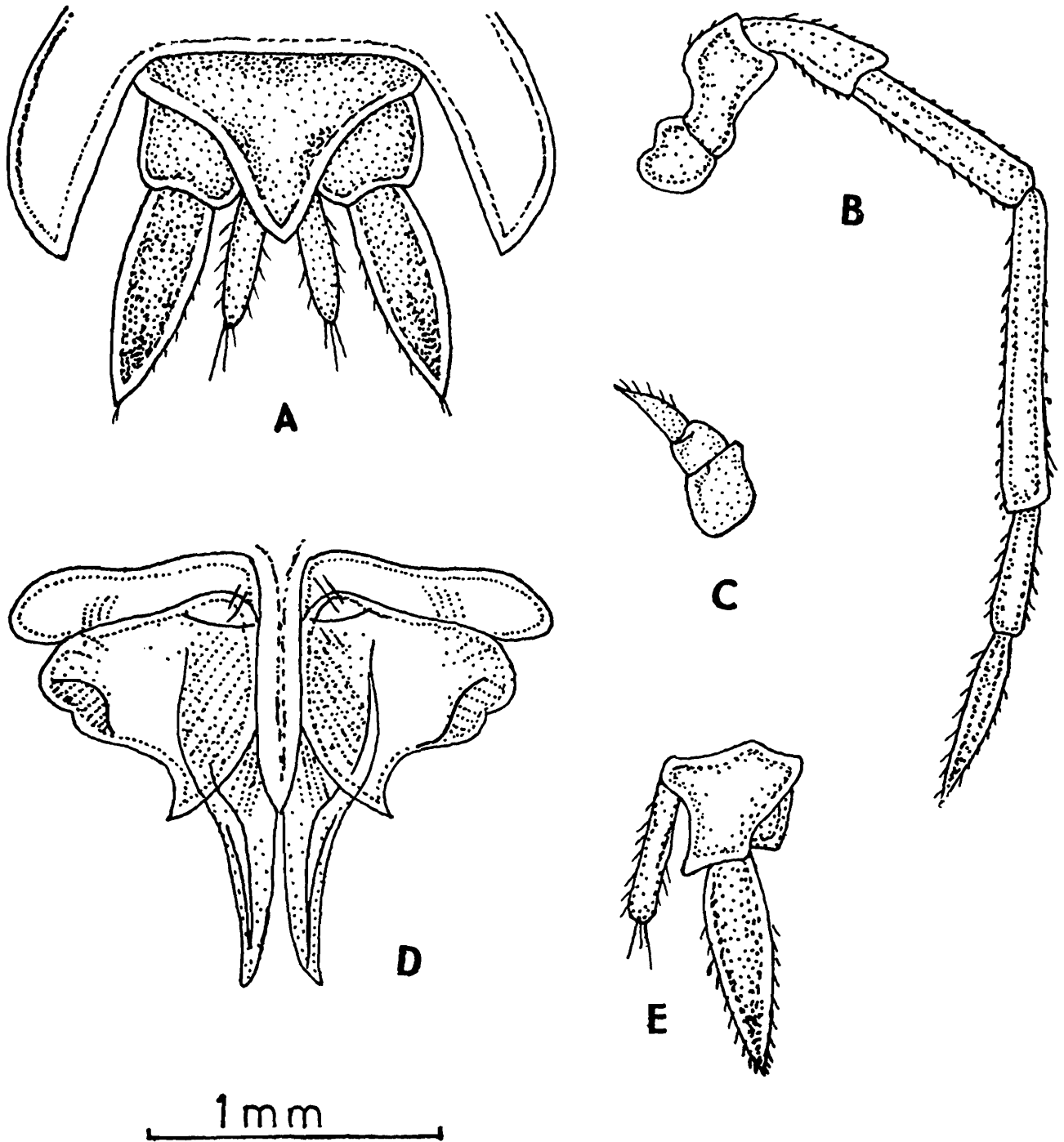


Fig. 44. *Tracheoniscus rathkei* Brandt : A. Last segment of abdomen and uropoda ; B. Second antenna ; C. First antenna ; D. First pleopod of male ; E. Uropod.

