Fauna of India

HOMOPTERA

APHIDOIDEA

SUBFAMILY LACHNINAE

A. K. GHOSH

Aphidoidea forms one of the most important group of Phytophagous insects because of their polymorphism, host alternating heteroecious behaviour, reproductive habits and above all for their role as largest group of insect vector of plant viruses. The Fauna of India and the adjacent countries, in this group, constitutes about 16% of the world fauna, including a large number of rare, endemic species. However, no consolidated account of Indian aphids was so far available and the present work was started in 1976 and has been so planned as to be published in several parts. The first part published in 1980, deals with an introductory chapter on Aphidoidea leadiug to subfamily Chaitophorinae. The present volume, the second in tho sereis, deals with Lachninae and will be followed by third part dealing with subfamily Pemphiginae ; the entire superfamily is expected to be covered under at least eight seperate parts. Besides, taxonomic accounts, the volumes will also provide information on host plant association, association with ants, natural enemies of aphids, distribution etc

THE FAUNA OF INDIA

AND

THE ADJACENT COUNTRIES

HOMOPTERA

APHIDOIDEA

Part 2

SUBFAMILY LACHNINAE

by

A. K. GHOSH

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EDITOR'S PREFACE

The "Fauna of India: Homoptera: Aphidoidea," dealing with General Introduction to the group and the subfamily Chaitophorinae was published in June, 1980. This important group of insects, most well-known for their role as plant-virus vectors, has two families, Aphididae and Adelgidae; the current volume deals with the second subfamily i.e., Lachninae, out of the eight subfamilies of Aphididae. Lachnids are world wide in distribution and largely inhabit vegetation of temperate region and are regarded as one of the major forest pests especially on conifers. In this volume, as in the previous one, the author, Dr. A. K. Ghosh, one of the eminent aphidologists of the country, has dealt extensively with all the species of subfamily Lachninae so far known from India, Pakistan, Nepal, Bhutan and Sri Lanka; the information includes detailed descriptions, keys, geographical distribution, natural enemies, association with ants, and the host-plants of the species. This economically important insect-group has a total of nine subfamilies, and only two subfamilies have so far been dealt with by the author; as more subfamilies are to be covered, the series is expected to run to several volumes and we sincerely hope that Dr. Ghosh, who is to be warmly congratulated upon for these fine volumes, will be able to complete the other volumes within a reasonable period of time, perhaps during the next five years or so. I feel that the present volume, as well as the first one, will bridge the gap of our knowledge about this important group of insects, and will be a handy tool to the specialists and the research students engaged in the studies of Indian aphids in India and elsewhere.

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CALCUTTA
19*th January*, 1982

AUTHOR'S PREFACE

The present volume forms the second part of Aphidoidea. The material for the present study was obtained from several Institutions and personal collection, besides from the collections in the Zoological Survey of India.

My sincere thanks are due to Dr. V F. Eastop and authorities of the British Museum (Natural History) London, Dr. D. Hille Ris Lambers, Bennekom, The Netherlands, Dr. H. L. G. Stroyan, Harpenden, Herts, England, Dr. G. Shaposhnikov, Zoological Institute, Leningrad, U.S.S.R., Dr. R. Kumar, Department of Entomology, University of Wyoming, U.S.A., Dr. (Miss) Louise M. Russell, Co-operating Scientist, U.S.D.A., Washington, U.S.A., Dr. Charles Chia-chu Tao, Agricultural Research Institute, Taiwan, Dr. H. Higuchi, Entomological Laboratory, Hokkaido University, Sapporo, Japan, Dr. D. N. Raychaudhuri and his colleagues, Department of Zoology, University of Calcutta, Dr. S. Chakrabarti, Department of Zoology, University of Kalyani, Dr. K. D. Verma, Central Potato Research Institute, Simla, Dr. S. Kanakaraj David, 22, Kamaraj Avenue, Madras, Mr. L. K. Ghosh, Zoological Survey of India, Calcutta, for their continuous cooperation and kind help in sending material on loan, in supplying unavailable literature and unpublished data. I am grateful to the Editorial & Publication Section, C.S.I.R.O., Australia and to the authorities of the British Museum (Nat. Hist.) London, for permitting me to reproduce drawings (Plate 18 & Plate 22) from their publication.

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GENERAL CONTENTS

SYSTEMATIC CONTENTS

Abbreviations

The following abbreviations have been used for private owners of collections and Museums, cited in the text; BMNH=British Museum (Natural History) London; CCT=Charles Chia-chu Tao, Agricultural Research Institute, Taiwan; CU=Department of Zoology, University of Calcutta; DHRL=D. Hille Ris Lambers Bennekom, The Netherlands; HLGS=H.L.G. Stroyan, Harpenden, Herts, England; ERS, ZSI=Eastern Regional Station, Zoological Survey of India, Shillong, KDV=K. D. Verma, Central Potato Research Institute, Simla; LKG=L.K. Ghosh, Zoological Survey of India, Calcutta; RK=R. Kumar, Department of Entomology, University of Wyoming, U.S.A.; SC=S. Chakrabarti, Department of Zoology, University of Kalyani, West Bengal; SKD=S. Kanakaraj David, 22, Kamaraj Avenue; Madras, ZSI=Zoological Survey of India, Calcutta.

INTRODUCTION

The first record of *LACHNINAE* from the Indian region was published by Buckton (1899) as *Lachnus pyri* Buckton and subsequently three new species were described by van der Goot (1916, 1917). Das (1918) recorded two more species from the Northwestern region and George (1927) described another species, *Dilachnus krishni* George, from the Nilgiri hills in South India. All other species of the subfamily have subsequently been described between 1956 to 1975, from different areas of Northern India; one of these, viz. *Lachnus tilabarensis* Raychaudhuri and Ghosh 1964, has been excluded from the present account, as this is now placed under *Aiceona*. Out of a total of 36 species and subspecies under 14 genera and 3 tribes, now known from Indian region, 16 species are known from the Northeastern region, including one species, *Pyrolachnus pyri* (Buckton) (Syn. *Dilachnus krishni* George) which is also known from Southern India, whereas the rest are known from the North Western Region. Evidently, the availability of most of the host plant groups explain the occurrence of almost all the species in the Northern temperate region. A high percentage of endemism in this group could also be noted from the fact that out of 36 species and subspecies, 24 species and 2 subspecies are endemic in origin and are mostly restricted to the region, except a few species like *Cinara atrotibialis* David and Rajasingh and *Lachnus tropicalis* (v.d. Goot), which are now known from wider areas. Two of the 14 genera, *Longistigma* Wilson and *Schizolachnus* Mordwilko were unknown from India till recent times.

No comprehensive account of *LACHNINAE* of the region has been published up to now; however Raychaudhury *et. al.* (1980) have given an account of the Lachninae of Eastern India.

Subfamily *LACHNINAE*

Body 2.0–8.0 mm long, with conspicuous hairs. Head usually with a median suture. Eyes large or reduced, with or without ocular tubercles. Antennae 5–6 segmented, usually in both apterae and alatae, with round, sunken or protuberant secondary rhinaria; rhinaria may be with or without chitinous rim; processus terminalis always shorter than base of last antennal segment, may be only with apical setae or with a few hairs and apical setae or only with normal hairs. Rostrum usually long and may extend much beyond the length of the body; segment 4 and 5 may be distinct and long or almost fused and blunt. Ultimate rostral segment (urs.) may be without any to with more than 30 accessory hairs. Tergum pale

or variably pigmented, often with brown "muskelplatten" and at least with a dark sclerotic band on 8th tergite, may be striated or reticulated. Dorsal hairs fine or thick with acute, acuminate, blunt or furcated apices. Siphunculi usually on sclerotic hair-bearing cones or may be simple ring like or even absent. Cauda broad, semilunar with many fine hairs. Anal plate entire. Legs variably pigmented, hind legs may be much elongate or normal, second segment of hind tarsi ($ht._2$) may be normal or much elongate (as in Tramini); first tarsal segments usually with more than 9 ventral hairs and may sometimes with a pair of dorsal hairs. Empodial hairs very short and inconspicuous. Wings pale or pigmented; forewings with pterostigma blunt or elongate and many times as long as maximum width, radial sector distinctly curved to almost straight, media simple, once or twice branched, sometimes faintly indicated; hind wings with both obliques. Sexuales with males alate or apterous, oviparae always apterous, Glowacza *et al.* (1974) have dealt with male reproductive system of different genera of Lachninae and concluded that *Lachnus* Burm., is more primitive than *Cinara* Curtis, as species under the genus *Lachnus* show more number of testicular follicles than in *Cinara*.

The subfamily is composed of three tribes viz.; Tribe Lachnini containing at least 9 recognised genera, all but except one (*Sinolachnus* H.R.L.) being recorded in the region, Tribe Cinarini containing 6 genera, five of which are known from the region and the Tribe Tramini, containing 5 genera, only one of which has been recorded from the region. A total of 339 species is known in the subfamily for the world fauna.

Aphids belonging to *LACHNINAE* are known to be Monoecious and apparently lead holocyclic life cycle except Tramini, members of which are nearly all anholocyclic, on plants of Fagaceae, Salicaceae and Rosaceae (Lachnini), Coniferae (Cinarini) and roots of Asteraceae, Boraginaceae, Papilionaceae, Poaceae, and Polygonaceae (Tramini). The genus *Cinara* Curtis is the largest genus in the subfamily and is well represented in the Palaearctic region and Nearctic region. Some of the genera under the Tribe Lachnini, e.g. *Lachnus* Burmeister, *Maculolachnus* Gaumont, *Nippolachnus* Matsumura, *Pyrolachnus* Basu & Hille Ris Lambers, *Tuberolachnus* Mordvilko etc. are very well represented in the region under study. At least two genera, *Indocinara* Ghosh, *et al.* and *Pyrolachnus* Basu & H.R.L. are endemic in origin.

Heie (1967) has stated that there is no palaeontological evidence of the evolution of *LACHNINAE* and most of the authors believe *LACHNINAE* to be of recent origin and most closely related to *APHIDINAE*.

The subfamily has often been treated as a separate family, LACHNIDAE by many earlier authors. Taxonomic works con-

cerning the regional fauna of *LACHNINAE* include: Blanchard (1939): Argentina; Bodenheimer & Swirski (1957): Middle East; Bradley (1956–1968): Canada; Borner (1952): Central Europe; Eastop (1958): East Africa, (1961): West Africa (1966): Australia (1972): British *Cinara* (1972); Gomez-menor (1963): Spain; Heinze (1962): Europe; Hottes (1960a, 1960b, 1961a, 1961b): U.S.A., Inouye (1970): Japan; Narzikulov (1963): Central Asia; Paik (1965): Korea; Palmer (1952): U.S.A.; Pasek (1952, 1954); Pintera (1959, 1966); Szelegiewicz (1962); Shaposhnikov (1964): Eastern Europe; Takahashi (1931); Tao (1961): China, etc.

Key to the **Tribes**

1. Second segment of hind tarsi greatly elongate, 0.50–0.95 × as long as hind tibiae, first segment reduced. Eyes of true apterae only of three facets or small; compound eyes of alatae always large and of many facets. Radius of forewing slightly bent, media faint, once or twice branched, hind wing with both obliques. Siphunculi present or absent, if present, placed on small hairy cones. First instar larvae with antenane 5 segmented. On Polygonaceae (*Rumex*), Ranunculaceae (*Ranunculus*) and roots of many compositae. Tramini

   Second segment of hind tarsi normal, never elongate as above, first segment never reduced. Eyes of all forms usually many faceted. Wing venation variable. Siphunculi always present, even as mere rings. First instar larvae with antennae 4–5 segmented. Usually on aerial parts of trees of Coniferae, Fagaceae, Salicaceae and Rosaceae etc... 2

2. Ultimate rostral segment always blunt, rostral segment 5 reduced. Forewings often with pigmentation; radius of forewing curved and of moderate length. Siphunculi always on hairy cones. Usually on aerial parts of dicotyledons, when on Coniferae, rostrum longer than the body. Lachnini

   Ultimate rostral segment usually acuminate, distinctly divided into segment 4 and 5, when short and blunt, then feeding on needles of coniferae. Forewing usually hyaline; radius of forewing straight and short. Siphunculi on hairy cones or mere rings surrounded by a few hairs. Usually on Coniferae. Cinarini

[*Note:* Siphunculi absent in *Stomaphis asiphon* Szel., described from Korea but this species could easily be separated from any Tramini by normal second segment of hind tarsus & rostrum exceeding the length of body.]

Tribe Cinarini

Body 1.5–8.0 mm long, usually covered with numerous hairs. Antennae 5–6 segmented, much shorter than the length of the body; apterae usually with 1–2 secondary rhinaria on segment IV; primary rhinarium with or without chitinous rims; processus terminalis always much shorter than the base of antennal segment VI and bearing 2–11 subapical hairs. Eyes of all morphs are of many facets. Ultimate rostral segment either long and pointed and distinctly divided into segments 4 and 5 or short and blunt. Abdominal dorsum usually pale, bearing "muskelplatten" small scleroites and sclerotic bands on 8th tergite, sometimes absent (as in some species of *Eulachnus* Wilson); dorsal hairs usually fine but sometimes thick, acuminate, blunt or furcated; 8th abdominal tergite usually bearing more than 7 hairs, siphunculi usually on large dark hairy cones or sometimes appearing as mere rings, without any hairs or surrounded by a few hairs. Cauda crescent shaped. First tarsal segments bear at least 9 ventral hairs and sometimes a pair of dorsal hairs (e.g. *Eulachnus*); empodial hairs short, inconspicuous. Wing venation normal; forewings with radius rather short and straight, and media often faintly indicated and sometimes once branched.

The tribe has often been sub-divided into two subtribes Cinarina and Eulachnina (= Schizolachnina) which may be separated as follows:

1(2)	Body elongate or elongate oval. Epicranial suture obscure or invisible or distinct. Ultimate rostral segment short and blunt, segment 5 indistinctly separated from segment 4. Siphunculi hardly elevated, with or without any surrounding hairs. First tarsal segment sometimes with a pair of dorsal hairs. Usually feed on needles of Coniferae.	Eulachnina
2(1)	Body rounded. Epicranial suture usually distinct. Ultimate rostral segment pointed, distinctly divided into segment 4 and 5. Siphunculi on small to large, sclerotic cones, bearing many hairs. First tarsal segments never with dorsal hairs. Usually feed on twigs and branches, rarely on needles of Coniferae or on leaves of other plants.	Cinarina

Subtribe CINARINA

Key to the Genera of CINARINA

1(2) Body usually covered with fine hairs. Apterae usually with a secondary rhinarium at the apices of segment IV and segment V. Eyes with ocular tubercles. Dorsal hairs usually long and fine, never arising from strong bases. First tarsal segment with 9 or more ventral hairs but without any peg like setae. Hairs on siphuncular cones fine. On Coniferae... *Cinara* Curtis

2(1) Body covered with thick hairs. Apterae with secondary rhinarium only at the apex of antennal segment V. Eyes without ocular tubercles. Dorsal hairs thick, arising from papillate sclerotic bases and may be acuminate or furcated at apices. First tarsal segments with 10–11 ventral hairs and one short peg. Hairs on the siphuncular cones similar to those on dorsum of abdomen. On *Plectranthus*. *Indocinara* Ghosh *et al.*

Genus **Cinara** Curtis 1835

1835. *Cinara* Curtis, *J. British Entomology*, **12**: 576. Type species: *Aphis pini* L.

*1909. *Lachniella* Del Guercio, G., *Redia*, **5**: 286. Type species: *Lachnus fasciatus* Burmeister = *costata* Zetterstedt.

*1917. *Todolachnus* Matsumura, A., *Jt. coll. Agric. Tohoku Imp. Univ.*, **7**: 381. Type species: *Todolachnus abietis* Matsumura =*Cinara matsumurana* Hille Ris Lambers.

1919. *Wilsonia* Baker, A.C., *Can. Ent.*, **5**: 212. Type species: *Lachniella gracilis* Wilson.

1919. *Dilachnus* Baker, A.C., *Can. Ent.*, **5**: 253. Type species: *Lachniella gracillis* Wilson.

1929. *Panimerus* Laing, in Theobald, F. V., *The plant Lice or Aphididae of Great Britain*, **3**: 129. Type species: *Lachniella gracilis* Wilson.

1929. *Neochmosis* Laing, in Theobald, F. V., *The plant lice or Aphididae of Great Britain*, **3**: 129. Type species: *Lachniella gracilis* Wilson.

*1939. *Cinaria* Borner, C., *Arb. physiol. angew. Ent. Berl.*, **6**: 76. Type species: *Aphis laricis* Walker.

*1939. *Cinarina* Borner, C., *Arb. physiol. angew. Ent. Berl.*, **6**: 76. Type species: *Lachnus viridescens* Cholodkovsky.

*1939. *Cinaropsis* Borner, C., *Arb. physiol. angew. Ent. Berl.*, **6**: 76. Type species: *Lachnus pinicola* Kaltenbach, *sensu* Borner =*pilicornis* Hartig.

*1940. *Dinolachnus* Borner, C., *Neue Blattlause aus mittleurope*, **1**, Naumberg (Saale). Type species: *Lachniella cilicia* var. *cecconii* Del Guercio =*confinis* (Koch).

*1948. *Cinarella* Hille Ris Lambers, D., *Trans. R. ent. Soc. Lond.*, **99**: 275. [as subgenus or *Cinara* Curtis] Type species: *Lachnus pineus* Mordvilko.

*1949. *Subcinara* Borner, C., *Beitr. tax. Zool.*, **1**: 59 [as subgenus of *Cinara* Curtis]. Type species: *Cinara brauni* Borner.

*1949. *Laricaria* Borner, C., *Beitr. tax. Zool.*, **1**: 59 [as subgenus of *Cinaria* Borner]. Type species: *Cinara kochiana* Borner.

*1949. *Pityaria* Borner, C., *Beitr. tax. Zool.*, **1**: 59 (as subgenus of *Cinaria* Borner]. Type species: *Lachnus pruinosus* Hartig *syn. bogdanowi* Mordvilko.

*1949. *Mecinaria* Borner, C., *Beitr. tax. Zool.*, **1**: 59 [as subgenus of *Cinaria* Borner]. Type species: *Aphis piceae* Panzer.

*1952. *Cinarellia* Borner, C., *Mitt. thuring, bot. Ges.*, **4**(3): 41. Type species: *Cinara laricicola* Borner =*boerneri* Hille Ris Lambers. =*cuneomaculata* Del Guercio.

*1952. *Buchneria* Borner, C., *Mitt. thuring bot. Ges.*, **4**(3): 41. Type species: *Aphis pectinatae* Nordlinger.

[Names with (*) have been considered as subgenera by several earlier authors.]

Morphology: Body of medium size to large, 2.0–8.0 mm long. Head without antennal tubercles, with a median suture. Antennae 6 segmented up to 0.60 × as long as the body (usually less than 0.50 ×); flagellum usually with a secondary rhinarium at apices of segments III and IV, in apterae; in alatae, with variable number of secondary rhinaria on segments III–V; hairs on flagellum usually longer than the basal diameter of antennal segment III; processus terminalis 0.13–0.60 × as long as base of antennal segment VI and bearing 3 apical setae besides 2–11 subapical setae. Ultimate rostral segment distinctly divided into segments 4 and 5, and segment 4 usually bearing 4–10 accessory hairs but in some species number of accessory hairs may be up to 60 (Eastop, 1972). Abdominal dorsum pale, bearing a variable number of scleroites and muskelplatten besides a transverse sclerotic hand on 8th tergite which may be interrupted at the middle; dorsal hairs usually long and fine, 3.0–8.5 × as long as the basal diameter of antennal segment III, but sometimes extremely short and up to 0.50–0.80 × as long as the mentioned diameter. Siphunculi on dark sclerotic hair bearing cones. Cauda sclerotic semilunar and bearing many fine hairs. Sub-genital plate hairy and of characteristic shape in adults. Legs variably pigmented; first tarsal segments bearing 9 or more ventral hairs; empodial hairs very short. Wings often hyaline, fore wing with radius originating from end of pterostigma, radial sector nearly straight, media often faintly indicated, twice branched; hind wing with both obliques.

Sexual forms of many species are still unknown. Oviparae are normally apterous and may resemble fourth instar larvae but they

can be distinguished by pale 8th abdominal segment, often bearing a group of lateroventral hairs on either side and by the large, densely hairy, subgenital plate; hind tibiae of oviparae usually swollen and bearing pseudosensoria, especially in the species with alate males. Males may be alate or apterous, often with characteristic genitalia; alate males with more secondary rhinaria on the flagellum. No sexual form is however known from this region except for *Cinara confinis* (Koch), *Cinara eastopi* Pintera, *Cinara maculipes* Hille Ris Lambers and *Indocinara hottesis* Ghosh *et. al.*

Discussion: The genus contains about 215 species from different regions of the world, of which the North American fauna appears to be richest with seventy five percent of the species being represented in that region; about 25 species are known from Japan and Oriental region, of which 12 have been recorded from Indian region. Nine of these 12 species are endemic in origin while the other three are Palaearctic in origin. A number of subgenera have been recognised by earlier authors (See generic synonymy) but Eastop (1972) has stated when World-Fauna is considered no satisfactory subgeneric separation could be made; however available subgeneric names for the species dealt in the text have been given in Table I, following Inouye (1970) and Eastop (op.cit.). The genus shows a large number of characters like large body size, compound eyes, dense pubescence, distinct rostral segments 4 and 5, complete wing venation and absence of host alternation, which are suggestive of its being an oldgroup of aphids, but the straight radial sector in fore wings indicates a recent origin (Heie, 1967).

Biology: Members of *Cinara* live on Pinaceae and Cupressaceae (Coniferae); most of the species living on Pinaceae have been observed to be specific to one or a few closely related species of *Abies, Larix, Picea* or *Pinus,* but many species living on Cupressaceae exhibit a wider host-range and may infest species of several genera of conifers. The known hosts of the species recorded from the region belong to *Abies, Cedrus, Picea, Pinus* and *Thuja* and most species infest the stem and feed on the bark of the host plants. No complete life cycle has been recorded for any of the species in the region; Eastop (op.cit.) has given a brief account of the life cycle of *Cinara* as this has been observed in Britain.

All the 12 species recorded so far from the region have been largely recorded between the months of November and June and only in the Northern Himalayan region. Myrmecophily is not very common.

Distribution.—Cosmopolitan. The principal works on the taxonomy of regional faunas include: Bodenheimer & Swirski (1957), Börner (1949), Braun (1938), Eastop (1972), Gomez-Menor (1962), Heinze (1962), Inouye (1970), Narzikulov (1963), Paik

(1965), Pasek (1954), Pintera (1966), Shaposhnikov (1964), Szelegiewicz (1962; 1974): Palaearctic; Eastop (1958; 1961): Ethiopian; Takahashi (1931), Tao (1961), Oriental; Eastop (1966): Australian; Blanchard (1939): Neotropical; Bradley (1956–1968), Hottes (1960a, 1960b, 1961a, 1961b), Palmer (1952), Pepper and Tissot (1973), Tissot (1939): Nearctic.

Type species.—*Aphis pini* Linnaeus, 1758. Eastop (1972) has stated that there has been a dispute as to the species of *Cinara* to which the name *pini* should be applied. Stroyan (1955) has commented on this problem. Location of material of *Aphis pini* L., is not known.

[Figures in parenthesis in the following text, from the original description, unless otherwise stated.]

TABLE I. List of species of *Cinara* from Indian region

Species	Available Subgeneric names	Host plant genera
**atroalbipes* David & Rajasingh	*Lachniella*	*Pinus*
**atrotibialis* David, Narayanan, Rajasingh	*Cinarella*	*Pinus*
**chaetorostrata* L. K. Ghosh & Raychaudhuri	*Cinaropsis*	?
**comata* Doncaster	*Lachniella*	*Picea*
confinis (Koch)	*Dinolachnus*	*Abies*
**eastopi* Pintera	*Cinara* s.s.	*Pinus*
**indica* Verma	*Cinaropsis*	*Cedrus*
**lachnirostris* Hille Ris Lambers	*Cinarella*	*Pinus*
**maculipes* Hille Ris Lambers	*Cinara* s.s.	*Pinus*
**Pilicornis* (Hartig)	*Cinaropsis*	?*Picea*
similis (vander Goot)	*Cinara*	?
tujafilina (Del Guercio)	*Cupressobius*	*Thuja*

(*) denotes endemic species.

Key to the species of **Cinara**

Apterous viviparous female:

1(4) Spinal hairs on dorsum of abdomen short and thick, longest one 0.04 mm long, shorter than the basal diameter of antennal segment III. Siphunculi on small cones, basal diameter being shorter than or little longer than the length of rostral segment

2(3) Legs with pantherine spots on femora and tibiae. Dorsal hairs on abdomen 0.02–0.04 mm long, 0.50–0.80 × as long as the basal diameter of antennal segment III. Antennal segment VI always shorter than segment V. Rostral segment 4, 2.0–2.5 × as long as segment 5 and segments 4+5 less than 0.60 × as long as second segment of hind tarsus. Siphunculi on very small pigmented cones, basal diameter being equal to or little longer than the length of the rostral segment 4. Body 3.75–4.9 mm long. On *Pinus* spp. — *C. maculipes* Hille Ris Lambers

3(2) Legs without pantherine spots as above. Dorsal hairs on abdomen of two types, spinal ones 0.013–0.016 mm long, marginal ones 0.053–0.056 mm long, these being 0.25–0.33 × and 1.4–1.5 × as long as the basal diameter of antennal segment III, respectively. Antennal segment VI always longer than segment V. Rostral segment 4, 2.5–3.0 × as long as segment 5 and segment 4+5, 0.65–0.78 × as long as second segment of hind tarsus. Siphuncular cones small, basal diameter being shorter than the length of rostral segment 4. Body 2.42–2.83 mm long. On Pinus... — *C. lachnirostris* Hille Ris Lambers

4(1) Spinal hairs on dorsum of abdomen much longer, longest one 0.100–0.215 mm long, always longer than the basal diameter of antennal segment III. Siphunculi usually on large cones, basal diameter distinctly shorter than the length of rostral segment

5(6) Body usually large 4.6–8.0 mm long. Antennal segment III 0.75–1.1 mm long, longest hair on segment III 0.190–0.300 mm long. Primary rhinaria without chitinized rim. First segment of hind tarsus dorsally up to 0.30 × as long as its ventral length. Rostral segment 4, 2.1–2.6 × as long as segment 5 and bearing 7–13 accessory hairs

Antennal segment V, 1.2–1.8 × as long as segment VI. Rostral segment 4, 1.8–2.4 × as long as first segment of hind tarsus. Second segment of hind tarsus 2.5–3.0 × as long as the first segment. Usually on *Abies* spp. — *C. confinis* (Koch)

6(5) Body 1.7–5.0 mm long. Antennal segment III 0.35–0.88 mm long, longest hair on segment III 0.90–0.198 mm long. Primary rhinaria with or without chitinized rim. First segment of hind tarsus dorsally 0.32–0.75 × as long as its ventral length. Rostral segment 4, 1.0–3.0 × as long as segment 5 and bearing 4–9 accessory hairs. On *Pinus, Picea, Cedrus, Thuja* spp.

7(12) First segment of hind tarsus dorsally longer than the diameter at basal articulation. Dorsal cephalic hairs up to 0.130–0.203 mm long, 3.0–5.5 × as long as the basal diameter of antennal segment III. Rostral segment 4, 0.18–0.38 mm long, 2.0–2.5 × as long as segment 5. Longest hair on anterior abdominal tergites, 0.150–0.218 mm long. Body 2.7–5.0 mm long. On *Pinus* spp.

8(9) Longest hair on antennal segment III, 5.0–6.2 × as long as the basal diameter of the segment. Processus terminalis 0.16–0.20 × as long as antennal segment III. Longest hair on anterior abdominal tergites, 5.6–6.5 × and on 8th tergite, 7.2–8.5 × as long as the basal diameter of antennal segment III, respectively. Flagellum without any secondary rhinaria; primary rhinaria without chitinized rims. Fore tibiae dark, others pale. First segment of hind tarsus dorsally 1.2–1.3 × as long as the diameter at the basal articulation. Body 2.7–3.2 mm long. *C. atroalbipes* David, Narayanan, Rajasingh

9(8) Longest hair on antennal segment III up to 4.0 × as long as the basal diameter of the segment. Processus terminalis 0.08–0.12 × as long as antennal segment III. Longest hair on anterior abdominal tergites 4.6 × as long as the basal diameter of antennal segment III. Flagellum with or without secondary rhinaria; primary rhinaria with chitinized rims. All tibiae variably pigmented. First tarsal segment of hind leg, dorsally 1.25–3.0 × as long as the diameter at the basal articulation. Body 3.3–5.0 mm long.

10(11) Abdominal dorsum with many scattered dark brown hair bearing sclerites, longest hair on anterior tergites 0.151–0.164 mm long, 2.8–4.0 × as long as the basal diameter of antennal segment III. Longest hair on antennal segment III. 2.8–4.0 × as long as the basal diameter of the segment. Rostral segment 4, 2.3–2.7 × as

long as segment 5 and 0.74–0.90 × as long as the diameter of the siphuncular cone and bearing 4 accessory hairs. First segment of hind tarsus dorsally 0.71–0.75 × as long as its ventral length and 3.0 × as long as its diameter at the basal articulation. Second segment of hind tarsus 1.8 × as long as the first segment. Body 3.3–4.3 mm long. *C. atrotibialis* David & Rajasingh

11(10) Abdominal dorsum with double row of sclerites on 1st–7th tergites, those on 4th–7th being larger than others. Longest hair on anterior tergites, 0.150–0.215 mm long. 3.5–4.6 × as long as the basal diameter of antennal segment III. Longest hair on antennal segments, III, 3.6–4.0 × as long as the basal diameter of the segment. Rostral segment 4, 2.1–2.3 × as long as segment 5 and less than half as long as the diameter of siphuncular cones and bearing 8–9 accessory hairs. First segment of hind tarsus dorsally 0.43 × as long as its ventral length and 1.25 × as long as its diameter at the basal articulation. Second segment of hind tarsus 2.2–2.4 × as long as the first segment, Body 3.6–5.0 mm long. *C. eastopi* Pintera

12(7) First segment of hind tarsus dorsally shorter than or at most equal to the diameter at the basal articulation. Dorsal cephalic hairs 0.93–0.163 mm long, 2.8–3.8 × as long as the basal diameter of antennal segment III. Rostral segment 4, 0.13–0.27 mm long, 1.4–2.4 × as long as segment 5. Longest hair on anterior abdominal tergites 0.100–0.178 mm long. Body 1.7–4.7 mm long. On *Cedrus*, *Picea*, *Thuja* spp.

13(16) Legs with femora pale, tibiae dark at apices only; longest hair on hind tibiae 0.140–0.280 mm long; second segment of hind tarsus always longer than the basal diameter of siphuncular cones. Rostral segment 4, 1.4–1.8 × as long as segment 5

14(15) Hairs on frons up to 0.163 mm long, 3.5–3.8 × as long as the basal diameter of antennal segment III. Antennae 0.26–0.32 × as long as the body; longest hair on segment III, 0.169–0.198 mm long, 3.0–4.5 × as long as the basal diameter of the segment; processus terminalis 0.13–0.15 × as long as the base of segment VI and 0.7–0.8 × as long as antennal segment III; primary rhinaria with chitinized

rims. Rostral segment 4+5, 0.85–0.98 × as long as the second segment of hind tarsus. 8th abdominal tergite with at most 16 hairs, up to 0.178–0.216 mm long. Femora densely pubescent, 5.0 × or more as wide as the width at the middle of antennal segment III. Body 4.1–4.5 mm long. On *Picea*. *C. conata* Doncaster

15(14) Hairs on frons up to 0.103 mm long, 2.8–3.4 × as long as the basal diameter of antennal segment III. Antennae 0.33–0.36 × as long as the body, longest hair on segment III, 0.100–0.170 mm long, 3.0–3.9 × as long as the basal diameter of the segment; processus terminalis 0.15–0.20 × as long as base of segment VI and 0.9–0.11 × as long as antennal segment III; primary rhinaria without chitinized rim. Rostral segment 4+5, 1.08–1.12 × as long as second segment of hind tarsus, 8th abdominal tergite with 18–26 hairs, up to 0.120–0.190 mm long. Femora never so pubescent as above, little over 3.0 × as wide as the width at the middle of antennal segment III. Body 1.7–3.5 mm long. On *Thuja* and other Cupressaceae... *C. tujafilina* (Del Guercio)

16(13) Legs with femora at least partly pigmened, tibiae variably pigmented; longest hair on hind tibiae 0.130–0.220 mm long; second segment of hind tarsus may be shorter or longer than the basal diameter of siphuncular cones. Rostral segment, 4, 1.8–2.4 × as long as segment 5. On *Cedrus* and *Picea*.

17(18) Primary rhinaria with chitinized rim. Rostral segment 4, 0.19–0.25 mm long, 1.8–2.1 × as long as segment 5 and bearing 4–7 accessory hairs. Second segment of hind tarsus 3.0–4.1 × as long as first segment and 1.5–2.4 × as long as rostral segment 4 and longer than the basal diameter of siphuncular cones. 8th abdominal tergite with 20–77 hairs, up to 0.130–0.180 mm long. Body 2.1–4.7 mm long. On *Picea*.. *C. pilicornis* (Hartig)

18(17) Primary rhinaria without chitinized rim. Rostral segment 4, 0.27 mm long, 2.4 × as long as segment 5 and bears 8–9 accessory hairs. Second segment of hind tarsus 4.3 × as long as first segment and 1.3 × as long as rostral segment 4 and shorter than the diameter of siphuncular cones. 8th tergite with 14 hairs up to 0.198 mm long. Body 3.3 mm long. On *Cedrus*. *C. indica* Verma

Alate viviparous female:

1(2) Rostral segment 4 with 24–32 accessory hairs.

Dorsal cephalic hairs fine, up to 0.198 mm long, 3.75 × as long as the basal diameter of antennal segment III. Secondary rhinaria protuberent, 2–4 on segment III, 2–3 on segment IV and 1 on segment V. Longest hair on segment III, 0.248 mm long, on anterior tergite 0.231 mm long and on 8th tergite up to 0.292 mm long, these being 4.6 ×, 4.3 × and 5.6 × as long as the basal diameter of antennal segment III, respectively. Second segment of hind tarsus 3.5 × as long as the first segment. Body 4.4–4.8 mm long. — *C. chaetorostrata* Ghosh & Raychaudhuri

2(1) Rostral segment 4 with 4–13 accessory hairs.

3(4) Dorsal hairs 0.02–0.06 mm long, always shorter than the basal diameter of antennal segment III.

Antennal segment III with 14–18 secondary rhinaria of variable sizes, arranged in a row, and segment IV with 1–5 similar rhinaria. Rostral segment 4+5 little longer or little shorter than the basal diameter of siphuncular cones. Longest hair on hind tibiae 0.03–0.04 mm long, 0.25–0.30 × as long as the diameter at the middle of hind tibiae. Legs with pantherine spots. Body 4.2–5.2 mm long. On *Pinus*.. — *C. maculipes* Hille Ris Lambers

4(3) Dorsal hairs up to 0.105–0.320 mm long, always longer than the basal diameter of antennal segment III.

5(8) Body usually large, 5.1–7.8 mm long. Antennal segment III, 0.72–0.117 mm long, longest hair on segment III, 0.160–0.320 mm long. Primary rhinaria without chitinized rim. First segment of hind tarsus dorsally 0.28–0.40 × as long as its ventral length. Rostral segment 4 with 8–13 accessory hairs. Dorsal sclerotes small or very small. On *Abies* and *Cedrus* spp.

6(7) Antennal segment III with 7–15 and segment IV with 2–5 secondary rhinaria. 8th tergite with 29–42 hairs. Second segment of hind tarsus 2.6–3.5 × as long as the first segment. Hind tibiae black, may be paler only at bases, longest hair on hind tibiae 0.220–0.380 mm long. — *C. confinis* (Koch)

7(6) Antennal segment III with 2–13, IV with 2–5 and V with 2–4 large rounded secondary rhinaria. 8th tergite with 18–22 hairs. Second segment of hind tarsus 4.0 × as long as the first segment. Hind tibiae black, longest hair on hind tibiae 0.130–0.134 mm long. *C. indica* Verma

8(5) Body usually 2.6–5.2 mm long, when more than 4.5 mm long then abdominal dorsum with distinct paired segmental spinal sclerites (*C. eastopi*). Antennal segment III, 0.35–0.85 mm long, longest hair on segment III, 0.80–0.264 mm long. Primary rhinaria with or without chitinized rims. First segment of hind tarsus dorsally 0.35–0.73 × as long as its ventral length. Rostral segment 4 with 4–8 accessory hairs. Abdominal dorsum with some very small to large sclerites. On *Pinus*, *Picea*, *Thuja* spp.

9(12) Longest hair on dorsum of abdomen 5.4–6.7 × as long as the basal diameter of antennal segment III; longest hair on antenal segent III 5.0–6.6 × as long as the basal diameter of the segment; segment III with 1–2 secondary rhinria and segment IV and V each with one similar rhinaria; processus terminalis 0.14–0.19 × as long as the base of segment VI. Dorsum of abdomen may be with or without large spinal sclerites.

10(11) Processus terminalis 0.19 × as long as base of segment VI. Primary rhinaria without chitinized rim. Rostral segment 4 with 4 accesory hairs, rostral segment 4+5 always shorter than the second segment of hind tarsus. Abdominal dorsum pale with brown muskelplatten; longest hair on anterior abdominal tergites 0.190 mm long and on tibiae 0.265 mm long. On *Pinus* sp. *C. atroalbipes* David, Narayanan & Rajasingh

11(10) Processus terminalis 0.14–0.15 × as long as base of segment VI. Primary rhinaria with chitinized rim. Rostral segment 4 with 5–6 acccessory hairs; rostral segment 4+5 always distinctly longer (up to 1.5 ×) than the second segment of hind tarsus. Abdominal dorsum usually with a single irregular spiral sclerite on each of 3rd 6th tergites, besides paired sclerites on 7th and 8th tergites and 4–6 muskelplatten on each tergite; longest hair on anterior abdominal tergites 0.215–0.264 mm long, and on tibiae 0.300–0.366 mm long. On *Picea*. *C. comata* Doncaster

12(9) Longest hair on dorsum of abdomen 3.0–5.0 × as long as the basal diameter of antennal segment III. Longest hair on antennal segment III 2.5–4.0 × as long as the basal diameter of the segment; segment III with 3–16 secondary rhinaria and segment IV with 0–4 and V with 0–2 similar rhinaria; processus terminalis 0.20–0.35 × as long as the base of segment VI. Dorsum of abdomen never with large spinal sclerites.

13(16) Antennal segment III, 0.59–0.85 mm long, with 8–16 protuberant secondary rhinaria. Primary rhinaria with chitinized rims. Rostral segment 4, 0.21–0.35 mm long, 2.3–2.5 × as long as segment 5. Second segment of hind tarsus always shorter than the basal diameter of siphuncular cones. Abdominal dorsum with distinct spinal or marginal sclerites on anterior tergites or with number of hair-bearing scleroites. Body 3.8–5.2 mm long. On *Pinus* spp.

14(15) Longest hair on antennal segment III, 0.115–0.151 mm long, on anterior abdominal tergites 0.164 mm long, and on 8th tergite 0.164–0.177 mm long. Abdominal dorsum pale bearing scattered brown hair bearing scleroites and dark "muskelplatten". First tarsal segment of hind leg dorsally 3.3–3.6 × as long as its width at basal articulation. Body 3.8–4.2 mm long.. *C. atrotibialis* David & Rajasingh

15(14) Longest hair on antennal segment III, 0.146–0.163 mm long, on anterior abdominal tergites 0.205–0.215 mm long, and on 8th tergite 0.215–0.231 mm long. Abdominal dorsum with spinal and marginal sclerites on 1st and 2nd tergites besides paired spinal scleroites or a few scattered sclerites on other tergites. First tarsal segment of hind leg 1.2–1.4 × as long as its width at basal articulation. Body 4.5–5.2 mm long. *C. eastopi* Pintera

16(13) Antennal segment III, 0.31–0.53 mm long. Primary rhinaria with or without chitinized rim, if with chitinized rim then antennal segment III with 1–8 secondary rhinaria. Rostral segment 4, 0.13–0.25 mm long, 1.5–2.2 × as long as segment 5. Second segment of hind tarsus shorter or longer than the basal diameter of siphuncular cones. Abdominal dorsum may be with or without small scleroites on anterior tergites. Body 2.5–4.4 mm long. On *Picea* and *Thuja* spp.

17(18) Primary rhinaria with chitinized rim. 8th abdominal tergite with 21–53 hairs. Antennal segment II with 8–20 hairs; antennal segment III with 1–8 rounded secondary rhinaria distributed over its entire length. Longest hair on antennal segment III 0.80–0.160 mm long, on anterior abdominal tergites 0.105–0.160 mm long. Second segment of hind tarsus distinctly shorter than basal diameter of siphuncular cones. Abdominal dorsum without scleroites on 2nd–5th tergites. On *Picea*. *C. pilicornis* (Hartig)

18(17) Primary rhinaria without chitinized rim. 8th abdominal tergite with 17–24 hairs. Antennal segment II with 9–11 hairs; antennal segment III with 3–8 secondary rhinaria. Longest hair on antennal segment III, 0.120–0.200 mm long, on anterior abdominal tergites 0.120–0.210 mm long. Second segment of hind tarsus may be longer than the basal diameter of siphuncular cones. Scleroites may be small or absent on 2nd–5th abdominal tergites. On *Thuja* and other Cupressaceae. *C. tujafilina* (Del Guercio)

[*Note:* As no material of *C. similis* (v.d. Goot) was available, it has not been included in the key.]