Abdomen : Metasome rarely attaining one-fourth of the length of the body. The first two segments small and covered by the epimeral plates of the seventh thoracic segment. The epimeral plates of 3rd to

5th segments well developed and recurved. Telson broadly triangular and the distal end acutely produced.

Appendages : Antennule (Text fig. 44-c) small and three jointed. The antennae (Text fig. 44-b) long attaining nearly half the length of the body and slender. The first two joints small, the third beind as long as the first two and hour glass shaped ; the fourth longer than the third and fifth longest of all. Flagellum almost equal in length of the last peduncular joint and its distal joint longer than its proximal.

Legs of uniform size and the last pair in male well built than in the female with the carpal joint dilated near the base.

Opercular plates of all the pleopods with air cavities (Text fig. 44-d). Uropoda (Text fig. 44-e) with exop odite broadly lanceolate and the endopod considerable rod shaped and extending well beyond the tip of the telson (Text fig. 44-a). The first pair of pleopods in male modified.

The colour of dorsal surface is dark brown with three longitudinal lines if light yellow, one median and one on either side of the union of lateral plates with segments. Between the median line of light yellow and the lateral lines are the wavy lines of light yellow on the brown colour. Males are light in colour compared with females.

Material examined : Description is based on a single male specimen measuring 8.5 and 4 mm. in length and breadth respectively and collected from Calcutta (West Bengal) preserved on the National Zoological Collections of the Zoological Survey of India, bearing Reg. No. C. 3655/2.

Distribution : This species is common in Norway and other parts of Europe, Southern Russia and America. In India, it is also of fairly common occurrence in Assam, Meghalaya, Arunachal Pradesh, Bihar, West Bengal, Orissa, Madhya Pradesh, Uttar Pradesh, Rajasthan, Haryana, Himachal Pradesh, Punjab, Maharashtra and Karnataka, Tamil Nadu, Andhra Pradesh in the penunsular India.

Genus 8. *Hemilepistus* Budde-Lund

- 1879. *Hemilepistus*, Budde-Lund, *Prospectus Isop. terrestrium*, p. 4.
- 1885. *Hemilepistus*, Budde-Lund, *Crustacea Isopoda Terrestria* : 76-151.
- 1896. *Hemilepistus*, Dollfus, *Mem. Soc. zool. de France*, 9 : 526-546.

1904. *Hemilepistus*, Budde-Lund, *A Revision of Crust. Isop. Terrestria* : 37.

1911. *Hemilepistus*, Stebbing, *Rec. Indian Mus.*, 6 (4) : 185-186.

Characters : Body elongate-oval, slightly convex, with surface of the body smooth but for cephalon and the first three thoracic somites.

Cephalon small, quadrate with its front developing into two lobes. The central and postero-lateral parts with large obtuse warts. Eyes small with ocelli arranged in three longitudinal rows.

Thorax double its greatest width and somites sub-equal. The first three segments with a row of blunt teeth on their posterior margins. Lateral margins with four to five large warts.

Abdomen narrow. Telson large, triangular with sides sinuous and its apex terminating in an obtuse point. The Second antenna long and stout. The flagellum of two unequal joints. Mandibles with strongly dentate cutting plates. Outer lobe of first maxilla with stout spines at its distal end. Inner lobe setaceous.

Uropod extending beyond telson.

Type-species : *Hemilepistus klughii* (Brandt)

Distribution : Baluchistan in Pakistan and Punjab in India.

Keys to the Indian species of the Genus Hemilepistus

Body elongate oval. Surface smooth except for the cephalon and the following thoracic somites studded with large teeth or warts. Flagellum of two unequal joints. Uropoda extending beyond the telson. Its basal joint wider and strongly built.

... *Hemilepistus klugii*.

28. *Hemilepistus klugii* (Brandt)

(Text figs. 45, 46a-e)

1833. *Porcellio klugii* Brandt, *Conspectus Crust. Oniscodorum*, p. 17.

1879. *Hemilepistus klugii* Budde-Lund, *Prospectus Isop. terrestrium*, p. 4.

1885. *Hemilepistus klugii* Budde-Lund, *Isopoda terrestria*, p. 152.