Cinara atroalbipes David, Narayanan, Rajasingh, 1970
(Plate 2; Plate 52; fig. 1)

1970. *Cinara* (*Lachniella*) *atroalbipes* David, S. Kanakaraj, Narayanan, K., and Rajasingh, S. G., *Orient. Ins.*, **4**(4): 415.

Apterous viviparous female: Body 2.88–3.15 mm (2.71–3.00) long. Head light brown with a distinct median suture, hairs on head, long and fine, longest one 0.131–0.163 mm long, 5.0–5.5 × as long as the basal diameter of antennal segment III. Antennae 0.37–0.40 × as long as the body, pale yellow, except at apices of segments III, IV, V and almost whole of segment VI, which are darker; secondary rhinaria absent; hairs on flagellum sparse, thick, longest one on segment III 0.146–0.165 mm long, shortest one 0.066–0.086 mm long, these being 5.0–6.2 × and 2.2–3.1 × as long as the basal diameter of the segment; base of antennal segment VI with 6–7 hairs up to 0.104–0.138 mm long; processus terminalis 0.31–0.35 × as long as base of segment VI and 0.16–0.20 × as long as antennal segment III and bearing 4 short hairs up to 0.010 mm long. Eyes with small ocular tubercles. Rostrum reaching hind coxae; rostral segment 4, 1.98–2.14 × as long as rostral segment 5 and bearing 4 accessory hairs besides 3 pair of hairs at the junction of segments 4 and 5; segments 4+5, 0.64–0.70 × as long as second

segment of hind tarsus. Mesothoracic farca dark brown. Metathoracic tergum with a pair of light brown spinal scleroites. Abdominal dorsum pale, bearing six circular light brown "muskelplatten" in each segment, besides a pair of small spinal sclerites on 1st tergite and a pair of transverse sclerotic bands on 8th tergite; hairs on the dorsum of abdomen long, thicker on posterior tergites, longest one on anterior tergites, 0.163–0.184 mm long, shortest one0.050–0.066 mm long, these being 5.56–6.50× and 1.67–2.50× as long as the basal diameter of antennal segment III, respectively; longest hair on 7th tergite, 0.205–0.231 mm long and on 8th tergite 0.207–0.238 mm long, these being 6.89–8.50× and 7.22–8.50× as long as the mentioned diameter respectively. Siphunculi on slightly elevated cones and bearing many short hairs. Cauda light brown, somewhat conical and bearing 8–10 hairs. Legs pale brown except fore femora, apices of tibiae and whole of tarsi, which are dark; fore femora thicker and more hairy than others; hairs on femora fine, those on tibiae thicker and stiffer, longest one on hind tibiae 0.305–0.315 mm long, 2.73–3.06× as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg, dorsally 0.51–0.57× as long as its ventral length and 1.20–1.33× as long as the width at the basal articulation; second segment of hind tarsus 3.20–3.66× as long as the first segment.

Colour: Green to dark green with a longitudinal pale streak (S. K. David *et al.*, 1970).

	Measurements in mm			
	1	2	3	4
Length	3.15	3.01	3.13	2.88
Width	1.78	1.58	1.60	1.44
Antenna	1.16	1.10	1.17	1.14
Antennal segments III ...	0.35	0.37	0.35	0.35
,, IV ...	0.16	0.15	0.16	0.16
,, V ...	0.20	0.19	0.19	0.19
,, VI ...	(0.20+0.06)	(0.19+0.06)	(0.20+0.07)	(0.20+0.07)
Rostral segments 4+5 ...	0.18+0.09	0.18+0.09	0.18+0.08	0.18+0.08.
ht_2	0.40	0.41	0.37	0.41
Siphunculus diameter base ...	?	0.28	0.28	0.28
,, apex ...	0.06	0.08	0.08	0.07

(1, ex Pine, 18-5-1970, Simla; 2, ex Pine, 6-6-1968, Simla; 3, ex Picea, 26.XI.1969, Simla; 4, ex indet, 12.V.1970, Simla; SKD.)

Alate viviparous female: The alate viviparous female was not available for the present study. As such the description is given from David *et al.* (op.cit.).

Head dark brown; hairs on head up to 0.155 mm long. Antennae 0.29 × as long as the body, with segments I and II brown; antennal segment III, IV and V each with one secondary rhinarium, hairs on flagellum up to 0.175 mm long; processus terminalis 0.19 × as long as base of antennal segment VI and 0.10 × as long as antennal segment III. Abdominal dorsum with brown "muskelplatten"; hairs on the dorsum of abdomen may be up to 0.190 mm long on anterior tergites and 0.235 mm long on posterior tergites, Siphunculi and cauda brown. Legs with femora mottled brown; apices of tibiae and whole of tarsi brown; fore femora wider than the other two; hairs on femora and tibiae up to 0.265 mm long. Wing venation normal, with media once branched, stigma elongate, brown. Other characters as in apterous viviparous female.

Colour: Not known.

Measurements in mm

	1
Length	3.93
Width	?
Antenna	1.12
Antennal segments III ...	0.40
,, IV ...	0.19
,, V ...	0.24
,, VI ...	(0.21+0.04)
Rostral segments 4+5 ...	?
$ht._2$	?
Siphunculus, diameter base ...	0.47
,, apex ...	?

Sexual forms: Not known.

Nymph (Apterous, late instar): Body 2.34 mm long. Head light brown, with distinct median suture; dorsal hairs up to 0.115 mm long, 3.0 × as long as the basal diameter of antennal segment III. Antennae 0.40 × as long as the body, pale, with apices of segment III–V and most part of segment VI dusky; segment III with 14 hairs, longest one 0.015 mm long, shortest one 0.08 mm long, these being 3.92 × and 2.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.39 × as long as base of segment VI and 0.25 × as antennal segment III. Abdominal dorsum pale, bearing six small "muskelplatten" per segment on 1st–6th tergites, besides a pair of narrow transverse sclerotic bands on 8th tergite; hairs on the dorsum of abdomen sparse, longest one on anterior tergites, 0.172 mm long, shortest one 0.050 mm long, these being 4.4 × and 1.25 × as long as the basal diameter of antennal segment III; longest hair on 7th tergite 0.187 mm long, and on 8th tergite 0.178 mm long, these being

4.83 × and 4.53 × as long as the mentioned diameter. Siphunculi on pale brown cones. Legs pale, fore-femora stouter than the others, fore tibiae little dusky; longest hair on hind tibiae 0.198 mm long, 2.0 × as long as the diameter at the middle of hind tibiae, first tarsal segment of hind leg dorsally 0.47 × as long as its ventral length and 0.88 × as long as the width at the basal articulation; second segment of hind tarsus 3.60 × as long as the first segment.

Colour: Not known.

	Measurements in mm
Length	2.34
Width	1.19
Antenna	0.93
Antennal segments III ...	0.28
,, IV ...	0.12
,, V ...	0.16
,, VI ...	(0.18+0.07)
Rostral segments 4+5 ...	(0.163+0.076)
$ht._2$	0.27
Siphunculus, diameter base ...	0.15
,, apex ...	0.06

(ex. Pine, 19-9-1970, Simla, SKD)

Material examined: One apterous viviparous female, from Pine, Simla, Himachal Pradesh, India, 6-6-1968, coll. KN & SGR (SKD No. 721); two apterous viviparous females, from an unidentified host, Simla, Himachal Pradesh, India, 12-5-1969, coll. K. Narayanan (SKD No. 877); one apterous viviparous female and one nymph, from ? *Picea smithiana* Simla, Himachal Pradesh, India, coll. KN & SGR (SKD, No. 1163); one apterous viviparous female, from Pine, Simla, Himachal Pradesh, India, 18-5-1970, coll. K. Narayanan (SKD No. 1231); four apterous nymphs from Pine, Simla, Himachal Pradesh, India, 19-11-1970, coll. K. Narayanan (SKD, No. 1287).

Discussion: The present species can be easily separated from others by the sparse, long and stiff hairs and black fore tibiae as has been pointed out by David *et al.* (1970). The record of the species from *Picea* appears erroneous as all other collections have only been made on pine in the same locality; the species appears to be common on Pines from November to June, in Simla Hills.

Distribution.—INDIA: Himachal Pradesh (Simla Hills).

Types.—In the collections of S. Kanakaraj David, 22 Kamaraj Avenue, Madras; one paratype in the collection of D.Hille Ris Lambers, Bennekom, the Netherlands.

Cinara atrotibialis David & Rajasingh, 1968
(Plate 3; Plate 52, figs. 2–4)

1962. *Cinara (Cinarella) pineus*, Ghosh, A. K. and Raychudhuri, D. N. *J. Bombay nat. Hist. Soc.*, **59**(1): 240. [Misid.]

1968. *Cinara atrotibialis* David, S. Kanakaraj and Rajasingh, S. G. *Orient. Ins.*, **2** (1): 103.

1972. *Cinara sp.*, Robinson, A. G., *Can. Ent.*, **104**: 604.

1972. *Cinara khasyae* Robinson, A. G., *Can. Ent.*, **104**: 1925.

1974. *Cinara nr. schimitscheki*, Ghosh, A. K., *J. Bombay nat. Hist. Soc.*, **71**(2): 209.

1976. *Cinara (Cinarella) atrotibialis*, Eastop, V. F., *Bull. Br. Mus. nat. Hist.* (Ent.), **35**(1): 7.

Apterous viviparous female: Body oval 3.37–4.32 mm long. Head yellowish brown with a distinct median suture; hairs on frons and vertex thick, with acute apices, longest one 0.176–0.203 mm long, 3.2–4.0 × as long as the basal diameter of antennal segment III. Antennae 0.47–0.51 × as long as the body, dark brown except basal 0.50–0.66 portion of antennal segment III; segment III subequal to segments IV+V; secondary rhinaria absent; hairs on the flagellum rather stiff, longest one on segment III, 0.112–0.151 mm long, shortest one 0.052–0.065 (0.44) mm long, these being 2.75–3.0 × and 1.0–1.3 × as long as the basal diameter of the segment, respectively; processus terminalis 0.33–0.35 × as long as base of segment VI and 0.11–0.12 × as long as antennal segment III. Eyes large, brown on dark brown raised stalks. Rostrum reaches siphunculi; rostral segment 4, 2.33–2.53 × (2.77 ×) as long as rostral segment 5 and bearing 4 short accessory hairs, 0.05–0.06 mm long; segments 4+5, 1.23–1.39 × as long as second segment of hind tarsus. Pro- and Mesonotum brown, sclerotic, metanotum pale, bearing scattered small scleroites, many of which bear dorsal hairs. Abdominal dorsum pale, faintly reticulated, bearing scattered small dark scleroites and "muskelplatten"; 8th tergite with an irregular transverse sclerotic band which may be broken in the middle and bears 16 hairs; hairs on the dorsum of abdomen mostly arising from sclerotic bases, longest one on anterior tergites, 0.151–0.164 mm long, shortest one 0.091–0.112 mm long, these being 2.75–4.0 × and 1.75–2.3 × as long as the basal diameter of antennal segment III, respectively; longest hair on 7th tergite 0.164 mm long and on 8th tergite 0.177–0.203 mm long, these being 3.0 × and 3.5–4.3 × as long as the mentioned diameter, respectively. Siphunculi on brown sclerotic cones, bearing many hairs. Cauda dark brown bearing 16–18 hairs. Legs with numerous hairs on femora and tibiae; femora stout, brown to dark brown; fore tibiae black, others paler on basal 0.75 portion, darker apicad; tarsi black; longest hair on hind tibiae 0.151–0.178 mm long, 1.4–1.6 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.71–0.75 × as long as its ventral length and 3.0 × as

long as the width at the basal articulation; second segment of hind tarsus 1.78–1.81 ×as long as the first segment.

Colour: Brown to dark brown with darker legs and antennae.

Measurements in mm

	1	2	3
Length	3.96	4.31	4.24
Width	2.43	2.71	2.64
Antenna	1.97	2.18	2.0
Antennal segments III ...	0.65	0.75	0.70
,, IV ...	0.33	0.33	0.32
,, V ...	0.42	0.47	0.39
,, VI ...	(0.23+0.08)	(0.24+0.08)	(0.23+0.08)
Rostral segments 4+5 ...	(0.38+0.15)	(0.35+0.15)	(0.35+0.15)
$ht._2$	0.38	0.41	0.41
Siphunculus diameter base ...	0.42	0.47	0.47
apex ...	0.10	0.10	0.10

(1, ex Pine, Shillong, 11-5-1973; 2, ex Pine, Shillong, 10-2-1974; 3, ex Pine, Shillong, 23-12-1966, ZSI.)

Alate viviparous female: Body 3.47–4.24 mm long. Head dark brown; longest hair on vertex 0.190–0.203 mm long, 3.8–4.7 ×as long as the basal diameter of antennal segment III. Antennae 0.49–0.55 ×as long as the body, paler on bases of segment III, rest dark brown; segment III with 8–12, small circular, somewhat protuberant secondary rhinaria, segment IV with 0–3 and V with 0–2 similar rhinaria; hairs on the flagellum, of variable lengths, longest one on segment III, 0.115–0.151 mm long, shortest one 0.05–0.06 mm long, these being 2.5–3.3 × and 1.0–1.6 ×as long as the basal diameter of the segment, respectively; processus terminalis 0.29–0.32 ×as long as the base of antennal segment VI and 0.10–0.11 ×as long as antennal segment III. Rostral segment 4, 2.32–2.50 ×as long as rostral segment 5, segments 4+5, 1.28–1.40 ×as long as the second segment of hind tarsus. Abdominal dorsum pale bearing scattered brown hair-bearing scleroites and dark "muskelplatten"; longest hair on anterior tergites 0.164 mm long, shortest one 0.065–0.104 mm long, these being 3.0–4.0 × and 1.6–2.6 ×as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.164–0.177 mm long, 3.0–4.3 ×as long as the mentioned diameter. Legs pale brown on basal segments and basal 0.10–0.50 portion of femora, rest black; longest hair on hind tibiae 0.177–0.216 mm long, 2.0–2.50 ×as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.63–0.73 ×as long as its ventral length and

3.3–3.6 × as long as the width at the basal articulation; second segment of hind tarsus 1.79–1.87 × as long as the first segment. Wing venation normal.

Colour: Dark in life.

Measurements in mm

	1	2	3
Length	3.61	4.24	3.47
Width	1.81	2.36	1.78
Antenna	1.97	2.00	1.71
Antennal segments III ...	0.69	0.74	0.59
,, IV ...	0.27	0.30	0.27
,, V ...	0.41	0.43	0.39
,, VI ...	(0.24+0.07)	(0.23+ ?)	(0.19+0.07)
Rostral segments 4+5 ...	(0.35+0.15)	(0.35+0.15)	(0.34+0.15)
ht.$_2$	0.38	0.39	0.37
Siphunculus diameter base ...	0.41	0.41	0.34
,, apex ...	0.07	0.07	0.07

(1, ex Pine, Shillong, 11-4-1973; 2, ex Pine, Shillong, 23-12-1966, ZSI; 3, ex Pine, Shillong, 8-10-1967, SKD.)

Sexual forms: Not known.

Nymphs (Apterous): Body 2.47 mm long. Head yellow with distinct median suture. Antenna 0.53 × as long as the body, pale except at apices of segment IV, and whole of segments V and VI which are dusky; longest hair on segment III, 0.104 mm long, shortest one 0.039 mm long, these being 2.6 × and 1.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.46 × as long as base of segment VI and 0.06 × as long as antennal segment III. Rostral segment 4, 2.89 × as long as segment 5, segments 4+5, 1.4 × as long as second segment of hind tarsus. Abdominal dorsum pale bearing many small brown hair bearing scleroites and dark "muskelplatten"; longest hair on anterior tergites 0.117 mm long, shortest one 0.052 mm long, these being 3.0 and 1.3 × as long as the basal diameter of antennal segment III, respectively; longest hair on 7th tergite 0.138 mm long and 8th tergite 0.151 mm long, these being 3.3 × and 3.6 × as long as the mentioned diameter. Siphunculi on brown hairy cones. Legs with basal segments and femora pale, front tibiae black, mid and hind tibiae paler on basal 0.40–0.50 portion; all tarsi black; first tarsal segment of hind leg dorsally 0.67 × as long as its ventral length and 2.0 × as long as the width at the basal articulation, second segment of hind tarsus 2.0 × as long as the first segment.

Colour: Pale brown in life.

Measurements in mm

Length	2.47
Width	1.38
Antenna	1.30
Antennal segments III ...	0.39
,, IV ...	0.19
,, V ...	0.30
,, VI ...	(0.17+0.07)
Rostral segments 4+5 ...	(0.35+0.12)
ht.$_2$	0.32
Siphunculus, diameter base ...	0.17
,, apex ...	0.06

(ex Pine, Shillong, 11-5-1973, ZSI)

Material examined: Four apterous viviparous females and one alate viviparous female, from *Pinus kesiya* (=*insularis*), Shillong, Meghalaya, India, 10-1-1960, coll. A. K. Ghosh (CU); one apterous and two alate viviparous females from *Pinus* sp. Shillong, Meghalaya, India, 23-12-1966 (ERS., ZSI, No. 247); three apterous viviparous females from *Pinus* sp. Shillong, Meghalaya, India, 19-5-1967, coll. S. G. Rajasingh (SKD, No. 185); one apterous and one alate viviparous females from *Pinus* sp., Shillong, Meghalaya, India, 8-10-1967, coll. S. G. Rajasingh (SKD, No. 294, Paratypes); one apterous and one alate viviparous females and four apterous nymphs, from *Pinus kesiya*, Shillong, Meghalaya, India, 11-5-1973, coll. A. K. Ghosh (ERS, ZSI, No. 210); four apterous viviparous females from *Pinus kesiya*, Shillong Meghalaya, India, 10-2-1974, coll. M. Vasanth (ERS, ZSI, No. 370).

Discussion: This species has been considered closest to *C. piniformosana* (Takahashi) from which it differs by its larger size and longer rostral segments 4+5. Robinson (1972) while describing *C. khasyae* from *Pinus kesiya* (=*khasya*) in Thailand mentioned that the former appears to be most closely related to *atrotibialis* but differs in having shorter body length (2.80–3.43 mm), shorter antennal segments and shorter second segment of hind tarsus (0.25–0.31 mm). As length of antennal segments and tarsal segments appear to be co-related with body size, *C. khasyae* from Thailand may well be considered as a synonym of *atrotibialis*, following Eastop (1976). Eastop (op.cit.) recorded *atrotibialis* from Philippine Islands but mentioned that specimens from the islands differs in having a body length of 2.7 mm and rostral length of 0.264 mm and may be a subspecies.

These insects normally remain confined to the base of the needle in young growing shoots and the first peak period of infestation appears to be in the months of March–April; the population gradually declines in the subsequent months till August, when the aphids are hardly found; the second peak period of infestation could be traced in September–October which declines gradually towards end of December. A black ant (*Pheidole* sp.), different species of spiders, larvae and adults of a number of Coccinellidae and Syrphid larvae have often been found in association with these insects. The tree sparrow *Passer montanus* has been observed to be one of the chief predators of this aphid (Biswas, 1967). Field observations also reveal a hymenopteran parasite in the infested Pine trees and laboratory rearing of aphid colonies showed that *Pauesia laricis* (Haliday) usually parasitises the aphids in October and November.

Besides *Pinus kesiya*, the species has also been noted to feed on *Pinus roxburgii* (=*longifolia*).

Distribution.—INDIA: Manipur, Meghalaya; Himachal Pradesh THAILAND; PHILIPPINE Islands. (Eastop, 1976);

Types.—In the collection of S. Kanakaraj David, 22 Kamaraj Avenue, Madras.

Cinara chaetorostrata Ghosh & Raychaudhuri
(Plate 4; Plate 53)

Cinara chaetorostrata Ghosh, L. K. and Raychaudhuri, D. N., *Orient. Ins.* (In press)

Alate viviparous female: Body 4.4 mm (4.8 mm) long. Head dark brown, with a median suture; hairs on vertex fine, longest one 0.198 mm long (0.130 mm) 3.75× as long as the basal diameter of antennal segment III. Antennae (0.41) 0.44× as long as the body, brownish yellow; flagellum smooth; antennal segment III with 2–3 (–4) protuberant secondary rhinaria near apices, segment IV with 2–3 and segment V with 1 (–2) similar rhinaria; hairs on the flagellum very long and stiff, longest one on segment III, 0.248 mm long, shortest one 0.118 (0.065 mm) long, these being 4.68× and 2.25× as long as the basal diameter of the segment, respectively; base of antennal segment VI with 8 hairs, 0.164–0.216 mm long; processus terminalis 0.29× (0.33×) as long as the base of antennal segment VI and 0.09× as long as antennal segment III. Rostrum stout, segment 4, 2.3× as long as segment 5, and bears many (24–32) fine necessary hairs, segments 4+5, 1.0–1.02 as long as second segment of hind tarsus. Abdominal dorsum pale, bearing some scattered light brown "muskelplatten" besides a pair of broken spinal sclerites on 1st tergite and a pair of characteristic sclerotic transverse bands on 8th tergite; hairs on the dorsum of

abdomen numerous, longest one on anterior tergites 0.231 mm (0.169 mm) long, shortest one 0.100 mm (0.130 mm) long, these being 4.37 × and 1.87 × as long as the basal diameter of antennal segment III respectively; 8th tergite with 18 hairs, longest one 0.292 mm long, 5.62 × as long as the mentioned diameter. Siphunculi on small brown sclerotic cones. Cauda brown sclerotic, bearing a number of long, fine hairs. Legs stout, dark brown, except basal 0.40–0.50 portion of femora which is yellowish; hairs on femora and tibiae, long and stiff, longest one on hind tibiae, 0.270 mm long, 2.16 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg, dorsally 0.30 × as long as its ventral length and 0.60 × as long as the width at the basal articulation; second segment of hind tarsus 3.5 × as long as the first segment. Wing venation normal; media once branched.

(Figures within parenthesis from original description of holotype, *in litt.*)

Colour: Not known.

Measurements in mm

Length	...	...	4.44
Width	...	...	1.94
Antenna	...	...	1.94
Antennal segments	III	...	0.72
,,	IV	...	0.29
,,	V	...	0.34
,,	VI	...	(0.23+0.06)
Rostral segments	4+5	...	(0.34+0.15)
$ht._2$	...	...	0.48
Siphunculus, diameter	base	...	0.38
,,	apex	...	0.08

(On Snow, Kufri, 15-12-1973, ZSI)

Apterous viviparous female: Not known.

Sexual forms: Not known.

Nymph: Not known.

Material examined: One alate viviparous female (paratype) collected on snow, Kufri, Himachal Pradesh, India, 15-12-1973, coll. L. K. Ghosh, (ZSI).

Discussion: The present species differs from all other oriental species in having numerous hairs on ultimate rostral segment. Of the Palaearctic species, it resembles *C. kochiana* (Borner) of which a subspecies *kochi* Inouye, is known from Japan & Korea, in the hairy ultimate rostral segment but could easily be separated by its

very long antennal and dorsal hairs; the nature of antennal and dorsal hairs also help to separate the present species from some Nearctic species like *C. tanneri* Knowlton and *C. thatcheri* Knowlton and Smith, which are known to have a very hairy rostrum.

Distribution.—INDIA: Himachal Pradesh (Kufri).

Types.—In the collections of Zoological Survey of India, Calcutta.

Cinara comata Doncaster 1956

(Plate 5; Plates 54; 55, figs. 1, 2)

1956. *Cinara* (*Lachniella*) *comata* Doncaster, J. P., *Proc. R. ent. Soc. London* (B), **25**: 111.

1971. *Cinara* (*Lachniella*) *comata*, David S. Kanakaraj, Narayanan, K. and Rajasingh, S. G., *Madras Agric. J.*, **58**(5): 373.

1975. *Cinara* (*Lachniella*) *comata*, Chakrabarti, S. and Raychaudhuri D. N., *Orient. Ins.*, **9**(2): 208.

Apterous viviparous female: Body 4.11–4.53 mm long. Head yellowish brown with a distinct median suture; hairs on frons and vertex numerous, fine, longest one 0.163 mm long, 3.5–3.8 × as long as the basal diameter of antennal segment III. Antennae 0.26–0.32 × as long as the body, pale, except at the apices of segments III–V and apical 0.50 portion of segment VI, which are dusky; flagellum nearly smooth; secondary rhinaria absent on segment III, segment IV and V each with a sunken secondary rhinarium near apices; hairs on flagellum long and fine, longest one on segment III, 0.169–0.198 mm long, shortest one 0.050–0.083 mm long, these being 3.0–4.5 × and 1.3–1.9 × as long as the basal diameter of segment, respectively; base of antennal segment VI bears 10 fine hairs, 0.050–0.100 mm long; processus terminalis 0.13–0.15 × as long as base of antennal segment VI and 0.07–0.08 × as long as antennal segment III. Rostrum reaches beyond hind coxae, rostral segment 4, 1.44–1.56 × as long as rostral segment 5 and bearing 6–7 accessory hairs; segments 4+5, 0.85–0.90 × (in one specimen 0.98 ×) as long as second segment of hind tarsus. Abdominal dorsum pale, bearing paired brown spinal sclerites on 1st and 2nd tergites and paired larger and broader spino-pleural sclerites on 7th and 8th tergites, besides muskelplatten and some irregular scleroites which may be variably present on other tergites; stigmal poriton dark sclerotic plates; hairs on the dorsum of abdomen numerous, with acute apices, longest one on anterior tergites, 0.172–0.178 mm long, shortest one on 0.07–0.08 mm long, these being 3.8–4.2 × and 1.7–1.9 × as long as the basal diameter of antennal segment III, respectively; 8th tergite with 16 hairs, longest one 0.178–0.215 mm long, 3.9–4.7 × as long as the mentioned diameter. Siphunculi on brown sclerotic cones. Cauda dark sclerotic bearing many fine hairs. Legs concolorous with the head

except at the apices of tibiae and whole of tarsi which are dark brown; front tibiae distinctly wider than other tibiae; hairs on legs numerous, with acute apices, longest hair on hind tibiae, 0.231–0.280 mm long, 1.4–1.7 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.32–0.34 × as long as its ventral length and 0.62–0.68 × as long as the width at the basal articulation; second segment of hind tarsus 3.2–3.5 × as long as the first segment.

Colour: Light brown in life.

Measurements in mm

	1	2	3	4
Length	4.32	4.11	4.17	4.18
Width	2.81	2.53	2.40	2.53
Antenna	1.24	1.28	1.34	1.26
Antennal segment III ...	0.38	0.41	0.44	0.39
,, IV ...	0.18	0.19	0.18	0.19
,, V ...	0.23	0.23	0.21	0.22
,, VI ...	(0.20+0.03)	(0.20+0.03)	(0.20+0.03)	(0.20+0.03)
Rostral segments 4+5 ...	(0.21+0.15)	(0.23+0.15)	(0.26+0.16)	(0.23+0.15)
$ht._2$	0.42	0.45	0.43	0.45
Siphunculus diameter, base ...	0.28	0.30	0.30	0.30
,, apex ...	0.08	0.10	0.09	0.10

(1–4, ex *Picea smithiana*, Pahalgam, 14-5-1970, SKD)

Alate viviparous female: Body 3.9–4.2 mm long. Head black, sclerotic, longest hair on head 0.230–0.240 mm long, 5.8–6.5 × as long as the basal diameter of antennal segment III. Antennae 0.32–0.34 × as long as the body, pale except at the basal segments and apices of segments III–VI; segment III with 1–2, and segments IV and V each with one secondary rhinarium near apices; longest hair on segment III, 0.215–0.264 mm long, shortest one 0.163–0.178 mm long, these being 5.4–6.6 × and 4.2–5.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.14–0.15 × as long as base of antennal segment VI and 0.06–0.07 × as long as antennal segment III. Rostral segment 4, 1.4–1.5 × as long as segment 5, segments 4+5, 0.80–0.85 × as long as second segment of hind tarsus. Abdominal dorsum pale, usually with a single irregular spinal sclerite on each of 3rd–6th tergites and paired and larger sclerites on 7th and 8th, and with 4–6 "muskel-platten" on each tergite; hairs on the dorsum of abdomen long and fine, longest one on anterior tergites 0.215–0.264 mm long, shortest one 0.163–0.178 mm long, these being 5.4–6.7 × and 4.2–5.0 × as

long as the basal diameter of antennal segment III, respectively; hairs on posterior tergites almost similar to those on the anterior tergites. Siphunculi on dark sclerotic cones. Cauda dark, sclerotic. Legs with bases and apices of femora and most portions of tibiae pale brown, rest darker; longest hair on hind tibiae 0.300–0.366 mm long, 3.3–4.4 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg, dorsally 0.35–0.38 × as long as its ventral length and 0.76–0.82 × as long as the width at the basal articulation; second segment of hind tarsus 3.5–3.6 × as long as the first segment. Forewings with media once branched, redia indistinct.

Colour: Not known.

Measurements in mm

	1	2	3	4
Length	?	4.14	3.90	3.97
Width	2.19	1.71	1.71	1.71
Antenna	1.49	1.34	1.33	1.32
Antennal segment III ...	0.50	0.44	0.45	0.44
,, IV ...	0.23	0.22	0.20	0.20
,, V ...	0.25	0.24	0.24	0.22
,, VI ...	(0.21+0.03)	(0.21+0.03)	(0.20+0.03)	(0.20+0.03)
Rostral segments 4+5 ...	(0.21+0.14)	(0.21+0.14)	(0.20+0.13)	(0.20+0.13)
$ht._2$	0.44	0.44	0.42	0.44
Siphunculus diameter, base ...	0.55	0.61	?	0.55
,, apex ...	0.08	0.09	?	0.09

(1, ex. Snow, Rhotang Pass, 5-6-1955, BMNH; 2, ex Pine, Kufri, 7-6-1968 SKD; 3–4, ex indet host, Simla, 20-5-1970, SKD.)

Sexual forms: Not known.

Nymph: (Apterous; early instar): Body 1.38 mm long, head dusky with distinct median suture; longest hair on head 0.090 mm long, 1.70 × as long as the basal diameter of antennal segment III. Antennae 4 segmented, 0.45 × as long as the body; hairs on flagellum fine, on segment III, 0.033–0.100 mm long, 0.59–1.76 × as long as the basal diameter of the segment; processus terminalis 0.33 × as long as base of last antennal segment. Rostral segment 4, 1.56 × as long as segment 5, segments 4+5, 1.5 × as long as second segment of hind tarsus. Abdominal dorsum pale with small scattered pale brown "muskelplatten" and paired scleroites on 8th tergite; hairs on dorsum of abdomen 0.065–0.163 mm long, 1.0–2.9 × as long as the basal diameter of antennal segment III. Siphunculi on

small pale cones. Legs pale with tip of tarsal segments dusky; longest hair on hind tibiae 0.138 mm long, 1.4 × as long as the diameter at the middle of hind tibiae; second segment of hind tarsus 3.50 × as long as the first segment.

Colour: Pale in life.

Measurements in mm

Length	1.38
Width	?
Antenna	0.62
Antennal segment III ...	0.30
,, IV ...	(0.13+0.04)
Rostral segments 4+5 ...	(0.26+0.14)
$ht._2$	0.23
Siphunculus, diameter ...	0.10

(ex *Picea smithiana*, Pahalgam, 14-5-1970, SKD.)

Material examined: Four apterous viviparous females and four nymphs, from *Picea smithiana*, Phalgam, Jammu & Kashmir, India, 14-5-1970, coll. K. Narayanan (SKD, No. 1216); two apterous viviparous females from Indet. host, Almora, Uttar Pradesh, India, 22-10-1970, coll. S. Chakrabarti (CU); one alate viviparous female, collected on snow, Rhotang Pass (4198 m) India, 4-6-1955, coll. A. P. Kapur, det. J.P.D. (ZSI, C.I.E., 14764 No. 3, metatype); two damaged alate viviparous females, collected on snow, Rhotang Pass (4258–4320 m) India, 19-6-1955, coll. A. P. Kapur, det. J.P.D (BMNH, C.I.E. 14764, No. 10); one alate viviparous female from Pine, Kufri, Himachal Pradesh, India, 7-6-1968, coll. K.N. & S.G.R. (SKD, No. 728); two alate viviparous females, from Indet host, Simla, Himachal Pradesh, India, 20-5-1970, coll. K.N. (SKD No. 1237).

Discussion: This species, with its long apical rostral segment, short first tarsal segment, long fine hairs on body and appendages and once branched media of forewing comes closest to *C. costata* (Zetterstedt), the type of *Lachniella* Del Guercio, but differs in the ratio of segment 4 to 5 of rostrum and in having longer hairs on flagellum, spinal sclerites, fewer hairs on abdominal dorsum and hyaline wings etc.

The species was originally described from alates collected on snow in Tehri-Garhwal region of Uttar Pradesh.

Distribution.—Northwest India.

Types.—In the collections of British Museum (Nat. Hist.), London.

Cinara confinis (Koch, 1856)

(Plates 7–8; Plate 55, figs. 3, 4; Plate, 56, figs. 1, 2)

1856. *Lachnus confinis* Koch, C. L. *Die Pflanzenläuse Aphiden*, Nürnberg, **8:** 245.

1899. *Lachnus abieticola* Cholodkovsky, N. A., *Zool. Anz.*, **22:** 470.

1909. *Lachniella ciliciea* Del Guericio, G., *Redia*, **5:** 287.

1909. *Lachniella cilicica* var *cecconii* Del Guercio, G. *Redia*, **5:** 297.

1919. *Lachnus vanduzei*, Swain, A. F., *Univ. Calif. Publs Ent.*, **3**(1): 50.

1930. *Dilachnus pubescens*, Wellenstein, G., *Z. Morph. Okol. Tiere*, **17:** 743.

1952. *Todolachnus abieticola*, Börner, C., *Mitt. thüring bot. Ges.*, **4**(3): 1: 44.

1952. *Todolachnus confinis* Börner, C., *Mitt. thüring bot Ges.*, 4(3), **1:** 44.

1954. *Cinara abieticola*, Hottes, F. C. and Essig, E. O., *Proc. biol. Soc. Wash.*, **66:** 95.

1966. *Dinolachnus abieticola*, Hille Ris Lambers, D., *Ent. Ber. Amst.*, **26:** 124.

1972. *Cinara abieticola*, Eastop, V. F., *Bull. Br. Mus. Nat. Hist.* (Ent.), **27**(2): 123.

1976. *Cinara confinis*, Eastop, V. F., and Hille Ris Lambers, D., *Survey World's Aphids:* 148.

Apterous viviparous female: [Not recorded in the region; description based on a single aptera from England.] Body 3.8–7.8 mm long. Head dark brown, sclerotic, with a distinct median suture; hairs on head long, fine, longest one 0.248 mm long, 4.4× as long as the basal diameter of antennal segment III. Antennae brown sclerotic; (segment III: 0.58–0.110 mm, IV: 0.28–0.59 mm, V: 0.33–0.63 mm, VI: 0.23–0.29+0.44–0.90 mm long; segment III with 0–1 and IV with 0–3 secondary rhinaria); hairs on flagellum fine, longest one on segment III: 0.163 mm long (0.190–0.300 mm), shortest one 0.073 mm long, these being 2.94× and 1.29× as long as the basal diameter of the segment; primary rhinaria without any chitinized rim. Rostrum reaches siphunculi, rostral segment 4, (0.27–0.36 mm long), 2.1× as long as segment 5, (0.12–0.15 mm long) and bearing 10 (7–13) accessory hairs; segments 4+5, 1.1× as long as second segment of hind tarsus. Mesosternal tubercles absent. Abdominal dorsum pale, bearing a double row of spinal sclerites on 1st–7th tergites, besides a pair of transverse bands on 8th tergite; hairs on the dorsum of abdomen long, fine, longest one on anterior tergite 0.231 mm long (0.160–0.270 mm long) shortest one 0.165 mm long, these being 4.1× and 2.8× as long as the basal diameter of antennal segment III, respectively, 8th tergite with 30 (29–43) hairs, longest one 0.248 mm long (0.190–0.360 mm long) and 4.4× as long as the mentioned diameter. Siphunculi on dark sclerotic cones, bearing many fine and thin hairs. Cauda dark sclerotic, somewhat conical and bearing about 20 hairs. Subgenital plate with 40 (30–50) hairs. Legs pale on basal 0.50 portion of femora and a small area proximal to knee joints on

tibiae, rest black; hairs on femora and tibiae, fine, numerous, longest one hind tibiae 0.258 mm long, 1.3 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.31 × as long as its ventral length and 0.56 × as long as width at the basal articulation. (Figures in parenthesis from Eastop, 1972.)

Colour: Not known.

Measurements in mm

Length	?
Width	3.15
Antenna	?
Antennal segment III ...	0.60
,, IV ...	?
,, V ...	?
,, VI ...	?
Rostral segments 4+5 ...	(0.30+0.14)
$ht._2$	0.41
Siphunculus, diameter base ...	0.62
,, apex ...	0.10

(ex house, Surrey, England, III, 1967, BMNH.)

Alate viviparous female: [Not recorded in the region; description based on a single alate from England.] Body large, 7.05 mm long (5.1–7.5 mm). Head dark brown, longest hair on head 0.248 mm long, 4.1 × as long as the basal diameter of antennal segment III. Antennae stout, 0.37 × as long as the body, brown to dark brown on basal segments and on apical 0.40–0.50 portions of segments III–VI, rest pale; antennal segment III with 10(7–15) IV with 3–4(2–5) and V with 2(0–3) large circular secondary rhinaria; (antennal segment III; 0.80–0.115 mm long, IV: 0.38–0.62 mm long, V: 0.38–0.65 mm long and VI: 0.25–0.32+0.04 0.07 mm long); longest hair on segment III, 0.231 mm long (0.220–0.320 mm), shortest one 0.083 mm long, these being 3.9 × and 1.4 × as long as the basal diameter of the segment; processus terminalis 0.14 × as long as base of segment VI and 0.04 × as long as antennal segment III and bearing 3–4 subapical hairs; base of antennal segment VI with 11(10–14) hairs. Rostral segment 4, 2.2 × as long as segment 5 and segments 4+5, 0.94 × as long as second segment of hind tarsus. Abdominal dorsum pale, bearing small segmental sclerites and muskelplatten (4–6 per segment on 2nd–7th tergites) besides paired broad sclerotic bands on 8th tergite and a median irregular sclerite on 1st tergite; longest hair on anterior abdominal tergites 0.231 mm long (0.160–0.320 mm), shortest one 0.163 mm long, these being 3.9 × and 2.8 × as long as the basal diameter of antennal segment III, respectively; 8th tergite

with 38 hairs (29–42), longest one 0.268 mm long (0.250–0.320 mm) 4.5 ×as long as the mentioned diameter. Siphunculi and cauda brown, sclerotic. Legs dark except near bases of femora; longest hair on hind tibiae 0.248 mm long (0.220–0.380 mm), 1.7 ×as long as the diameter at the middle of hind tibiae. Forewings with media very faint, other veins normal. Figures in parenthes is from Eastop, 1972.)

Colour: Not known.

	Measurements in mm
Length	7.05
Width	3.29
Antenna	2.58
Antennal segment III ...	0.96
,, IV ...	0.48
,, V ...	0.57
,, VI ...	(0.28+0.04)
Rostral segments 4+5 ...	(0.31+0.14)
$ht._2$	0.48
Siphunculus, diameter ...	?

(ex *Cedrus*, Wimbledon, England, 23-6-1953, BMNH.)

Sexual forms: Alate male: Body 3.56 mm long. Head dark, sclerotic; longest hair on head 0.178 mm long, 5.0 ×as long as the basal diameter of antennal segment III. Antennae pale, slender, 0.54 ×as long as the body, antennal segment III with 102–130, IV with 35–39 and V with 14–18, small, circular, somewhat protuberant secondary rhinaria; longest hair on antennal segment III: 0.187–0.231 mm long, shortest one 0.100–0.106 mm long, these being 5.3–6.4 × and 2.7–2.9 ×as long as the basal diameter of the segment, respectively; processus terminalis 0.19–0.20 ×as long as base of segment VI and 0.06–0.07 ×as long as antennal segment III. Rostral segment 4, 2.1 ×as long as rostral segment 5, segments 4+5, 0.76 ×as long as second segment of hind tarsus. Abdominal dorsum pale, bearing paired spinal hair-bearing sclerites on 1st–7th tergites, these may be fused on 3rd–6th tergites; 8th tergite with a pair of narrow transverse bands; longest hair on anterior abdominal tergites 0.198–0.231 mm long, shortest one 0.146 mm long, these being 5.4–6.4 × and 4.0–4.1 × as long as the basal diameter of antennal segment III; respectively; longest hair on 8th tergite 0.225–0.231 mm long, these being 6.2–6.4 ×as long as the mentioned diameter. Siphunculi on small sclerotic cones. Genitalia dark sclerotic. Legs with coxae dark brown, femora pale, tibiae brownish; longest hair on hind tibiae 0.248 mm long, 3.5 ×as long as the diameter at the middle of hind tibiae; first segment of hind tarsus, dorsally 0.38 ×as long as its ventral length and 0.87 ×as long

as the width at the basal articulation. Wing venation as in alate viviparae.

Colour: Not known.

	Measurements in mm	
	1	2
Length	3.56	?
Width	1.37	?
Antenna	1.92	1.84
Antennal segment III ...	0.78	0.69
,, IV ...	0.33	0.35
,, V ...	0.33	0.32
,, VI ...	(0.26+0.05)	(0.25+0.05)
Rostral segments 4+5 ...	(0.18+0.08)	(0.17+0.08)
$ht._2$	?	0.33
Siphunculus, diameter, base ...	0.24	?
,, apex ...	0.06	0.06

(ex. on fir in spiders' web., Murree, Pakistan, 25-11-1958, BMNH.)

Apterous oviparous female: Body 7.40 mm long. Head light brownish; longest hair on head 0.198 mm long, 3.0 × as long as the basal diameter of antennal segment III. Antennae 0.38 × as long as the body, brown on basal segments, flagellum pale; without any secondary rhinaria; longest hair on segment III 0.248 mm long, shortest one 0.073 mm long, these being 3.75 × and 1.1 × as long as the basal diameter of the segment, respectively, processus terminalis 0.20 × as long as base of segment VI which bears 7–8 hairs and 0.04 × as long as antennal segment III. Rostral segment 4, 2.5 × as long as rostral segment 5, segments 4+5, 0.95 × as long as second segment of hind tarsus. Abdominal dorsum pale bearing large light brown paired sclerites on 1st–3rd tergites and on 7th tergite and broad sclerotic bands on 8th tergite, besides a number of dark brown muskelplatten; longest hair on anterior abdominal tergites 0.231 mm long, shortest one 0.146 mm long, these being 3.0 × and 1.1 × as long as the basal diameter of antennal segment III, respectively; hairs on 8th tergite mostly broken. Siphunculi on large sclerotic cones. Legs pale near bases and apices of femora and in the area just proximad to knee joints on tibiae, rest brown to dark brown; longest hair on hind tibiae 0.200 mm long, 1.09 × as long as the diameter at the middle of hind tibiae; hind tibiae with a number of round to oval pseudosensoria; first segment of hind tarsus dorsally 0.56 × as long as its ventral length and 0.65 × as long as the width at the basal articulation.

Colour: Not known.

Measurements in mm

Length	...	...	7.40
Width	...	...	4.10
Antenna	...	...	2.81
Antennal segment	III	...	1.24
,,	IV	...	0.48
,,	V	...	0.50
,,	VI	...	(0.25+0.05)
Rostral segments	4+5	...	(0.37+0.15)
$ht._2$	...	...	0.55
Siphunculus, diameter		...	?

(ex *Abies pindrow*, Murree, Pakistan, 25-11-1958, BMNH.)

Nymphs: Not seen.

Material examined: One apterous viviparous female, from "near Cedar", Chertsey, Surrey, England, -3-1967, coll. Public Health Inspector, (BMNH, No. 121/67c); one alate viviparous female from *Cedrus*, Wimbledon, England, 23-6-1953, coll. K. M. Harris (BMNH, No. 181/74); two alate males on fir in spiders' webs and on needles, Murree, Pakistan, 25-11-1958, coll. M. Ghani, det. JPD. (BMNH, CIE No. 16363, 10); one apterous oviparous female from *Abies pindrow*, Murree, Pakistan, 25-11-1958, coll. M. Ghani, det. JPD. (BMNH, C.I.E. No. 16363, 4).

Discussion: This species has been described under several names and intermediates in all characters are known to occur. Eastop (1972) has discussed its probable synonymies in detail under *abieticola.* This species is known to occur sporadically in large numbers between the months of March to June and apterae are said to outnumber alate during March to May whereas alate outnumber apterae in June and July; it is said to spend its summer in the roots of *Abies* in special chambers prepared by ants (Eastop, op. cit). Sexual forms have been recorded from Pakistan and England. At least 3 species of hymenopteran parasites viz. *Pauesia grossa* (Fahringer). *P. macrogaster* (Ashmead) and *P. picta* (Haliday) are known from this species of aphid (Mackauer, 1968).

C. confinis is known to feed on at least seven species of *Abies* besides *Cedrus deodara* (Eastop, op. cit). A subspecies of *confinis* has been described from India, a description of which is given separately.

Distribution: Holoarctic.

Types: Location of types is not known.

Cinara confinis tenuipes (Chakrabarti & Ghosh, 1974) (Plate 9–10, Plate 56, figs. 3–4)

1974. *Cinara abieticola tenuipes* Chakrabarti, S. and Ghosh, A. K., *Orient. Ins.* **8**(4): 522.

1976. *Cinara confinis tenuipes*, Eastop, V. F. and Hille Ris Lambers, D. Survey World's Aphids., 148.

Apterous viviparous female: Body 3.6–4.3 mm long. Head brown to dark brown, with a median suture; dorsal hairs on head up to 0.190 mm long, 4.3 × as long as the basal diameter of antennal segment III. Antennae 0.35–0.45 × as long as the body; segment I dark brown, segment II, apices of segments III–V and whole of segment VI brown, rest pale; segment III without any secondary rhinaria, segment IV and V each with 1 secondary rhinarium; hairs on flagellum fine, on segment III 0.066–0.163 mm long, 1.4–4.0 × as long as the basal diameter of the segment; processus terminalis 0.29–0.37 × as long as the base of segment VI and 0.09–0.10 × as long as the antennal segment III. Rostral segment 4, 2.2 × as long as rostral segment 5 and bearing 7–8 accessory hairs, segments 4+5, 0.95–1.0 × as long as the second segment of hind tarsus. Abdominal dorsum pale, bearing double rows of spinal sclerites besides scattered pleural and marginal ones up to 7th tergite; an individual spinal sclerite may sometime appear broken on anterior tergites; 8th tergite with two distinct transverse sclerotic bands; Stigmal plates sclerotic. Hairs on the dorsum of abdomen fine, on anterior tergites 0.130–0.215 mm long, 3.0–4.6 × as long as the basal diameter of antennal segment III; respectively; 8th tergite with 30–32 hairs, up to 0.215 mm long, 3.0–4.6 × as long as the mentioned diameter. Legs pale brown, except basal segments, apical 0.50 portion of femora, knee joints, distal 0.66 portion of tibiae and whole of tarsi, which are dark brown to black; hairs on legs fine, numerous, longest one on hind tibiae 0.216 mm long. up to 2.0 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg ventrally 2.0 × as long as its dorsal length and 3.2 × as long as the width at the basal articulation.

Colour: Brownish in life.

	Measurements in mm			
	1	2	3	4
Length	3.91	3.88	4.39	4.33
Width	1.82	2.77	2.33	2.77
Antenna	1.68	1.61	1.68	1.58
Antennal segment III ...	0.58	0.58	0.59	0.57
,, IV ...	0.22	0.22	0.25	0.23
,, V ...	0.32	0.30	0.34	0.32
,, VI ...	(0.17+0.06)	(0.16+0.06)	(0.17+0.06)	(0.17+0.05)
Rostral segments 4+5 ...	(0.21+0.10)	(0.21+0.10)	(0.20+0.11)	(0.21+0.10)
ht.$_2$	0.32	0.32	0.32	0.32
Siphunculus diameter, base ...	0.44	0.46	0.47	0.46
,, apex ...	0.07	0.08	0.09	0.08

(1–4, ex ? *Abies* sp., Simla, 6-4-1970, CU.)

Alate viviparous female: Body 4.51–5.13 mm long. Head and thorax black. Antennae almost uniformly dark brown, 0.40–0.41 × as long as the body; segment III with 11–14, IV with 2 and V with 1 large tuberculate secondary rhinaria; processus terminalis 0.32–0.35 × as long as the base of segment VI and 0.08–0.09 × as long as antennal segment III. Rostral segment 4+5, 0.84–0.90 × as long as the second segment of hind tarsus. Abdominal dorsum pale bearing scattered and much smaller sclerites than in apterae; 8th tergite with similar sclerites as in apterae. Legs completely black except near the very bases of femora which may be pale. Wing venation normal, stigma dark; other characters as in apterous viviparous female.

Measurements in mm

	1	2	3	4
Length	4.51	4.62	5.13	4.68
Width	2.08	2.15	2.40	2.25
Antenna	1.79	1.89	2.11	?
Antennal segment III ...	0.68	0.72	0.75	0.72
,, IV ...	0.29	0.29	0.30	0.26
,, V ...	0.34	0.34	0.36	0.36
,, VI ...	(0.18+0.06)	(0.17+0.06)	(0.19+0.06)	(?)
Rostral segments 4+5 ...	(0.21+0.10)	(0.22+0.10)	(0.21+0.10)	(0.21+0.10)
$ht._2$	0.34	0.35	?	0.34
Siphunculus diameter, base ...	0.47	0.50	0.46	0.47
,, apex ...	0.09	0.08	0.08	0.09

(1–4, ex ? *Abies* sp., Simla, 6-4-1970, CU.)

Sexual forms: Alate male: Body 3.01– mm long. Head dark brown, dorsal cephalic hairs fine, longest one 0.164 mm long, 5.2 × as long as basal diameter of antennal segment III. Antennae 0.50 × as long as the body, darker at basal segments, rest pale brown; segments III with 26–30, IV with 12–13, V with 7–10 and base of segment VI with 1–3 small secondary rhinaria; hairs on flagellum fine, longest one on segment III 0.137 mm long, shortest one 0.100 mm long, these being 3.8 × and 2.7 × as long as the basal diameter of the segment, respectively; processus terminalis 0.29 × as long as base of segment VI and 0.12 × as long as antennal segment III. Rostral segment 4, 1.76 × as long as rostral segment 5, segments 4+5, 0.64 × as long as second segment of hind tarsus. Abdominal dorsum pale, bearing paired spinal sclerites on 1st–7th tergites; hairs on the dorsum of abdomen numerous, long, fine,

longest one on anterior tergites, 0.163 mm long, shortest one 0.100 mm long, these being 4.5× and 2.7× as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.198 mm long and 5.4× as long as the mentioned diameter. Siphunculi and cauda pale, sclerotic. Genitalia sclerotic (Plate 9, fig. 2). Legs pale brown, darker at knee joints, apices of tibiae and whole of tarsi, longest hair on hind tibiae, 0.178 mm long and 2.20× as long as the width at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.58× as long as its ventral length, 1.75× as long as the width at the basal articulation.

Colour: Not known.

	Measurements in mm
Length	3.01
Width	?
Antenna	1.51
Antennal segment III ...	0.49
,, IV ...	0.25
,, V ...	0.29
,, VI ...	(0.23+0.06)
Rostral segments 4+5 ...	(0.15+0.08)
$ht._2$	0.35
Siphunculus, diameter ...	?

(ex on snow, Jakhoo, 12-12-1973, ZSI.)

Nymph: (Alate: late instar): Body 3.77 mm long. Head dark brown. Antennae 0.42× as long as the body; pale, darker at apices of segments III, IV, V and whole of VI; hairs on flagellum 0.083–0.163 mm long, upto 3.2× as long as the basal diameter of antennal segment III. Rostral segment 4, 2.5× as long as rostral segment 5, segments 4+5 equal to the second segment of hind tarsus. Abdominal dorsum with paired spinal sclerites on 1st–2nd and 4th–7th tergites and a pair of transverse band like sclerites on 8th tergite, besides small marginal sclerites on 1st–7th tergites; hairs on the dorsum of abdomen 0.130–0.215 mm long, 2.8–4.2× as long as the basal diameter of antennal segment III. Siphunculi on dark sclerotic cones. Cauda dark, sclerotic. Legs pale except at knee joints, apical 0.66 portion of tibiae and whole of tarsi which are dark; first tarsal segment of hind leg dorsally 0.54× as long as its ventral length, 1.20× as long as the width at the basal articulation.

Colour: Pale brown with darker legs.

Measurements in mm

Length	3.77
Width	1.92
Antenna	1.58
Antennal segment III ...	0.13
,, IV ...	0.05
,, V ...	0.07
,, VI ...	(0.04+0.02)
Rostral segments 4+5 ...	0.33
ht.$_2$	0.33
Siphunculus, diameter base ...	0.38
,, ,, apex ...	0.08

(1, ex indet. host. Mashobra, 6-9-1970, CU.)

Material examined: Four apterous and four alate viviparous females and two nymphs from ? *Abies* sp., Mashobra, Simla, Himachal Pradesh, India, 6-9-1970, coll. A. N. Chowdhury (CU); one alate male collected on snow, Kufri, Himachal Pradesh, India, 15-12-1973, coll. L. K. Ghosh (ZSI); one alate male, collected on snow, Jakhoo, Himachal Pradesh, India, 12-12-1973, coll. L. K. Ghosh (ZSI).

Discussion: The subspecies differs from other members of the *confinis* (Koch) complex in having dorsal length of first tarsal segment longer than the middle diameter of the segment and shorter rostral segments 4+5.

Distribution.—INDIA: Himachal Pradesh.

Types.—In the collections of Entomology Laboratory, Department of Zoology, University of Calcutta.

Cinara eastopi Pintera 1965
(Plate 11–12, Plate 57)

1965. *Cinara eastopi* Pintera, A., *Entomologist*, (March) **98**: 62.

1974. *Cinara orientalis* Tak, Ghosh, A. K., *J. Bombay nat. Hist. Soc.*, **71**(2): 209 [misid.].

1974. *Cinara radicicola* Wellendt, Ghosh, A. K., *J. Bombay nat. Hist. Soc.*, **71**(2): 209. (misid.)

Apterous viviparous female: Body 5.0 mm long. Head brown with a median suture; hairs on frons and vertex up to 0.146 mm long, 3.0× as long as basal diameter of antennal segment III. Antennae 0.39× as long as the body; segment I brown, segment II, apices of segments III–V and whole of segment VI dusky, rest pale;

segment III without any secondary rhinaria, segment IV with 2 and V with 0–1 secondary rhinaria; hairs on flagellum long and fine, longest one on segment III, 0.163 mm long, shortest one 0.06 mm long, these being 3.6× and 1.3× as long as the basal diameter of the segment, respectively; processus terminalis 0.29× as long as base of antennal segment VI and 0.08× as long as antennal segment III. Rostrum reaches siphunculi; rostral segment 4, 2.3× as long as rostral segment 5, and bearing 16(?) accessory hairs, segments 4+5, 1.0× as long as second segment of hind tarsus. Abdominal dorsum pale bearing double rows of brown spinal sclerites on 1st–7th tergites, those on 1st, being larger than others and similar marginal sclerites on 1st–2nd tergite on each side, besides some scattered "muskelplatten"; 8th tergite with a pair of transverse sclerotic bands, separated only at the middle and bearing at least 24 hairs; hairs on the dorsum of abdomen long and fine, longest one on anterior tergites 0.215 mm long, shortest one 0.160 mm long, these being 4.6× and 3.4× as long as the basal diameter of antennal segment III, respectively; 8th tergite with 24 hairs, longest one 0.248 mm long and 5.3× as long as the mentioned diameter. Siphunculi on dark brown hairy cones. Cauda brown, sclerotic bearing about 16 hairs. Legs pale brown except basal segments and bases of femora which are darker; hairs on legs fine, numerous, longest one on hind tibiae, 0.198 mm long, 1.6× as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.53× as long as its ventral length and 1.3× as long as the width at the basal articulation; second segment of hind tarsus 2.47× as long as the first segment.

Colour: Brownish in life.

	Measurements in mm
Length	4.0
Width	2.78
Antenna	1.92
Antennal segment III ...	0.72
,, IV ...	0.33
,, V ...	0.38
,, VI ...	(0.19+0.05)
Rostral segments 4+5 ...	(0.26+0.10)
$ht._2$	0.36
Siphunculus, diameter, base ...	?
,, ,, apex ...	0.10

(1, ex *Pinus wallichiana*, Koniain, 24–30-5-1922, BMNH labelled as *orientalis* (Tak.) and corrected as *eastopi* Pintera.]

Alate viviparous female: Body elongate 5.0–5.21 mm long. Head and thorax sclerotic black. Antennae uniformly brown; segment III with 12–18, IV with 3 and V with 1–2 large tuberculate secondary rhinaria; longest hair on antennal segment III 0.146 (0.231 mm) long, shortest one 0.066 mm long, these being 3.0× and 1.4× as long as the basal diameter of the segment, respectively; processus terminalis 0.27× as long as base of antennal VI and 0.7× as long as antennal segment III. Rostral segment 4. 2.4–2.5× (2.75×) as long as rostral segment 5. Abdominal dorsum pale with spinal and marginal sclerites on 1st and 2nd tergites, besides smaller spinal sclerites and a few scattered scleroites on other tergites and a pair of spinopleural sclerotic bands on 8th tergite; hairs on the dorsum of abdomen, fine, numerous, longest one on anterior tergites 0.205–0.215 mm long, shortest one 0.146 mm long, these being 4.2–4.6× and 3.0–3.2× as long as the basal diameter of antennal segment III, respectively; 8th tergite with 22–24 long, fine hairs, longest one 0.231 mm long (0.331 mm), 4.7–5.0× as long as the mentioned diameter. Legs dark brown, except at very bases of femora and sometimes near bases of tibiae, which are pale, hairs on femora and tibiae, fine, numerous, longest one on hind tibiae 0.178 mm long, 2.20× as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg, dorsally 0.065 mm long, (0.056 mm) and 0.46–0.47× as long as its ventral length and 1.20× (1.14×) as long as the width at basal articulation. Wing venation normal, stigma dark. Other characters as in apterous viviparous female.

Colour: Dark brown in life with paler abdomen.

Measurements in mm

	1	2	3
Length	5.21	?	5.0
Width	2.22	?	?
Antenna	?	2.11	?
Antennal segment III ...	0.82	0.76	0.85
,, IV ...	?	0.33	?
,, V ...	?	0.41	?
,, VI ...	(?)	(0.20+0.06)	(?)
Rostral segment 4+5 ...	(0.25+0.10)	(0.23+0.10)	(0.23+0.10)
$ht._2$	?	0.34	0.34
Siphunculus diameter, base ...	0.61	0.58	0.61
,, apex ...	0.09	0.09	0.09

(1, 2, on Snow, Rhotang Pass, 4–5, 6-1965, BMNH; 3, on snow, Rhotang Pass, 4-6-1955, ZSI.)

Material examined: Two alate viviparous females, collected on snow, Rhotang Pass (3712 m) India, 4-6-1955, coll. A. P. Kapur (BMNH, C.I.E. 14764, No. 14); two alate viviparous female collected on snow, Rhotang Pass (4198 m) India, 4-6-1955, coll. A.P Kapur (ZSI, C.I.E. 14764, No. 1) and (C.I.E. 14764, No. 2); one apterous viviparous female from underbark of *Pinus coallichana* (=*exelsa*) Chakrata dist., Konain, 2434 m, India, 24–30-5-1922, coll. S. N. Chatterjee (BMNH).

Discussion: This species was originally described from three damaged alate viviparous females, collected on snow, in Rhotang Pass at 4,000 m. However, while preparing a list of species of aphids from Indian region, the author was informed of a species labelled as *Cinara* ? *radicicola* Well., collected on snow in the Rhotang Pass, in the collection of British Museum (Nat. Hist.) London, and this species as also another species, labelled as *Cincara orientalis* (Takahashi) collected from *Pinus excelsa* in Chakrata dist. at 2,434 m (V. F. Eastop *in litt.*) were included in the list (Ghosh, 1974a). Both these species have now been identified as *Cinara eastopi* Pintera. This species, with characteristic dorsal sclerotic pattern, length of rostral segments 4+5, and ratio of dorsal and ventral length and basal width of first tarsal segment, could easily be separated from the other species found in the region. Pintera (1965) while describing the alatae mentioned its affinity with *C. taeniatus* Koch.

Distribution.—Northwest India.

Types.—In the collection of British Museum (Nat. Hist.), London.

Cinara indica Verma 1970
(Plates 13–14; Plate 58)

1970. *Cinara indica* Verma, K. D., *Bull. Ent.*, **11**(2): 96.

1972. *Cinara abieticola* (Cholod.), Eastop V. F., *Bull. Br. Mus. nat. Hist.* (Ent.) **27** (2): 125. (partim)

1974. *Cinara* ? *abieticola*, Ghosh, A. K., *J. Bombay nat. Hist. Soc.* **71**(2): 209.

Apterous viviparous female: Body 3.30 mm long. Head dark brown, frons with many long fine hairs, longest one 0.130 mm long, 3.0 ×as long as long as the basal diameter of antennal segment III. Antennae stout 0.40 ×as long as the body, segments I, II, apices of segment III, apical half of segment IV and most portion of segment V and VI dark brown, rest pale; flagellum nearly smooth; segment IV with 0–1 and V with 1 secondary rhinaria; primary rhinaria without chitinized rim. Hairs on flagellum fine, longest one on segment III 0.178 mm long, (0.16 mm), shortest one 0.056 mm long, these being 5.0 × and 1.6 ×as long as the basal diameter of antennal segment III, respectively; base of antennal segment VI with 9 hairs and processus terminalis with 3–4 subapical setae;

processus terminalis 0.25 ×as long as base of antennal segment VI and 0.11 ×as long as antennal segment III. Rostrum reaches at least 4th abdominal segment; rostral segment 4, 2.4 ×as long as rostral segment 5 and bearing 8–9 accessory hairs; rostral segments 4+5 little longer than second segment of hind tarsus. Mesosternal tubercle absent. Abdominal dorsum pale, membraneous, bearing small scattered scleroites in pleural region and a broad transverse band on 8th tergite; hairs on dorsum numerous, fine, longest one on anterior tergites 0.178 mm long, shortest one 0.070 mm long, these being 5.0 × and 2.0 ×as long as the basal diameter of antennal segment III, respectively; few hairs on 7th tergite arise from dark sclerotic bases; 8th tergite with 14 hairs, all arising from dark transverse sclerotic band; longest hair on 7th tergite 0.169 mm long and on 8th tergite 0.198 mm long, these being 4.6 × and 5.4 ×as long as the mentioned diameter, respectively. Siphunculi on black cones bearing many long fine hairs. Cauda light brown with 10 hairs. Legs with basal half of femora and tibiae pale, rest dark brown to black; hairs on tibiae long and short, longest one on hind tibiae 0.190 mm (0.11 mm) long, 1.6 ×as long as the diameter at the middle of hind tibiae; first tarsal segments of hind leg dorsally 0.33 ×as long as its ventral length and 0.70 ×as long as the width at the basal articulation; second segment of hind tarsus 4.3 × as long as the first segment.

Colour: Not known.

Measurements in mm

Length	3.30
Width	1.99
Antenna	0.14
Antennal segment III ...	0.47
,, IV ...	0.22
,, V ...	0.29
,, VI ...	(0.20+0.05)
Rostral segments 4+5 ...	(0.27+0.11)
$ht._2$	0.35
Siphunculus, diameter, base ...	0.41
,, ,, apex ...	0.07

(1, ex *Cedrus deodara*, Jammu, 17-3-1974, KDV.)

Alate viviparous female: Body 5.43–7.85 mm long. Head dark brown, sclerotic with a distinct median suture; hairs on dorsum of head, long and fine, longest one up to 0.178 mm long, 3.5 ×as long as the basal diameter of antennal segment III. Antennae 0.40 × as long as the body, with segments I, II and apical 0.50 portions of segments III–V and whole of VI dusky, rest pale; flagellum nearly

smooth; segment III with 2–13, IV with 2–5 and V with 2–4 large round secondary rhinaria; hairs on the flagellum fine, longest one on segment III, 0.215 mm long, shortest one 0.073–0.083 mm long, these being 3.4× and 1.3–1.4×as long as basal diameter of the segment, respectively; processus terminalis 0.24×as long as base of segment VI and 0.07×as long as antennal segment III. Rostrum reaches siphunculi; rostral segment 4, 2.7–2.8×as long as rostral segment 5, segments 4+5, 0.81×as long as second segment of hind tarsus. Abdominal dorsum pale, bearing rows of spinal, pleural and marginal "muskelplatten", besides a pair of dark brown transverse sclerotic bands on 8th tergite; hairs on the dorsum of abdomen numerous, longest one on anterior tergites 0.205–0.215 mm long, shortest one 0.115 mm long, these being 3.25–3.38× and 1.75–2.19×as long as basal diameter of antennal segment III, respectively; 8th tergite with 18–22 hairs, longest one 0.238–0.276 mm long. 4.25–4.50×as long as the mentioned diameter. Siphunculi on dark brown hairy cones. Cauda dark sclerotic with many long fine hairs. Legs stout, dark brown to black except at basal 0.40–0.50 portion of femora which is much paler; longest hair on hind tibiae, 0.130–0.134 mm long, 1.0×as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.30–0.40×as long as its ventral length and 0.80×as long as the width at the basal articulation; second egment of hind tarsus 4.0×as long as the first segment.

	Measurements in mm	
	1	2
Length	5.42	7.85
Width	?	4.03
Antenna	?	3.14
Antennal segment III ...	0.72	1.17
,, IV ...	0.37	0.55
,, V ...	0.41	0.62
,, VI ...	(?)	(0.32+0.08)
Rostral segments 4+5 ...	(0.40+0.14)	(0.41+0.15)
$ht._2$	?	0.70
Siphunculus, diameter, base ...	0.49	0.69
,, ,, apex ...	0.11	0.14

(1, ex *Cedrus deodara*, Mussoorie, -7-1920, BMNH; 2, on snow, Rhotang Pass, 4-6-1966, BMNH.)

Sexual forms: Not known.

Nymphs: Not known.

Material examined: One apterous viviparous female (Holotype) from *Cedrus deodara*, Botota, Jammu, India, 17-3-1964, coll. K. D.

Verma (KDV, No. ZD-202 H); one damaged alate viviparous female, Mussoorie, (1978 m) from underbark of *Cedrus deodara*, — -7-1920, coll. S. N. Chatterjee (BMNH, labelled *Cinara* ? *indica*); one alate viviparous female, collected on snow, Rhotang Pass, (4198 m) India, 4-6-1955, coll. A. P. Kapur (BMNH, C.I.E. 14764 No. 7).

Discussion: Verma (1970) described the species from a single apterous viviparous female and pointed out that it differs from closely related species viz. *Cinara cedri* Mim., in the length and number of hairs on antenna and *Cinara confinis* Koch (=*abieticola* Chol.), in the length of antennal segments III, IV, V besides length of antennal and body hairs. The present study shows that it differs further from *confinis* (Koch) in the length of hind tibia, (1.97 mm as against 3.4–5.4 mm in *confinis*) and in the ratio of 1st–2nd segments of hind tarsus, besides in the number of hairs on 8th tergite and in the length of hairs on hind tibiae in alatae etc. However, some measurements as given by Verma (op. cit.) appeared to be different as indicated in the text. The alate viviparous female was so far undescribed and the present description has been based on two specimens, one collected on the same host as that of *indica* but was much damaged and the other on snow, the second specimen differing from the first in its much longer body length and consequently in the lengths of antennal segments. However, large variation in body length and appendages is not uncommon in some species of the genus (alate *confinis* may vary from 5.1–7.5 mm in body length) as has been pointed out by Eastop (1972) in his review of *Cinara* species occuring in Britain.

Distribution.—Northwest India.

Types.—In the collections of K. D. Verma, Central Potato Research Institute, Simla.

Cinara lachnirostris Hille Ris Lambers 1966
(Plate 15; Plate 59, fig. 1)

1966. *Cinara lachnirostris* Hille Ris Lambers, D. *Tijdschr. Ent.*, **109**: 201.

1976. *Cinara (Cinarella) lachnirostris*, Eastop, V. F., *Bull. Br. Mus. nat. Hist.* (Ent.), **35**(1): 9.

Apterous viviparous female: Body 2.42–2.76 mm long (2.47–2.83 mm), pale, with head, pronotum and marginal areas of mesonstum, brownish to dark. Head without median suture, cephalic hairs stiff, acute, 0.04–0.05 mm long, at most 1.5 × as long as the basal diameter of antennal segment III. Antennae more than half as long as the body [up to 0.60 ×], with segment I concolorous with the head, rest gradually becoming darker, flagellum nearly smooth except at imbricated apices of segment V and whole

of VI; segment III longer than segment IV and V taken together, segment V being longer than IV, and segment VI being longer than V; segment III with 0 (3), IV with 0–3 and V with 0(1) secondary rhinaria; hairs on flagellum stiff and erect, those on antennal segment III 0.03–0.05 mm long, 0.50–1.3 × as long as the basal diameter, of the segment; processus terminalis little less than 0.50–(0.33–0.40 ×) as long as base of segment VI and 0.17–0.18 × as long as antennal segment III, with 8–11 short spiny hairs. Rostrum reaching 6th–7th sternite, rostral segment 4 with 6 fine hairs besides 3 pairs near the junction of 4 and 5, 2.5–3.0 × as long as rostral segment 5 and 1.5 × as long as its basal width, segments 4+5, 0.65–0.75 × as long as second segment of hind tarsus. Abdominal dorsum with fine reticulations and bearing 6 rows of "muskelplatten's"; hairs on the dorsum of abdomen of two types, marginal ones stiff and acute, up to 0.05 mm long, 1.4–1.5 × as long as the basal diameter of antennal segment III, spinal ones very small, thick and blunt, 0.01–0.02 mm long, 0.25–0.33 × as long as the mentioned diameter, those on posterior tergites little longer; 8th tergite with a transverse sclerotic band. Ventral hairs long and fine. Siphunculi dark, on small cones, bearing 20–25 fine hairs, and little shorter than rostral segment 4. Cauda half as long as broad with many hairs. Fore and mid legs pale, with femora except base, bases and apices of tibiae and whole of tarsi blackish; hind legs with tibiae darker than in other legs; hairs on hind tibiae 0.02–0.05 mm long, 0.33–0.75 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.063–0.064 × as long as its ventral length and 2.50 × as long as the width atthe basal articulation and bearing 2 short spines and numerous hairs; empodial hairs little over 0.50 × as long as the sclerites on which they are placed (H.R.L., 1966).

Colour: Dark brown in life (HRL, 1966).

	Measurements in mm	
	1	2
Length	2.76	2.42
Width	1.52	1.44
Antenna	1.32	1.42
Antennal segment III ...	0.48	0.50
,, IV ...	0.16	0.18
,, V ...	0.22	0.24
,, VI ...	(0.18+0.08)	(0.19+0.09)
Rostral segments 4+5 ...	0.21	0.23
$ht._2$	0.32	0.34
Siphunculus, diameter, base ...	0.14	0.14
,, ,, apex ...	0.10	0.08

(1–2, ex *Pinus wallichiana* (=*excelsa*), Muree, 3-7-1964, DHRL.)

Alate viviparous female: Not known.

Sexual forms: Not known.

Nymphs: Not known.

Material examined: Two apterous viviparous females (paratypes) from *Pinus wallichiana* (=*excelsa*), Murree (*c* 2130 m), West Pakistan, 3-7-1364, coll. v.d. Bosch, det. D.H.R.L. (DHRL).

Discussion: The present species with short dorsal hairs, long antennal segment VI and small siphuncular cones, is distinct from others. No data on biology is available.

Distribution.—West Pakistan, Murree. It is likely to be present also in N.W. India.

Types.—In the collection of D.Hille Ris Lambers, Bennekom, The Netherlands.

Cinara maculipes Hille Ris Lambers. 1966

(Plates 16–17; Plate 59, figs. 2–4; Plate 60, fig. 1)

1966. *Cinara maculipes*, Hille Ris Lambers, D., *Tijdschr. Ent.*, **109**: 203.

1969. *Cinara maculipes*, David, S. Kanakaraj, Narayanan, K., Rajasingh, S. G., *Bull. Ent.*, **10**: 158.

1971. *Cinara maculipes*, David, S. Kanakaraj, Narayanan, K., Rajasingh, S. G., *Madras agric. J.*, **58**(5): 373.

Apterous viviparous female: Body large, 3.75–4.9 mm long (4.2–4.8), pale except head, pronotum, mesonotum and legs which are mottled brown, dark brown "muskelplatten", pale brown siphunculi and subgenital plate. Head with a median suture, with stiff, thorn-like hairs 0.03–0.04 mm long, hardly exceeding basal diameter of antennal segment III. Antennae 0.40–0.46 × as long as the body, segment II and III mostly pale, rest dark; flagellum smooth, except distal portion of segment V and whole of segment VI which are dusky; segment IV with 0–2 secondary rhinaria; hairs on flagellum short and thorny, on segment III 0.020–0.030 mm long, 0.5–0.8 × as long as the basal diameter of the segment ; processus terminalis 0.43–0.45 × as long as base of segment VI and 0.10–0.12 × as long as antennal segment III, which is always longer than IV and V taken together. Rostrum reaches between 2 nd and 3rd abdominal sternite; rostral segment 4 about 2.0–2.5 × as long as rostral segment 5 which is 1.50–1.80 × as long as its maximum width, segments 4+5, 0.54–0.58 × as long as second segment of hind tarsus, with 6 long and fine hairs, besides 3 pairs of hairs at the junction of 4 and 5. Mesosternal processi absent. Dorsum of abdomen with fine median reticulations and with 4–6 muskelplatten per segment up to 7th tergite; 8th tergite with a pair of band like sclerites; hairs on the dorsum of abdomen stiff as on head and

antennae, 0.02–0.04 mm long, longest one hardly 0.50–0.80 × as long as basal diameter of antennal segment III. Siphunculi very small, on pigmented cones bearing 12–15 (19) fine hairs, basal diameter of siphunculi equal to the 4th rostral segment. Cauda more than half its basal width and bears at least 20 hairs. Legs yellow with "pantherine spots" on femora and tibiae, darker near junction of femora and tibiae and apical portion of tibiae and whole of tarsi; hairs on legs short and thorny almost obtuse at apices, those on tibiae 0.30–0.07 mm long, 0.016–0.032 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg, dorsally 0.80–0.85 × as long as its ventral length, 3.20–3.80 × as long as the width at the basal articulation and bearing 2–3 short ventral spines besides number of long hairs; empodial hairs about 0.64–0.66 × as long as the length of sclerites on which they are placed:

Colour: Pale brown in life (H.R.L., 1966).

Measurements in mm

	1	2	3	4
Length	4.85	4.58	3.75	3.89
Width	2.8	2.5	1.9	1.8
Antenna	2.0	1.94	1.72	1.76
Antennal segment III ...	0.88	0.75	0.69	0.70
,, IV ...	0.27	0.33	0.23	0.28
,, V ...	0.34	0.34	0.29	0.29
,, VI ...	(0.20+0.08)	(0.20+0.09)	(0.18+0.08)	(0.18+0.08)
Rostral segments 4+5 ...	(0.20+0.08)	(0.20+0.08)	(0.18+0.08)	(0.18+0.09)
$ht._2$	0.49	0.49	0.48	0.50
Siphunculus diameter, base ...	0.21	0.19	0.19	0.21
,, apex ...	0.09	0.10	0.09	0.08

(1, ex *Pinus wallichiana*, Murree, 9-7-1964, DHRL; 2, ex *Pinus* sp. Mashobra, 17-10-1974, ZSI; 3, ex *Pinus wallichiana* (=*excelsa*), Rohroo, 21-10-1970, CU; 4, ex *Pinus patula*, Manali, 17-5-1969, SKD.)

Alate viviparous female: Body 4.8–5.2 mm (4.23 mm) long. Head and thorax mottled brown, longest hair on frons 0.05–0.06 mm long, 0.89–0.94 × as long as the basal diameter of antennal segment III. Antennae 0.36–0.41 × as long as the body, flagellum darker on segments IV–VI, rest yellowish; antennal segment III with 14–18 secondary rhinaria of different sizes, arranged in a row and IV with 1–5 similar rhinaria; hairs on flagellum thick and stiff, 0.02–0.04 mm long, longest one on segment III 0.04 mm long, 0.69–0.72 × (0.77 ×) as long as the basal diameter of the segment; processus terminalis 0.40 × as long as the base of antennal segment VI

and 0.10–0.11 × as long as antennal segment III. Rostral segment 4+5, 0.50–0.54 × as long as second segment of hind tarsus. Abdominal dorsum membraneous with at least two rows of "muskelplatten" on each side of pleural and marginal region; 8th tergite with a pair of band like sclerites; hairs on the dorsum of abdomen stiff, on anterior tergites, 0.02–0.03 mm long and 0.28–0.39 × as long as the basal diameter of antennal segment III, longest hair on 8th tergite 0.03–0.05 mm long and 0.63–0.83 × as long as the mentioned diameter. Siphunculi on brown sclerotic cones. Legs yellowish brown to dark, with pantherine spots as in apterae but these are less conspicuous; hairs on tibiae short and stiff, longest on hind tibiae; 0.03–0.04 mm long, 0.25–0.30 × as long as the diameter at the middle of hind tibiae, but those near apices, finer, up to 0.07 mm long and 0.50 × as long as the mentioned diameter; first tarsal segment of hind leg dorsally 0.81 × as long as its ventral length and 3.40 × as long as the width at basal articulation, wing venation normal.

Colour: Not recorded.

Measurements in mm

	1	2	3
Length	5.21	4.72	4.86
Width	2.50	2.01	2.08
Antenna	1.90	1.94	1.89
Antennal segment III ...	0.82	0.79	0.78
,, IV ...	0.26	0.36	0.29
,, V ...	0.30	0.34	0.33
,, VI ...	(0.20+0.08)	(0.21+0.08)	(0.21+0.08)
Rostral segments 4+5 ...	(0.18+0.08)	(0.16+0.08)	(0.18+0.08)
$ht._2$	0.48	0.49	0.48
Siphunculus diameter, base ...	0.23	0.26	0.23
,, apex ...	0.09	0.10	0.09

(1, ex. Pine, Simla, 22-5-1970, SKD; 2–3, ex *Pinus patula*, Manali, 17-5-1969 SKD.)

Sexual forms:

Alate Male: Body extremely shrunken, damaged. Antennae stout; flagellum with numerous small secondary rhinaria on segment III, IV and V; hairs on segment III up to equal to the basal diameter of the segment. Abdominal dorsum yellowish, membraneous, dorsal hairs as in alate viviparae. Siphunculi on small brownish yellow cones. Genitalia dark sclerotic. Legs dark brown; first tarsal segment of hind leg dorsally 0.86 × as long as its ventral length and 4.0 × as long as the width at the basal articulation.

Colour: Not recorded.

	Measurements in mm
Length	?
Antenna	1.93
Antennal segments III ...	0.76
,, IV ...	0.30
,, V ...	0.39
,, VI ...	(0.19+0.09)
Rostral segments 4+5 ...	(0.16+0.08)
$ht._2$	0.44
Siphunculus, diameter, base ...	0.20
,, apex ...	0.08

(ex *Pinus* sp., Simla, 26-11-1969, SKD.)

Nymphs: Apterous: 2nd Instar: Body 2.13 mm long. Antennae 4 segmented, 0.48 as long as the body, pale yellow except at apices of segment III and whole of IV which are darker; hairs on flagellum stiff, thinner than in adult, longest one on segment III 0.05 mm long, shortest one 0.03 mm long, these being 0.84 × and 0.47 × as long as the basal diameter of the segment, respectively. Rostrum reaches siphunculi, segments 4+5 thick, brown, 0.75 × as long as the second segment of hind tarsus. Abdominal dorsum pale bearing two rows of small "muskelplatten" on pleural and marginal areas of 1st–6th tergites on each side, besides some small hair-bearing scleroites in spinal region and a pair of small sclerites on 8th tergite, each of which bears 5 hairs; hairs on dorsum of abdomen conspicuous, much longer than in apterous adult, longest one an anterior tergites 0.06 mm long, shortest one 0.02 mm long, these being 1.12 × and 0.35 × as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.12 mm long and 2.12 × as long as the mentioned diameter. Siphunculi on small hair-bearing cones. Cauda dusky, bearing many fine hairs. Legs stout, pale yellow, with knee joints, apices of tibiae and whole of tarsi dusky to dark brown; hairs on femora short and thin, those on tibiae longer and thicker, longest one on hind tibiae 0.08 mm long, 0.74 × as long as the width at middle of hind tibiae. First tarsal segment of hind leg dorsally 0.60 × as long as its ventral length and 1.20 × as long as the width at the basal articulation.

Colour: Not recorded.

Measurements in mm

Length	2.13
Width	0.96
Antenna	1.09
Antennal segment III ...	0.62
,, VI ...	(0.14+0.09)
Rostral segment 4+5 ...	0.06
$ht._2$	0.08
Siphunculus, diameter, base ...	0.12
,, ,, apex ...	0.06

(ex *Pinus excelsa*, Pahalgam, 14-5-1970, SKD.)

Material examined: One apterous viviparous female (paratype) from *Pinus wallichiana* (=*excelsa*), Muree, West Pakistan, 9-7-1964 coll. v.d. Bosch, det. D.H.R.L. (DHRL); two apterous viviparous females from *Pinus wallichiana*, (=*excelsa*) Manali, Himachal Pradesh, India, 12-6-1968, coll. S. G. Rajasingh and K. Narayanan, det. S. K. David, No. 759; two apterous viviparous females and two alate viviparous females, from *Pinus patula*, Manali, Himachal Pradesh, India, 17-5-1969, coll. K. Narayanan, det. S. K. David, No. 894; two apterous viviparous females and 5 nymphs from *Pinus wallichiana* (=*excelsa*), Pahalgam, Jammu & Kashmir, India, 14-5-1970, coll. K. Narayanan, det. S. K. David, No. 1225; one apterous and one alate viviparous female and one alate male from *Pinus* sp., Simla, Himachal Pradesh, India, 26-11-1969, coll. K.N. and S.G.R., det. S. K. David, No. 1164; one apterous and one alate viviparous female from *Pinus* sp., Simla, Himachal Pradesh, India, 22-5-1970, coll. K. Narayanan, det. S. K. David, No. 1246 (SKD); one apterous viviparous female from *Pinus wallichiana* (=*excelsa*), Rohroo, Himachal Pradesh, India, 21-10-1970, coll. A. N. Chowdhury (CU); one apterous viviparous female and three nymphs from *Pinus* sp., Mashobra, Himachal Pradesh, India, 17-10-1974, coll. L. K. Ghosh (ZSI).