1908. *Hemilepistus klugii* Budde-Lund, *Voeltzkow's Reise in Ostafrika*, 2 : 281.

1911. *Hemilepistus klugii* Stebbing, *Rec. Indian Mus.*, 6.(4) : 186-188.

General : Body elongate oval (Text fig. 45), its length thrice its greatest width. Surface of body smooth, except for the Cephalon and the three following thoracic somites studded with large teeth or warts.

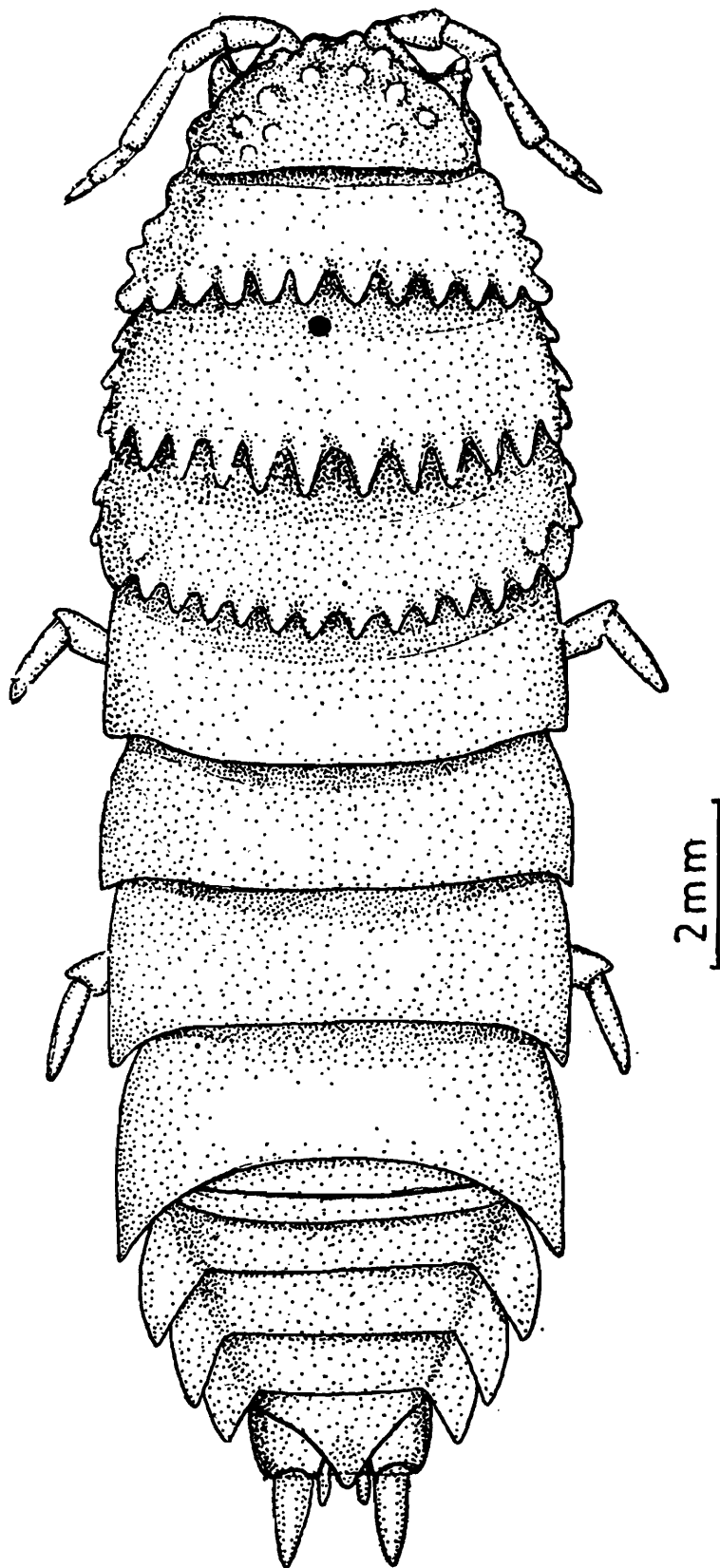


Fig. 45. *Hemilepistus klugii* : Dorsal view.