Discussion: This species is distinctive with its spotted legs, short and thick dorsal hairs and small siphuncular cones.

No data on biology is available but from collection-records it appears to be more common in the months of May to July in North-western India and Pakistan.

Distribution.—INDIA: Himachal Pradesh and Jammu & Kashmir; PAKISTAN: Muree.

Types.—In the collection of D. Hille Ris Lambers, Bennekom, The Netherlands.

Cinara pilicornis (Hartig, 1841)
(Plates 18–19; Plate 60, figs. 2–4)

1841. *Aphis pilicornis* Hartig, T., *Z. Ent.*, (Germar) **3**: 369.
1848. *Aphis abietis* Walker, F., *Ann. Mag. nat. Hist.*, (2) **2**: 100.
1856. *Lachnus hyalinus* Koch, C. L., *Die Pflanzenlause Aphiden, Nurnberg*, **8**: 238.
1881. *Lachnus macrocephalus* Buckton, G. B., *Monog. Brit. Aphides*, London, **3**: 48.
1895. *Lachnus flavus* Mordwilko, A. K., *Zool. Anz.*, **18**: 102.
1896. ? *Lachnus piceicolus* Cholodkovsky, N. A., *Zool. Anz.*, **19**: 146.
1945. ? *Cinara piceicola*, Palmer, M. A., *Ann. ent. Soc. Am.*, **38**: 447.
1952. *Cinaropsis pilicornis*, Borner, C., *Mitt. thuring. bot. Ges.*, **4**(3): 43.
1954. *Cinara (Cinaropsis) pilicornis*, Pasek, V., Aphids attacking coniferous trees in Czechoslovakian forests, Bratislava, 207.
1970. *Cinara (Cinaropsis) pilicornis*, Inouye, M., *Bull. Govt. Forest. Expt. Stn. Megoure*, **228**: 80.
1972. *Cinara pilicornis*, Eastop, V. F., *Bull. Brit. Mus. nat. Hist.* (Ent.), **27**(2): 152.
1974. *Cinara* nr. *piceicola*, Ghosh, A. K., *J. Bombay nat. Hist. Soc.*, **71**(2): 209.

Apterous viviparous female: [Not recorded in India; description based on Eastop (1972)]. Body 2.1–4.7 mm long. Antennal segment III 0.250–0.530 mm long, IV, 0.120–0.200 mm long, V, 0.150–0.280 mm long and VI, 0.110–0.180+0.025–0.045 mm long; segment III with 0–1, IV with 0–2, V with 1–(2) secondary rhinaira; antennal segment II with 9–18 hairs, longest hair on antennal segment III 0.090–0.150 mm long; base of antennal segment VI with 6–14 hairs and processus terminalis with 3–4 subapical hairs. Mesosternal tubercle absent. Rostral segment 4, 0.190–0.250 mm long, 1.8–2.1 × as long as rostral segment 5 and bearing 4–7 accessory hairs, segment 5, 0.100–0.130 mm long. Abdominal dorsum with very small scleroites on 2nd–5th tergite; hairs on dorsum of abdomen fine, 30–90 on 5th tergite and 20–77 on 8th tergite; longest hair on 3rd tergite 0.100–0.160 mm long and on 8th 0.130–0.180 mm long. Siphuncular cones may be 0.130–0.390 mm in diameter. Subgenital plate with 13–38 hairs. First segment of hind tarsus ventrally 0.90–0.150 mm long, dorsally 0.027–0.053 mm long and diameter at the basal articulation may be 0.031–0.053 mm; second segment of hind tarsus 0.300–0.520 mm long, 3.0–4.1 × as long as the first segment and 1.2–2.5 × as long as the diameter of siphuncular cones; hind tibiae 0.9–2.2 mm long, longest hair on hind tibiae 0.130–0.220 mm long.

Alate viviparous female: Body 3.22 mm (2.6–4.4 mm) long Head dark brown with a distinct median suture; hairs on vertex with acute apices (mostly broken). Antennae 0.36 × as long as the body, pale brown, paler near bases of antennal segment III;

segment III with 6(1–8), rounded secondary rhinaria distributed over its entire length, segment IV with 2(0–3) and V with 2(1–2) similar rhinaria near apices; primary rhinaria with chitinised rim; hairs on the flagellum fine; longest one on segment III, 0.106 mm (0.80–0.160 mm) long, shortest one 0.066 mm long, these being 3.2 × (3.0–5.0 ×) and 2.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.20 × as long as the base of antennal segment VI and 0.06 × as long as antennal segment III and bearing 4 subapical hairs. Rostrum reaches middle of abdomen; rostral segment 4, 1.65 × (2.1 ×) as long as rostral segment 5 and bears 4(4–6), accessory hairs, segments 4+5, 0.85 × as long as second segment of hind tarsus. Abdominal dorsum pale, bearing a small spinal sclerite on 1st tergite and a pair of transverse sclerotic bands on 8th tergite, besides 4–6 muskelplatten on 2nd–6th tergites; hairs on the dorsum of abdomen fine, longest one on anterior tergites 0.115 mm long (0.105–0.160 mm), shortest one 0.066 mm long, these being 3.5 × and 2.0 × as long as the basal diameter of antennal segment III, respectively; 8th tergite with 22 hairs (21–23), longest one 0.146 mm (0.125–0.220 mm) long, 4.5 × as long as the mentioned diameter. Siphunculi on brown sclerotic cones. Cauda sclerotic, spinulose. Hind legs brownish (other legs broken), paler on basal 0.33 portions and near apices of femora; longest hair on hind tibiae 0.146 mm long, 1.80 × as long as the diameter at the middle of hind tibiae. First tarsal segment of hind leg dorsally 0.43 × as long as its ventral length and 1.25 × as long as the width at the basal articulation; second segment of hind tarsus 0.300 mm long (0.350–0.520 mm), 2.61 × (3.2–4.4 ×) as long as the first segment. [Figures within parenthesis from Eastop (1972).]

Colour: Not known.

Measurements in mm

Length	3.22
Width	1.39
Antenna	1.17
Antennal segment III ...	0.41
,, IV ...	0.20
,, V ...	0.24
,, VI ...	(0.14+0.03)
Rostral segments 4+5 ...	(0.153+0.093)
$ht._2$	0.30
Siphunculus, diameter, base ...	0.24
,, ,, apex ...	0.05

(On snow, Rhotang Pass, 4-6-1955, BMNH.)

Sexual forms: Not recorded in India, Walker (1848) provided a short description of alate males of *C. abietis* as follows: Body dark

brown; antennae brown yellow at base, more than 0.50 × as long as the body. Eyes black. Rostrum reaches near tip of abdomen. Legs yellow and stout, black. Wing much longer than the body. Cholodkovsky (1898) mentioned that the sexuales occur in Leningrad region of U.S.S.R. from mid-June onwards whereas Inouye (1970) recorded sexuparae in Japan from September to November. Eastop (op. cit.) mentioned that alate males possess secondary rhinaria on antennal segments as follows: III: 45–58, IV: 13–18, V: 3–4, VI: 0; and oviparae show numerous conspicuous pseudosensoria on hind tibiae.

Nymphs: (Apterous: early instar): [Not recorded in India. Description based on European material received from British Museum (Nat. Hist.), London.]

Body 1.64 mm long. Head blackish brown with a distinct median suture. Antennae 4 segmented, 0.33 × as long as the body; hairs on segment III, 0.016–0.050 mm long, longest one 1.2 × as long as the basal diameter of the segment; base of last antennal segment with 8 hairs. Rostrum reaches near tip of abdomen, rostral segment 4+5, 1.50 × as long as second segment of hind tarsus. Abdominal dorsum pale, bearing some small brown "muskelplatten" on anterior tergites, besides brown stigmal pori; hairs on the dorsum of abdomen fine, longest one on anterior tergites 0.050 mm long, shortest one 0.033 mm long, these being 1.2 × and 0.8 × as long as basal diameter of antennal segment III, respectively; longest hair on 8th tergite, 0.073 mm long, 1.7 × as long as the mentioned diameter. Siphunculi on small brown cones. Cauda with many long, fine hairs. Legs stout, brown, paler on bases of femora and tibiae.

Colour: Not known.

Measurements in mm:

	Length	Width	Antenna	Antennal segment		Rostral segments	ht.$_2$
				III	IV	4+5	
1.	1.64	0.75	0.25	0.29	(0.08+0.05)	(0.25+0.10)	0.23

(ex *Picea excelsa*, Slovakia 6-5-1952.)

Material examined: One alate viviparous female, collected on snow, Rhotang Pass (4198 m) India, 4-6-1955, coll. A. P. Kapur, (BMNH, C.I.E. 14764, No. 5); three apterous fundatrix and two nymphs, from *Picea excelsa*, Gelnica, Czechoslovakia 6-5-1952, coll. Pasek, det. Pasek (BMNH, No. 1952–537).

Discussion: The single alate specimen from Indian region has been included under *pilicornis* as it agrees in most characters with this species; however, when compared with the biometric data of

alate *pilicornis* provided by Eastop (op. cit.), based on his examination of extensive material, it becomes apparent that the specimen differs in having a little shorter rostral segment 4, and consequently a different ratio of rostral segment 4 to first segment of hind tarsus and also in the ratio of second segment of hind tarsus to the first (3.2–4.4 × as against 2.6 × in the present specimen) and hind tibia to the longest hair borne on it (6.5–11 × as against 13.5 × in the present specimen). If more material could be obtained in future, the Indian specimens may be considered as a sub-species of *pilicornis* (Harig). The species has been reported to be attended by ants, *Lasius niger* in Japan and Europe, besides *Myrmica* sp. in Japan. In Japan, they have been observed to be common on the main stems of seedlings or twigs of young trees from spring to summer; after budding of young sprouts of host plant, colonies usually move on to them and stay there for rest. The fertilised females are reported to lay eggs in the upper part of the needles in rows (Inouye, op. cit.); Eastop (op. cit.) observed apterae viviparae to be common during May to July and alatae from May to August, in England. This species could infest several species of *Picea* of *Eupicea* and *Cascitae* group viz. *abies, asperata, glauca, koamai, obovata, orientalis, pungens, rubens* etc. Eastop (op. cit.) opined that most of the records of *Cinara piceicola* Cholod, between 1915 and 1966 should apply to another european species i.e. *C. stroyani* (Pasek).

Distribution.—North eastern India. Palaearctic, Oriental and Australian regions. Eastop (op. cit.) considered the North American record of this species should be related to *C. braggii* Gillette, and opined that Argentinian records could not be accepted with certainty.

Types.—Location of types is not known.

Cinara similis (van der Goot, 1917)
(Plate 20)

1917. *Lachnus similis*, Goot, P. van der, *Rec. Indian Mus.*, **13**: 182.

1976. *Cinara similis*, Eastop, V. F. and Hille Ris Lambers, D., Survey World's Aphids, 155.

Alate viviparous female (from van der Goot, 1917): Body 4.70 mm long; head and thorax with numerous long and fine hairs, longest one on segment III, 3.50 × as long as the basal diameter of the segment; relative lengths of antennal segments III–VI: 35, 17, 19, 17; segment III with 1—2 and IV with 1 secondary rhinaria; processus terminalis hardly 0.15 × as long as the base of antennal segment VI and 0.10 × as long as antennal segment III. Rostrum reaches hind coxae. Siphunculi broadly conical, little elevated. Legs with numerous fine hairs. Wing venation normal except media which is once branched.

Colour (noted from specimen in alcohol by van der Goot, op. cit.); Head and thorax black; antennae brownish yellow with tips of all segments blackish; abdomen dirty greyish with four longitudinal rows of dark brown spots; siphunculi black; legs light yellowish except most part of femora, apices of tibiae and whole of tarsi which are brownish black; pterostigma of forewings dark brown.

Measurement in mm:

Length	Width	Antenna	Siphunculus diameter	Wing expanse
4.70	2.16	1.65	0.13	16.20

Apterous viviparous female: Not known.

Sexual forms: Not known.

Nymphs: Not known.

Discussion: Van der Goot (1917) described the species from a single partly damaged alate viviparous female collected from an undetermined host at Phagu (9,000 ft, Simla Hills), 18-5-1916, by N. Anandale and S. Kemp, and deposited the holotype (3825/H.I.) in the Indian Museum, Calcutta, which has now been reported to be lost by Z.S.I., Calcutta. No other reference of this species has ever been noted in subsequent literature and the above description has been based on the original description and drawings privided by van der Goot (op. cit.) who has compared *similis* with *Lachnus pineti* Koch, which is now considered as *Cinara pinea* (Mordv.) and as such it appears that he was dealing with a *Cinara* species and not a *Lachnus;* Eastop & Hille Ris Lambers (1976) listed this species under *Cinara.*

Distribution.—INDIA: Himachal Pradesh, Simla Hills.

Cinara tujafilina (Del Guercio, 1909)

(Plate 21; Plate 61)

1909. *Lachniella tujafilina* Del Guercio, G., *Redia,* **5**: 288.

1917. *Lachnus biotae* Goot, P., van Der, *Contr. Fauna Indes. neerl.* **1**(3): 161.

1927. *Dilachnus callitris* Froggatt, W. W., *Forest Insects and Timber Borers,* Sydney, 56.

1934. *Cinara winonkae* Hottes, F. C., *Proc. biol. Soc. Wash.*, **17**: 1.

1932. *Cinara tujafilina,* Borner, C. and Schilder, F. A., in *Sorauer* P., *Handbuch der Pflazen.,* **5**(2): 570.

1968. *Cinara (Cupressobium) tujafilina,* Sharma, K. C., *Nep. J. Agri.*, **3**: 114.

1972. *Cinara tujafilina*, Eastop, V. F., *Bull. Br. Mus., Nat. Hist.* (Ent.), **27**(2): 209.

1974. *Cinara tujafilina*, Ghosh, A. K., *J. Bombay nat. Hist. Soc.*, **71**(2): 209.

1974. *Cinara tujafilina*, Szelegiewicz, H., *Fragm. Faun.*, **19**(18): 462.

Apterous viviparous female: Body 2.15–2.25 mm (1.7–3.5 mm) long. Head light brown with a distinct median suture; hairs on frons and vertex with acute apices, longest one 0.093–0.103 mm long, 2.8–3.4 × as long as the basal diameter of antennal segment III. Antennae 0.33–0.36 × as long as the body, with segment I, apices of segments IV, V and most part of segment VI, dusky brown; segment III with 0–2 and IV with 1 small secondary rhinaria; hairs on the flagellum long, fine, longest one on segment III, 0.100–0.127 mm (0.110–0.170 mm) long, shortest one 0.056–0.073 mm long, these being 3.0–3.9 × and 1.8–2.2 × as long as the basal diameter of the segment, respectively; processus terminalis 0.15–0.20 × as long as base of antennal segment VI which bears 8(14) fine hairs, and 0.9–0.11 × as long as antennal segment III. Rostrum raches siphunculi, rostral segment 4, 1.65–1.80 × as long as rostral segment 5 and bearing 6(5–8) accessory hairs, segments 4+5, 1.08–1.12 × as long as second segment of hind tarsus. Mesosternal tubercle absent. Abdominal dorsum pale, with pale brown broken scleroits on 1st–2nd tergites and a pair of irregular transverse sclerotic bands on 8th tergite, besides series of muskelplatten; stigmal pori on sclerotic plates; hairs on the dorsum of abdomen numerous, fine, longest one on anterior tergites, 0.130–0.137 mm (0.100–0.180 mm) long, shortest one 0.066–0.083 mm long, these being 4.2–4.4 × and 2.2–2.5 × as long as the basal diameter of antennal segment III, respectively; 8th tergite with 18(19–26) hairs, longest one 0.146–0.163 mm (0.120–0.190 mm) long, 4.5–5.0 × as long as the mentioned diameter. Siphunculi on small brown hairy cones. Cauda pale brown. Legs pale with apices of tibiae and whole of tarsi dark brown; hairs on femora and tibiae fine, numerous, longest one on hind tibiae 0.115–0.163 mm (0.140–0.240 mm) long, 1.4–2.0 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.36–0.41 × as long as its ventral length, 0.73–0.75 × as long as the width at the basal articulation; second segment of hind tarsus 2.7–3.0 × as long as the first segment.

[Figures within parenthesis, from Eastop (1972).]

Colour: Brown in life.

Alate viviparous female: [Not recorded in the region. The following description has been based on extensive biometric data provided by Eastop (op. cit.).]

Cinara tujafilina (Del Guercio, 1909)

Apterous viviparous female

Measurements in mm:

	Length	Width	Antenna	Antennal segment				Rostral segments 4+5	$ht._2$	Siphunculus diameter	
				III	IV	V	VI			base	apex
1.	2.25	1.27	0.83	0.26	0.12	0.14	(0.13+0.02)	(0.13+0.08)	0.22	0.18	0.05
2.	2.15	1.24	0.75	0.24	0.11	0.13	(0.13+0.02)	(0.14+0.08)	0.23	0.18	0.05
3.	2.22	1.30	0.74	0.23	0.11	0.13	(0.13+0.02)	(0.13+0.08)	0.23	0.18	0.05
4.	?	?	0.82	0.28	0.12	0.14	(0.13+0.03)	(0.15+0.08)	?	0.21	0.06
5.	?	?	?	0.23	0.12	0.14	(0.12+0.03)	(0.15+0.08)	0.23	0.18	0.05

(1, 2, 3, ex *Cupressus* sp., Salisbury, Rhodesia, 26-8-1974, BMNH; 4, 5, ex Conifer, Kathmandu, Nepal, 14-12-1960, BMNH.)

Body 2.5–4.1 mm long. Antennae dusky on apices of segments III–VI, rest nearly pale; segment III, 0.31–0.41 mm long, 2.0–2.9 × as long as the longest hair (0.120–0.200 mm long), borne on it and 1.0–1.9 × as long as the diameter of siphuncular cones, bearing 3–8 secondary rhinaria; segment IV, 0.14–0.20 mm long and bearing 1–3 similar rhinaria; segment V, 0.16–0.19 mm long, 0.9–1.1 × as long as segment VI and bearing 1–2 similar rhinaria; base of segment VI 0.13–0.18 mm long and bearing 9–13 hairs; processus terminalis 0.014–0.030 mm long and bearing 3–4 subapical hairs. Rostral segment 4, 0.130–0.180 mm long, 1.5–2.2 × as long as rostral segment 5 and bearing 4–8 accessory hairs, rostral segment 5, 0.065–0.100 mm long. Hairs on the dorsum of abdomen fine, on 5th tergite their number may vary from 38 to 60; longest hair on 3rd tergite 0.120–0.210 mm long; 8th tergite with 17–24 hairs, longest one, 0.130–0.210 mm long. Subgenital plate with 24–36 hairs, Siphuncular cones broad, 0.170–0.380 mm in diameter. Legs with hind tibiae dark at apices; hind tibia 6.3–8.6 × as long as the longest hair borne on it, which may be 0.140–0.310 mm long; first segment of hind tarsus dorsally 0.025–0.035 mm long, ventrally 0.090–0.110 mm long; second segment of hind tarsus 0.240–0.340 mm long, 2.6–3.3 × as long as the first segment and 1.6–2.2 × as long as rostral segment 4.

Colour: Not known.

Sexual forms: Not known.

Nymphs: (Apterous: late instar): Body pale, antennae pale, 5 segmented; hairs on flagellum fine, on segment III 0.056–0.093 mm long, up to 2.33 × as long as the basal diameter of the segment; base of segment VI with 8 hairs, up to 0.073 mm long; processus terminalis 0.38 × as long as last antennal segment and 0.17 × as long as antennal segment III. Rostral segment 4, 1.80 × as long as rostral segment 5, segments 4+5, 1.17 × as long as second segment of hind tarsus. Abdominal dorsum pale, hairs on dorsum of abdomen fine, on anterior tergites 0.050–0.115 mm long, up to 3.0 × as long as the basal diameter of antennal segment III; hairs on posterior tergites up to 0.118 mm long. Siphunculi on small brown cones. Legs pale brown; longest hair on hind tibiae 0.100 mm long, 1.5 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg dorsally 0.35 × as long as its ventral length and 0.70 × as long as the width at basal articulation; second segment of hind tarsus, 2.7 × as long as the first segment.

Colour: Pale in brown.

	Measurements in mm
Length	?
Width	?
Antenna	0.56
Antennal segment III ...	0.09
,, V ...	(0.10+0.04)
Rostral segments 4+5 ...	(0.14+0.08)
$ht._2$	0.19
Siphunculus, diameter, base ...	0.12
,, ,, apex ...	0.05

(ex Conifers, Kathmandu, Nepal, 14-12-1960, BMNH.)

Material examined: Two damaged apterous viviparous females, and one nymph, from Conifer, Kathmandu, Nepal, 14-12-1960 coll. K. C. Sharma, (BMNH, C.I.E. 18695, 889/62); four apterous viviparous females from *Cupressus* sp., Salisbury, Rhodesia, 26-8-1974 coll. J. A. Coates-Palgrave, (BMNH).

Discussion: Eastop (1972) has given detailed biometric data for both apterae and alatae of *tujafilina;* he has stated that large numbers of apterae occur in the month of June, on the undersides of the branches of the host plant, near the trunk. Bray (1953) recorded *tujafinlia* on the roots of the host plants, in summer. At least one species of ant, *Pheidole megacephala* has been seen to be in attendance. Two natural enemies, *Chilochorus bispinulosus* and *Scymnus subyillosus* have been reported to control the pest in Spain and Morroco, respectively. Normally this species is known to infest *Thuja* (*Biota*) *orientalis* but it has also been recorded from other *Cupressaceae* viz. *Thuja occidentale, C. tasmanica, Chamaecyparis lawsoniana, Juniperus virginiana, Libocedrus decurrens* and *Widdringtonia whytei,* (Eastop, op.cit.).

Distribution.—Nepal and all Zoogeographical regions. Eastop (op. cit.) has stated that the distribution of *tujafilina* is much wider in warmer and drier part of the world than most other species of *Cinara.*

Types.—Location of types is unknown.

Genus **Indocinara** Ghosh, Basu, Raychaudhuri 1969

1969. *Indocinara*, Ghosh, A. K., Basu, R. C., Raychudhuri, D. N., *Orient, Ins.*, **3**(3): 249. Type species: *Indocinara hottesis*, Ghosh, Basu, Raychudhuri.

Morphology: Body oval, of medium size. Head without antennal tubercles, with a median suture. Antennae 6 segmented, less than one third the length of body; flagellum without secondary rhinaria on segments III and IV, with a single rhinarium near

primary rhinarium on segment V; hairs on the flagellum fine; processus terminalis short, up to 0.30 × as long as the base of segment VI and bears 2 apical setae besides 4 sub-apical setae. Ultimate rostral segment distinctly divided into segments 4 and 5. Eyes without occular tubercles. Abdominal dorsum bearing dark hair-bearing sclerites and scattered muskelplatten. Dorsal hairs on head arising from prominent bases, with acuminate or furcated apices; hairs on thoracic and abdominal dorsum thick, spine-like, arising from strong sockets and with similar apices to those on the head, 2.0–3.0 × as long as the basal diameter of antennal segment III; ventral hairs fine. Siphunculi on dark sclerotic cones, bearing hairs, similar to those on the abdominal dorsum. Cauda dark, sclerotic, bearing many fine hairs. Legs mostly pale; hairs on femora and tibiae fine; first tarsal segment with 10–11 ventral hairs besides one short peg; empodial hairs very short.

Sexual form is only known by apterous oviparae which largely resemble the viviparae but exhibit distinctly swollen hind tibiae bearing numerous small pseudosensoria.

Discussion: The genus is monotypic and the alatae are still unknown. Absence of ocular tubercles and presence of stiff thick hairs on the dorsum and its unusual association with plant family, Labiatae, help to distinguish this endemic genus from *Cinara* Curtis.

Biology: The only species, *I. hottesis* has been known to occur in Simla Hills from September to November, as indicated by the collection record; this species is reported to infest the leaves of the host plant. Myrmecophily is unknown.

Distribution.—Simla Hills, North West India.

Type species.—Indocinara hottesis Ghosh, Basu, Raychaudhuri 1969. In the collections of Entomology Laboratory, Department of Zoology, University of Calcutta.

Indocinara hottesis Ghosh, Basu, Raychaudhuri 1969

(Plate 23; Plate 62)

1969. *Indocinara hottesis*, Ghosh, A. K., Basu, R. C. Raychaudhuri, D. N., *Orient Ins.*, **3**(3): 249.

1976. *Indocinare hottesis*, Eastop, V.F. and Hille Ris Lambers, D., Survey of World's Aphids, 226.

Apterous viviparous female: Body oval, 2.9–3.1 mm long. Head dark brown; hairs on the vertex thick, acuminate or furcated at apices, arising from prominent bases, a few hairs on frons fine; longest hair on vertex 0.115 mm long, nearly 3.0 × as long as the basal diameter of antennal segment III. Eyes without ocular tubercles. Antennae little less than 0.33 × as long as the body, pale whitish except apical half of segment V and whole of segment

VI, which are dusky; flagellum smooth; segment III and IV without any secondary rhinaria, segment V with a single secondary rhinarium placed very close to the primary one; hairs on flagellum fine, with acute apices, those on outer margin distinctly longer than those on inner ones, longest one on segment III, 0.083–0.086 mm long, shortest one 0.026–0.040 mm long, these being 2.1–2.2× and 0.66–1.0× as long as the basal diameter of the segment, respectively; processus terminalis 0.25–0.28× as long as base of antennal segment VI and 0.10× as long as the antennal segment III. Rostrum long, reaching middle of abdomen; ultimate rostral segment distinctly divided into segment 4 and 5, rostral segment 4 nearly 2.0× as long as rostral segment 5 and bearing 4 accessory hairs, segments 4+5 nearly 1.3× as long as second segment of hind tarsus. Thorax sclerotic brown. Abdominal dorsum pale, bearing dark brown "muskelplatten" and hair-bearing scleroites; hairs or dorsum of abdomen arising from strong sockets, surrounded by dark brown scleroites, thick, spine-like, with acuminate or furcated apices, longest one on anterior tergites 0.112–0.115 mm long, shortest one 0.08 mm long, these being 2.8–2.9× and 2.0–2.1× as long as the basal diameter of antennal segment III respectively; 7th and 8th tergite each with a dark brown transverse sclerotic band, interrupted at the middle; 8th tergite with 12 hairs, longest one 0.118 mm long, 3.0× as long as the basal diameter of antennal segment III. Siphunculi on dark brown sclerotic cones, bearing hairs which are similar to those on abdominal dorsum. Cauda semilunar bearing many long fine hairs. Legs pale, with coxae, trochanters, preapical portion of femora and very apices of tibiae and tarsi dusky; hairs on legs fine, with acute apices, longest one on hind tibiae 0.143 mm long, 1.46× as long as the diameter at the middle of hind tibiae; empodial hairs very short; first tarsal segments with 10–11 ventral hairs besides one short leg.

Colour: Blackish in life.

	Measurements in mm	
	1	2
Length	3.05	3.12
Width	1.9	1.8
Antenna	0.94	?
Antennal segments III ...	0.29	?
,, IV ...	0.15	?
,, V ...	0.17	?
,, VI ...	(0.11+0.03)	(?)
Rostral segments 4+5 ...	(0.20+0.11)	(0.20+0.11)
$ht._2$	0.25	?
Siphunculus, diameter, base ...	0.28	0.28
,, apex ...	0.08	0.06

(ex *Plectranthus japonicus* (=*coetsa*) Simla, –9-1966, (CU.)

Alate viviparous female: Not known.

Sexual forms: Apterous oviparous females have been subsequently collected by K. D. Verma, C.P.R.I., Simla and R. Kumar, Simla, from Simla hills, after the genus and the species was described. The following description is based on above mentioned material.

Apterous oviparous female: Body oval 2.9–3.0 mm long. Head dark sclerotic, dorsal cephalic hairs as in viviparae, longest one 0.115 mm long, 3.1 × as long as the basal diameter of antennal segment III. Antennae 0.28 × as long as the body; longest hair on segment III, 0.070–0.076 mm long, shortest hair 0.030–0.050 mm long, these being 2.0–2.3 × and 1.0–1.2 × as long as the basal diameter of the segment, respectively; segment V with a single secondary rhinarium as in viviparae; processus terminalis 0.30 × as long as the base of antennal segment VI. Rostral segments 4+5, 1.2 × as long as second segment of hind tarsus; rostral segment 4 bears 6 accessory hairs besides preapicals. Hairs on the dorsum of abdomen as in viviparae, longest hair on anterior abdominal tergites 0.100–0.112 mm long, shortest one 0.050–0.060 mm long, these being 2.7–2.8 × and 1.3–1.8 × as long as the basal diameter of antennal segment III, respectively; longest hair on 7th tergite 0.106–0.115 mm long and on 8th, 0.118–0.124 mm long, these being 2.9–3.0 × and 3.1–3.2 × as long as the mentioned diameter. Siphunculi on dark elevated cones bearing thick spiny hairs. Cauda dark, bearing many fine hairs. Legs coloured as in viviparae; hind tibiae dusky, swollen and bearing numerous small pseudosensoria almost over their entire lengths; longest hair on hind tibiae 0.163 mm long and equal to the diameter at the middle of hind tibiae.

Colour: Not known.

Measurements in mm

	1	2
Length	2.91	3.04
Width	1.59	1.78
Antenna	?	0.85
Antennal segments III ...	0.33	0.30
,, IV ...	0.18	0.16
,, V ...	?	0.17
,, VI ...	(?)	(0.12+0.03)
Rostral segments 4+5 ...	0.31	0.31
$ht._2$	?	0.24
Siphunculus, diameter, base ...	0.24	0.22
,, apex ...	0.06	0.05

(1, ex indet. host, Kufri, 5-7-1970, CU; 2, ex indet, host, Simla, 10-11-1970, ZSI.)

Nymph (Apterous, early instar): Body pale; head, rostrum and legs dusky. Antennae 5 segmented, longest hair on segment III 0.050 mm long, shortest one 0.030 mm long, these being 1.15× and 0.69× as long as the basal diameter of the segment; processus terminalis 0.50× as long as base of segment V Rostral segments 4+5 distinct, 1.5× as long as the second segment of hind tarsus and bearing 4 accessory hairs. Hairs on the dorsum of abdomen 0.046–0.083 mm long, stout, thick with furcated or acuminate apices, arising from strong brown sockets; scleroites absent; 8th tergite with 10 hairs, longest one 0.106 mm long, 2.5× as long as the basal diameter of antennal segment III. Siphunculi on yellowish cones, Legs pale, longest hair on hind tibiae 0.083 mm long, equal to the diameter at the middle of hind tibiae.

Colour: Pale yellow in life.

	Measurements in mm
Length	?
Antenna	0.58
Antennal segments III ...	0.19
,, IV ...	0.10
,, V ...	(0.08+0.05)
Rostral segments 4+5 ...	0.31
$ht._2$	0.19
Siphunculus, diameter ...	0.10

(ex *Plectranthus japonicus* (=*coetsa*) Simla, —9-1966, CU.)

Material examined: Two apterous viviparous females and 4 nymphs (Holotype and paratypes) from *Plectranthus japonicus* (=*coetsa*) Simla, Himachal Pradesh, India, September 1966, coll. A. N. Choudhuri (CU); one apterous oviparous female, from an unidentified host, Kufri, Himachal Pradesh, India, 5-7-1970, coll. K. D. Verma (KDV); one apterous oviparous female, from an unidentified host, Simla, India, 10-11-1974, coll. R. Kumar (ZSI).

Discussion: This being the only species so far known under the genus, is easy to identify by the nature of dorsal hairs. The species has only been collected in Simla Hills, during September to November.

Distribution.—INDIA: Himachal Pradesh (Simla hills).

Types.—In the collections of Entomology Laboratory, Department of Zoology, University of Calcutta, India.

Subtribe **Eulachnina**

Key to the Genera of EULACHNINA

1(2)	Antennae 5 segmented. First tarsal segment of hind leg with 5 ventral hairs, without any dorsal hairs. Eyes without distinct triommatidia. Body very elongated..	*Pseudessigella* Hille Ris Lambers
2(1)	Antennae 6 segmented. First tarsal segment of hind leg with or without dorsal hairs. Eyes with ocular tubercles on shallow protuberance or distinct. Body elongated or spindle shaped or egg shaped.	
3(4)	Body elongated or spindle shaped. First tarsal segment of hind leg with dorsal hairs. Primary rhinarium without chitinised rim. Processus terminalis with 3 subapical hairs..	*Eulachnus* Del Guercio
4(3)	Body egg-shaped. First tarsal segment of hind leg without any dorsal hairs. Primary rhinaria with chitinised rim. Processus terminalis with 2 subapical hairs...	*Schizolachnus* Mordvilko,

Besides the three genera keyed above, one more genus under this subtribe viz. *Essigella* Del Guercio, is known from North America.

Genus **Eulachnus** Del Guercio 1909

1909. *Eulachnus* Del Guercio, G., *Riv. Patol. Veg.*, **3:** 329; Del Guercio G., 1909, *Redia*, **5:** 315; Pintera, A., 1968, *Acta entomol. bohem slov.*, **65:** 100; Inouye, M., 1970, *Bull. Govt. Forest Exp. Stn., Megouro* **228:** 92. Type species: *Lachnus agilis* Kaltenbach.

1915. *Protolachnus* Theobald, F. V., *Bull. Ent. Res.*, **6:** 145. Type species: *Protolachnus tuberculostemmata* Theobald.

Morphology: Body elongate, 1.4–3.5 mm long. Head with epicranial suture. Antennae slender, 6 segmented, always shorter than the body; flagellum in apterae without secondary rhinaria which are variably present on segments III–V in alatae; hairs on flagellum may be acute, acuminate, blunt or capitate at apices, 0.010–0.013 mm long and 0.27–0.50 × as long as basal diameter of antennal segment III; primary rhinaria without chitininous rims; processus terminalis 0.17–0.25 × as long as base of antennal segment VI and bearing 3 subapical hairs besides 3 apical hairs. Ultimate rostral segment short and blunt, 0.06–0.13 mm long, segment 5 fused with segment 4 and shorter than its own basal width. Eyes with ocular tubercle on a shallow protuberance, not visible from

above. Tergum with variable sclerotic pattern or hair-bearing scleroites, sometimes sclerotisation may be nearly absent; dorsal hairs 0.06–0.160 mm long, with acute, acuminate, blunt or capitate apices. Siphunculi pore-like, on variably pigmented cones; hairs on tibiae spiny, with variable apices, those on hind tibiae 0.033–0.150 mm long, 0.50–3.1 × as long as the diameter at the middle of hind tibiae; first tarsal segments with a pair of dorsal hairs; second segment of hind tarsus 0.150–0.270 mm long. Forewings with media faint, usually once branched; hind wings with both obliques.

Sexual forms not known in many species. Males are usually alate and possess numerous secondary rhinaria on segments III–V and a few at the bases of antennal segment VI and exhibit finer dorsal hairs than in alate viviparae. Oviparae are usually apterous and show swollen hind tibiae bearing numerous pseudosensoria.

First instar nymph usually bears 2 subapical hairs on processus terminalis.

Discussion: The characteristic shape of body, host plant association and combination of morphological characters usually help to distinguish species of this genus from other genera of *Eulachnina*. Out of two species recorded from the region, *E. thunbergii* appears to be fairly common in Pine growing areas of Northeastern India.

Biology: The genus contains about 14 species, most of which feed on needles of different species of *Pinus* except *E. tamaricis* Nevsky, which is known to infest radix of *Tamarix ramosissima*. Ants normally do not attend these species but sometimes a few may be seen in association. Most of the species are brown, blackish green or bright green and some may remain lightly covered with whitish wax secretion.

Distribution.—Palaearctic, Oriental, Australian and Nearctic. Pintera (1968) has given an account of Middle-European species and Inouye (1970) has dealt with the Japanese species. Szelegiewicz (1970) while describing a new species discussed relationship between several species of the genus.

Type species.—*Lachnus agilis* Kaltenbach 1843. Location of the type is unknown.

Key to the species of **Eulachnus**

Apterous viviparous female:

1(2) Abdominal dorsum with distinct hair-bearing scleroites. Dorsal hairs with acute apices, longest one on anterior tergites 0.128–0.148 mm long, 4.5–5.0 × as long as the basal diameter of antennal segment III. Ultimate rostral segment

0.57–0.59 × as long as the second segment of hind tarsus. Longest hair on hind tibiae 0.130–0.146 mm long, 2.0–2.55 × as long as the diameter at the middle of the hind tibiae. . *E. thunbergii* Wilson

2(1) Abdominal dorsum without hair-bearing scleroites, at least on anterior tergites. Dorsal hairs short, sparse, with acuminate apices, longest one on anterior tergites 0.010 mm long, 0.30 × as long as the basal diameter of antennal segment III. Ultimate rostral segment 0.39 × as long as second segment of hind tarsus. Longest hair on hind tibiae 0.033 mm long, 0.50 × as long as the diameter at the middle of hind tibiae. .. *E. pumilae* Inouye

Alate viviparous female:

1(2) Longest hair on antennal segment III, 0.116–0.120 mm long. Antennal segment III with 2–5 secondary rhinaria and segment IV with 1 secondary rhinarium. Dorsal hairs up to 0.08–0.146 mm long.... .. *E. thunbergii* Wilson

2(1) Longest hair on antennal segment III up to 0.04 mm long. Flagellum usually without secondary rhinaria. Dorsal hairs up to 0.05 mm long. *E. pumilae* Inouye

Eulachnus pumilae Inouye 1939

(Plate 24; Plate 63)

1939. *Eulachnus pumilae* Inouye, M., *Insecta matsum.*, **13**(3): 134.

1950. ? *Eulachnus cembrae* Borner, C., *Selbstverlag, Naumberg*, 2.

1968. ? *Eulachnus cembrae*, Pintera, A., *Acta entom Bohemoslov.*, **65**(2): 100.

1970. ? *Eulachnus cembrae*, Ghosh, L.K., *Sci. Cult.*, **36**: 562.

1970. *Eulachnus pumilae* Inouye, M., *Bull. Govt. Forest Exp. Stn. Megouro*, **228**: 93.

1974. *Eulachnus pumilae*, Szelegiewicz, H., *Fragm. Fauns.*, **19**(18): 463.

Apterous viviparous female: Body pale, elongate, 2.31–2.36 mm long. Head with a distinct median suture, pale, with about 14 stiff hairs, with swollen apices, longest one 0.038–0.060 mm long, 1.20–1.63 × as long as the basal diameter of antennal segment III. Antennae brownish, stout, 0.38–0.40 × as long as the body; flagellum gradually more distinctly imbricated from base to apex; hairs on flagellum minute, with swollen apices, longest one on segment III, 0.010–0.013 mm long, shortest one 0.006-0.010 mm long, these being 0.27–0.40 × and 0.18–0.30 × as long as the basal diameter of the segment, respectively; processus terminalis 0.20–0.25 × as long as

the base of segment VI and 0.15–0.16 × as long as antennal segment III. Rostrum hardly reaches mid-coxae, ultimate rostral segment broad, obtuse, 0.39 × as long as second segment of hind tarsus and bears a pair of accessory hairs. Abdominal dorsum pale without any scleroites; hairs on the dorsum of abdomen minute, 0.006–0.010 mm long, 0.18–0.30 × as long as the basal diameter of antennal segment III; 8th tergite with few hairs up to 0.010 mm long. Siphunculi small, hardly elevated, placed on small dusky hairless sclerites. Cauda pale with 6–8 long fine hairs. Legs stout, dusky or brown; hairs on femora sparse; hairs on tibiae conspicuous but mostly shorter than those on the vertex, longest one on hind tibiae 0.033 mm long, 0.50 × as long as the diameter at the middle of hind tibiae; first tarsal segment elongate, 0.66 × as long as the second segment and bearing 2 dorsal hairs and 8–9 ventral hairs.

Colour: Pale. According to Inouye (1939), body yellowish green to green; eyes dark red, antennae pale green, somewhat dusky on distal end of antennal segments III–VI; legs pale green, femora dusky at the end, tibiae and tarsi dusky; siphunculi dusky.

Measurements in mm

	1	2
Length	2.36	2.31
Width	0.85	0.78
Antenna	0.96	0.88
Antennal segment III ...	0.29	0.24
,, IV ...	0.15	0.14
,, V ...	0.16	0.15
,, VI ...	(0.15+0.04)	(0.14+0.03)
urs.	0.080	0.080
$ht._2$	0.20	0.19
Siphunculus, diameter ...	0.020	0.020

(1–2, ex indet. host, Tenga Valley, 20-12-1965, ZSI.)

Alate viviparous female: [Not recorded in the region, description based on Inouye (1939)]. Body elongate. Dorsal cephalic hairs up to 0.08 mm long. Antennae slender, with minute hairs, up to 0.04 mm long; antennal segment II little shorter than segment I and bearing 3 hairs; antennal segment III with 12 hairs and IV with 6 hairs; flagellum without any secondary rhinaria; segments V and VI each with a large apical rhinarium besides small accessory ones; relative lengths of segments III: 45, IV: 23, V: 26, VI: 23. Dorsal hairs small, 0.05 mm long. Legs very long and slender; length of femora; fore, 0.38 mm, middle, 0.32 mm, hind, 0.90 mm; length of tibia: fore, 0.74 mm, middle 0.72 mm; hind 1.46 mm; hairs on hind tibiae 0.06 mm long. Wings hyaline; stigma and

veins pale yellow; forewings with media obsolete on basal part, once branched and faintly imbricated; hind wings with two obliques. Otherwise as in apterous viviparous females.

Colour: As in apterous viviparous female, thorax yellowish green.

Measurements in mm:

	Length	Antenna	Forewings	Hindwings
1.	2.52	1.20	2.43	1.50

Sexual forms: Alate male and oviparous females of *E. cembrae* Borner, which has been considered here as a synonym of *E. pumilae*, have been described from Europe, by Pintera (1968) as follows.

Alate male: Antennae blackish brown; ratio of segments III–VI–100: 55: 65: 39+7; segment III with 138–161, IV with 52–70, V with 38–43 and basal portion of VI with 7–15 minute secondary rhinaria; abdomen with brown transverse stripes placed ventrally.

Oviparous female: Ratio of antennal segments III–VI–100: 53: 65: 45+10; dorsal hairs on anterior abdominal tergites 0.010 mm long; hind tibiae swollen with 35–77 well developed pseudosensoria.

Nymphs: Not known.

Material examined: Two apterous viviparous females, from *Pinus* sp. Rupa, Tenga valley, district, Arunachal Pradesh, India 20-12-1965, coll. S. K. Bhattacharya, det. L. K. Ghosh (as *E. cembrae*, ZSI).

Discussion: This species could easily be separated from the only other known species of the genus found in India, by minute dorsal and antennal hairs. As the species has been originally described from Japan, efforts were made to compare the Indian specimens with type material but these could not be obtained. This species is known to feed on needles of Pine trees; it has so far been recorded from *Pinus pumila*, *P. cembra*, *P. coraiensis*, and *P. pentaphylla* in different regions.

Distribution.—INDIA: Arunachal Pradesh; JAPAN; KOREA; SIBERIA and alpine region of EUROPE.

Types.—Probably in the Entomological Institute, Faculty of Agriculture, Hokkaido University, Sapparo, Japan and in Hokkaido Forestry Experimental Station, Japan.

Eulachnus thunbergii Wilson 1919
(Plate 25; Plate 64)

1919. *Eulachnus thunbergii* Wilson, H. F., *Ent. News*, **30**: 3.

1921. *Eulachnus piniformosanus* Takahashi, R., *Aphididae of Formosa*, pt. **1**: 83.

1968. *Eulachnus thunbergii*, Ghosh, A. K. and Raychuadhuri, D. N., *Bull. Ent.*, **9**(2): 147.

1969. *Eulachnus ? rileyi*, David, S. Kanakaraj and Rajasingh, S. G., *Proc. zool. Soc. Calcutta*, **22**: 154. [misid.]

1970. *Eulachnus thunbergii*, Inouye, M., *Bull. Govt. Forest Exp. Stn. Megouro*, **228**: 92.

Apterous viviparous female: Body elongate, 2.39–3.10 mm long. Head dusky to brown, with a distinct median suture; frons and vertex with at least 20 long fine hairs, longest one 0.138–0.164 mm long, up to 5.6–6.2 × as long as the basal diameter of antennal segment III. Antennae brownish, sometimes darker towards apices, 0.50–0.59 × as long as the body; flagellum gradually more distinctly imbricated from base towards apex; hairs on the flagellum long and fine, longest one on segment III, 0.116–0.120 mm long, shortest one 0.038–0.040 mm long, these being 4.2–4.6 × and 1.5–1.6 × as long as the basal diameter of the segment, respectively; processus terminalis 0.17–0.19 × as long as base of segment VI and 0.08–0.09 × as long as antennal segment III. Rostrum reaches mid coxae or little beyond, ultimate rostral segment 0.57–0.59 × as long as the second segment of hind tarsus and bearing 4 accessory hairs. Abdominal dorsum pale, bearing series of brown hair-bearing scleroites besides some "muskelplatten" in marginal areas; hairs on the dorsum of abdomen with acute apices, longest one 0.128–0.148 mm long, shortest one 0.070–0.100 mm long, these being 4.5–50 × and 2.5–4.0 × as long as the basal diameter of antennal segment III, respectively; 8th tergite with a pair of brown scleroitic bands which may fuse into a single transverse band and bearing at least 12 fine hairs, longest one being 0.140–0.144 mm long. Siphunculi small, hardly elevated, without any hairs. Subgential plate brown, sclerotic. Cauda brown to dark with many long fine hairs. Legs light to dark brown, femora stout, with many fine hairs; hairs on tibiae long and fine, longest one on hind tibiae 0.130–0.146 mm long, 2.0–2.25 × as long as the diameter at the middle of hind tibiae; first tarsal segments with 2 long dorsal hairs and 10–11 ventral hairs.

Colour: Pale dirty green to yellowish in life.

Measurements in mm:

	Length	Width	Antenna	Antennal segments III	IV	V	VI	urs.	ht.$_2$	Siphunculus diameter
1.	2.72	1.13	1.52	0.45	0.26	0.29	(0.22+0.04)	0.13	0.22	0.03
2.	2.39	0.98	1.42	0.44	0.24	0.28	(0.18+0.04)	0.12	0.22	0.03
3.	2.42	0.98	1.44	0.43	0.22	0.27	(0.18+0.04)	0.12	0.22	0.03

[1, ex Pine, Shillong, 28-12-1965, coll. S. K. Chanda (ZSI),
2, ex Pine, Shillong, 28-4-1970, coll. H. Banerjee (CU),
3, ex Pine, Mawphlang, 12-1-1973. coll. A. K. Ghosh (ZSI).]

Alate viviparous female: Body elongate, 2.73–3.18 mm long. Head brownish, hairs on frons and vertex as in apterous morph, longest one 0.115–0.130 mm long, 4.4–5.0 × as long as the basal diameter of antennal segment III. Antennae yellowish to brown, with apices of segment III, IV, V and apical 0.75 portion of segment VI darker; segment III with 2–5 and segment IV with 1 secondary rhinaria; longest hair on segment III, 0.115–0.130 mm long, shortest one 0.040–0.060 mm long, these being 4.5–5.0 × and 1.5–2.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.20–0.22 × as long as base of segment VI and 0.07–0.09 × as long as the antennal segment III. Abdominal dorsum pale bearing some "muskelplatten" besides a few hair-bearing scleroites, the latter appearing fewer than in apterae and more restricted to spinal region; hairs on the dorsum of abdomen fine, longest one on anterior tergites 0.115–0.146 mm long, shortest one 0.083 mm long, these being 5.0–6.0 × and 3.0–3.5 × as long as the basal diameter of antennal segment III, respectively; 8th tergite with 10–12 hairs. Siphunculi mere rings on sclerotic bases. Cauda dusky with many fine hairs. Legs yellowish brown, with bases of hairs, specially on femora, often brownish; hairs on tibiae fine, longest one on hind tibiae 0.163–0.181 mm long, 2.9–3.3 × as long as the diameter at the middle of hind tibiae. Forewings with media obsolete on basal part, once branched and faintly indicated; pterostigma dark brown; radial sector, cubitus and anal bordered brown; hind wings with both obliques.

Colour: Dirty green to brown in life.

Measurements in mm:

	Length	Width	Antenna	Antennal segments III	IV	V	VI	urs.	ht.$_2$	Siphunculus diameter
1.	3.1	1.06	1.66	0.55	0.39	0.37	(0.21+0.04)	0.12	0.21	0.03
2.	2.6	?	1.30	0.48	0.24	0.31	(0.20+0.04)	0.12	0.21	0.03

[1, ex Pine, Shillong. 11-3-1971, coll. S. Sarker (CU),
2, ex Pine, Mawphlang, 12-1-1973 coll. A. K. Ghosh (ZSI).]

Sexual forms: No sexual form has been recorded from India. Inouye (1972) has mentioned that alate males and oviparous females appear in October in Sapporo and Nanae (Hokkaido), Japan but do not appear in November in Southern part of Japan.

Nymphs: Takahashi (1924) has given short description of different instars (under *piniformosanus* Takahashi) as follows: First instar nymph: Body narrow, bearing many long hairs. Head indistinctly divided by a median suture and bearing 15 hairs on dorsum. Eyes large. Antennae 4 segmented, relative length of segment III: 47 and IV: 28. Rostrum normally reaches far beyond hind coxae but sometimes only to the middle of hind coxae. Siphunculi as in adult. Cauda semicircular. Second instar nymph: Antennae 5 segmented, with relative lengths of segment III: 40, IV: 20, V: 28. Third instar lymph: Antennae 6 segmented, with relative lengths of segment III: 47, IV: 20, V: 29, VI: 35; wing pads begin to appear in alatae nymphs. Fourth instar nymph: segment IV in both apterous and alate morphs, with a rhinarium near the apex; relative lengths of segment III: 47, IV: 20, V: 29, VI: 35; wing pads well developed in alate nymphs; hairs on the dorsum of head 16–22 in apterous nymph and 20 in alate nymphs.

Material examined: Numerous material have been seen from Northeastern region from *Pinus kesiya* including one apterous viviparous female from Pine, Shillong, 8-10-1967, coll. S. G. Rajasingh (SKD, No. 293 labelled as *E. rileyi*) and three apterous viviparous females and one nymph from Pine, Taihaku, Feb. 1929, det. Takahashi (CCT, labelled as *E. piniformosanus* Takahashi).

Discussion: The species could easily be recognised by its dirty green to brown coloured colonies on pine needles. It has been seen to infest both young pine seedlings and needles of older trees from September to March but appears more common and active on tender seedling. Only once, small black ants (*Cremastogaster ? politula* Forel) were seen in association with this species. Rearing of this species in the Laboratory at Shillong, yielded a hymenopterous parasite, *Diaeretus leucopterus* (Haliday) in November and February. This parasite has earlier been recorded from England and continental Europe, Japan, South Korea on *E. agilis* (Kalt.), *E. ? brevipilosus* Borner, and *E. piniformasanus* Takahashi (now considered a synonym of *E. thurbergii*)and *E. tuberculostemmata* Theobald (Mackauer, 1968). Predatory chamaemyid flies have been recorded in Shillong region of Khasi Hills, Meghalaya in association with this species. The species has been recorded to infest *Pinus densiflora, Pinus thunbergii, Pinus montana, Pinus luchuensis, P. massoniana* and *Pinus taeda* elsewhere, (Inouye, 1970). Researchers in a project on "Pine forest ecosystem" in Meghalaya are currently investigating bionomics and population dynamics of Pine insects, including *E. thunbergii.* The species earlier reported as *E. ? rileyi*

(William) by David and Rajasingh (1969) from Shillong has now turned out to be *E. thunbergii* Wilson. Eastop (1966) has mentioned that *E. piniformosanus* Takahashi may be a synonym of *E. thunbergii* Wilson; three apterae available through the courtesy of Dr. Charles Chu Tao Taiwan, [labelled "*E. piniformosanus* February 1929, Taihaku, R. Takahashi, Host Pine"] showed that the specimens agree fairly well with *E. thunbergii* Wilson, except in the ratio of antenna to body which is 0.43–0.48 × as against 0.55–0.59 × in *thunbergii*.

Distribution.—INDIA: Arunachal, Assam, Meghalaya, Nagaland, and Manipur; JAPAN: KOREA: FORMOSA and AUSTRALIA.

Types.—According to Dr. V F. Eastop, British Museum (Nat. Hist.) London, the types may be in the collections of United States Department of Agriculture, Washington, D.C., U.S.A.

Genus **Pseudessigella** Hille Ris Lambers, 1966

1966. *Pseudessigella*, Hille Ris Lambers, D., *Tijdschr. Ent.*, **109**: 219: Pintera, A., 1968, *Acta ent. Bohemoslov.*, **65**: 100. Type species; *Pseudessigella brachychaeta* Hille Ris Lambers.

Morphology: Body elongated, narrow. Front strongly convex; dorsal cephalic hairs incrassate at apices. Antennae short, 5 segmented, 0.25 × as long as the body; flagellum without secondary rhinaria in apterae; processus terminalis less than 0.15 × as long as base of last antennal segment; hairs on flagellum sparse, short and blunt. Eyes without distinct triommatidia. Ultimate rostral segment very short and blunt, about 0.33 × as long as the second segment of hind tarsus. Tergum membraneous with small fuscous sclerites bearing hairs and wide sclerotic area on 8th abdominal tergite; dorsal hairs usually with incrassate apices, shorter than the basal diameter of antennal segment III. Siphunculi small, hardly elevated, placed on pale brown hairless sclerites. Cauda semilunar. Legs variably pigmented, hind tibiae much longer than other tibiae; first tarsal segments with 5 ventral hairs, without any dorsal hairs; claws of second tarsal segments slender and acute.

Alate viviparous female and sexual forms of this monotypic genus are unknown.

Discussion: The genus is very closely related to *Eulachnus* Del Guercio and the American genus *Essigella* Wilson, but could be separated from the former by 5 segmented antennae besides other characters and from the latter by the nature of tarsal claws.

Biology: The only species of this endemic genus is reported to infest long needles of *Pinus wallichiana* during July in Muree hills of Pakistan. Although the host plant is common in Northwestern part

of the subcontinent, the species has never been reported from other regions, though some species of *Cinara* are known from the same host.

Distribution.—PAKISTAN: Muree Hills.

Type species.—*Pseudessigella brachychaeta* Hille Ris Lambers, 1966. In the collections of D. Hille Ris Lambers, Bennekom, The Netherlands.

Pseudessigella brachychaeta Hille Ris Lambers, 1966

(Plate 26; Plate 65, figs. 1–2)

1966. *Pseudessigella brachychaeta* Hille Ris Lambers, D., *Tijdschr. Ent.* **109**(8): 219.

Apterous viviparous female: Body elongate, pale 2.22–2.43 (2.0–2.6 mm) mm, long with 0.72 mm as maximum width. Head pale with a few dorsal hairs with incrassate apices; frons convex. Antennae 5 segmented, pale yellow, 0.20–0.26 × as long as the body, 1.20 (1.3 ×) as long as the width of head across the eyes; flagellum feebly imbricated, without any secondary rhinaria, bearing few very short hairs up to 0.006 mm long, primary rhinaria on segments IV and V large, rounded; processus terminalis hardly 0.12–0.13 × as long as base of segment V Rostrum reaches beyond midcoxae, ultimate rostral segment blunt, 0.28–0.30 × as long as, narrow, elongate second segment of hind tarsus and bearing only preapical hairs. Eyes without triommatidia. Abdominal dorsum membraneous, pale, bearing small brown pleural and marginal intersegmental sclerites; stigmal plates brownish; hairs on dorsum of abdomen mostly arising from minute, fuscous scleroites and with incrassate apices, longest one on anterior tergites 0.012–0.013 mm (–0.017 mm) long, 0.80 × as long as the basal diameter of antennal segment III, shortest one as those on antenna; hairs on posterior tergites 0.013–0.015 mm long, 0.80–0.90 × as lorg as the mentioned diameter; 8th tergite separated from the rest, appearing as one wide dusky ring and bearing 15–18 short hairs, up to 0.015 mm long. Siphunculi on small brown cones without any hair and appearing as mere rings. Cauda blunt, semilunar, twice or more times as long as wide and bears at least 20(–30) hairs. Legs pale yellow, fore and mid tibiae short and strongly swollen on basal dorsal areas and appearing convex; hind tibiae about twice as long as middle tibiae and swollen to a lesser extent and bearing short hairs up to 0.02–0.03 mm long, which may be 0.60–0.75 × as long as the diameter at the middle of hind tibiae; first tarsal segments elongate, and bearing 5.5.5 hairs; first tarsal segment of hind leg ventrally 1.50 × as long as dorsally, second tarsal segments narrow elongate and with slender, acute apical claws.

Colour: Pale green in life (H.R.L. 1966).

	Measurements in mm	
	1	2
Length	2.43	2.53
Width	0.72	0.72
Antenna	0.52	0.53
Antennal segment III ...	0.20	0.21
,, IV ...	0.08	0.09
,, V ...	(0.08+0.02)	(0.08+0.02)
urs.	0.06	0.06
$ht._2$	0.20	0.20
Siphunculus, diameter base ...	0.04	0.04
,, apex ...	0.02	0.02
Cauda	0.07	0.07

(1, 2, ex *Pinus wallichiana* (=*excelsa*), Muree, 4-7-1964, DHRL.)

Alate viviparous female: Not known.

Sexual forms: Not known.

Nymphs: Not known.

Material examined: Two apterous viviparous females (Paratypes), from *Pinus wallichiana* (=*excelsa*), Muree, West Pakistan, 4-7-1964, coll. V. D. Bosch, det. D.H.R.L. (DHRL).

Discussion: Short processus terminalis, very short dorsal hairs, 5 segmented antennae, swollen femora and acute tarsal claws would make diagnosis easy for this species.

The species is reported to feed on needles of Pines.

Distribution.—PAKISTAN: Muree. Although several collection of aphids have been made by the author from pines in Northeast India, this species has never been observed and it appears to be restricted to some localities of the Northwest region of the subcontinent.

Types.—In the collections of D. Hille Ris Lambers, Bennekom, The Netherlands.

Genus **Schizolachnus** Mordvilko, 1908

1908. *Schizolachnus* Mordvilko, A. K., *Ezheg. Zool. Mus.*, **13**: 375; Pintera, A., 1968. *Acta ent. bohemoslov.*, **65**: 108; Inouye, M., 1970. *Bull. Govt. Forest Exp. Stn., Tokyo*, **228**: 91. Type species: *Aphis tomentosa* Villers =*Aphis pineti* Fab.

1919. *Unilachnus* Wilson, H. F., *Ent. News*, **30**: 5. Type species: *Unilachnus parvus* Wilson =*Lachnus parvus* Wilson.

Morphology: Body oval, densely pubescent. Head with epicranial suture, which may sometimes be incomplete. Antennae

6 segmented, always shorter than the body; flagellum without secondary rhinaria in apterae; alatae with secondary rhinaria on segments III and IV; primary and secondary rhinaria with chitinised rims; processus terminalis very short, with apical and subapical setae almost placed at same level. Eyes large, ocular tubercles sometimes not easily discernible. Rostrum short, ultimate rostral segment obtuse at apex. Abdominal dorsum pale with row of small muskelplatten; dorsal hairs numerous, fine, flagellate. Siphunculi on small sclerotic cones bearing few hairs. Cauda sclerotic, semioval. Legs with many fine hairs; first tarsal segments without any dorsal hairs, with 8–12 ventral hairs and one short sense-peg; wings pale; forewings with radial sector straight, stigma elongate, media simple or once branched; hind wings with both obliques.

Sexual forms include alate males and apterous oviparous female, the latter usually with swollen hind tibiae bearing numerous pseudosensoria.

Discussion: The genus contains about 8 species, all of which are Nearctic and Palaearctic in distribution; only one species *S. orientalis* (Takahashi), is known from South-east Asia viz. Japan, China, India and Formosa. The members of this small genus could easily be separated from related genera by the combination of characters as mentioned above. All species are known to feed on Pine-tree needles, and secrete dirty white waxy secretion. Pintera (1968) and Inouye (1970) have redescribed the genus.

Biology: The species of this genus form small colonies, where the individuals usually form a row on pine-needles. The secretion of fine whitewax sometimes help to detect the colonies on the needless. Sexuales are usually known to be produced in winter months. Ants are not known to attend these aphids. At least 3 species of hymenopteran parasites viz. *Pauesia unilachni* (Gohan), *Pauesia californica* Ashmead and *Praon bicolor* Mackauer are known from some species of *Schizolachnus.*

Distribution.—INDIA, JAPAN, CHINA, FORMOSA, TURKEY, EUROPE, U.S.A., CANADA.

Type species.—*Aphis tomentosa* Villers 1789 = *pineti* Fabricius 1781. Location of type is not known.

Schizolachnus orientalis (Takahashi)

(Plate 27; Plate 65, figs. 3–4).

1924. *Unilachnus orientalis* Takahashi, R. *Rep. Dept. Agric. Govt. Res. Inst.* Formosa **10**: 74.

1970. *Schizolachnus orientalis,* Inouye, M., *Bull. Govt. Forest Exp. Stn. Megouro,* **139**: 91.

Apterous viviparous female: Body broadly oval, 2.2–2.3 mm long (1.95–2.42 mm). Head dark brown with distinct epicranial suture; hairs on frons and vertex fine, up to 0.130–0.146 mm long, 3.3–3.5 × as long as the basal diameter of antennal segment III. Eyes large, ocular tubercles hardly discernible. Antennae 6 segmented, 0.40–0.44 × (0.37–0.43 ×) as long as the body, pale except on basal segments and apical 0.50 portion of segment V and 0.80 portion of segment VI which are dusky to brown; flagellum without any secondary rhinaria, hairs on flagellum long, thin, numerous, longest one on antennal segment III, 0.155–0.170 mm long, shortest one 0.076–0.083 mm long, these being 4.0 × (3.5–4.5 ×) and 1.8–2.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.25–0.38 × as long as base of antennal segment VI and 0.09–0.12 × as long as antennal segment III; base of segment VI with 6–7 long fine hairs, and processus terminalis with 4 setae, including 2 subapical and 2 apical ones. Rostrum reaches mid coxae, ultimate rostral segment short, stout, 0.54–0.58 × (0.47–0.55 ×) as long as the second segment of hind tarsus and bearing 4 accessory hairs. Mid thoracic furca with a broad base. Abdominal dorsum pale bearing a row of marginal and a row of spinal "muskelplatten" on each side besides sclerotic stigmal plates; hairs on the dorsum of abdomen, numerous, flagellate, 0.130–0.146 mm long, 3.3–3.8 × as long as the basal diameter of antennal segment III. Siphunculi on small brown sclerotic cones, basal diameter of siphuncular cones little longer than the longest hair on antennal segment III, bearing 11–16 fine hairs. Cauda brown, semioval with many long, fine hairs. Legs pale except on basal segments, most part of femora, apices of tibiae and whole of tarsi which are dusky to dark brown; hairs on legs long, fine, numerous, longest one on hind tibiae 0.198–0.200 mm long, 2.0–2.1 × as long as the diameter at the middle of hind tibiae; first tarsal segments with 11–12 ventral hairs and one sense peg; second segment of hind tarsus 2.33 × as long as the first segment.

Colour: Black brown in life.

	Measurements in mm		
	1	2	3
Length	2.28	2.28	2.18
Width	1.38	1.35	1.41
Antenna	0.91	0.94	0.96
Antennal segment III ...	0.34	0.33	0.33
,, IV ...	0.15	0.16	0.18
,, V ...	0.14	0.15	0.15
,, VI ...	(0.11+0.04)	(0.12+0.03)	(0.11+0.04)
urs.	0.14	0.13	0.15
$ht._2$	0.24	0.24	0.24
Siphunculus diameter, base ...	0.16	0.16	0.18
apex ...	0.05	0.07	0.07

(1–3, ex *Pinus kesiya* (=*insularis*), Langol hill, 12-1-1976, TKS.)

Alate viviparous female: (Description sent by Th. K. Singh, Manipur; material not available). Body about 2.34–2.36 mm long with 1.11–1.25 mm as the maximum width. Antennae 6 segmented, pale, excepting the apices of segments III, IV and distal half of segment V and whole of segment VI which are dark, about 0.39–0.41 × as long as the body; flagellum distinctly imbricated; longest hair on the antennal segment III about 5–6.42 × as long as the basal diameter of the segment, and about 0.25 × as long as base of antennal segment VI; segment III with 6–8 rounded, protuberant secondary rhinaria distributed along the outer margin; IV with 2 similar rhinaria on the distal 0.5 portion. Rostrum reaches mid coxae; urs. about 0.5 × $ht._2$ with 2 secondary hairs. Abdominal dorsum pale but with scattered brownish muscle plates; dorsal hairs numerous, long and fine. The distal half of tibiae and whole of tarsi brown, rest of femora and tibiae pale. Radial sector in forewing nearly straight, media simple; hind wing with 2 oblique veins. Otherwise as in apterae viviparae.

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	$ht._2$
				III	IV	V	VI		
1.	2.36	1.11	0.93	0.33	0.16	0.15	(0.11+0.02)	0.10	0.21

Sexual forms:

Apterous oviparous female: (Description sent by Th. K. Singh, Manipur; material not available). Body about 2.59 mm long with 1.68 mm as the maximum width. Head dark brown, without lateral frontal tubercles, smooth. Antennae 6 segmented, about 0.35 × as long as the body, without secondary rhinaria; processus terminalis about 0.25 × as long as the base of antennal segment VI. Ultimate rostral segment blunt, about 0.47 × $ht._2$ with 2 long and fine hairs. Legs brown, hind tibiae swollen, with many rounded pseudensoria, other characters as in apterae viviparae.

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	$ht._2$
				III	IV	V	VI		
1.	2.59	1.68	0.93	0.32	0.16	0.16	(0.11+0.02)	0.10	0.24

Nymphs: Not seen.

Material examined: Three apterous viviparous females from *Pinus kesiya*, Langol Hill, Manipur, India, 12-1-1976, coll. Th. K. Singh (labelled *Nippolachnus nungbiensis* n.sp.).

Discussion: This species forms the first record of the genus *Schizolachnus* from India; it has been collected only from the locality at Manipur. However, it has been reported to be very common in Japan during the months of July to November; alate males and apterous oviparous females have also been reported to appear during October and November (Inouye, 1970).

The blackish brown species infests, needles of the Pine tree (*Pinus kesiya* in India, *Pinus densiflora* and *Pinus thunberü* in Japan, *Pinus mossoniana* in Formosa) and may cluster in rows along the needle; often fine white meal may cover their bodies (–Inouye, *op. cit.*). In Manipur, it has been collected sometimes along with *Eulachnus thunbergii* (Wilson) and *Cinara atrotibialis* David & Rajasingh.

Distribution.—INDIA: Manipur; CHINA; JAPAN; FORMOSA.

Tribe **Lachnini**

Key to the genera of LACHNINI

1(2) Rostrum much longer than the body, when extended. Flagellum usually with secondary rhinaria on segment IV in apterae & on segment III and IV in alatae; processus terminalis as thick as base of segment VI and with many normal hairs. Eyes with distinct ocular tubercles. Forewings with media usually twice branched; radial sector long and curved. Body of large size, 4.0–8.0 mm long. On Coniferae, and on broad-leafed plants. *Stomaphis* Walker

2(1) Rostrum shorter than body; processus terminalis slender than base of antennal segment VI and with apical setae, may or may not be with normal hairs. Other characters variable.

3(10) Forewings with pterostigma elongate, many times as long as maximum width, almost straight up to the tip; radial sector little curved or straight. Wings immaculate. Apterae may be with or without ocular tubercles and sometimes with a single tubercle on 4th abdominal tergite.

4(5) Eyes without ocular tubercles. Dorsal cephalic hairs long and fine, may be up to 6.5 × as long as the basal diameter of antennal segment III. Tergum pale in apterae, with sclerotic pattern in alatae,

Forewings with media much paler and thinner than other veins, may be simple, once or twice branched. Body 2.5–5.5 mm long. Usually on plants of Rosaceae .. *Nippolachnus* Matsumura

5(4) Eyes with distinct ocular tubercles. Dorsal cephalic hairs up to 3.5 × as long as the basal diameter of antennal segment III. Tergum pale or sclerotic in apterae and alatae. Forewings with media as dark as or paler than other veins, usually twice branched. On various host plants. Body usually 4.0–6.0 mm long.

6(7) Abdominal dorsum with a large spinal tubercle on 4th tergite Flagellum with secondary rhinaria on segment IV in apterae and on segments III and IV in alatae. Hairs on the hind tibiae up to 0.70 × as long as the diameter at the middle of hind tibiae. On *Salix* and *Eriobotrya*..... *Tuberolachnus* Mordvilko

7(6) Abdominal dorsum without tubercle on 4th tergite. Flagellum with secondary rhinaria on segments III–IV in apterae and in alatae. Hairs on hind tibiae shorter or longer than the diameter at the middle of hind tibiae. On various host plants.

8(9) Forewings with pterostigma curved over the tip of the wings. Hairs on flagellum and dorsum of abdomen fine, always longer than the basal diameter of antennal segment III. Abdominal dorsum with large marginal sclerites, at least on anterior tergites. Hairs on hind tibiae longer than diameter at the middle of hind tibiae. On *Berchemia*, *Carya*, *Fagus*, *Liquidamber*, *Platanus*, *Quercus* and *Tilia* spp. *Longistigma* Wilson

9(8) Forewings with pterostigma never reaching the tip of the wings. Hairs on flagellum and dorsum of abdomen fine or thick, those on flagellum shorter or longer than the basal diameter of antennal segment III. Abdominal dorsum may be distinctly reticulated or not, and may bear scattered scleroites but without large marginal sclerites, as above. Hairs on hind tibiae, 0.40–0.80 × as long as the diameter at the middle of hind tibiae. On *Pyrus* and *Prunus* spp. *Pyrolachnus* Basu & Hille Ris Lambers

10(3) Forewings with pterostigma blunt; radial sector usually curved. Wings often variably pigmented or with a dark blotch or pale. Apterae with ocular tubercles and never with a single dorsal tubercle on 4th tergite.

11(12) Abdominal dorsum with double row of large spinal tubercles. Flagellum with secondary rhinaria on segments III–IV; hairs on flagellum much shorter than the basal diameter of antennal segment III. Hairs on hind tibiae less than 0.50 × as long as the diameter at the middle of hind tibiae. Forewings with areas between medial braches and between anal and cubitus, pigmented. On *Prunus* spp. *Pterochloroides* Mordvilko

12(11) Abdominal dorsum without tubercles. Hairs on flagellum shorter or longer than basal diameter of antennal segment III. Hairs on hind tibiae shorter or longer than the diameter at the middle of hind tibiae. Other characters variable.

13(14) Abdominal dorsum with hair-bearing scleroites, which may sometimes become confluent. Ultimate rostral segment much shorter than or nearly equal to second segment of hind tarsus and bearing 10–15 accessory hairs. Hind legs usually similar to fore and mid legs. Forewings with a pigmented blotch at base of media. On *Rosa* and *Rubus*. *Maculolachnus* Gaumont

14(13) Abdominal dorsum usually without scleroites as above. Ultimate rostral segment shorter or longer than second segment of hind tarsus and bears 6 to more than 20 accessory hairs. Hind legs much elongated. Forewings usually strongly variegated. On various dicotyledens. *Lachnus* Burmeister

[* The genus *Sinolachnus* Hille Ris Lambers is not known from the region and has been excluded from the above key.]

Genus **Lachnus** Burmeister 1835

[1758. *Aphis* Linnaeus, C., *Systema naturae*, **1**: 451, partim auctores diversi.]

1835. *Lachnus* Burmeister, H. C. C., *Handb. Ent.*, **2**(1): 91; Schumacher, F., 1921. *Zool. Anz.*, **53**: 185; Hottes, F. C., 1930. *Proc. biol. Soc. Wash.*, **43**: 185; Hottes, F. C., 1954. *Bull. Zool. Nom.*, **9**(6): 174; Gomez Menor, G., 1962. *Revta esp. Entomol.*, **38**(3): 403. Type species: *Lachnus fasciatus* Burmeister (=*Aphis roboris* Linnaeus.).

1847. *Dryaphis* Amyot, C. J., *Ann. Soc. ent. Fr.*, (2) **5**: 481. Type species: *Aphis roboris* Linn. (=*fasciatus* Burm.).

1848. *Pterochlorus* Rondani, C., *Nuovi Annali delle Scienze Naturali Bologna* **9**: 35. partim. Type species: *Aphis roboris* Linn.

1855. *Dryobius* Koch, C., *Die Pflanzenläuse Aphiden*, **7**: 225. Type species: *Aphis roboris* Linn.

1932. *Schizodryobius* van der Goot. P., *Tijdschr. Ent.*, **56**: 130. Type species: *Lachnus exsiccator* Altum (=*pallipes* (Hartig) [now considered as a subgenus by some authors].

Morphology: Body medium to large, 2.25–6.0 mm long. Head with a distinct median suture. Eyes with ocular tubercles. Antennae 6 segmented, hardly more than 0.70 × as long as the body; flagellum with secondary rhinaria variably present or absent on segment III and IV in apterae; alatae with secondary rhinaria on segment III–IV and sometimes also on segment V; processus terminalis hardly exceeds 0.60 × as long as the base of antennal segment VI. Rostrum usually reaches hind coxae but may extend up to siphunculi; segments 4+5 obtuse, and usually bears 6 or more accessory hairs. Mesosternal tubercle may be present (in ubgenus *Schizodryobius* v.d. Goot) or absent. Dorsal hairs usually fine, sometimes with acuminate or bluntish apices, shorter than, to more than 2.5 × as long as the basal diameter of antennal segment III. Abdominal dorsum with scattered "muskelplatten" and with a single or a pair of transverse sclerotic bands on 8th tergite; other scleroites usually absent. Siphunculi on small to fairly large brown to dark hairy cones. Cauda semioval, sclerotic with many hairs. Legs variably pigmented; hind legs usually much elongate; hairs on femora and tibiae usually fine or stiff, longest one on hind tibiae may be much shorter than or longer than the diameter at the middle of hind tibiae; first tarsal segment trapezoidal, with many fine ventral hairs and sometimes with sense peg, besides normal hairs. Wings often with pigmentation; forewings with pterostigma blunt, radius curved and media twice branched; hind wings with both obliques.

Sexual forms are not known for any of the species, so far recorded from the region. Elsewhere, both males and oviparae have been reported to be apterous (Palmer, 1952).

Discussion: The genus contains about 12 species most of which are known from the Palaearctic and oriental region. Of the 4 species recorded from the region, all are known to be endemic in origin. Only one subgenus *Schizodryobius* van der Goot, 1913 has been recognised by some authors, under this genus; earlier, two European species *Lachnus pallipes* Hartig and *Lachnus longirostris* Mordvilko were known under *Schizodryobius*, (Borner, 1952) but later *longirostris* has been treated as synonym (Shaposhnikov, 1964) or as a subspecies (Szelegiewicz 1974) of *pallipes;* recently a second

species *L. chosoni* Szel., has been described under the subgenus from Korea(*Szelegiewicz*, op. cit.) and all these species exhibit distinct or at least ill developed mesosternal processi. Eastop and Hille Ris Lambers (1976) listed *L* (*S*) *boerneri* Pasek and *chosoni* Szel, under *Schizodryobius* but considered *boerneri* as=*Lachnus roborois* (Linn.); and *chosoni* as under *Lachnus* Burm.

It may be noted that in spite of the use of the generic name *Lachnus* in many early palaeontological works, no fossil aphid could be related to this genus and this perhaps indicates the recent origin of this group (Heie, 1971).

Biology: Members of *Lachnus* mostly feed on aerial parts, of plants, specially on stem of Fagaceae e.g. *Castanea, Fagus, Quercus, Castanopsis* spp. Many species are known to be restricted to host plants of one of the above four plant genera, whereas others have been known to feed on plants of two or more of the above genera, and all are known to lead a holocyclic life cycle. Fulmek (1956–57) has listed syrphid predators and parasites belonging to Braconidae, Chalcididae, Cynipidae and Proctotrupidae for some species of *Lachnus.*

All the species recorded so far from the region have been largely collected during the months of November to July and only in the Northern temperate region. Myrmicophily is not very common.

Distribution.—Palaearctic, Oriental, Malayan and Nearctic regions.

The principal works on the taxonomy of regional fauna include: Bodenheimer & Swirski (1957), Borner (1952), Gomez-Menor (1962), Heinze (1962), Paik (1965), Pasek (1954), Pintera (1966), Shaposhnikov (1964), Szelegiewiez (1962; 1974): Palaearctic; Eastop (1958, 1961): Ethiopian; Takahashi (1931), Tao (1961): Oriental.

Type species.—Lachnus fasciatus Burmeister, 1835 (=*Aphis roboris* Linnaeus, 1758). Location of type material is not known.

Key to the species of **Lachnus**

Apterous viviparous female:

1(2) Longest hair on hind tibiae 0.24–0.29 × as long as the diameter at the middle of hind tibiae. Antennal segment VI subequal to segment IV.

Antennae without any secondary rhinaria; base of antennal segment VI with 8–9 hairs. Hairs on the anterior abdominal

tergites up to 1.1 × as long as the basal diameter of antennal segment III. First segment of hind tarsus 0.38 × as long as the second segment. On *Salix fragilis*. — *L. longirostrum* David & Ghosh

2(1) Longest hair on hind tibiae 0.57–1.0 × as long as the diameter at the middle of hind tibiae. Antennal segment VI distinctly shorter than segment IV. Other characters variable.

3(4) Hairs on the dorsum of head and flagellum stiff and thick, up to 0.85 × as long as the basal diameter of antennal segment III. Ultimate rostral segment 0.74–0.79 × as long as second segment of hind tarsus and bearing 11–14 accessory hairs. Longest hair on hind tibiae up to 0.63 × as long as the diameter at the middle of hind tibiae. On *Quercus* sp.. — *L. acutihirsutus* Kumar & Burkhardt

4(3) Hairs on dorsum of head and flagellum 1.3–2.0 × as long as the basal diameter of antennal segment III. Ultimate rostral segment 0.95–1.0 × as long as second segment of hind tarsus and bearing 18–22 accessory hairs. Longest hair on hind tibiae 0.65–1.0 × as long as the diameter at the middle of hind tibiae. On *Quercus* spp. — *L. tropicalis* (v.d. Goot)

Alate viviparous female:

1(2) Hairs on flagellum long and fine, on segment III, up to 2.9 × as long as the basal diameter of the segment; antennal segment III with 1–2 and IV and V without secondary rhinaria. Dorsal hairs fine, up to 2.8 × as long as the basal diameter of the antennal segment III. Wings pale. Antennal segment III nearly 4.0 × as long as segment IV; segment IV and V subequal, segment VI much longer than segment IV or V; processus terminalis 0.50 × as long as base of segment VI. Rostrum reaches near siphunculi. Forewings with media very faintly indicated, twice branched. Body 2.25 mm long. .. — *Lachnus longisetosus* sp. nov.

2(1) Hairs on flagellum variable, on segment III at most 2.0 × as long as the basal diameter of the segment; antennal segment III with 6–45 secondary rhinaria, segment IV with 0–10, and V with 0–7 similar rhinaria. Dorsal hairs up to

2.1 × as long as the basal diameter of antennal segment III. Wings pale or variegated.

3(4) Wing pale hyaline. Antennal segment III with 7–8 secondary rhinaria, segment VI equal to segment IV. Hairs on antennal segment III fine, up to 1.6 × as long as the basal diameter of the segment. Dorsal hairs 1.7–2.1 × as long as the basal diameter of antennal segment III. — *L. longirostrum* David & Ghosh

4(3) Wings variegated. Antennal segment III with 6–23 secondary rhinaria; segment VI distinctly much shorter than segment IV; longest hair on segment III up to 1.3 × as long as the basal diameter of segment.

5(6) Dorsal hairs thick and stiff, up to 1.1–1.3 × as long as the basal diameter of antennal segment III. Flagellum with 6–7 small secondary rhinaria on segment III and 0–1 similar rhinaria on segment IV. Ultimate rostral segment, less than 0.70 × as long as second segment of hind tarsus, bearing 11–12 accessory hairs. .. — *L. acutihirsutus* Kumar & Burkhardt.

6(5) Dorsal hairs thick or fine, 1.1–2.0 × as long as the basal diameter of antennal segment III. Flagellum with 12–23 protuberant secondary rhinaria on segment III, and 2–7 similar rhinaria on segment IV.

Ultimate rostral segment, 0.90–1.0 × as long as second segment of hind tarsus, bearing 18–22 accessory hairs. — *L. tropicalis* (v.d. Goot)

Lachnus acutihirsutus Kumar and Burkhardt 1970

(Plate 28; Plate 66)

1970. *Lachnus acutihirsutus* Kumar, R. and Burkhardt, C. C., *J. Kans. ent. Soc.*, **43**(4): 461.

Apterous viviparous female: Body 3.08–3.64 mm long. Head yellowish with a distinct median suture; hairs on frons and vertex stiff, thick, longest one 0.053–0.060 mm long, 0.81–0.85 × as long as the basal diameter of antennal segment III. Antennae 0.64–0.67 × as long as the body, dark brown on basal segments, apices of

segments III–IV and on most portion of segment VI; flagellum with fine spinulose imbrications, without any secondary rhinaria (alatoid apterae with 6–7 rhinaria on segment III and 0–1 on segment IV); hairs on the flagellum stiff, spiny, longest one on segment III, 0.046–0.050 mm long, shortest one 0.023–0.026 mm long, these being 0.67–0.79 × and 0.33–0.42 × as long as the basal diameter of the segment, respectively; processus terminalis 0.40–0.50 × as long as base of segment VI, which bears 14 hairs, and 0.7–0.9 × as long as antennal segment III. Rostrum reaching hind coxae, ultimate rostral segment stout, 0.74–0.79 × as long as second segment of hind tarsus and bearing 11–14 accessory hairs. Abdominal dorsum pale with transverse striations and reticulations and bearing at least two rows of brown 'muskelplatten' on pleural and marginal region up to 7th tergite; 8th tergite with median brown sclerotic patch; hairs on the dorsum of abdomen short, stiff, longest one on anterior tergites 0.043–0.050 mm long, shortest one 0.030–0.036 mm long, these being 0.62–0.79 × and 0.43–0.53 × as long as the basal diameter of antennal segment III, respectively; hairs on 8th tergite thinner than the ones on anterior tergites, longest one 0.076–0.096 mm long, 1.1–1.5 × as long as the mentioned diameter; ventral hairs numerous, fine. Siphunculi on small dark brown sclerotic cones. Cauda light brown with many fine hairs. Legs pale brown except at the apices of femora, tibiae and whole of tarsi which are dark brown; hairs on femora and tibiae stiff, longest one on hind tibiae 0.066–0.073 mm long, 0.57–0.63 × as long as the diameter at the middle of hind tibiae. First tarsal segment of hind leg 0.57 × as long as the second tarsal segment.