Cephalon : Head small (Text fig. 45) almost quadrangular with its antero-lateral sides developing into lobes, terminating in an acute process. Posterior margin straight, rounded at their lateral extremity. Cephalon deeply convex, with its central and postero-lateral parts with large obtuse teeth or say warts arranged in two rows. Eyes small, dorso-lateral, placed well behind the lateral lobes and ocelli arranged in three longitudinal rows.

Thorax : Elongate and about twice as wide as long. All the thoracic somites almost subequal. The first three somites with a row of thirteen blunt teeth on their posterior margins. The lateral margins studded with four to five large warts. Lateral plates of the first three somites not at expanding, while those of the fourth to seventh drawn postero-laterally, but gradually increasing in size, with maximum limit attained in the seventh somite.

Abdomen : Abdomen narrow and shorter than mesosomatic segments. The first two segments subequal, and the first only covered with lateral plates of the last thoracic somite. The lateral plates of the second not expanding but terminate in an acute process. Those of the third to fifth somites wider than the first two, drawn postero-laterally ending in an acute point. Telson large, triangular with sinuous sides, and with its apex terminating in an obtuse point.

Appendages : The second antenna (Text fig. 46-a) long, well built, with its basal plate small. Second joint wider than the basal and cup shaped. Third joint subequal to the fourth, its distal end wider than the proximal and fourth joint cylindrical. Fifth joint longest, longer than third and fourth together and tubular in shape. The flagellum of two unequal joints, the proximal longer than the distal.

Mandibles (Text fig. 46-b) with two cup-shaped dark brown teeth at its distal end.

First maxilla (Text fig. 46-d) outer lobe with four stout spines at its distal end and two smaller ones on the inner side. The inner lobe with two setaceous spines.

Maxillipede (Text fig. 46-c) with three minute spines near the distal margin and two large spines below. The short broad first joint of the palp with one large spine. The conical second joint with its inner margin provided with curved spine and a smaller one between that and the small narrow third joint.

Uropoda (Text fig. 46-e) extending beyond the telson, its basal joint

wider and strongly built. Exopodite stout and triangular, articulating from its centre. Endopodites small, cylindrical articulating from the antero-lateral angle of the basal joint.

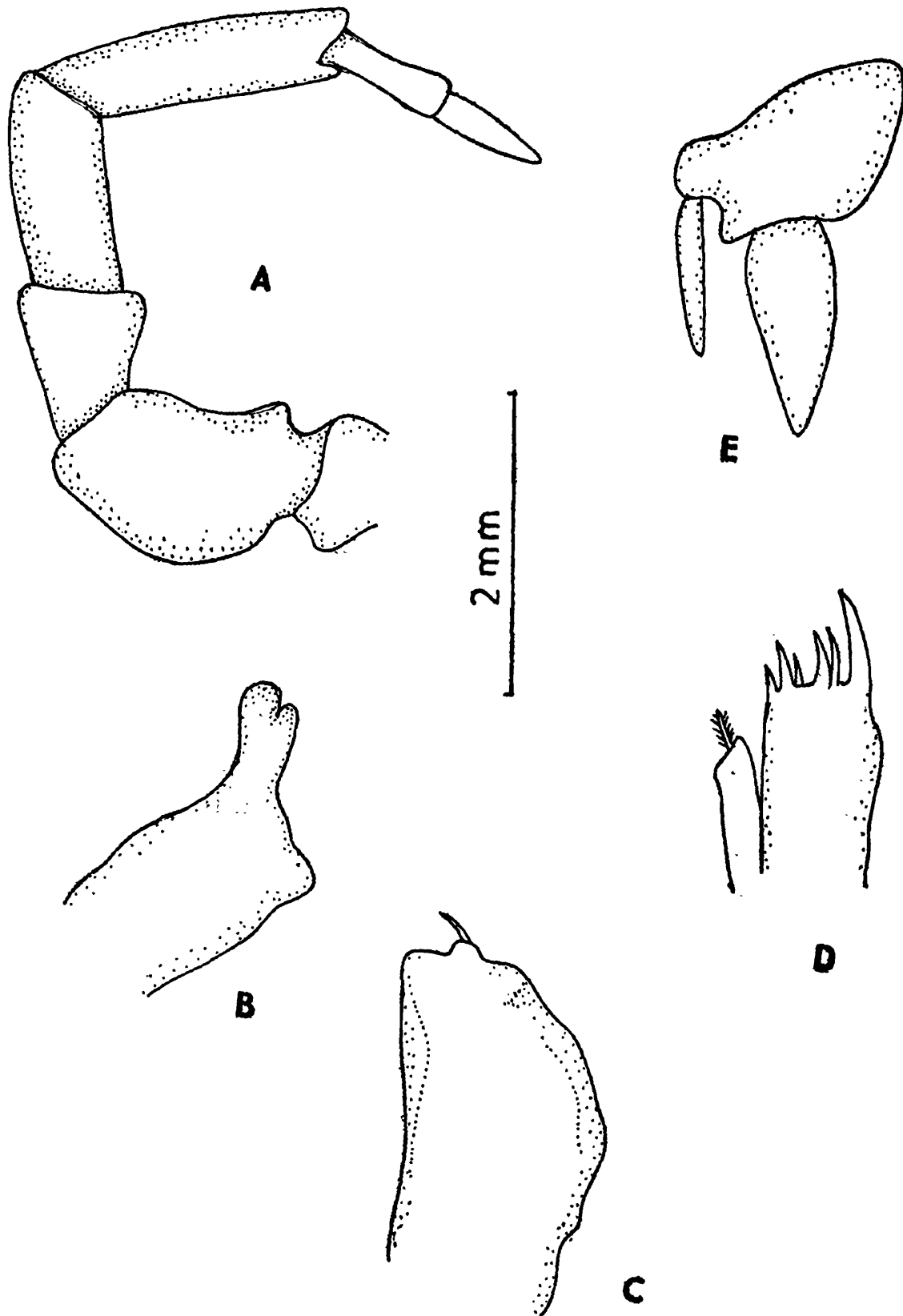


Fig. 46. *Hemilepistus klugii* : A. Second antenna ; B. Mandible ; C. Maxillipede ; D. First maxilla with inner and outer lobes ; E. Uropoda.

Second thoracic leg short and stout with its basal plate longest.

Fourth and fifth joints with long sharp spines on their postero-ventral sides, the last joint with a curved acute spine.

Colour of the specimen dark grey.

Length and the greatest width of the male specimen 18 and 6 mm. respectively.

Type Locality : Quetta, Baluchistan, Pakistan.

Distribution : Apart from the type locality in Pakistan as above, this species is recorded for the first time in Faridkot, Punjab, in India.

Remarks : Description and illustrations based on an authentic identified male specimen, collected from Quetta, Baluchistan, Pakistan donated by the Locust Research Entomologist, Quetta, as the type specimens could not be procured. Collinge 1911 based his description of the species on the specimens collected by Mr. J. W. N. Cumming from Quetta, Baluchistan on 6.4.1980.

Genus 9. *Platyarthrus* Van Name

1894. *Platyarthrus*, Van-Name. *Mit. Angabe lar. Loberns. Weise Und Beschauung neuws Arpen*. Berlin : 201-202.

1921. *Platyarthrus, Archangeli*. *Ajk. Jdc. Ital. Sci. Nat.* Milano 40 : 182-216.

1924. *Platyarthrus* Chopra *Rec. Ind. Mus.* 26 : (5)-523-528.

Characters : Body oval, convex with minute granules scattered on the thorax. Head distinctly separated from the first thoracic somite. Lateral lobes large and broadly rounded. Eyes absent. Thoracic segments large, subequal. Abdomen considerably short. Telson small, blunt four pointed. Antennules reduced. Second antenna short stout and hardly reaching upto posterior margin of the thoracic somite when turned backwards. Pleopods small. Their opercular rami rectangular and devoid of air cavities. Uropoda extending beyond telson.

Distribution : In India, it is restricted to its type locality namely, Barkuda Island, Chilka lake, in Orissa, India.

Keys to the Indian species of the Genus Platyarthrus.