Colour: Not known.

Alate viviparous female: Body 3.3–3.7 mm long. Head brown, with a distinct median suture; hairs on frons and vertex thick, stiff, with acute apices, longest one 0.066–0.076 mm long, 1.1–1.3 × as long as the basal diameter of antennal segment III. Antennae 0.50–0.60 × as long as the body with basal segments brown and rest nearly pale, or with apical 0.33 portion of segment III and 0.50 portions of segments IV and V and whole of segment VI, dark brown; flagellum with spinulose imbrications; antennal segment III with 6–7 circular secondary rhinaria and segment IV with 0–1 similar rhinaria; hairs on flagellum stiff, longest one on segment III, 0.046 mm long, shortest one 0.023–0.026 mm long, these being 0.78–0.82 × and 0.39–0.47 × as long as the basal diameter of the segment, respectively; processus terminalis 0.44–0.47 × as long as the base of segment VI and 0.09–0.10 × as long as antennal segment III. Ultimate rostral segment triangular, bearing 11–12 accessory hairs. Abdominal dorsum pale, with fine transverse reticulations supported by sinuated ridges and bearing some scattered dark brown "muskelplatten", besides a few much smaller and paler scleroites; hairs on the dorsum of abdomen with acute or

Lachnus acutihirsutus Kumar and Burkhardt 1970

Apterous viviparous female

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	ht $_2$	Siphunculus diameter	
				III	IV	V	VI			base	apex
1.	3.19	1.67	2.05	0.85	0.41	0.35	(0.15+0.06)	0.17	0.23	0.17	0.08
2.	3.64	1.97	2.23	0.91	0.43	0.38	(0.16+0.08)	0.17	0.23	0.19	0.08
3.	3.51	1.78	2.33	1.01	0.45	0.41	(0.18+0.08)	0.17	0.23	0.19	0.08
4.	?	?	2.22	1.0	0.41	0.37	(0.16+0.08)	0.17	0.23	0.24	0.12
5.	3.42	1.92	2.12	0.82	0.39	0.41	(0.15+0.06)	0.18	0.22	0.19	0.09
6.	3.08	1.58	2.04	0.84	0.34	0.39	(0.15+0.06)	0.18	0.23	0.18	0.07

(1–4, ex *Quercus*, Manall; 23-5-1970, SKD; 5–6, ex. a tree, Simla, 31-7-1966, RK.)

acuminate apices, longest one on anterior tergites, 0.066 mm long, shortest one 0.040–0.046 mm long, these being 1.1–1.2 × and 0.7–0.8 × as long as the basal diameter of antennal segment III, respectively; hairs on 8th tergite with acute apices, longest one 0.100–0.103 mm long, 1.7–1.8 × as long as the mentioned diameter. Siphunculi on small brown sclerotic cones. Cauda about twice as long as wide. Legs blackish brown (mostly broken). Forewings dark pigmented except in the region between the radial sector and pterostigma, and media and cubitus and in the region posterior to anal; hind wings largely pale.

Colour: Not known.

Measurements in mm

	1	2
Length	3.77	3.32
Width	1.58	1.64
Antenna	1.85	2.03
Antennal segment III ...	0.69	0.77
,, IV ...	0.35	0.44
,, V ...	0.39	0.38
,, VI ...	(0.16+0.07)	(0.15+0.07)
urs.	0.19	0.19
$ht._2$	?	?
Siphunculus, diameter, base ...	0.19	0.16
,, apex ...	0.08	0.08

(1–2, ex. a tree, Simla, 31-7-1966, RK.)

Sexual forms: Not known.

Nymphs: (Apterous early instar): Body 1.37 mm long. Head brown, longest cephalic hair 0.052 mm long, 1.0 × as long as the basal diameter of antennal segment III. Antennae pale, 4 segmented, 0.58 × as long as the body; flagellum with spinulose imbrications; hairs on the flagellum stiff, on segment III, 0.026–0.036 mm long, 0.57–0.70 × as long as the basal diameter of the segment; processus terminalis 0.89 × as long as base of last antennal segment. Rostrum reaches middle of abdomen, ultimate rostral segment 0.94 × as long as the second segment of hind tarsus. Abdominal dorsum pale; hairs on the dorsum of abdomen, stiff, thin, with acute apices, on anterior tergites 0.053–0.060 mm long, 1.1–1.3 × as long as the basal diameter of antennal segment III, on 8th tergite up to 0.066 mm long, and 1.43 × as long as the mentioned diameter. Siphunculi appearing as mere rings. Legs pale whitish, longest hair on hind tibiae 0.050 mm long, 0.75 × as long as the diameter at the middle of hind tibiae; first segment of hind tarsus 0.51 × as long as second tarsal segment.

Colour: Not known.

Measurements in mm:

	Length	Width	Antenna	Antennal segment III	Antennal segment IV	urs.	ht.$_2$	Siphunculus diameter
1.	1.37	?	0.79	0.48	(0.09+0.08)	0.16	0.17	0.05

(ex *Quercus* sp., Manali, 23-5-1970, SKD.)

Alatoid nymph (from Kumar & Burkhardt, 1970): Body pyriform; dorsal cephalic hairs up to 0.02 mm long, Antennae 6 segmented, 0.50× as long as the body; relative lengths of antennal segments III: 0.58 mm, IV: 0.30 mm, V: 0.34 mm, VI: (0.14+0.06) mm; secondary rhinaria absent on III–V; segment III with about 43 hairs, subequal to the basal diameter of the segment; segment VI with an unusual secondary rhinarium and a tuberculated rhinarium just below the primary rhinarium, besides 4–5 small accessory rhinaria. Mesosternal processi hornlike. Rostrum reaching middle of abdomen. Abdominal dorsum with fine transverse reticulations supported with sinuated ridges and bearing 4–7 small, dark sclerites on 1st–8th tergites; hairs on the dorsum of abdomen thick, blunt, on anterior tergites up to 0.04 mm long, and on 8th tergite up to 0.07 mm long. Siphunculi on large black sclerotic cones. Cauda about twice as wide as long. Legs pale, except distal part of femora, whole of tibiae and tarsi, which are darker; hairs on legs usually blunt, except a few hairs with acuminate apices at the proximal part of femora and long and thin hairs with acute apices on the inner distal side of tibiae.

Material examined: Two apterous viviparous females, two alate viviparous females and one nymph from an undetermined tree, Simla, Himachal Pradesh, India, 31-vii-1966, coll. R. Kumar, (RK No. 53); Five apterous viviparous females and two apterous nymphs from *Quercus* sp. Manali, Himachal Pradesh, India, 23-v-1970, coll. K. Narayanan, (SKD, No. 1253).

Discussion: Kumar and Burkhardt (1970) described the species from *Quercus incana* and discussed its relationship with *Lachnus swirskii* Hille Ris Lambers, from which the apterae of the present species differ in the absence of secondary rhinaria on antennal segment III–V, in the ratio of segment III to IV–VI, in the length of the longest hair of antennal segment III and in the length of rostrum; the alatae of the present species differs from *swirskii* in having dorsal hairs with acute apices and sinuated ridges in the dorsal reticulations. *L. acutihirsutus* differs from *L. tropicalis* (v.d.G.) which also feeds on *Quercus* spp., in Northeast India, in having shorter, dorsal cephalic and antennal hairs and longer antennae, in the ratio of ultimate rostral segment to second segment of hind tarsus, in having much lesser number of accessory hairs on the ultimate

rostral segment and in the number of secondary rhinaria on antennal segment III in alatae, etc.

The present species has been reported to feed on the stem of the host plant with which it completely harmonizes in colour.

Distribution.—INDIA: Himachal Pradesh.

Types.—In the collections of British Museum (Natural History) London and in the collections of Dr. R. Kumar, University of Wyoming, U.S.A.

Lachnus longirostrum David and Ghosh, sp. nov.

(Plate 29; Plate 67, figs. 1–2)

Apterous viviparous female: Body 4.38 mm long. Head yellowish brown, with a distinct median suture; hairs on frons and vertex fine with acute apices, longest one 0.083 mm long, 1.1 × as long as the basal diameter of antennal segment III. Antennae 0.45 × as long as the body, almost concolorous with the head, except at apices of segment V and whole of segment VI, which are darker; flagellum faintly imbricated, without any secondary rhinaria; hairs on flagellum fine, longest one on segment III, 0.050 mm long, shortest one, 0.030–0.033 mm long, these being 0.65–0.68 × and 0.41–0.43 × as long as the basal diameter of the segment; processus terminalis 0.50 × as long as base of segment VI, which bears 8–9 hairs, and 0.12–0.13 × as long as antennal segment III. Rostrum reaches beyond hind coxae, ultimate rostral segment 0.65–0.67 × as long as second segment of hind tarsus and bearing at least 10 (?) accessory hairs. Abdominal dorsum pale, with a pair of brown sclerotic transverse bands on 8th tergite, besides small, dark, 'muskelplatten' on 1st–7th tergites; hairs on the dorsum of abdomen numerous, fine, longest one on anterior tergites, 0.076–0.083 mm long, shortest one 0.050–0.056 mm long, these being 1.0–1.1 × and 0.68–0.74 × as long as the basal diameter of antennal segment III; 8th tergite with many fine hairs, longest one 0.115 mm long, 1.5–1.6 × as long as the mentioned diameter. Siphunculi on small brown sclerotic cones, with large aperture, diameter at apex being 0.56 × as long as the diameter at the base. Cauda dark, sclerotic with many fine hairs. Legs pale except at the apices of fore and mid tibiae and apical 0.50 portion of hind tibiae and whole of tarsi which are dark; hairs on femora and tibiae small, stiff, longest one on hind tibiae 0.040–0.053 mm long, 0.24–0.29 × as long as the diameter at the middle of hind tibiae; first segment of hind tarsus 0.38 × as long as the second tarsal segment.

Colour: Not known.

Measurements in mm

	1	2
Length	4.38	?
Width	2.74	?
Antenna	1.99	2.08
Antennal segment III ...	0.81	0.82
,, IV ...	0.28	0.34
,, V ...	0.33	0.35
,, VI ...	(0.20+0.10)	(0.20+0.10)
urs.	0.29	0.28
$ht._2$	0.43	0.43
Siphunculus, diameter, base ...	0.34	0.34
,, apex ...	0.19	0.19

(1–2, ex *Salix fragilis*, Manali, 12-6-1968, SKD.)

Alate viviparous female (extremely damaged): Body pale. Head yellow, with a median suture; hairs on frons and vertex with acute apices, longest one 0.100 mm long, 2.1 × as long as the basal diameter of antennal segment III. Antennae yellowish; segment III with 7–8 small secondary rhinaria, segment IV with 0–1 similar rhinaria; hairs on the flagellum with acute apices, longest one on segment III 0.073 mm long, shortest one 0.050 mm long, these being 1.6 × and 1.0 × as long as the diameter at the constricted base of the segment; processus terminalis 0.55 × as long as base of segment VI and 0.13 × as long as antennal segment III. Ultimate rostral segment 0.61 × as long as second segment of hind tarsus. Abdominal dorsum yellowish; hairs on the dorsum of abdomen fine, longest one on anterior tergites, 0.100 mm long, shortest one 0.080 mm long, these being 2.1 × and 1.7 × as long as the basal diameter of antennal segment III, respectively. Siphunculi and cauda damaged. Legs yellowish with numerous hairs, those on tibiae thicker than the ones on femora, longest one on hind tibiae, 0.086 mm long, 0.58 × as the diameter at the middle of hind tibiae; first segment of hind tarsus 0.35 × as long as the second tarsal segment. Wings damaged, hyaline.

Colour: Not known.

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	$ht._2$	Siphunculus diameter
				III	IV	V	VI			
1.	?	?	1.16	0.93	0.34	0.38	(0.22+0.12)	0.28	0.46	?

(ex *Salix fragilis*, Manali, 12-6-1968, SKD.)

Sexual forms: Not known.

Nymphs: Not known.

Material examined: Holotype: One apterous viviparous female, from *Salix fragilis*, Manali, Himachal Pradesh, India, 12. vi. 1968, coll. S. G. R. & K. N. (SKD No. 762); Paratypes: One apterous viviparous female, one damaged alate viviparous female, other data same as per holotype.

Discussion: The present species could easily be separated from other species known from the region, by its short hairs on tibiae and ratio of antennal segment VI to segment IV, besides other characters as mentioned in the key. No data on its biology was available during this study.

Distribution.—INDIA: Himachal Pradesh (Manali).

Types.—In the collections of Dr. S. Kanakaraj David, 22 Kamaraja Avenue, Madras, India.

Lachnus tropicalis (van der Goot 1916)

(Plate 30; Plates 68)

1916. *Pterochlorus tropicalis* Goot, P. van der, *Rec. Indian Mus.*, **12**: 3.

1917. ? *Pterochlorus japonicus* Matsumura, S., *J. Coll. Agric. Tohoku Imp. Univ.*, **7**: 378.

1917. ? *Pterochlorus ogasawarae* Matsumura, S., *J. coll. Agric. Tohoku Imp. Univ.*, **7**: 378.

1950. *Lachnus tropicalis*, Takahashi, R., *Annls. Ent. Soc. Am.*, **43**: 592.

1961. *Lachnus* (*Pterochlorus*) *tropicalis*, Tao, Charles Chia chu, *Sci. Yb. Taiwan Mus.*, **4**: 40.

1965. *Lachnus tropicalis*, Paik, W. H., *Aphids of Korea*, Seoul, 13.

1968. *Lachnus tropicalis*, Szelegiewicz, H., *Annls. Zool.* **25**(12): 468.

Apterous viviparous female: Body 3.8–4.6 mm (5.40 mm) long. Head yellow to almost black with a distinct median suture; hairs on frons and vertex with acute apices, longest one 0.066–0.100 mm long, 1.3–2.0× as long as the basal diameter of antennal segment III. Antennae 0.40–0.50× as long as the body, dark brown to black; flagellum without any secondary rhinaria (in alatoid apterae, segment III with 6–8 and IV with 4–5 secondary rhinaria); segment III, 2.0–2.8× as long as segment IV; hairs on the flagellum thick and stiff, with acute apices, longest one on segment III, 0.050–0.83 mm long, shortest one 0.020–0.066 mm long, these being 0.75–1.1× and 0.30–1.3× as long as the basal diameter of the segment, respectively; processus terminalis 0.50–0.53× as long as base of segment VI and 0.10–0.12× as long as antennal segment III. Rostrum reaches siphunculi, ultimate rostral segment 0.95–1.0× as long as second segment of hind tarsus and bearing 18–22

accessory hairs. Abdominal dorsum pale, bearing a pair of brown to dark brown transverse sclerites on 8th tergite, besides some scattered dark brown spinal, pleural and marginal "muskelplatten" on 1st–7th tergites; stigmal pori on brown sclerotic plates; hairs on the dorsum of abdomen with acute apices, longest one on anterior tergites 0.066–0.83 mm long, shortest one 0.036–0.053 mm long, these being 1.0–1.7 × and 0.55–1.0 × as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.100–0.115 mm long, 1.5–2.3 × as long as the mentioned diameter; abdominal venter striated or with a faint irregular reticulated pattern and bearing numerous hairs. Siphunculi on brown to dark brown sclerotic cones. Cauda usually dark, sclerotic. Legs uniformly brown to almost black; hairs on femora and tibiae short, longest one on hind tibiae 0.073–0.090 mm long, 0.65–1.0 × as long as the diameter at the middle of hind tibiae; first segment of hind tarsus 0.50 × as long as the second tarsal segment.

Colour: Brown to black, in life.

Alate viviparous female: Body 3.84–5.0 mm long. Head brown to almost black; hairs on frons and vertex 0.086–0.115 mm long, 1.5–2.0 × as long as the basal diameter of antennal segment III. Antennae 0.48–0.53 × as long as the body, uniformly pale brown to dark brown; flagellum nearly smooth; antennal segment III, 2.0–2.7 × as long as segment IV, with 17–23 (12–16) protuberant secondary rhinaria distributed over its entire lengths, segment IV with 2–6 (5–7) similar rhinaria, and segment V usually without or sometimes with only 1 secondary rhinaria; hairs on flagellum thick, conspicuous, with acute apices, longest one on segment III, 0.068–0.074 mm long, shortest one 0.050–0.055 mm long, these being 1.1–1.3 × and 0.75–0.80 × as long as the basal diameter of the segment, respectively. Ultimate rostral segment 0.90–1.0 × as long as second segment of hind tarsus. Abdominal dorsum pale, bearing scattered pale to dark brown "muskelplatten" and a pair of sclerotic transverse bands on 8th tergite; hairs on the dorsum of abdomen with acute apices, longest one on anterior tergites 0.080–0.115 mm long, shortest one 0.044–0.080 mm long, these being 1.1–2.06 × and 0.70–1.4 × as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.106–0.137 mm long, 2.0–2.4 × as long as the mentioned diameter; stigmal pori large, on sclerotic plates. Legs dark brown; longest hair on hind tibiae 0.070–0.110 mm long, 0.60–1.0 × as long as the diameter of the middle of hind tibiae. Wings pigmented brown with areas between radial sector and pterostigma and between second branch of media and cubitus, in the forewings, pale. Other characters as in apterous viviparous female.

Colour: Dark brown in life.

Lachnus tropicalis (van der Goot 1916)

Apterous viviparous female

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	$ht._2$	Siphunculus diameter	
				III	IV	V	VI			base	apex
1.	4.17	2.36	1.83	0.65	0.32	0.32	(0.16+0.08)	0.26	0.27	0.41	0:10
2.	4.13	2.64	2.15	0.84	0.41	0.38	(0.16+0.08)	0.27	0.27	0.42	0.10
3.	4.24	2.57	1.71	0.69	0.24	0.27	(0.14+0.07)	0.27	0.27	0.41	0.09
4.	4.66	2.67	2.19	0.91	0.35	0.37	(0.15+0.08)	0.28	0.28	0.51	0.10
5.	3.84	2.19	1.85	0.75	0.29	0.32	(0.15+0.08)	0.27	0.28	0.41	0.10

(1–2, ex. *Quercus* sp., Shillong, 1966, ZSI; 3, ex. *Quercus phyllyraeoides* Osaka, Japan, 25-7-1965, BMNH; 4, ex. *Lithiocarpus elegans* (=*Quercus spicata*) Nagaland, BMNH; 4, ex. ?, Taiwan, 9-7-1921, CCT.)

Lachnus tropicalis (van der Goot 1916)

Alate viviparous female

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	$ht._2$	Siphunculus diameter	
				III	IV	V	VI			base	apex
1.	3.84	1.92	1.95	0.70	0.35	0.35	(0.18+0.09)	0.27	0.27	0.41	0.09
2.	4.79	2.47	2.33	0.89	0.39	0.41	(0.19+0.09)	0.30	0.31	0.55	0.12
3.	4.65	2.1	2.29	0.93	0.42	0.39	(0.18+0.09)	0.28	0.30	0.55	0.11
4.	4.90	2.30	2.00	0.85	0.33	0.35	(0.16+0.08)	0.28	0.28	0.30	0.10
5.	4.45	2.05	2.36	0.99	0.37	0.38	(0.16+0.08)	0.30	0.30	0.55	0.12

(1, ex. *Quercus* sp., Shillong, 29-7-1975, ZSI; 2, ex. *Lithocarpus dealbata* (=*Quercus dealbata*), Shillong, 19-9-1969, CU; 3, ex. *Quercus* sp., Gangtok, Sikkim, 26-5-1970; CU; 4, ex. *Quercus* sp. Cherrapunji, 10-12-1968, CU; 5, ex ? 9-7-1921, CCT.)

Sexual forms: Not known.

Nymphs: (Apterous: Early instar): Body elongate 2.26 mm long. Head dark brown with a distinct median suture; longest hair on vertex, 0.100 mm long, 2.3 × as long as the basal diameter of antennal segment III. Antennae brown, 6 segmented, 0.47 × as long as the body; segment III, 1.38 × as long as segment IV; hairs on the flagellum stiff, on segment III, 0.016–0.040 mm long, 0.38–1.0 × as long as the basal diameter of the segment; processus terminalis 0.68 × as long as the base of segment VI and 0.33 × as long as antennal segment III. Rostrum reaches cauda, ultimate rostral segment equal to the second segment of hind tarsus and bearing 20 accessory hairs. Abdominal dorsum pale, bearing 4 rows of small brown 'muskelplatten" on 1st–6th tergites; hairs on the dorsum of abdomen with acute apices, on anterior tergites 0.033–0.066 mm long, 0.77–1.54 × as long as the basal diameter of antennal segment III; 8th tergite with 12 hairs, longest one 0.070 mm long, 1.6 × as long as the mentioned diameter. Siphunculi appearing as mere rings on small brown cones. Legs brown, hairs on femora and tibiae thick, spiny, longest one on hind tibiae 0.77 × as long as the diameter at the middle of hind tibiae; first tarsal segment of hind leg 0.44 × as long as the second tarsal segment.

Colour: Brown in life.

	Measurements in mm
Length	2.26
Width	0.96
Antenna	1.04
Antennal segment III ...	0.25
,, IV ...	0.18
,, V ...	0.20
,, VI ...	(0.12+0.08)
urs.	0.24
$ht._2$	0.24
Siphunculus diameter, base ...	0.10
,, apex ...	0.07

(ex *Quercus* sp., Shillong, 2º-7-1975, ZSI.)

Material examined: Two alatoid apterous viviparous females from *Quercus spicata* Naga Hills, Nagaland, India, associated with *Tetramorium* sp., coll. Chatterjee, det. V.F.E. (BMNH); three apterous viviparous and one alate nymph from a plant of fagaceae, (? *Quercus*), Shillong, Meghalaya, India, 1966, coll. S. Biswas, det. A. K. Ghosh (CU); one apterous and one alate viviparous female from undetermined host plant, Cherrapuni, Meghalaya, India,

10-xii-1968, coll. A. K. Ghosh (CU): one alate viviparous female from *Lithocarpus dealbata* (=*Quercus dealbata*), Shillong, Meghalaya, India, 19-xi-1969, coll. R. C. Basu (CU); 24 alatoid apterous viviparous females from *Castanopsis* sp., Shillong, Meghalaya India. 15-xi-1974, coll. A. K. Ghosh (ERS, ZSI); two alate viviparous females and three apterous nymphs from *Quercus* sp., Shillong, Meghalaya, India, 19-vii-1975, coll. K. Deb, det. A. K. Ghosh (ERS, ZSI); one apterous and one alate viviparous female from *Quercus* sp., Gangtok, Sikkim, 26-v-1970, coll. M. R. Ghosh, det. A. K. Ghosh (CU, No. PLK 1883); one apterous viviparous female and two nymphs from *Quercusphillyraeoidea*, Osaka, Japan 25-vii-1965 coll. & det. S. Sorin, (BMNH, No. 1966–527); one apterous viviparous female, two alate viviparous females and one nymph from unknown host, Taiwan, China, 9-vii-1921 (CCT.).

Discussion: This species, originally described from Dibrugarh in Assam, has now been known from a wider area of Northeastern India and elsewhere and appears to be restricted to plants of Fagaceae e.g. *Quercus* and *Castanopsis* in Indian region; in Japan, it has been recorded from 8 species of *Quercus*, two species of *Castanopsis* besides from *Castanea crenata* (Higuchi & Miyazaki, 1969); in China and Korea it has been reported from *Castanea* and *Quercus spp.* (Tao, 1961; Paik, 1965) and in Malaya, only from *Quercus* sp. (Takahashi, 1950). In Indian region, it occurs from May to July and again in the months of October to December. No natural enemy of this species has been noted so farl, in this region. Usually this species forms small to medium sized colony on the stems of the host plants; sometimes ants, *Pheidole* sp., have been noted in, association.

It has been noted from the present study that the specimens collected in Indian region exhibit more pigmentation and thicker dorsal hairs than found in Japanese or Chinese material; Szelegiewicz (1974) has treated *L. japonicus* (Matsumura) as a separate species as known from China, Korea, Japan and Eastern Parts of U.S.S.R.

Distribution: INDIA; West Bengal, Meghalaya, Manipur, Sikkim, MALAYA; CHINA; JAPAN; KOREA; VIETNAM, INDONESIA.

Types.—Originally deposited in the Indian Museum (4695/20), now reported to be lost.

Lachnus longisetosus sp. nov.

(Plate 31; 67 figs 3–4)

Alate viviparous female: Body 2.25 mm long. Head dark brown with a distinct median suture; hairs on frons and vertex fine, longest one 0.063 mm long, 2.1 × as long as the basal diameter of antennal segment III. Antennae 0.60 × as long as the body,

brown, darker on basal segments; flagellum imbricated near the very base of antennal segment III, which bears 1–2 small secondary rhinaria; segments IV and V without any secondary rhinaria; hairs on the flagellum fine, numerous, longest one on segment III 0.086 mm long, shortest one 0.050 mm long, these being 2.9 × and 1.7 × as long as the basal diameter at the constricted base of segment; base of segment VI with 18 long fine hairs, 0.053–0.073 mm long; processus terminalis with 4 fine hairs up to 0.053 mm long, besides subapical shorter hairs which may be up to 0.033 mm long; processus terminalis 0.56 × as long as base of segment VI, and 0.17 × as long as antennal segment III. Rostrum reaches siphunculi, ultimate rostral segment 1.09 × as long as second segment of hind tarsus and bearing at least 6 long accessory hairs (0.073–0.093 mm long). Abdominal dorsum pale, bearing paired brown marginal sclerites on 1st–3rd tergites, a fragmented median sclerite on 6th tergite, and brown narrow transverse sclerotic bands on each of 7th and 8th tergite, besides a number of small brown hair-bearing scleroites on anterior tergites; hairs on the dorsum of abdomen fine, numerous, longest one on anterior tergites 0.083 mm long, shortest one 0.050 mm long, these being 2.8 × and 1.7 × as long as the basal diameter of antennal segment III; 8th tergite with 14 hairs, longest one 0.112 mm long, 3.78 × as long as the mentioned diameter. Siphunculi on large brown sclerotic cones. Cauda brown, bearing many long, fine hairs. Legs dark brown except at the bases of femora which are pale; hairs on femora and tibiae, fine, numerous, longest one on hind tibiae 0.100 mm long, 1.67 × as long as the diameter at the middle of hind tibiae; first segment of hind tarsus 0.29 × as long as the second segment and bearing 7 hairs.

Colour: Not known.

Measurements in mm

Length	2.25
Width	0.97
Antenna	1.36
Antennal segment III ...	0.58
,, IV ...	0.15
,, V ...	0.18
,, VI ...	(0.18+0.10)
urs.	0.20
$ht._2$	0.20
Siphunculus, diameter, base ...	0.27
,, apex ...	?

(ex Indet, Kufri, 15-12-1973, ZSI.)

Apterous viviparous female: Not known.

Sexual forms: Not known.

Nymphs: Not known.

Material examined: One alate viviparous female (Holotype) from an undetermined host plant, Kufri, Himachal Pradesh, India, 15-xii-1973, coll. L. K. Ghosh, (ZSI).

Discussion: The alate form could easily be separated from other species known from the region by long fine antennal and dorsal hairs and fewer secondary rhinaria on antennal segment III.

Distribution.—INDIA: Himachal Pradesh.

Genus **Longistigma** Wilson 1909

1909. *Longistigma* Wilson, H. F., *Can. Ent.*, **41**: 385; Baker, A. C., 1920. *Bull. U.S. Dept. Agric.*, **826**: 17; Palmer, M. A., 1952, *Aphids of the Rocky Mountain Region*, The Thomas say Foundation, **5**: 55. Type species: *Aphis caryae* Harris.

1909. *Davisia* Del Guercio, G., *Redia*, **5**: 185. Type species: *Lachnus longistigma* Monell.

Morphology: Body large, average 5.0–6.0 mm long. Head with incomplete or complete median suture. Antennae 6 segmented, up to 0.45 × as long as the body; flagellum with secondary rhinaria on segments III–IV in apterae and alatae; hairs on flagellum fine, numerous; processus terminalis slender, 0.33–0.60 × as long as base of antennal segment VI and bearing a few short hairs besides apical setae. Eyes large with distinct ocular tubercles. Rostrum with segments 4 and 5 distinct. Abdominal dorsum in apterae, with longitudinal rows of "muskelplatten", besides marginal sclerites, at least on anterior tergites; in alatae, also with distinct marginal sclerites. Dorsal hairs fine, with acute apices. Siphunculi on broad, hairy, sclerotic cones. Cauda broadly semilunar. Legs with numerous long, fine hairs; hairs on hind tibiae longer than the diameter at the middle of hind tibiae; first tarsal segments with 8 or more ventral hairs. Forewings with pterostigma extended to the tip, radial sector short, arising at a distance proximad to apex of stigma, media twice branched; hind wings with both obliques.

Males are reported to be winged and oviparous females are apterous (Baker, 1920).

Discussion: The members of this genus could easily be separated from all related genera by large size of body, long, fine hairs on body and appendages, short rostral segment 5, and a very long and narrow stigma reaching the tip of fore wings.

So far only two species *caryae* Harris (=*chantali* Quednau) and *liquidambarus* (Takahashi) are known under the genus. A fossil

specimen of *caryae* has been found in the tertiary deposits in Iceland (Heie & Friedrich, 1971).

Biology: The giant bark aphid, *Longistigma caryae* (Harris) has been described in the past, under three different names, usually being derived from the name of respective host plants on which they were found feeding, i.e. *caryae* Harris, on *Carya* or Pecans and *platanicola* Riley, on *Platanus* or Sycamore, etc. Now it is known that *L. caryae* could feed on *Carya*, *Fagus*, *Liquidamber*, *Platanus*, *Quercus* and *Tilia* spp., in U.S.A.; this species is known to occur on various hosts in the months of June to December but alatae have been seen from Trap collection during April-June and sexuales (apterous oviparae and alate males) are usually produced during October and November. Another North American species *L. chantali* Quednau, now being considered as a synonym of *L. caryae* (Harris). [Eastop and Hille Ris Lambers 1976] is known only from *Fagus grandifolia*. The Chinese species, *L. liquidambarus* (Takah.) is known from *Liquidambar formosanum* whereas the Indian specimens have been collected from *Berchemia floribunda*, a plant of Rhamnaceae, during October and November. Infestation may sometimes be heavy and usually colonies are formed along the stem of the host. No association with ants has been noted, at least in the region.

Distribution: INDIA, JAPAN, U.S.A., CANADA.

Type species: *Aphis caryae* Harris, 1841, may be in the collections of U.S. National Museum, Washington.

Longistigma ? liquidambarus (Takahashi 1925)

(Plate 32; Plate 69)

1925. *Dilachnus liquidambarus* Takahashi, R., *Rep. Dept. Agric. Govt. Res. Inst.* Formosa, **16:** 42.

1961. *Longistigma liquidambarus*, Tao., C. C. *Sci. Yb. Taiwan Mus.*, **4:** 42.

Apterous viviparous female: Body 4.45–5.27 mm long. Head dark brown, sclerotic; hairs on frons and vertex numerous with acute apices, longest one 0.106–0.146 mm long, 2.1–3.2 × as long as the basal diameter of antennal segment III. Antennae 0.35–0.36 × as long as the body, dark brown; antennal segment III with 0–2 secondary rhinaria, and segment IV with 1–3 similar rhinaria; hairs on flagellum fine, longest one on segment III, 0.155–0.198 mm long, shortest one 0.050–0.080 mm long, these being 3.2–4.0 × and 1.1–1.5 × as long as the basal diameter of the segment, respectively; processus terminalis 0.33–0.38 × as long as base of antennal segment VI and 0.07–0.10 × as long as antennal segment III. Pro and Meso thoracic tergites dark sclerotic; metathoracic dorsum with dark brown marginal sclerotic areas besides some small scleroites in spinopleural region. Rostrum reaches little beyond hind coxae;

rostral segment 4, 3.0× as long as segment 5, and bearing 16–18 accessory hairs; segments 4+5, 0.77–0.79× as long as second segment of hind tarsus. Abdominal dorsum pale bearing paired marginal sclerites on 1st–4th tergites besides a pair of transverse sclerotic bands on 8th tergite and some scattered "muskelplatten" on 1st–7th tergites; hairs on the dorsum of abdomen fine, numerous, longest one on anterior tergites, 0.146–0.163 mm long, shortest one 0.083–0.093 mm long, these being 3.0–3.6× and 1.7–1.9× as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite, 0.155–0.178 mm long, 3.3–3.9× as long as the mentioned diameter. Siphunculi on dark brown sclerotic cones. Cauda broadly semilunar, 0.51–0.63× as long as wide. Legs black except basal 0.80 portion of hind femora which are yellowish; hairs on femora and tibiae fine, numerous, longest one on hind tibiae 0.163–0.178 mm long, 1.3–1.5× as long as the diameter at the middle of the hind tibiae; first segment of hind tarsus 0.40–0.43× as long as the second segment.

Colour: Dark brown in life.

	Measurements in mm			
	1	2	3	4
Length	5.27	4.73	4.86	4.45
Width	2.60	2.60	2.56	2.40
Antenna	1.88	1.71	1.70	1.59
Antennal segment III ...	0.70	0.58	0.59	0.59
,, IV ...	0.32	0.30	0.30	0.28
,, V ...	0.33	0.32	0.32	0.29
,, VI ...	(0.15+0.05)	(0.15+0.05)	(0.16+0.06)	(0.15+0.05)
Rostral segment 4+5 ...	(0.20+0.07)	(0.20+0.07)	(0.20+0.07)	(0.20+0.07)
$ht._2$	0.35	0.35	0.35	0.34
Cauda, length ...	0.24	0.20	0.23	0.22
Siphunculus diameter, base ...	0.69	0.62	0.69	0.58
,, apex ...	0.12	0.14	0.12	0.10

(1–4, ex *Berchemia floribunda*, Shillong, 27-10-1976, ZSI.)

Alate viviparous female: Body 5.07–5.68 mm long. Head dark brown; hairs on frons and vertex with acute apices, longest one 0.155–0.169 mm long, 3.0–3.1× as long as the basal diameter of antennal segment III. Antennae 0.36–0.41× as long as the body, brown to dark brown; antennal segment III, with 10–14 protuberant secondary rhinaria distributed over entire length and segment IV with 3–5 similar rhinaria; hairs on flagellum fine, numerous, longest one on segment III, 0.185–0.215 mm long, shortest one 0.056–0.100 mm long, these being 3.4–4.1× and 1.0–1.8× as long as the basal piameter of the segment, respectively;

processus terminalis 0.26–0.35 × as long as base of antennal segment VI and 0.06–0.09 × as long as antennal segment III. Rostral segments 4+5, 0.76–0.77 × as long as second segment of hind tarsus. Abdominal dorsum pale, bearing paired marginal sclerites on 1st–4th tergites and 3 rows of "muskelplatten" on each side, besides paired transverse sclerotic bands on 8th tergite; hairs on the dorsum of abdomen fine, longest one on anterior tergtes 0.198–0.205 mm long, shortest one 0.090–0.115 mm long, these being 3.5–3.6 × and 1.6–2.0 × as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.198–0.230 mm long, 3.5–4.1 × as long as the mentioned diameter. Siphunculi on dark brown sclerotic cones. Cauda brown sclerotic, 0.61–0.81 × as long as wide. Legs black except at bases of fore and mid femora and basal 0.80–0.90 portion of hind femora; longest hair on hind tibiae, 0.267–0.273 mm long, 2.0–2.1 × as long as the diameter at the middle of hind tibiae; first segment of hind tarsus 0.43–0.45 × as long as the second segment. Wing venation normal, stigma dark brown.

Colour: Dark brown in life.

	Measurements in mm			
	1	2	3	4
Length	5.68	5.34	5.07	5.07
Width	2.53	2.26	2.26	2.12
Antenna	2.08	1.92	2.10	1.95
Antennal segment III ...	0.77	0.69	0.82	0.73
,, IV ...	0.37	0.38	0.39	0.37
,, V ...	0.43	0.39	0.39	0.37
,, VI ...	(0.19+0.05)	(0.17+0.06)	(0.16+0.07)	(0.18+0.05)
Rostral segments 4+5 ...	(0.21+0.07)	(0.20+0.07)	(0.20+0.07)	(0.19+0.07)
$ht._2$	0.37	0.35	0.35	0.34
Cauda, length ...	0.25	0.28	0.24	0.22
Siphunculus diameter, base ...	0.75	0.63	0.69	0.58
,, apex ...	0.15	0.15	0.14	0.15

(1–4, ex *Berchemia floribunda*, Shillong, 4-11-1976, ZSI.)

Sexual forms: Not known.

Nymphs (Apterous; early instar): Body 2.33 mm long. Head dark brown, sclerotic; longest hair on vertex 0.137 mm long, 2.80 × as long as the basal diameter of antennal segment III. Antennae 0.36 × as long as the body, 4 segmented, concolorous with the head; longest hair on antennal segment III, 0.100–0.140 mm long, 2.0–2.9 × as long as the basal diameter of the segment; processus terminalis 0.78 × as long as base of last antennal

segment and 0.11 × as long as antennal segment III. Rostral segments 4+5, 0.91 × as long as second segment of hind tarsus. Abdominal dorsum pale, bearing 6 longitudinal rows of small brown "muskelplatten" on 1st–7th tergites; hairs on the dorsum fine, on anterior tergites, 0.066–0.130 mm long, 1.33–2.67 × as long as the basal diameter of antennal segment III; longest hair on 8th tergite 0.155 mm long, 3.20 × as long as the mentioned diameter. Siphunculi on small brown sclerotic cones. Legs black except basal 0.95 portion of hind femora which are yellowish; longest hair on hind tibiae 0.163 mm long, 2.0 × as long as the diameter at the middle of the hind tibiae; first segment of hind tarsus, 0.43 × as long as the second segment.

Colour: Pale brown in life.

Measurements in mm:

	Length	Width	Antenna	Antennal segment		Rostral segment	ht.$_2$	Siphunculus	
				III	IV	4+5		base	apex
1.	2.33	1.10	0.84	0.48	(0.09+0.07)	(0.17+0.05)	0.23	0.14	0.07

(ex *Berchemia floribunda*, Shillong, 27-10-1976, ZSI.)

Material examined: Six apterous viviparous females, four apterous nymphs and one alate nymph from *Berchemia floribunda*, Shillong, Meghalaya, India, 27-x-1967, coll. M. S. Jyrwa, (ERS, ZSI, 1065); five alate viviparous females, two alate nymphs and one apterous nymph, from *Berchemia floribunda*, Shillong, Meghalaya, India, 4-xi-1976, coll. A. K. Ghosh (ERS, ZSI, 1072).

Discussion: The present species comes close to *L. liquidambarus* Takahashi, but these are much smaller in size. (Body 4.4–5.3 × as against 7.7 mm *liquidambarus*) than those described from Formosa, besides being associated with a different host plant. However the present status is being kept following suggestion of V F. Eastop, British Museum (Nat. Hist.) London.

Distribution.—INDIA: Meghalaya, Shillong; FORMOSA.

Types: Probably in the collections of Agricultural Research Institute, Taipei, Formosa.

Genus **Maculolachnus** Gaumont 1920

1920. *Maculolachnus* Gaumont, L., *Bull. Soc. ent. Fr.*, **25:** 30. Type species: *Aphis submacula* Walker (=*Lachnus rosae* Cholod.).

1923. *Maculodryaphis* Gaumont. L., *Annl. Epiphyt.*, **9:** 340. Lapsus pro *Maculolachnus* Gaumont.

1929. *Neolachnus* Mordvilko, A. K., *Trudy prikl. Ent.*, **14:** 55. Type species: *Neolachnus rosae* (Cholodkovsky) =*Aphis submacula* Walker.

Morphology: Body of medium size, 2.7–4.0 mm long. Head with a median suture; dorsal cephalic hairs may be up to more than twice as long as the basal diameter of antennal segment III. Antennae up to half as long as the body, with protuberant secondary rhinaria on segments III–IV, in both apterae and alatae; hairs on flagellum fine, 0.71–2.3 × as long as the basal diameter of antennal segment III; processus terminalis 0.20–0.62 × as long as base of antennal segment VI. Eyes large, with ocular tubercles. Rostrum may reach up to bases of siphunculi, ultimate rostral segment much shorter than or equal to the second segment of hind tarsus and bearing 6 to 10 accessory hairs. Abdominal dorsum pale or sclerotic, with fine hairs arising from small scleroites; 8th tergite with a narrow or broad transverse sclerotic band. Siphunculi on dark brown hair bearing cones. Cauda brown. Legs dark brown to black; hairs on hind tibiae usually shorter than or little longer than the diameter at the middle of hind tibiae; first tarsal segments with few spine-like setae besides fine ventral hairs. Forewings with radial sector curved, media twice branched and with a blotch at the base; hind wings with both obliques.

Sexual forms, both male and oviparae are reported to be apterae; males are with thinner and shorter antennae and oviparae are usually with few pseudosensoria on the basal half of swollen hind tibiae, but hind tibiae may not be swollen or pseudosensoria may be absent in some species; subgenital plate in oviparae may be clefted or entire.