Opercular rami rectangular and devoid of air cavities. Flagellum of second antenna with two joints pleon not abruptly narrower than the paereon. Epimeral plates of thorax and abdomen large, a Myrmecophile

... *Platyarthrus acropyga*.

29. *Platyarthrus acropyga* Chopra

(Text Figs. (47, 48a-f))

1924. *Platyarthrus acropyga* Chopra, *Rec. Indian Mus.*, 26 (5) : 524-528.

1975. *Platyarthrus acropyga* Ramakrishana, *Rec. zool. Surv. India*, 68 : 297-303.

General : Body oval with its greatest breadth more than half its length (Text-fig. 47) Smooth dorsal surface, convex with minute granules scattered on the thorax. Thoracic segments provided with longitudinal carinae from end to end, but somewhat indistinct, and prominent in older specimens.

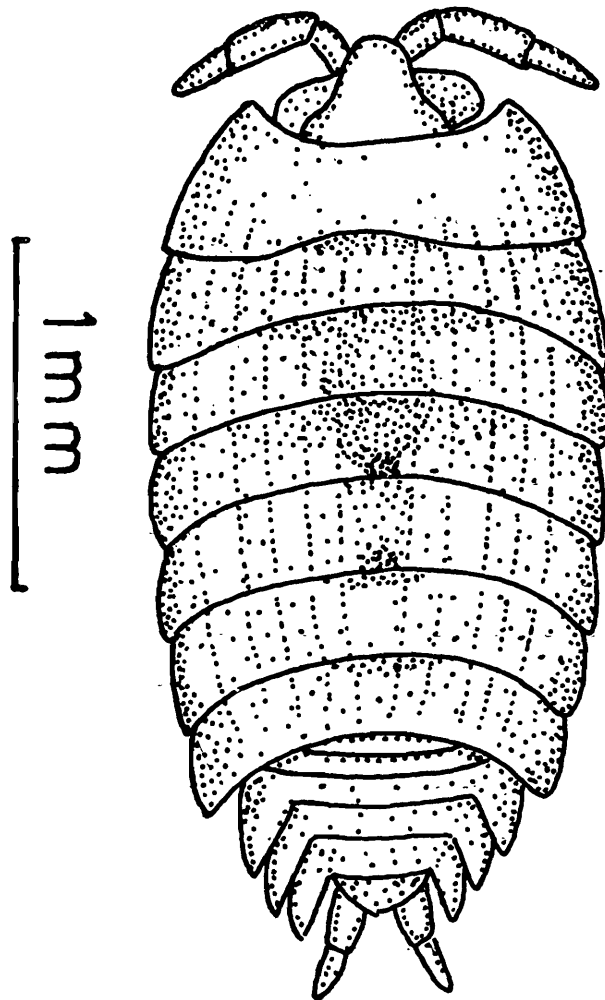


Fig. 47. *Platyarthrus acropyga* Chopra : Dorsal view.

Cephalon : Head distinctly separated from the first thoracic somite, subtriangular and roundly produced in front between the antennae. Lateral lobes large and broadly rounded at their margins. Eyes absent indicative of the cave dwelling habit.

Thorax : Thoracic segments large, subequal, and markedly convex from side to side, their lateral parts well developed, lamellar and subcontiguous. The lateral part of the first segment produced anteriorly surrounding part of the head. Except for the last segment, which is acutely lateral parts or all others terminating bluntly.

Abdomen : Abdomen considerably short, less than a third of the total length of the body, not abruptly narrower than the thorax. First segment not visible being concealed under the last thoracic somite ; second also short and lateral parts hidden by the 7th thoracic segment. Lateral parts of the next three somites large, directed posteriorly and with blunt pointed tips, those of the fifth segment extending beyond the terminal segment. The last segment small, bluntly pointed and scarcely drawn.

Appendages : Head appendages and mouth parts small, insignificant, all except the antennae, hardly visible to the naked eye.

Antennules extremely reduced. Second antennae (Text fig. 48-e) short, stumpy and hardly reaching up to the posterior margin of the first thoracic somite when turned backwards. Basal peduncular segments grooved, the first four segments short, third subtriangular, the fifth peduncular segment longest of all and as long as the third and fourth combined, practically rectangular with outside longer compared with the inner. Flagella short and pyramid shaped as long as the fifth segment and formed of two unequal parts, basal short and terminal conically tapering with setae at its distal end.

Outer lobe of first maxilla (Text fig. 48-c) terminating in about six spines, the outer four being larger than the rest and strongly curved.

Mandibles (Text fig. 48-d) well developed, provided with a double row of strong chitinous teeth, a membranous hairy lappet with two penicils arising from it and followed at a distance with another large penicil.

Maxilliped (Text fig. 48-f) with outer palp terminating in a large multispinous process. Inner palp more or less rounded distally.

Legs increasing in size antero-posteriorly and some of the basal segments grooved.

Pelopods very small, their opercular rami more or less rectangular and devoid of air cavities.

Uropoda (Text fig. 48-a) extending a great deal beyond the telson. Inner rami not visible when seen from the dorsal surface being covered over by remaining parts. Basal segment flattened dorsoventrally.

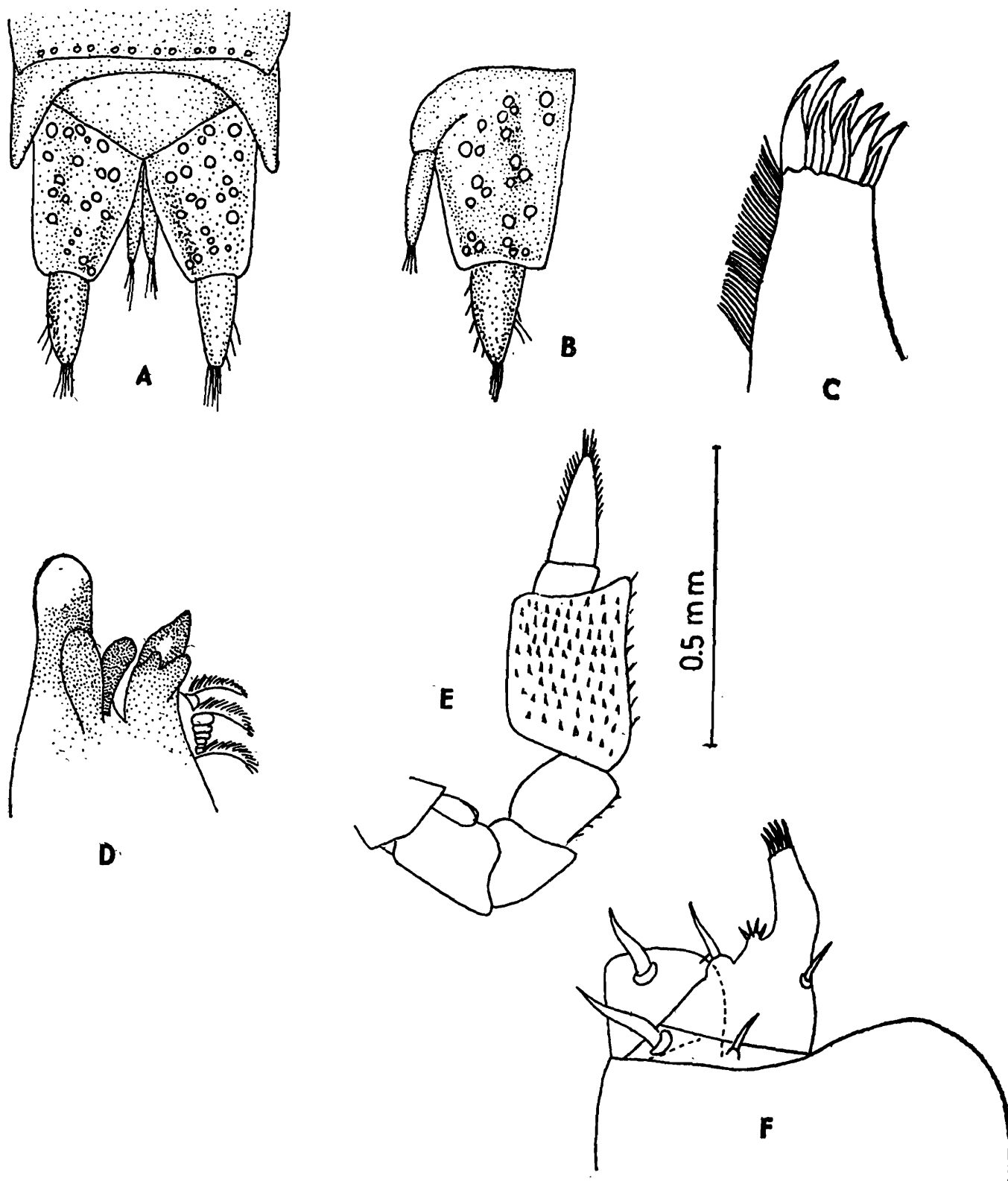


Fig 48. *Platyarthrus acropyga* Chopra : A. Uropoda with two terminal abdominal segments ; B. Single uropod ; C. Terminal portion of outer lobe of first maxilla ; D. Terminal portion of mandible ; E. Second antenna ; F. Terminal portion of maxillipede.

Inner ramus narrow, linear arising far in advance of the outer. Outer ramus short, triangular tapering posteriorly and more or less acutely pointed at the apex. All parts of uropoda setaceous and both rami terminating in tufts of long setae.

Colour almost white with some dark pigment about the mid-dorsal region.

Length of the largest specimen reaching upto 2.5 mm.

Type-Locality : Barkuda Is., Chilka Lake, Orissa, INDIA, (In nests of the ant *Acropyga aculiventris* Roger), Sept. 1923 (Coll. N. Annandale).

Material examined : *Syntypes* : 7 specimens in the National Zoological Collections, Zoological Survey of India, Calcutta. Regd. No. C. 950/1.

Distribution : The species is restricted to its type locality only.

Remarks : *Platyarthrus acropyga* Chopra is a myrmecophilous Isopod associated with ants of the Species *Acropyga aculiventris* Roger, the common little yellow ant of Barkuda. The Isopod exhibits true characters of a mermecophil in so far as it shows adaptations indicative of a subterranean existence. It is almost white in colour, having only scanty pigmentation on the exterior and is totally blind. The integument also as in other mermecophilous and termitophilous animals is very brittle.