Discussion: Only four species are known from the genus so far and these may be separated by the combination of characters mentioned earlier, especially by presence of dorsal scleroites, normal hind legs and characteristic blotch at the base of media of forewings, from the members of closely related and allied genus *Lachnus* Burmeister.

Biology: Species of this genus are known to infest plants of Rosaceae, usually *Rosa* spp., except *M. rubi* Ghosh & Raychaudhuri which is only known from *Rubus*. *M. submacula* (Walker) is known to feed on bark of stem, of both cultivated and wild *Rosa* spp., in North America; viviparae are found from the month of May to October, while the available records in India indicated their occurrence during October–November in temperate hill region of Himachal Pradesh; *M. rubi* on the other hand, has only been collected during the months of June–July, in Shillong, Khasi Hills in Eastern India; the third species *M. sijpkensi* Hille Ris Lambers, was originally described from oviparae collected in considerable numbers between the spines of branches of *Rosa acicularis* in the month of September in Canada; viviparae were subsequently collected from the same host-species during July, in Mongolia, while *M. jachonthovi* Juohnevitch & Kan, is only known from asiatic part of U.S.S.R. Sexuales of *M. submacula* (Walker) are usually produced

in the month of October in North America; one ant species *Lasius fuliginosus* is known to be associated with *submacula* in Europe.

Distribution.—Cosmopolitan except in Africa and Australia.

Types species.—*Aphis submacula* Walker, 1848, in the collection of British Museum (Nat. Hist.) London; type of *Lachnus rosae* Cholodkovsky 1899, is probably in the Institute of Zoology, Leningrad, U.S.S.R.

Key to the species of **Maculolachnus**

Apterous viviparous female:

1(2)	Processus terminalis 0.50–0.62 × as long as the base of segment VI. Ultimate rostral segment, pointed, 0.92–0.96 × as long as the second segment of hind tarsus. Sclerotic areas on dorsum often confluent. On *Rubus* sp.	*M. rubi* Ghosh & Raychaudhuri
2(1)	Processus terminalis 0.30–0.36 × as long as the base of segment VI. Ultimate rostral segment blunt, 0.64–0.67 × as long as the second segment of hind tarsus. Scleroites on dorsum scattered.	*M. submacula* (Walker)

Maculolachnus rubi Ghosh & Raychaudhuri 1972

(Plate 33; Plate 70)

1972. *Maculolachnus rubi* Ghosh, A. K., Raychaudhuri, D. N., *Proc. Zool. Soc.* Calcutta, **25**: 101.

Apterous viviparous female: Body elongate 2.70–3.4 mm long with 1.5–2.0 mm as maximum width at the middle of abdomen. Head dark brown, sclerotic with many long and fine hairs, longest one 0.093–0.106 mm long, these being 1.12–1.28 × as long as the basal diameter of antennal segment III. Antennae 0.48–0.51 × as long as the body, dark brown except at somewhat paler, basal 0.50–0.75 portion of segment III; flagellum distinctly imbricated near constricted base of segment III and on whole of processus terminalis, rest nearly smooth; apical part of segment III with 1–7 small, somewhat protuberant secondary rhinaria, segment IV with 1–6, segment V 1–5 and base of segment VI with 1–3 similar rhinaria; hairs on flagellum fine with acute apices, longest one on segment III, 0.80–0.106 mm long, shortest one 0.050–0.066 mm long, these being 2.2–2.3 × and 1.14–1.54 × as long as the basal diameter of the segment, respectively; processus terminalis 0.50–0.62 × as long as base of segment VI and 0.12–0.15 × as long as antennal segment III. Rostrum reaches beyond hind coxae, ultimate rostral segment stout, narrowed at apex, 0.92–0.96 × as long as second segment of hind tarsus and bearing 12 accessory hairs.

Abdominal dorsum sclerotic, brown, finely reticulated, bearing scattered "muskelplatten" on pleural and marginal areas, besides broken sclerotic band on 7th tergite and a solid sclerotic band on 8th tergite; stigmal pori on dark sclerotic plates; hairs on the dorsum of abdomen, fine, numerous, many arising from small sclerotic bases which may often become confluent in spinal region and form broken bands as on 7th tergite; abdominal venter with fine spinules; longest hair on the anterior tergites 0.093–0.137 mm long, shortest one 0.083–0.100 mm long, these being 2.6–3.2 × and 2.0–2.5 × as long as the basal diameter of antennal segment III, respectively; 8th tergite with 18–20 hairs, longest one being 0.124–0.146 mm long, 2.7–3.4 × as long as mentioned diameter. Siphuncular cones dark brown, entire. Cauda brown, sclerotic, bearing many fine hairs. Legs dark brown to black except at basal segments and bases of femora which are concolorous with thoracic tergum; hairs on femora and tibiae long and fine, longest one on hind tibiae 0.081–0.106 mm long, 0.90–1.2 × as long as the diameter at the middle of the hind tibiae; first segment of hind tarsus dorsally 0.03–0.04 mm long, ventrally 0.07–0.08 mm long; first tarsal segments with 10–12 hairs of which at least 6–8 appear short, spine-like.

Colour: Dark brown in life.

	Measurements in mm			
	1	2	3	4
Length	2.8	3.3	3.4	3.4
Width	1.7	1.9	2.01	1.8
Antenna	1.4	1.6	1.7	1.7
Antennal segments III ...	0.57	0.63	0.70	0.72
,, IV ...	0.21	0.22	0.23	0.20
,, V ...	0.21	0.23	0.24	0.23
,, VI ...	(0.14+0.07)	(0.15+0.09)	(0.18+0.09)	(0.18+0.10)
urs.	0.22	0.24	0.24	0.23
$ht._2$	0.23	0.27	0.28	0.25
Siphunculus diameter, base ...	0.46	0.55	0.49	0.48
,, apex ...	0.07	0.08	0.07	0.07

(1, 2, 3, ex *Rubus* sp., Shillong, 17-vii-1970; 4, ex *Rubus* sp., Shillong, 9-vi-1970, CU.)

Alate viviparous female: Not known.

Sexual forms: Not known.

Nymphs (Apterous; early instar): Body pale, extremely hairy. Antennae 5 segmented; hairs on flagellum fine, 0.03–0.06 mm long; secondary rhinaria absent; processus terminalis slender, 0.71 × as long as base of segment VI. Dorsum without any sclerotic areas

or band, venter finely spinulose. Siphunculi pale, on small elevated cones. Legs pale; hairs on femora and tibiae fine; first segment of hind tarsus dorsally 0.02 mm long, ventrally 0.05 mm long.

Colour: Pale in life.

Measurements in mm:

	Length	Width	Antenna	Antennal segments III	IV	V	urs.	ht.$_2$
1.	1.3	?	0.80	0.18	0.09	(0.04+0.07)	?	0.15

(ex *Rubus* sp., Shillong, 9-vi-1970, CU.)

Material examined: Three apterous viviparous females and 3 nymphs, from *Rubus* sp., Shillong, Meghalaya, India, 9-vi-1970; coll. S. Sarker; 3 apterous viviparous females and 4 nymphs, 30-vi-1970, other dat asame as before; 5 apterous viviparous and 3 nymphs, 17-vii-1970 other, data same as before; 2 apterous viviparous females and 2 nymphs, 10-xi-1970, other data same as before.

Discussion: This endemic species is the only member of the genus infesting *Rubus* sp., and could be separated from two other closely related species of the genus viz. *submacula* Wlk., and *sijpkensi* Hille Ris Lambers, in having sclerotic areas on dorsum, long and thin processus terminalis and long and pointed ultimate rostral segment. The species usually infest apical stem of the host during June–July and October–November, in Shillong areas of Meghalaya. Ants were seen in association during most of the collection.

Distribution.—INDIA: Meghalaya, Shillong.

Types:—In the collections of Entomology Laboratory, Department of Zoology, University of Calcutta, India.

Maculolachnus submacula (Walker 1848)

(Plate 34; Plate 35; Plate 71)

1848. *Aphis submacula* Walker, F., *Ann. Mag. nat. Hist.*, **2**(2): 104.
1899. *Lachnus rubinaculosus* Cholodkovsky, N., Zool. Anz., **22**: 469.
1899. *Lachnus rosae* Cholodkovsky, N., *Zool. Anz.*, **22**: 471.
1920. *Maculolachnus rosae*, Gaumont., L., *Bull. Soc. Ent., Fr.* **25**: 26.
1929. *Pterochlorus rosae*, Knowlton, G. F., *Pan–Pacific Ent.*, **6**: 33.
1969. *Maculolachnus submacula*, David, S. K., Narayanan, K., Rajasingh, S. G., *Bull. Ent.*, **10**(2): 158.

Apterous viviparous female: Body 3.70–4.06 mm long. Head dark brown with a distinct median suture; hairs on frons and vertex long, with acute or acuminate apices, usually 0.100–0.115 mm long, longest one being 1.8–2.3× as long as the basal diameter of antennal segment III. Antennae brown, 0.43–0.44× as long as

the body; flagellum feebly imbricated except processus terminalis which is distinctly imbricated; segment III with 1–3 and IV with 1–2 small secondary rhinaria near the apices; hairs on the flagellum thick, longest one on segment III 0.056–0.066 mm long, shortest one 0.036–0.043 mm long, these being 1.2–1.4× and 0.71–0.87× as long as the basal diameter of the segment, respectively, processus terminalis 0.30–0.36× as long as base of segment VI and 0.12–0.15× as long as antennal segment III. Thoracic tergum sclerotic brown on prothorax and marginal areas of mesothorax, rest bearing many scattered, brown, hair-bearing scleroites. Rostrum reaches near bases of siphunculi, ultimate rostral segment stout, dark brown, 0.64–0.67× as long as second segment of hind tarsus and bearing at least 15 accessory hairs. Abdominal dorsum pale bearing many "muskelplattens" in pleural and marginal areas, besides small brown, hair-bearing scleroites; 8th tergite with a narrow sclerotic brown transverse band, somewhat interrupted in the middle; stigmal pori on brown sclerotic plates; hairs on the dorsum of abdomen numerous, thick, with acuminate apices, longest one on anterior tergites 0.106–0.115 mm long, shortest one 0.063–0.083 mm long, these being 1.80–2.33× and 1.20–1.67× as long as the basal diameter of antennal segment III, respectively; 8th tergite with many fine hairs with acute apices, longest one 0.115–0.124 mm long and 2.06–2.53× as long as the mentioned diameter. Siphunculi on dark brown, sclerotic, hair bearing cones. Subgenital and anal plate brown, sclerotic, former appearing somewhat cleft in the middle. Cauda brown with many fine hairs. Legs nearly uniformly dark brown, somewhat paler near bases of hind femora; hairs on legs stiff, longest one on hind tibiae, 0.073–0.080 mm long, 0.63–0.75× as long as the diameter at the middle of hind tibiae; first segment of hind tarsus dorsally 0.05 mm long, ventrally 0.13 mm long; first tarsal segments with 12–14 hairs including some short spines.

Colour: Not known.

	Measurements in mm		
	1	2	3
Length	4.06	3.97	3.70
Width	2.50	2.37	2.47
Antenna	1.78	1.71	1.64
Antennal segments III ...	0.58	0.55	0.49
,, IV ...	0.28	0.24	0.29
,, V ...	0.33	0.32	0.32
,, VI ...	(0.24+0.07)	(0.22+0.08)	(0.20+0.07)
urs.	0.25	0.23	0.23
$ht._2$	0.37	0.36	0.36
Siphunculus diameter, base ...	0.39	0.41	0.41
,, apex ...	0.08	0.09	0.09

(1–3, ex *Rosa moschata*, Simla, 26-XI-1969, SKD.)

Alate viviparous females: [Not recorded in India. The following description is based on the material received from British Museum (Nat. Hist.), London.]

Body 3.1–3.5 mm long, Head dark brown to black; hairs on frons and vertex fine, longest one 0.100–0.130 mm long, 3.0–3.6× as long as the basal diameter of antennal segment III. Antennae 0.48× as long as the body, dark brown; antennal segment III with 7–10 and IV with 1–2 large, oval, somewhat protuberant secondary rhinaria, arranged in a row; flagellum with many fine hairs, longest one on segment III 0.076 mm long, shortest one 0.050 mm long, these being 2.1–2.3× and 1.4–1.5× as long as the basal diameter of antennal segment III, respectively; processus terminalis 0.27–0.33× as long as base of segment VI and 0.10–0.11× as long as antennal segment III. Ultimate rostral segment 0.59–0.62× as long as second segment of hind tarsus and bearing 15–16 accessory hairs. Abdominal dorsum pale bearing rows of "muskelplatten" on pleural and marginal areas on 1st–6th tergite, besides irregular spinal sclerotic areas on 1st–2nd tergites, a pair of transverse bands on 8th tergite and numerous, small scleroites bearing hairs; stigmal pori on large sclerotic plates; hairs on the dorsum of abdomen fine, longest one on anterior tergites 0.118–0.134 mm long, shortest one 0.83–0.100 mm long, these being 3.6× and 2.5–2.7× as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.137–0.146 mm long, 4.1–4.2× as long as the mentioned diameter. Siphunculi on dark brown hairy cones. Cauda brown, sclerotic. Legs brown to dark brown, paler at the bases of femora; hairs on femora and tibiae fine, longest one on hind tibiae 0.08–0.09 mm long, 1.04–1.30× as long as the diameter at the middle of hind tibiae; first segment of hind tarsus dorsally 0.06–0.07 mm long, ventrally 0.12–0.14 mm long.

Colour: Not known.

	Measurements in mm	
	1	2
Length	3.49	3.08
Width	1.58	1.44
Antenna	1.66	1.48
Antennal segments III ...	0.60	0.56
,, IV ...	0.22	0.20
,, V ...	0.29	0.28
,, VI ...	(0.22+0.06)	(0.20+0.06)
urs.	0.23	0.21
$ht._2$	0.36	0.34
Siphunculus diameter, base ...	0.41	?
,, apex ...	0.06	0.06

(1, ex *Rosa*, Surrey, 28-v-1967, BMNH; 2, ex *Rosa* sp. Herts, England, 20-iv-1954, BMNH.)

Sexual forms: [Not recorded in the region; description based on Palmer (1952) and Hille Ris Lambers (1962).]

Male: Apterous: Colour same as apterous vivipara. Body 1.6 mm long. Antenna 1.0 mm long; measurements of antennal segment III: 0.26, IV: 0.13, V: 0.19 and VI: 0.15+0.04; antennal segment III with 4 and segment IV with 3, small protuberant secondary rhinaria; longest hair on segment III hardly exceeding the basal diameter of the segment. Hind tibia 1.1 mm long.

Oviparous female: Apterous: Colour as in apterous vivipara or darker, Dorsum of abdomen with broad sclerotic area in each tergite; all or nearly all hairs arise from little dark sclerotic plates. Subgenital plate divided into two parts. Hind tibiae slightly swollen, with a number of distinct pseudosensoria.

Nymphs: Not seen.

Material examined: Three apterous viviparous females from *Rosa moschata*, Simla, Himachal Pradesh, India, coll. K. Narayanan & S.G. Rajasingh (SKD, No. 1160); one alate viviparous females from *Rosa* sp. Tring, Herts, England, coll. G.H.E., Hopkins, det, J.P.D. (BMNH, No. 15/54); one alate viviparous female from Rose, Ham, Surrey England, 28-V-1967, coll. L.A. Mound., (BMNH, No. 286/67).

Discussion: Holman and Szelegiewicz (1972) while dealing with the Mongolian aphid fauna mentioned that all North American records of *M. submacula* (Walker) should be actually referred to *M. sijpkensi* H.R.L., which was described from oviparae, collected on *Rosa acicularis*, in Canada. However, while describing the new species, Hille Ris Lambers (1962) mentioned the differences between oviparae of *submacula* of which he has examined all morphs from various countries, and oviparae of *sijpkensi*, especially in the nature of subgenital plate and presence or absence of pseudosensoria on hind tibiae. Palmer (1952) has figured oviparae of *submacula* (as *rosae*) from U.S.A., where she has shown a number of pseudosensoria on hird tibiae, as should be normally present in *submacula*, but according to Hille Ris Lambers (*op. cit.*) at most only one pseudosensorium is present in *sijpkensi*. As such, it is not clear whether *submacula* is absent in Nearctic region as has been claimed by Holman & Szelegiewicz (op. cit.). Mackauer (1968) has listed a hymenopteran parasite *Pauesia maculolachnini* (Stary) which is known to attack *submacula* in Europe. *M. submacula* is known to live on roses, both in subterranean and aerial parts.

Distribution.—INDIA. West Palaearctic region and (?) Nearctic region.

Types: In the collections of British Museum (Natural History) London.

Genus **Nippolachnus** Matsumura, 1917

1917. *Nippolachnus* Matsumura, S. *J. Coll. agric. Tohoku imp. Univ.*, **7**(6): 382; Baker, A. C., 1920. *Bull. U.S. Dep. Agric.*, **826**: 14; Borner, C., 1930. *Arch. klassif. phylogen. Ent.*, **1**(2): 125; Shinji, O., 1941. *Monogr. Japanese Aphids*, 104. Type species: *Nippolachnus piri* Matsumura.

Morphology: Body elongate to oval, 2.5–5.5 mm long. Head with a distinct median suture; dorsal cephalic hairs long, fine, up to 6.5× as long as the basal diameter of antennal segment III. Antennae 6 segmented, 0.25–0.50× as long as the body; apterae usually with few secondary rhinaria on segments III–VI, sometimes these may be absent; alatae with large, oval secondary rhinaria on segments III–VI; hairs on the flagellum fine, 2.5–6.5× as long as the basal diameter of antennal segment III; processus terminalis 0.33–0.57× as long as base of segment VI. Eyes without apparent ocular tubercles. Rostrum reaches at most little beyond hind coxae, ultimate rostral segment 0.65–0.80× as long as second segment of hind tarsus and may bear 10–20 accessory hairs. Tergum pale, membraneous, sometimes with spinopleural bands on 8th tergite, in apterae; in alatae, often with spinal sclerotic pattern; dorsal hairs fine, up to 6.8× as long as the basal diameter of antennal segment III. Siphunculi on pale to dark hairy cones. Cauda pale to brown, bearing many fine hairs. Legs variably pigmented, long and slender, and bearing many fine hairs, those on hind tibiae up to 0.60–2.0× as long as the diameter at the middle of hind tibiae. Wings hyaline, pterostigma sometimes dark, media of forewings once or twice branched, hind wings with both obliques.

Males are known to be alate; both oviparae and males are smaller in size than viviparae.

Discussion: The genus contains 3 species, all of which are found in the region including two endemic ones. Pale colour of the apterae with characteristic long legs, short antennae with large secondary rhinaria, absence of ocular tubercles, dense pubescence and their association with plants of Rosaceae, help to distinguish the members of this genus from the related ones. The genus apparently resembles *Anoecia* Koch, from which it differs in having epicranial suture, long stigma in forewings and in the absence of distinct ocular tubercles, besides other characters.

Biology: All species of this genus infest plants of Rosaceae e.g. *Eriobotrya, Pyrus, Photinia, Rhaphiolepis, Sorbus* spp. and more frequently the plants of first two genera, during the months of March to July and sometimes during November to January. Usually these insects infest undersurface of leaves of the host plants and arrange themselves in rows along the sides of midrib. Ants have been noted in association with only one species, e.g. *N. bengalensis*.

Distribution.—INDIA, KOREA, JAPAN, TAIWAN and MALAYA.

Type species.—*Nippolachnus piri* Matsumura 1917. Probably in the Entomological Laboratory, Hokkaido University, Sapporo, Japan.

Key to the species of **Nippolachnus**

Apterous viviparous females:

1(2) Legs in apterae black or blackish. Dorsal cephalic hairs 2.7–2.8 × as long as basal diameter of antennal segment III. Hairs on the hind tibiae up to 0.60–0.75 × as long as the diameter at the middle of hind tibiae. Colour in life brick red. — *N. himalayensis* (v.d. Goot)

2(1) Legs in apterae pale, sometimes, brownish at the apices of tibiae and whole of tarsi. Dorsal cephalic hairs 5.0–6.5 × as long as the basal diameter of antennal segment III. Hairs on the hind tibiae up to 1.6–2.0 × as long as the diameter at the middle of hind tibiae. Colour in life, usually green.

3(4) Ultimate rostral segment 0.14–0.18 mm long, with 9–14 accessory hairs. Antennal segment VI with part basad to primary rhinarium twice or more times as long as the part distal the primary rhinarium; processus terminalis with only few terminal setae, without any hairs. Hairs in hind tibiae, 0.130–0.180 mm long, 1.80–2.0 × as long as the diameter at the middle of hind tibiae. — *N. bengalensis* Basu & Hille Ris Lambers

4(3) Ultimate rostral segment 0.17–0.22 mm long with 18–20 accessory hairs. Antennal segment VI with part basad to primary rhinarium shorter or little longer than the part distal to primary rhinarium; processus terminalis with a few fine hairs besides terminal setae. Hairs on the hind tibiae, 0.163–0.178 mm long, 1.7–1.8 × as long as the diameter at the middle of hind tibiae. — *N. piri* Matsumura

Alate viviparous female:

1(2) Abdomen without dorsal sclerotic areas. Antennae with 40–60 scattered secondary rhinaria on segment III and 10–11 similar rhinaria on segment IV. Legs dark brown to black. Forewings with media twice branched. Colour in life, brick red. . . . — *N. himalayensis* (v.d. Goot)

2(1) Abdomen with dorsal sclerotic pattern. Antennae with 5–12 secondary rhinaria arranged in a row on segment III, and 0–5 similar rhinaria on segment IV. Fore and mid legs variably black. Forewings with media simple, once or twice branched. Colour in life, green to dark yellowish brown.

3(4) Antennal segment VI with the part basad to primary rhinarium twice or more times as long as the part distad to primary rhinarium; processus terminalis up to 0.33 × as long as base of segment VI and bearing only terminal setae. Ultimate rostral segment with 9–14 accessory hairs. *N. bengalensis* Basu & Hille Ris Lambers

4(3) Antennal segment VI with the part basad to primary rhinarium shorter or little longer than the part distal to primary rhinarium; processus terminalis 0.45–0.57 × as long as base of antennal segment VI and bearing a few hairs, besides terminal setae. Ultimate rostral segment with 18–20 accessory hairs. *N. piri* Matsumura

Nippolachnus bengalensis Basu & Hille Ris Lambers, 1968
(Plate 36; Plate 72)

1968. *Nippolachnus bengalensis*, Basu, A. N. and Hille Ris Lambers, D. *Ent. Ber. Amst.*, **28**: 9.

1974. *Nippolachnus bengalensis*, Ghosh, A. K., *Orient. Ins.*, **8**(2): 171.

Apterous viviparous females: Body spindle shaped, pale, 2.60–2.90 mm long (2.78–3.31 mm). Head, body and appendages with numerous pale or dark, fine and long hairs. Head with a complete median suture; dorsal cephalic hairs 0.13–0.16 mm long, 5.0–6.2 × as long as basal diameter of antennal segment III. Antennae 0.25–0.33 × as long as the body, pale, sometimes dusky at processus terminalis; secondary rhinaria usually absent but sometimes each of segments III, IV and V with 2–3 secondary rhinaria; flagellum smooth up to base of segment VI, bearing many fine hairs, longest one on segment III, 0.13–0.15 mm long, shortest one 0.08 mm long, these being 5.0–6.0 × and 3.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.37–0.44 × as long as the base of segment VI and 0.16–0.20 × as long as antennal segment III. Eyes without ocular tubercles. Rostrum hardly reaches mid coxae, ultimate rostral segment blunt, 0.66–0.71 × as long as the second segment of hind tarsus and bearing 10–11 (9–14) long fine accessory hairs, besides 3 pairs of long preapical hairs. Abdominal dorsum pale with numerous fine hairs,

up to 0.10–0.15 mm long, 3.75–5.0× (4.5–5.3×) as long as the basal diameter of antennal segment III. Siphunculi on pale cones, with numerous hairs. Cauda pale with many hairs. Legs pale, sometimes little brownish, with numerous long, fine hairs, those on hind tibiae, 0.13–0.16 mm long, 1.8–2.0× as long as the diameter of the middle of hind tibiae.

Colour: Light green in life.

Measurements in mm

	1	2	3	4
Length	2.45	2.60	2.90	2.76
Width	1.20	0.96	1.03	1.24
Antenna	0.85	0.78	0.89	0.79
Antennal segments III ...	0.33	0.24	0.33	0.25
,, IV ...	0.12	0.10	0.12	0.10
,, V ...	0.14	0.15	0.16	0.12
,, VI ...	(0.09+0.04)	(0.10+0.04)	(0.12+0.04)	(0.12+0.04)
urs.	0.14	0.15	0.15	0.14
$ht._2$	0.22	0.20	0.22	0.20
Siphunculus diameter ...	0.10	0.09	0.10	0.10

(1, ex *Eriobotrya dubia*, Darjeeling, 6-vii-1958, DHRL; 2–3, ex *Eriobotrya dubia*, Darjeeling 20-vi-1969, CU; 4, ex *Pyrus pashia*, Shillong, 18-vi-1973, ZSI.)

Alate viviparous female: Body spindle shaped, 2.70–2.90 mm long. Head brownish, much darker along eyes and median suture; dorsal cephalic hairs 0.10–0.13 mm long, 5.0–5.5× as long as the basal diameter of antennal segment III. Antennae pale brownish, darker at apices of segments III–VI; segment III with 7–8 (8–11) large rourdish or irregular secondary rhinaria over their entire length; segment IV with 0–2 (3–5), V with 1(1–5) and base of segment VI with 1 secondary rhinaria; longest hair on segment III, 0.10–0.12 mm long, 4.0–4.2× as long as the basal diameter of the segment; processus terminalis usually 0.33× as long as base of segment VI and 0.12–0.16× as long as antennal segment III and with only terminal spines. Abdominal dorsum with paired, dark, marginal and pleural sclerites on 1st and 3rd tergites, a large dark spinopleural sclerotic band on each of 4th and 5th tergite which being fused, appears as a central patch; 6th and 7th tergites each with a spinal sclerite, 8th tergite with two band like transverse patch; hairs on the dorsum of abdomen up to 0.12–0.13 mm long, 5.0–5.7× as long as the basal diameter of antennal segment III. Siphunculi on brownish to large dark cones. Cauda brownish. Fore and mid legs, pale yellow with tarsi dusky; hind legs with apical half of femora, apical one third of tibiae and whole of tarsi dark

brown; hind tibiae with many fine hairs as in apterae. Wings hyaline, forewings with pterostigma dark as also subcosta; media simple, once or twice branched, arising some distance away from subcosta; hind wings with both obliques.

Colour: Head and thorax brownish, abdomen pale with sclerotic patches.

Measurements in mm

	1	2	3
Length	2.76	2.90	2.96
Width	1.10	1.10	1.08
Antenna	0.78	0.82	0.90
Antennal segments III ...	0.25	0.28	0.30
,, IV ...	0.10	0.10	0.12
,, V ...	0.14	0.14	0.14
,, VI ...	(0.12+0.04)	(0.12+0.04)	(0.11+0.04)
urs.	0.15	0.14	0.15
$ht._2$	0.20	0.20	0.22
Siphunculus diameter ...	0.10	0.10	0.10

(1–2, ex *Pyrus pashia*, Shillong, 18-vi-1973, ZSI; 3, ex *Eriobotrya dubia*, Darjeeling, 26-vi-1958, DHRL.)

Sexual forms: Not known.

Nymphs (Apterous 1st instar): Body pale; antennae faintly imbricated, 5 segmented, 0.38 mm long; processus terminalis only with terminal spines. Ultimate rostral segment 0.13 mm long, with 4 accessory hairs besides 3 pairs of preapicals, and 0.80 × as long as second segment of hind tarsus (0.16 mm long). Dorsum of body and legs with many long, fine, pale hairs.

Material examined: One apterous viviparous female and two nymphs, from *Eriobotrya dubia*, Darjeeling, West Bengal, India, 6-vii-1958, coll. S. Das, det. H.R.L. & Basu (DHRL); one alate and two apterous viviparous females & two nymphs, from *Eriobotrya dubia*, Darjeeling, West Bengal, India, 26-v-1958, coll. S. Das, det. H.R.L. & Basu (Paratypes, DHRL); four apterous viviparous females from *Eriobotrya dubia*, Darjeeling, West Bengal, India, 20-vi-1969, coll. S. Chakraborty, det. A. K. Ghosh, (CU); two apterous viviparous females from *Eriobotrya dubia*, Darjeeling, West Bengal, India, 15-xi-1968, coll. S.G.R. det. D.H.R.L. (SKD, No. 918); two apterous viviparous females and four alate viviparous females, from *Pyrus pashia*, Shillong, Meghalaya, India, 18-vi-1973, coll. & det. A. K. Ghosh (ZSI); three apterous viviparous females and eighteen nymphs from *Photinia arguta*, Shillong, Meghalaya, India, 24-v-1970, coll. S. Biswas, (ZSI); two apterous viviparous

females from *Photinia arguta* (=*Pourathiaea arcuta*), Shillong, Meghalaya, India, 20-v-1969, coll. S.G.R. det. D.H.R.L., (SKD).

Discussion: The base of segment VI being much longer than processus terminalis and the latter being with only terminal spines makes this species distinguishable from the other pale species of the genus, *N piri* Matsumura. The sclerotic pattern on abdominal dorsum of alatae seems to be variable as Basu & H.R.L. (1968) mentioned only a brown central patch on 4th and 6th tergites but the alatae from *Pyrus pashia* shows much more extensive sclerotin areas as has been pointed out by Ghosh (1974b).

This species causes mild infestation on *Eriobotrya dubia* and records indicate its incidence from May to January. On *Pyrus pashia* this species forms small colonies on undersurface of leaves and is largely attended by small red ants although ant attendance has not been observed on *Eriobotrya* (Basu & H.R.L., op. cit.). It has also been recorded in Shillong on *Photinia arguta* during May, where they have been noted in association with ants and predatory mites and spiders.

Distribution.—INDIA: West Bengal, Meghalaya.

Types.—Holotype and Paratypes in the collections of D. Hille Ris Lambers Bennekom. The Netherlands: some paratypes in the collection of A. N. Basu, I.A.R.I., New Delhi, India.

Nippolachnus himalayensis (van der Goot, 1917)
(Plate 37; Plate 73)

1917. *Lachnus himalayensis* Goot, P. van der, *Rec. Indian Mus.*, **13**: 180.
1933. *?Lachnus fici* Takahashi, R., *Philip. J. Sci.*, **52**: 291.
1958. *Lachnus himalayensis*, Tao, Charles, Chia-chu, *Agric. Res.*, (Taiwan) **8**: 1.
1961. *Lachnus himalayensis*, Tao, Charles Chia-chu, *Sci. Yb. Taiwan Mus.*, **4**: 38.
1968. *Nippolachnus eriobotryae* Basu, A. N. and Hille Ris Lambers, D. *Ent. Ber. Amst.*, **28**: 11.
1976. *Nippolachnus himalayensis*, Eastop, V. F. and Hille Ris Lambers, D. *Survey World's Aphids* 321.

Apterous viviparous female: Body broadly oval 3.21–5.24 mm long (–5.5 mm) long. Head brownish, with a distinct median suture, with many long dorsal hairs, longest one 0.130–0.140 mm long, up to 2.75–2.81 × as long as the basal diameter of antennal segment III. Antennae 0.33–0.50 × as long as the body, always much darker than head, but segment I sometimes almost concolorous with the head; secondary rhinaria usually absent, sometimes segment III with 1, IV with 4(2) and V with 3–5 (1) secondary

rhinaria; flagellum almost smooth and bearing long, fine hairs, longest one on antennal segment III 0.10–0.16 mm long, shortest one 0.04 mm long, these 2.6–4.0× and 0.80× as long as the basal diameter of the segment; processus terminalis 0.40–0.45× (0.50×) as long as base of segment VI and 0.11–0.12× as long as antennal segment III. Eyes large, without ocular tubercles. Rostrum reaches beyond hind coxae, ultimate rostral segment stout and obtuse, 0.68–0.75× (0.54–0.70×) as long as second segment of hind tarsus, with at least 20 fine accessory hairs, which are 0.10–0.13 mm long, besides much shorter (0.02–0.03 mm long), stiff preapical ones. Mid thoracic furca broad and joined at base. Thorax laterally and sometimes medially brown, sclerotic. Abdominal dorsum pale, smooth and membraneous but 8th tergite with paired spinopleural bands; hairs on the dorsum of abdomen numerous, long, fine, up to 0.12–0.15 mm long and 3.0–4.0×(2.5–3.0×) as long as the basal diameter of antennal segment III. Siphunculi on large, pale to brownish, hairy cones. Cauda pale brown, semi-lunar with at least 25–30 hairs. Legs long and stout, predominantly dark brown to black, with bases of femora paler, clothed with numerous long and fine hairs; femora often with scattered irregular plate like structure; hairs on hind tibiae 0.08–0.10 mm long, 2.0–2.6 (1.7–2.7×) as long as the basal diameter of antennal segment III and 0.60–0.75× as long as the basal diameter of the middle of hind tibiae; first tarsal segments with many (at least 20) long fine hairs, 0.05–0.06 mm long.

Colour: Body brick red, segmentation apparent with white intersegmental margin. Legs blackish (Basu & H.R.L., 1968).

Measurements in mm

	1	2	3
Length	3.21	5.24	4.89
Width	1.80	2.80	2.78
Antenna	1.52	1.96	1.79
Antennal segments III ...	0.55	0.75	0.69
,, IV ...	0.35	0.30	0.30
,, V ...	0.29	0.30	0.30
,, VI ...	(0.15+0.08)	(0.20+0.08)	(0.19+0.08)
urs.	0.24	0.25	0.29
$ht._2$	0.32	0.37	0.41
Siphunculus. diameter, base ...	0.45	0.61	0.58
,, apex ...	0.08	0.12	0.12

(1, ex *Eriobotrya petiolata*, Darjeeling 2-vi-1957, DHRL; 2–3, ex indet, host, Gaddikhana, 28-iii-1970, CU; 3, ex indet host. Manjitar, 15-iii-1970, CU.)

Alate viviparous female (description from Basu & H.R.L., 1968). Body about 4.0 mm long with head and thorax dark brownish and abdomen pale. Antennae brown, about 0.37 × as long as the body; segment III with 40–60 and IV with 10–11 roundish to oval secondary rhinaria arranged irregularly over their entire lengths, segment V with 4–5 secondary rhinaria only on basal half; hairs on flagellum thicker and darker. Eyes apparently without ocular tubercles. Ultimate rostral segment 0.56–0.63 × as long as second segment of hind tarsus. Siphunculi and cauda pale brown. Legs dark brown with many hairs. Wings hyaline; forewings with pterostigma pale brownish, media faint, twice branched; hind wings with both obliques.

Colour: Head and thorax brownish, abdomen brick red.

Measurements in mm:

	Length	Antenna	Antennal segments				Siphunculus diameter
			III	IV	V	VI	apex
1.	4.01	1.57	0.57	0.24	0.29	(0.17+0.07)	0.09
2.	3.95	1.57	0.61	0.27	0.26	(0.17+0.07)	0.09

(1–2, ex *Eriobotrya petiolata*, Darjeeling, 26-v-1958, DHRL.)

Sexual forms: Not known.

Nymphs (Alate: late instar): Body pale with wing bands, rostrum, legs and cauda brownish to dark. Antennae 6 segmented, 0.90 mm long, segment III little shorter (0.34 mm) than segments IV (0.10 mm), V (0.16 mm) and VI (0.10 mm), together; antennal hairs fine and numerous. Ultimate rostral segment dark, stout, about 0.64 × as long as second segment of hind tarsus. Hairs numerous on body and legs, hind legs much darker, stouter and 1.5 × as long as fore legs.

Material examined: One apterous viviparous female and one nymph from *Eriobotrya petiolata*, Darjeeling, West Bengal, India, 2-vi-1957, coll. A. N. Basu, det. D.H.R.L., & Basu, (DHRL); one apterous viviparous female from undetermined host, Gaddikhana, Darjeeling district, West Bengal, India, 28-iii-1970, coll. S. Chakrabarty, det. A. K. Ghosh, (CU, No. PLK 1935); one apterous viviparous female, from undetermined host, Manjitar, Rangit Valley, Darjeeling district, West Bengal, India, 15-iii-1970, coll. S. Chakrabarty, det. A. K. Ghosh (CU, No. PLK 1402).

Discussion: The identity of this species, originally described from a collection from undetermined host at Birch Hill area of Darjeeling (6-VII-1914) remained uncertain for a long time as the type collection No. 5601/H.I. deposited in the Indian Museum, Calcutta was reported to be lost. The nature of pubescence, number of secondary rhinaria, nature of rostrum, etc. suggested its

similarity with *N. eriobotryae* Basu & Hille Ris Lambers, which has been described from Darjeeling and Eastop and Hille Ris Lambers (1976) listed this species as a synonym of *himalayensis* van der Goot and placed *himalayensis* under *Nippolachnus*.

This species with large, brick red body, blackish legs and numerous secondary rhinaria on antennal segment III of alatae along with twice furcated media can easily be distinguished from other members of the genus.

According to Basu and Hille Ris Lambers (1968) these aphids form large colonies on leaves and petioles of host plants and are often found in association with *Tuberolachnus* (*Tuberolachniella*) *sclerata* Hille Ris Lambers and Basu. These aphids are also reported to be very sluggish and do not cause appreciable injury to the host.

Available records indicate its incidence at least from March to June.

Distribution.—INDIA: West Bengal (Darjeeling).

Types: Types of *himalayensis* are reported to be lost. Types of *eriobotryae* in the collections of D. Hille Ris Lambers, Bennekom, The Netherlands; some paratypes in the collection of A. N. Basu, I.A.R.I., New Delhi.

Nippolachnus piri Matsumura 1917

(Plate 38; Plate 74; Plate 75)

1917. *Nippolachnus piri* Matsumura, S., *J. Coll. Agric. Tohoku Univ.*, **7**(6): 382.

1928. *Anoecia piri*, Essig, E.O. & Kuwana, S. I., *Proc. Calif. Acad. Sci.*, **8**(3): 108.

1924. ? *Nippolachnus micromeli* Shinji, O., *Dobuts Zasshi*, **36**: 343.

1952. *Nippolachnus piri*, Ghosh, A. K., Raychaudhuri, D. N., *J Asiat. Soc. Beng.*, **14** (3 & 4): 107.

Apterous viviparous female: Body pale, elongate 3.0–3.7 mm long. Head with distinct median suture; hairs on frons and vertex long and fine, longest one 0.148–0.170 mm long, 5.6–6.5 × as long as the basal diameter of antennal segment III. Eyes without ocular tubercles. Antennae 0.26–0.30 × as long as the body, pale, sometimes little dusky on apical 0.50 portion of segment V and 0.75 portion of segment VI or on whole of flagellum except base of segment III; flagellum nearly smooth, except processus terminalis which is clearly imbricated, without any secondary rhinaria; primary rhinaria on segment V and VI large; segment III longer than segments IV+V taken together, segment V distinctly longer than IV; hairs on flagellum fine, longest one on segment III, 0.130–

0.169 mm long, shortest one 0.083–0.093 mm long, these being 4.4–6.5× and 3.1–3.2× as long as the basal diameter of the segment, respectively; processus terminalis with a few hairs besides terminal spines, 0.40–0.43× as long as base of segment VI and 0.17–0.19× as long as antennal segment III. Rostrum reaches beyond mid coxae, ultimate rostral segment stout, dusky brown, 0.77–0.80× as long as second segment of hind tarsus ar d bearing 16–18 accessory hairs; longest hair on anterior tergites, 0.130–0.146 mm long shortest one 0.083–0.100 mm long, these being 4.4–5.6× and 2.8–3.7× as long as the basal diameter of antennal segment III, respectively; 8th tergite with many fine hairs, longest one 0.146–0.178 mm long, 5.0–6.8× as long as the mentioned diameter. Siphunculi on pale, hair-bearing cones. Cauda pale, bearing many fine hairs. Legs pale, little dusky at apices of fore tibiae and tarsi; apices of hind tibiae and whole of hind tarsi brownish to black, sometimes knee joints of hind legs may also be dusky; hairs on legs fine, longest one on hind tibiae 0.163–0.178 mm long, 1.66–1.83× as long as the diameter at the middle of hind tibiae. First tarsal segments with 9–11 hairs, at least one of which appears shorter and spine like.

Colour: Pale green in life.

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	ht.$_2$	Siphunculus diameter
				III	IV	V	VI			
1.	3.3	1.4	1.0	0.35	0.15	0.18	(0.16–0.06)	0.20	0.25	0.34
2.	3.3	1.4	0.93	0.29	0.10	0.16	(0.14+0.05)	0.20	0.25	0.30
3.	3.7	1.6	0.96	0.31	0.09	0.16	(0.15+0.05)	0.18	0.23	0.28

(1, 2, ex *Pyrus communis*, Shillong, 2-xi-1972, 3, ex *Pyrus khasiana* Shillong, 8-viii-1966, ZSI.)