Another interesting aspect of this species is that in addition to it is found to occur along with a curious coccid, *Xenococcus annandalei* Silvestri. According to Chopra it is difficult to say what relation the Isopods have with their ant hosts, but come in the category of "tolerated guests".

30. *Saidjahus* Sp.

1911. *Saidjahus* Sp. Stebbing, *Rec. Indian Mus.*, 6 (4) : 183.

Stebbing reported the occurrence of the genus *Saidjahus* Budde-Lund in India during 1911 and based on a single specimen collected by Dr. Annandale at Mandapam, Pamban Passage, Tamil Nadu in the sand under the stones. Since he was not aware as to how much variability exists between the species, he desisted giving any specific name to the present material.

The author is not in a position either to describe and give any

specific rank, as the material as existing in the tube (Reg. No. 7933/10) is nothing but a small fragment of the thorax.

1936. *Dekanoscia longi-cornis* Verhoeff, *Records of the Indian Museum* 38 : 97-102.

2. *Nagara (Nagara) travancoria* Verhoeff.

3. *Nesodillo Jonesii* Verhoeff.

Verhoeff (1936) described the above three species of oniscid isopods in an article entitled "On a Few Isopoda from South India" published in the *These*. These were collected from Ponmudi hills (only male specimen collected by Dr. Jones) Travancore and the second and third from Kovalam (Travancore) not far from the coast seven miles from Trivandrum, South-west from the Deccan. The whereabouts of the deposition of these specimens (types) are not known. The author is unable to locate the types or the general collection of the survey undertook, an intensive survey during Aug.-Sept. 1983 from the same areas for collection of topotypes of the above three species were not fruitful. He was unable to locate the specimens but other terrestrial isopods nearby already included in this volume.

Since the three species described have no specimens in Zoological Collection of the Zoological Survey of India and efforts to obtain them from Dr. S. Jones, Retd. Chief Research Officer, Central Marine Fisheries Research Institute or from the locality were fruitless, the author is compelled to make a mention of the same in the present Fauna of India with no option left.

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