Alate viviparous female: Body 2.8–3.3 mm long. Head dark brown with fine dorsal hairs, longest one 0.137–0.140 mm long, 5.2–5.4× as long as the basal diameter of antennal segment III. Antennae 0.26–0.28× as long as the body, pale, darker only at apices of segments IV, V and whole of segment VI; segment III with 6–7, IV with 1–2 and V with 1 secondary rhinaria which may be very large to small [in Japanese specimens, segment III may be with 7–11, IV with 1–4, V with 2 secondary rhinaria, according to Essig & Kuwana (1918)]; flagellum with fine hairs, longest one on segment III, 0.115–0.130 mm long, shortest one 0.083 mm long, these being 4.4–5.0× and 3.1× as long as the basal diameter of the segment, respectively; processus terminalis 0.45–0.57× as long as base of segment VI and 0.20–0.27× as long as the antennal segment III. Ultimate rostral segment 0.76–0.77× as long as second segment of hind tarsus. Thoracic tergum dark brown, sclerotic. Abdominal dorsum pale bearing marginal sclerites on 1st–5th

tergites besides a broad spinal sclerite on 1st and a brown spinal sclerotic patch on 3rd–5th tergites; 8th tergite with a irregular broad transverse sclerotic band; hairs on the dorsum of abdomen numerous, fine, longest one on anterior tergites 0.124–0.146 mm long, shortest one 0.083–0.100 mm long, these being 4.8–5.0 × and 2.8–3.1 × as long as the basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.146–0.163 mm long, 5.6–6.2 × as long as the mentioned diameter. Siphunculi on dark brown hairy cones. Cauda brown with many long fine hairs. Fore and mid legs usually yellow, sometimes dark, hind legs black on apical 0.25 portion of femora and at apices of tibiae and whole of tarsi, rest paler; longest hair on hind tibiae 0.150–0.163 mm long, 1.8–2.2 × as long as the diameter at the middle of hind tibiae. Forewings with media once or twice branched; hind wings with both obliques.

Colour: Dark yellowish brown with black markings on the dorsum and deep brown legs.

Measurements in mm:

	Length	Width	Antenna	Antennal segments				urs.	$ht._2$	Siphunculus diameter
				III	IV	V	VI			
1.	3.4	1.3	0.92	0.30	0.10	0.15	(0.14+0.08)	0.16	0.22	0.38
2.	3.5	1.4	0.96	0.34	0.10	0.18	(0.15+0.06)	0.18	0.23	0.38

(1–2, *Pyrus khasiana*, Shillong, 8-vii-1976, ZSI.)

Sexual forms: Not seen.

Nymphs: (Apterous; early instar): Body completely pale; antennae pale, 0.33 × as long as the body; segment III longer than segments IV+V taken together; segment IV little longer than segment V; hairs on flagellum fine, flagellate, 0.036–0.115 mm long; processus terminalis 0.50 × as long as base of segment VI. Ultimate rostral segment stout 0.88 × as long as second segment of hind tarsus. Dorsum pale, hairs on the dorsum of abdomen fine, flagellate, 0.053–0.080 mm long. Siphunculi and cauda pale. Legs pale, hairy, longest hair on hind tibiae 0.080 mm long, 2.2 × as long as the diameter at the middle of hind tibiae.

Colour: Pale green in life.

Measurements in mm:

	Length	Antenna	Antennal segments				urs.	$ht._2$	Siphunculus
			III	IV	V	VI			
1.	1.6	0.44	0.12	0.05	0.04	(0.08+0.04)	0.13	0.15	?

(ex *Pyrus* sp., Shillong, 8-vii-1974, ZSI.)

Material examined: Six apterous viviparous females and two alate viviparous females from *Pyrus khasiana*, Shillong, Meghalaya, India, 8-VIII-1966, coll. S. Biswas (ZSI); three apterous viviparous females from *Pyrus communis*, Shillong, Meghalaya, India, 2-XI-1972, coll. A. K. Ghosh (ZSI); one apterous viviparous female and three nymphs from *Pyrus* sp. Shillong, Meghalaya, India, 8-VII-1974, coll. A. C. Sukla, (ZSI).

Discussion: *Nippolachnus piri* is known to infest plants of Rosaceae. Tao (1961) listed *Pyrus serotina*, *Rhaphiolepis indica R. indica* var. *tashiro*, as its recorded host plants in China. Higuchi & Miyazaki (1969) in a tentative catalogue of host plants of Aphidoidea in Japan, listed *Betula platyphylla*, *Castanea crenata*, *Eriobotrya japonica*, *Pyrus communis*, *Pyrus sertonia*, var. *culta*, *Rhaphiolepis umbellata*, and *Sorbus alnifolia* as host plants for *N. piri;* it seems unlikely that *Betula* (Betulaceae) and *Castanea* (Fegaceae) could really serve as hosts of this species. Shinji (1924) described a species *Nippolachnus micromeli* from *Micromeles alnifolia* (now *Sorbus alnifolia*) which has been regarded as a synonym of *N. piri* by Tao (op. cit.); in original description of *N. micromeli* it has been mentioned that in alatae antennal segment IV is longer than V, and is with 2 subcircular sensoria, and segment V is longer than VI, but in alate of♂ piri antennal segment IV is distinctly shorter than V, and V is usually equal to VI, as such it may be possible that *micromeli* is a separate species or a subspecies, Miyazaki & Higuchi (op. cit.) retained *micromeli* as a separate species and in the present account it has been shown as a probable synonym with a (?) mark.

In Eastern India, this species has only been recorded from *Pyrus communis* and *Pyrus khasiana* from last week of July to early part of January. The pale green apterae usually arrange themselves in rows on undersurfaces of leaves along midrib.

No parasite or predator has been recorded for this species; association with ants has also been never recorded.

Distribution.—INDIA: West Bengal, Meghalaya; KOREA; JAPAN; TAIWAN and MALAYA.

Types.—Probably in the collections of Entomological laboratory, Hokkaido University, Sapporo, Japan.

Genus **Pterochloroides** Mordvilko 1914

1914. *Pterochloroides* Mordvilko, A. K., *Fauna Russie*, Hem. I, Aphidoidea 23; Archangelsky, P. P., 1917. *Rev. appl. Entomol.*, Ser. A., Agr., **5:** 563. Type species: *Lachnus persicae* Cholod.

1918. *Tuberodryobius* Das, B., *Mem. Indian Mus.*, **6:** 259. Type species: *Lachnus persicae* Cholod.

Morphology: Body large, average 4.0 mm long. Head sclerotic with thick and blunt dorsal cephalic hairs. Eyes large

with ocular tubercles. Antennae 6 segmented, less than 0.46× as long as the body; flagellum with secondary rhinaria on segments III–IV in both apterae and alatae; processus terminalis up to 0.60× as long as the base of segment VI. Rostrum reaches middle of abdomen, ultimate rostral segment at most 0.80× as long as second segment of hind tarsus, bearing more than 10 accessory hairs. Meso and Metathoracic tergites and 1st–6th abdominal tergites each with a pair of large sclerotic spinal tubercles, besides pleural scleroites at least up to 2nd abdominal tergite and transverse sclerotic bands or paired patch on 7th and 8th tergites. Hairs on flagellum and dorsum thick, usually shorter than the basal diameter of antennal segment III. Siphunculi on dark sclerotic cones. Cauda dark sclerotic, bearing many fine hairs. Legs variably pigmented, longest hair on hind tibiae shorter than the diameter at the middle of hind tibiae. Forewings with media once or twice branched; stigma, areas between medial branches and between anal and cubitus, pigmented; hind wings hyaline with both obliques.

Of the sexual forms, only apterous oviparous female, which may lack pseudosensoria on hind tibiae, are known.

Discussion: This is a monotypic genus and the only species *persicae* (Cholod.) has been variously cited in earlier literature under *Lachnus*, *Pterochlorus*, *Dryobius*. Das (1918) apparently being unaware of Mordvilko's (1914) genus *Pterochloroides* placed this species under a new genus, *Tuberodryobius*. This genus could be easily separated from other genera under Lachnini by the series of sclerotic dorsal tubercles in both apterae and alatae.

Biology: Archangelsky (1917) has dealt in detail with the biology of the genotype, *P. persicae* (Cholod.); Das (op. cit.) has subsequently given a detailed biology of the species as observed in Lahore region in Pakistan. The species lays eggs in clusters during December to February; eggs are shining black and oval and hatch in the month of March and start to reproduce parthenogenetically from March–April and large colonies build up along the stem of the *Rosacaeous* hosts e.g. *Prunus* spp. Large number of Coccinellid and syrphid larvae are reported to prey on these colonies without causing any appreciable reduction of numbers. Loss due to infestation of this aphid has been said to be enormous. A number of hymenopteran parasites have also been reported to be associated with *P. persicae* (Cholod). Bodenheimer & Swirski (1957) have given a note on its life history in Israel, where, however, sexuales were not observed.

Distribution.—INDIA, PAKISTAN, IRAN, IRAQ, TURKEY, BULGARIA, ISRAEL, EGYPT and CENTRAL ASIA.

Pterochloroides parsicae (Cholodkovsky 1899)
(Plate 39–41; Plate 76; 77)

1899. *Lachnus persicae* Cholodkovsky, N., *Zool. Anz.*, **22**: 472.
1912. *Dryobius amygdali* van der Goot, P., *Mitt. naturhist. Mus.*, Hamburg, **29**: 273.
1917. *Pterochloroides persicae*, Archangelsky, P. P., *Rev. Appl. Ent.* Ser. A; Agr., **5**: 563.
1918. *Tuberodryobius persicae*, Das, B., *Mem. Indian Mus.*, **6**: 59.
1932. *Pterochlorus salicicola* Franssen, C. J. H., *Naturrh. maandbl.*, **21**: 90.
1953. *Pterochlorus* (*Lachnus*) *persicae*, Batra, H. N., *Indian J. Ent.*, **15**: 48.
1964. *Pterochloroides persicae*, Shaposhnikov., G.Kh., In Bey-Bienko, G. Y., Keys to the Insect of European Part of U.S.S.R., 525.
1964. *Pterochloroides persicae*, Tuatay, N., and Remaudier, G., *Revue. Path. veg. ent. agric. Fr.*, **43**: 244.

Apterous viviparous female: Body ovate, 4.8 (average 4.0 mm) long. Head brown with the areas below antennal sockets black; hairs on frons and vertex thick and bluntish, longest one 0.040 mm long, 0.67× as long as the basal diameter of antennal segment III. Antennae little less than 0.33× as long as the body, pale, except basal segments, apices, of segments III, IV, most portion of segment V and VI which are dark; flagellum sparsely imbricated in the margins, except processus terminalis which is distinctly imbricated; segment III with 2–5 large secondary rhinaria near apex, segment IV with 1–3 similar ones; hairs on flagellum similar to those on frons, longest one on segment III, 0.033 mm long, shortest one 0.016 mm long, these being 0.56× and 0.28× as long as the basal diameter of the segment, respectively; processus terminalis 0.50× (0.60×) as long as base of segment VI and 0.11× (0.14×) as long as antennal segment III. Prothorax with a pair of broad transverse sclerotic bands. Rostrum reaches middle of abdomen, ultimate rostral segment dark, stout, 0.78× as long as second segment hind tarsus and bearing at least 12 accessory hairs. Mesothorax with a pair of large black hair-bearing spinal tubercles on the dorsum, besides a pair of pleural scleroites on each side and dark sclerotic lateral areas; metathoracic tergum with a pair of spinal tubercles, similar to those on mesothorax, lateral areas being also equally dark and sclerotic. Abdominal dorsum pale bearing a pair of dark sclerotic spinal tubercles on each of 1st–6th tergites, besides a pair of pleural sclerites on 1st–2nd tergites, and series of small muskel-platten-like scleroites on spino-pleural region of 1st–7th tergites; stigmal plates dark sclerotic; 7th tergite with a dark, broad transverse sclerotic band and 8th tergite with a narrower band being interrupted in the middle; hairs on the dorsum of abdomen short and thick, longest one on anterior tergites, 0.050 mm long, shortest one 0.016 mm long, these being 0.83× and 0.28× as long as the basal diameter of antennal segment III; longest hair on 8th tergite 0.073 mm loag, up to 1.1× as long as the mentioned diameter.

Siphunculi on dark hair-bearing sclerotic cones. Cauda dark sclerotic, semicircular, bearing many fine hairs. Subanal plate large, sclerotic with numerous hairs. Legs pale with basal segments, knee-joints, apices of tibiae and whole of tarsi black; hind legs considerably longer than other legs; hairs on legs short, spiny, longest one on hind tibiae 0.053 mm long, 0.37 × the diameter at the middle of hind tibiae; first lateral segments with 14–16 hairs.

(Figures within parenthesis from Das, 1918.)

Colour: According to Das (op. cit.) apterous insects appear veriegated in colour, having greyish-white and dark reddish or pitch black intermixed.

	Measurements in mm	
	1	2
Length	4.80	4.0
Width	1.91	2.20
Antenna	1.52	1.40
Antennal segments III ...	0.53	0.50
,, IV ...	0.28	0.25
,, V ...	0.23	0.24
,, VI ...	(0.13+0.06)	(0.12+0.07)
urs.	0.23	?
$ht._2$	0.28	?
Siphunculus, diameter, base ...	0.55	0.46
,, apex ...	0.14	0.15

(1, ex Peach tree, Lahore, 3-iv-1967, BMNH; 2, from Das (1918) showing average measurement of apterous viviparous female.)

Alate viviparous female: Body 3.86–4.16 mm long. Head black with ill defined ocular tubercles; hairs on frons with acuminate to blunt apices, longest one 0.040–0.050 mm long, 0.88–0.93 × as long as the basal diameter of antennal segment III. Antennae rather short, mostly dark, with inner margins and bases of segments III, V and VI somewhat lighter, 0.32–0.34 × as long as the body; segment III with 7–16 secondary rhinaria of variable sizes, distributed over entire length of the segment; segment IV with 1–5 similar rhinaria: hairs on the flagellum short, and stiff, longest one on segment III, 0.030–0.033 mm long, shortest one 0.026 mm long, these being 0.59–0.71 × and 0.47 × as long as the basal diameter of the segment, respectively; processus terminalis 0.45–0.50 × as long as base of segment VI and 0.10–0.12 × as long as antennal segment III. Prothorax with a broad dorsal sclerotic transverse band. Abdominal dorsum pale, bearing paired hair-bearing sclerotic spinal tubercles on 1st–6th tergites and paired spinal sclerites on 7th and 8th tergites, besides rows of small scleroites on spinal, pleural and marginal areas; hairs on the dorsum of abdomen

similar to those as in apterae. Siphunculi on dark sclerotic hair bearing cones. Cauda and anal plate dark. Legs coloured as in apterae but femora with an ir termediate blackish patch; longest hair on hind tibiae, 0.060 mm long, 0.80–0.90 × as long as the diameter at the middle of hind tibiae. Forewings with media once branched [twice branched in the figure provided by Das (op. cit.)], stigma, areas between medial branches and also between 1st and 2nd oblique veins, pigmented; hind wings hyaline with two obliques.

Colour: Greyish white with long red-brown legs and deeply pigmented slender wings.

Measurements in mm

	1	2	3
Length	4.16	3.86	3.50
Width	?	2.72	1.65
Antenna	1.30	1.30	1.50
Antennal segments III ...	0.47	0.47	—
,, IV ...	0.20	0.22	—
,, V ...	0.23	0.24	—
,, VI ...	(0.13+0.06)	(0.14+0.05)	—
urs.	0.20	0.22	—
$ht._2$	0.27	0.27	—
Siphunculus diameter, base ...	0.41	0.41	0.45
,, apex ...	0.14	0.12	0.15

[1, ex Peach tree, Lahore, 3-iv-1967, BMNH; 2, ex Peach, tree, Amritsar, 3-VI-1965, SKD, 3, from Das (op. cit.) showing average measurements of alatae viviparous female.]

Sexual forms: Das (op. cit.) recorded apterous oviparous females in Lahore region and commented that there appear to be no secondary sexual characters to distinguish the oviparous forms from the viviparous females and even the pseudosensoria on hind tibiae appear to be entirely lacking; however, secondary rhinaria on antennae, are reported to be much less in number (2–3). Oviparous females lay large clusters of shining black, oval eggs. No male was recorded in the region.

Nymphs: (Apterous; late instar): Body pear-shaped, 1.80 mm long. Head brown, with a distinct median suture; dorsal hairs stiff. Longest one on frons 0.036 mm long, 0.55 × as long as the basal diameter of antennal segment III. Antennae 5 segmented, less than half the length of body, with segments I, II, apices of III and most part of IV and V dark, rest pale; longest hair on segment III, 0.026 mm long, shortest one 0.013 mm long, these being 0.40 × and 0.20 × as long as the basal diameter of the segment, respectively; processus terminalis nearly 0.50 × as long as the base of last antennal

segment. Rostrum reaches beyond the length of the body, ultimate rostral segment 0.8 × as long as the second segment of hind tarsus, and bears 12 accessory hairs, besides preapicals. Meso and Metathoracic segments each with a pair of spinal tubercles on dorsum, similar tubercles being also present on abdominal tergites 1st–7th; dorsum of abdomen pale, bearing row of small scleroites in spinopleural and marginal areas; 8th tergite with a pair of brown hair-bearing sclerites; stigmal plates large, dark, sclerotic. Siphunculi on dark, sclerotic cones. Legs pale with knee-joints, apical 0.50 portion of tibiae and whole of tarsi dark; longest hair on hind tibiae 0.036 mm long, 0.39 × as long as the diameter at the middle of hind tibiae.

Colour: Not known in life.

Measurements in mm:

	Length	Width	Antenna	Antennal segments III	IV	VI	urs.	$ht._2$	Siphunculus diameter base	apex
1.	1.80	1.0	0.82	0.33	0.16	(0.09+0.05)	0.18	0.21	0.20	0.08

(ex Peach Tree, Lahore, 3-IV-1967, BMNH.)

Material examined: One apterous and one alate viviparous female and one apterous nymph from Peach plant, Lahore, West Pakistan, 3-IV-1967, coll. A. Rawf, [BMNH, 252/67, C.I.E. A–1618]; two alate viviparous females from Peach Plant, Amritsar, India, 3-VI-1966, coll. D.R.C. Bakhetia (SKD), two apterous viviparous females, from Peach Plant, U.S.S.R., 29-VII-1965, coll. G. Shaposhnikov.

Discussion: Das (1918) has provided extensive morphological and biological notes on this species and recorded at least 4 species of *Prunus* viz. *persica, communis, armeniaca, amygdalus* as its host plants in Lahore region. According to Das (op. cit.) oviparous females most frequently appear in January and lay eggs throughout the month which normally hatch in March and these stem-mothers produce apterous viviparae, which after 2–4 generations produce alatae; during March and April, the insects appear abundant and cover all large branches of the host plant and produce enormous quantity of honey-dew. The population declines in May and again becomes abundant after September. The loss due to feeding of this aphid species has been calculated to be immense as very few fruits mature and attain normal size. Das (op. cit.) has recorded coccinellid and syrphid larvae preying on this species without much effect on population, but noted that sudden rise in temperature for a few days could lead to complete disappearance of the pest. This species is known to be visited by ants.

Batra (1953) has dealt briefly with the biology and control of *P. persicae*. At least three species of aphidiid parasites have been reported from this species viz. *Trioxys* nr. *heraclei* Hal., *Pauesia antennata* (Mukherji) and *Diaeretiella rapae* (M. Intosh) besides a chalcid parasite *Pachyneuron nazeeri* Mani. Two other parasites *Aphidius* sp. & *Aphidencyrtus aphidivorous* Mayr. are known from U.S.S.R.

Distribution.—INDIA: Himachal Pradesh and Punjab; PAKISTAN, IRAN, IRAQ, TURKEY, BULGARIA, ISRAEL, EGYPT and CENTRAL ASIA.

Types.—Probably in the collection of Zoological Institute, Academy of Sciences, Leningrad, U.S.S.R.

Genus **Pyrolachnus** Basu and Hille Ris Lambers, 1968

1968. *Pyrolachnus* Basu, A. N., and Hille Ris Lambers, D., *Ent. Ber. Amst.* **28**: 13. Type species: *Lachnus pyri* Buckton.

Morphology: Body large 4.0–6.0 mm long. Head with a distinct median suture; dorsal cephalic hairs with acute apices, up to 1.5–2.1 × as long as the basal diameter of antennal segment III. Antennae up to 0.40 × as long as the body; flagellum in apterae, usually with a few secondary rhinaria on segments III–IV, in alatae, secondary rhinaria may be protuberant; hairs on flagellum fine or thick and stiff, up to 2.0 × as long as the basal diameter of antennal segment III; processus terminalis 0.33–0.60 × as long as base of segment VI. Eyes with distinct ocular tubercles. Ultimate rostral segment sub-divided, blunt, 0.53–0.60 × as long as second segment of hind tarsus and bearing 6–12 accessory hairs. Abdominal dorsum pale, may be distinctly reticulated and bearing "muskelplatten" and hair bearing scleroites; dorsal hairs fine or thick, with acute or acuminate apices, always longer than the basal diameter of antennal segment III. Siphunculi on dark sclerotic cones. Cauda semioval, dark, sclerotic. Legs variably pigmented; with numerous hairs which may be thick and stiff or fine, flagellate, those on hind tibiae up to 0.40–0.80 × as long as the diameter at the middle of hind tibiae. Wings never maculate; forewings with pterostigma elongate, radial sector nearly straight and media once or twice branched; hind wings with both obliques.

Sexual forms: Not known.

Discussion: The genus, originally erected to accommodate *pyri* Buckton, now contains 3 species, all of which are endemic to the region. Large body, numerous dorsal hairs which are considerably longer than basal diameter of antennal segment III, eyes with triommatidia, immaculate wings with long pterostigma which

is much longer than maximum width etc., help to recognised the members of this genus.

Biology: The species of this genus are known to infest *Pyrus communis*, *Prunus cornuta* etc. in temperate hill region during the months of September to May. Usually, these aphids feed on stem and young shoots of the host plants and sometimes the colonies completely harmonise with the colour of the stem of host plant.

Distribution.—INDIA: Himachal Pradesh, West Bengal, Meghalaya, Tamil Nadu; CEYLON.

Type species.—*Lachnus pyri* Buckton, 1899. Location of the type material is not known.

Key to the species of **Pyrolachnus**

Apterous viviparous female:

1(2)	Hairs on the dorsum of abdomen, thick with acuminate apices. Abdominal dorsum pale, distinctly reticulated. Processus terminalis 0.35–0.42 × as long as the base of antennal segment VI. On *Prunus cornuta*.	*P. imbricatus* David, Narayanan, Rajasingh
2(1)	Hairs on the dorsum of abdomen fine, with acute apices. Abdominal dorsum without reticulation. Processus terminalis 0.48–0.60 × as long as the base of antennal segment VI. On *Pyrus communis*.	*P. pyri* (Buckton)

Pyrolachnus imbricatus David, Narayanan, Rajasingh 1971
(Plate 42; Plate 78; figs. 1–2)

1971. *Pyrolachnus imbricatus* David, S. Kanakaraj, Narayanan, K., and Rajasingh, S. G., *Orient. Ins.*, **5**: 565.

Apterous viviparous female: Body large ovoid, 4.38–4.90 mm (–5.2 mm) long. Head dark brown, frons and vertex with many hairs with acute apices, longest one 0.112–0.130 mm long, 1.9–2.1 × as long as the basal diameter of antennal segment III. Antennae 0.36–0.39 × (0.33–0.40 ×) as long as the body, brownish with basal segments and apices of segment III, IV and V darker; flagellum very feebly imbricated, without any secondary rhinaria; hairs on flagellum thick and stiff, longest one on segment III, 0.05–0.07 mm long, shortest one 0.03–0.04 mm long, these being 0.8–1.1 × and 0.53–0.75 × as long as the basal diameter of the segment, respectively; processus terminalis 0.35–0.42 × (0.33–0.38 ×) as long as the base of segment VI and 0.11–0.13 × as long as antennal segment III. Rostrum reaches beyond hind coxae, ultimate rostral segment subdivided into segments 4 and 5, 0.53–0.55 × (0.56 ×) as

long as second segment of hind tarsus and bears 6–8 accessory hairs. Abdominal dorsum pale, distinctly reticulated, bearing number of dark scattered scleroites on 1st–6th tergites and sclerotic stigmal plates; 7th and 8th tergite each with a pair of brownish spinal sclerites; hairs on the dorsum of abdomen numerous, thick, with acuminate apices, longest one on anterior tergites 0.093–0.112 mm long, shortest one 0.076–0.093 mm long, these being 1.8–2.0× and 1.3–1.7× as long as the basal diameter of antennal segment III, respectively; longest hair on 7th tergite 0.130–0.150 mm long and on 8th tergite 0.163–0.175 mm (0.105 mm) long, these being 2.5–2.9× and 2.8–3.3× as long as the mentioned diameter, respectively; 8th tergite with 16 hairs. Siphunculi on dark sclerotic cones. Cauda semioval dark, sclerotic. Legs pale except tibiae and tarsi which are dark; hind femora dark brown only near apices; hairs on legs thick and stiff, longest one on hind tibiae 0.06–0.07 mm long, and 0.4–0.6× as long as the diameter at the middle of hind tibiae; first segment of hind tarsus 0.12–0.13 mm long and up to 0.28–0.32× as long as second segment.

Colour: Body brown bearing rows of dark brown spots.

Measurements in mm

	1	1	2
Length	4.90	4.79	3.48
Width	2.92	2.60	2.42
Antenna	1.91	1.74	1.58
Antennal segments III ...	0.76	0.69	0.67
,, IV ...	0.22	0.20	0.19
,, V ...	0.28	0.23	0.22
,, VI ...	(0.24+0.09)	(0.23+0.09)	(0.19+0.08)
Rostral segments 4+5 ...	(0.17+0.07)	(0.16+0.07)	(0.17+0.07)
$ht._2$	0.44	0.43	0.43
Siphunculus diameter, base ...	0.55	0.48	0.44
,, apex ...	0.14	0.10	0.09

(1–3, ex indet. host, Simla, 19-XI-1970, SKD.)

Alate viviparous female (From David *et al.*, 1971): Body 4.41 mm long. Head dark brown, with numerous dorsal hairs up to 0.120 mm long. Antennae 0.37× as long as the body; hairs on flagellum up to 0.060 mm long; segment III with 9–15 circular, somewhat protuberant, secondary rhinaria; processus terminalis 0.35× as long as base of segment VI and 0.08× as long as antennal segment III. Abdominal dorsum pale, dorsal hairs numerous, those on 3rd tergite up to 0.078 mm long, on 6th tergite 0.097 mm long, on 7th tergite 0.156 mm long and on 8th tergite 0.215 mm long; 7th tergite with pleural sclerotic patches and 8th tergite with a narrow transverse band interrupted in the middle; dorsal reticulation much less distinct than in apterae. Wings clear, with prominent microtrichia

at the distal end of forewing; veins dark brown; stigma pale brown, radial sector slightly curved, media once or twice branched; hind wings with both obliques.

Colour: Dark brown in life.

Measurements in mm:

	Length	Antenna	Antennal segments				Siphunculus diameter	
			III	IV	V	VI	base	apex
1.	4.41	1.62	0.68	0.20	0.23	(0.20+0.07)	0.44	?

Sexual forms: Not known.

Nymphs (Apterous: late instar): Body elongate 1.94 mm long. Head brownish with many fine hairs, longest one 0.07 mm long. 1.22× as long as the basal diameter of antennal segment III, Antennae stout, 5 segmented, 0.41× as long as the body; flagellum with thick and stiff hairs, longest one on segment III, 0.033 mm long, shortest one 0.026 mm long, these being 0.56× and 0.44× as long as the basal diameter of the segment, respectively; processus terminalis slender, 0.75× as long as the base of last antennal segment. Rostrum reaches at least siphunculi, ultimate rostral segment, 0.81× as long as the second segment of hind tarsus. Abdominal dorsum pale bearing segmental sclerotic stigmal plates and a pair of spinal sclerites on each of the 7th and 8th tergites; hairs on the dorsum of abdomen numerous, with acute apices, longest one on anterior tergites 0.093 mm long, shortest one 0.073 mm long. these being 1.5× and 1.2× as long as the basal diameter of antennal segment III, respectively; longest hair on 7th tergite 0.100 mm long and on 8th 0.115 mm long, these being 1.7× and 1.9× as long as the mentioned diameter. Siphunculi on small sclerotic cones, Cauda dark sclerotic. Legs brownish and stout, tibiae and tarsi darker than the rest; hairs on tibiae short and stiff, longest one on hind tibiae 0.036 mm long, 0.43× as long as the diameter at the middle of hind tibiae.

Colour: Not known.

Measurements in mm

Length	1.94
Width	0.99
Antenna	0.80
Antennal segment III	0.27
,, IV	0.09
,, V	(0.12+0.09)
Rostral segments 4+5	0.24
ht.$_2$	0.28
Siphunculus, diameter, base ...	0.10
,, apex ...	0.08

(ex indet. host., Simla, 19-XI-1970, SKD.)

Material examined: Three apterous viviparous females and three apterous nymphs from an unidentified host, Simla, Himachal Pradesh, India, 19-XI-1970, coll. K. Narayanan, (SKD, No. 1290); one apterous viviparous female, from an unidentified host, Simla, Himachal Pradesh, India 13-V-1969, (SKD, No. 879).

Discussion: David *et al.* (1971) provided a detailed description of this species basing on a series of material collected on *Prunus cornuta* and from an undetermined plant collected on 13-V-1969 ard 20-V-1970; at Simla, Himachal Pradesh; three slides made available to the author by Dr. David, contained few apterous viviparous females and nymphs collected on an undetermined plant on 19-XI-1970 and these differ in the measurements of hairs etc. as already indicated in the text.

The reticulated pattern of abdominal dorsum and numerous thick hairs help to distinguish this species from the others in the genus.

Distribution.—INDIA: Himachal Pradesh (Simla Hills).

Types.—In the collections of S. Kanakaraj David, Madras, D. Hille Ris Lambers, Bennekom, the Netherlands and British Museum (Natural History), London.

Pyrolachnus pyri (Buckton 1899)

(Plate 43–44; Plate 78, figs. 3–4)

1899. *Lachnus pyri* Buckton, G. B. *Indian Mus. Notes*, **4**(5): 274.
1928. *Dilachnus krishni* George, C. J., *J. Proc. Asiat. Soc. Beng.*, **23**: 7.
1957. *Lachnus krishni*, David, S. Kanakaraj, *Ind. J. Ent.*, **19**: 171.
1968. *Pyrolachnus pyri*, Basu, A. N. and Hille Ris Lambers, D. *Ent. Ber. Amst.*, **28**: 13.
1973. *Pyroclachnus pyri*, Ghosh, A. K., *Orient. Ins.*, **8**(2): 173.
1973. *Pyrolachnus pyri*, Doncaster, J. P., *Bull. Brit. Mus. Nat. Hist.* (Ent.), **8**(2): 81.
1974. *Pyrolachnus pyri*, Ghosh, A. K., *Orient, Ins.*, **8**(2): 17.

Apterous viviparous female: Body 4.0–5.0 mm long. Head brown sclerotic with a distinct median suture, with many fine hairs on frons and vertex, longest one 0.060–0.080 mm long, 1.5–2.0× as long as the basal diameter of antennal segment III. Antennae pale brown, darker on segments V and VI, 0.36–0.40× as long as the body; flagellum nearly smooth, segment III subequal to segments IV+V+VI taken together and may bear 0–3 secondary rhinaria, segment IV with 3–7 similar rhinaria (occasionally with only a single rhinarium); hairs on flagellum fine with acute species, longest one on segment III, 0.060–0.090 mm long, shortest one, 0.040–0.050 mm long, these being 1.6–2.1 and 0.75–1.2× as long as the basal diameter of the segment, respectively; base of segment VI with 10–12 hairs, up to 0.50 mm long; processus terminalis as

broad as the base and 0.50–0.55× as long as the base of segment VI and 0.11–0.13× as long as antennal segment III. Rostrum reaches near siphunculi, ultimate rostral segment distinctly subdivided into 4 and 5, segment 4, 2.4–2.8× as long as segment 5 and bears at least 10 accessory hairs, segments 4+5, 0.54–0.59× as long as the second segment of hind tarsus. Thoracic segments with marginal sclerites. Abdominal dorsum pale with some scattered dark brown 'muskelplatten' besides broad sclerotic spiracular plates; hairs on the dorsum of abdomen numerous, all with acute apices, longest one on the anterior tergites, 0.073–0.090 mm long, shortest one 0.060–0.070 mm long, these being 1.6–2.3× and 1.3–1.6× as long as the basal diameter of antennal segment III, respectively; hairs on 7th and 8th tergites, 0.080–0.118 mm long and 1.8–2.7× as long as the mer tioned diameter. Siphunculi on dark sclerotic cones bearing similar fine hairs as on dorsum. Cauda dark sclerotic with many fine hairs. Anal plate dark sclerotic. Legs darker on basal segments and apices of tibiae and tarsi, rest yellowish, sometimes legs may be uniformly pigmented; hind tibiae much longer, than the others; hairs on the hind tibiae 0.026–0.076 mm long, longest one 0.50–0.64× as long as the diameter at the middle of the hind tibiae; first segment of hind tarsus, 0.110–0.117 mm long, 0.30–0.32× as long as the second segment and bears 11–12 hairs.

Colour: Dull brown to blackish brown in life.

Measurements in mm

	1	2	3	4
Length	4.83	4.96	4.69	4.93
Width	?	3.0	2.9	3.1
Antenna	1.75	—	1.79	1.88
Antennal segments III ...	0.73	—	0.73	0.78
,, IV ...	0.30	—	0.28	0.34
,, V ...	0.26	—	0.23	0.28
,, VI ...	(0.15+0.08)	(—)	(0.15+0.07)	(0.16+0.08)
Rostral segments 4+5 ...	(0.17+0.06)	(0.15+0.06)	(0.15+0.06)	(0.16+0.06)
$ht._2$	0.39	0.37	0.39	0.41
Siphunculus .diameter, base ...	.0.76	0.69	0.62	0.69
,, apex ...	0.16	0.16	0.15	0.16

(1, ex *Pyrus communis*, Ootcamond, 21-I-1957, SKD; 2, 3, ex Pear, Kodaikanal 20-II-1966, 4, ex Apple, Coonoor, 24-IV-1973, SKD.)

Alate viviparous female: Body 4.9–5.4 mm long. Head with a distinct median suture; hairs on frons and vertex long and fine, longest one 0.121–0.137 mm long, 2.5–3.0× as long as the basal diameter of antennal segment III. Antennae brown to dark brown, paler on basal segments and bases of III; segment III subequal to segments IV+V+VI taken together and bearing 29–41

protuberant secondary rhinaria distributed over entire length; segment IV with 7–10 and V with 2–3 similar rhinaria; longest hair on segment III, 0.08–0.09 mm long, shortest one 0.05–0.06 mm long, these being 1.7–2.0× and 1.0–1.3× as long as the basal diameter of the segment, respectively; processus terminalis 0.53–0.58× as long as base of segment VI and 0.11–0.12× as long as antennal segment III. Rostral segments 4+5, 0.50–0.52× as long as second segment of hind tarsus. Abdominal dorsum pale, bearing at least 6 rows of dark muskelplatten, besides a pair of brown sclerites on 7th tergite and a solid median sclerotic transverse band on 8th tergite; hairs on the dorsum of abdomen, numerous, fine, longest one on anterior tergites, 0.090–0.115 mm long, shortest one, 0.07–0.09 mm long, these being 2.0–2.5× and 1.5–1.9× as long as the basal diameter of antennal segment III; respectively; hairs on the 7th and 8th tergites usually 0.130–0.150 mm long (only in one specimen up to 0.181 mm long) and 2.7–3.2× as long as the mentioned diameter, Siphunculi, cauda and anal plate as in apterae. Legs yellowish brown, darker on apices of tibiae and whole of tarsi, bearing numerous fine hairs, longest one on hind tibiae 0.08 mm long, 0.7–0.8× as long as the diamter at the middle of hind tibiae; first segment of hind tarsus 0.112–0.118 mm long and up to 0.36× as long as second segment. Wing veins dark, pigmented; forewings with stigma long, and radial sector nearly straight.

Colour: Dull brown with meal, veins light brown, stigma dark (S. K. David, 1957).

	Measurements in mm			
	1	2	3	4
Length	5.07	5.34	5.07	5.10
Width	3.11	2.45	2.88	2.50
Antenna	1.99	1.97	1.81	1.81
Antennal segments III ...	0.82	0.82	0.75	0.78
,, IV ...	0.35	0.34	0.34	0.33
,, V ...	0.28	0.29	0.28	0.25
,, VI ...	(0.15+0.09)	(0.16+0.06)	(0.15+0.08)	(0.15+0.09)
Rostral segments 4+5 ...	(0.15+0.06)	(0.15+0.06)	(0.15+0.06)	(0.15+0.06)
$ht._2$	?	?	0.39	0.39
Siphunculus diameter, base ...	0.60	0.62	0.60	0.69
,, apex ...	0.18	0.16	0.16	0.15

(1, 2, ex Apple, Coonoor, 24-IV-1973, SKD; 3, 4, ex *Pyrus communis* Coonoor, 16-VII-1952, SKD.)

Sexual forms: Not known.

Nymphs: Late instar nymphs resemble the adults.

Material examined: One apterous viviparous female (much damaged) and three nymphs from Loquat, Shevarajs, South India, --III-1916, F. V Theebald collections, (BMNH, No. 1930–204, labelled *Dilachnus krishni* George); one apterous and two alate viviparous females from *Pyrus communis*, Coonoor, Tamil Nadu, India, 1-VI-1952, coll. S. K. David (SKD); five alate viviparous females from *Pyrus communis*, Coonoor, Tamil Nadu, India, 16-VII-1952, coll. S. K. David (SKD); one alate viviparous female, on snow, Rhotang Pass, India 19-VI-1955, coll. A. P. Kapur (BMNH, CIE 14764, No. 11); two apterous viviparous females, from *Pyrus communis* Ootcamund, Tamil Nadu, India, 12-I-1957, coll. S. K. David (SKD, labelled *Lachnus krishni* George) two apterous viviparous females, from Pear tree, Kodaikanal, Tamil Nadu, India, 20-VI-1966, coll. R. Menon (ZSI, labelled *Lachnus krishni* George); three apterous and two alate viviparous females from Apple tree, Coonoor, Tamil Nadu, India, 24-IV-1973, coll. S. K. David (SKD); three apterous viviparous females (much damaged) and two nymphs from *Pyrus communis*, Shillong, Meghalaya, India, 25-V-1970, coll. S. Biswas (ZSI).

Discussion: Basu and Hille Ris Lambers (1968) erected the genus *Pyrolachnus* with *Lachnus pyri* Buckton as the type but did not provide any detailed description of the species; the species was originally described from specimens in alcohol, sent to G. B. Buckton from a collection on Pear trees in Sri Lanka; the description was very brief and inadequate and Buckton left no specimens of *pyri* in his collection (Doncaster, 1973). No types could also be traced in Zoological Survey of India, Calcutta. Basing on some damaged material, a description was provided by Ghosh (1974) and inevitably it also lacked in some details and the detailed measurements for one species as given therein were of an apterous nymph and not of an adult. Doncaster (op. cit.) opined that *Dilachnus krishni* George, described from collections on Pear tree in Coonoor, South India could be a synonym of *pyri* Buckton. George (1928) while describing *krishni* pointed out that his species differs from *pyri* in having more rhinaria on antennal segment III of alatae and in the absence of dorsal tubercles. Buckton (1899) mentioned only the black spots, as has also been mentioned in the description of apterae by E. E. Green, and as regards rhinaria no definite number was given in any of the description of *pyri;* out of all the material examined, one alate specimen collected on snow in Rhotang Pass, India, 19-VII-1955, coll. A. P. Kapur, C.I.E. 14764, No. 11, obtained from British Museum (Nat. Hist.) London, while agreeing in general with *pyri* shows much fewer secondary rhinaria on segment III (15–78) and IV (2–3). David (1957) described both apterae and alatae of *krishni*, however, without indicating any possible affinity with *pyri*. Considering all available material and distribution range, *krishni* George has been treated as a definite synonym of *pyri* supporting Doncaster (op. cit.).

The only other species of Lachnid known from Pear trees is *Nippolachnus piri*, Matsumura, which could, however, be easily separated by the latters, live colour, sler der green bodies, and mode of infestation on undersurfaces of leaves of the host plant, besides other morphological characters. *Pyrolarchnus pyri* (Buckton) infests stem and young shoots and in some cases infestatior could be heavy as was recorded in Sri Lanka, (Buckton, op. cit.) and South India, (David, 1957). In Shillong, Meghalaya, region, it appears only in some localities during February–May, on the stem of Pear trees but the infestation never becomes heavy; parasitised apterae have also been noted sporadically. In South India, this species has also been seen to infest apple trees in the months of April–May.

Distribution: INDIA: West Bengal (Darjeeling district), Meghalaya (Shillong), Tamil Nadu, (Nilgiri Hills); SRI LANKA.

Types:—Buckton left no types; types of *krishni* George could not be located.

Genus **Stomaphis** Walker 1870

1870. *Stomaphis* Walker, F. *Zoologist*, (2) **5**: 2000; Baker, A. C., 1920. *Bull. U.S. Dep. Agric.*, **826**: 18; Gomez-Menor, J. 1962. *Rev. Esp Entom.*, **38**(3): 411; Inouye, M., 1970. *Bull. Govt. Forest Exp. Stn. Magoure*, **228**: 98. Type species: *Aphis quercus* Linnaeus.

1881. *Rhynchocles* Altum, B., *Forst. Zool.*, **3**: 350. Type species: *Rhynchlocles longistris* Altum=*Aphis quercus* Linn.

1913. *Macrhynchus* Haupt, *Mitt. ent. Ges.* Halle, **57**: 47. Type species: *Macrhynchus pini* Haupt=*Aphis quercus* Linn.

1953. *Parastomaphis* Pasek, *Acta Soc. Zool. bohemoslov*, **17**: 157. Type species: *Stomaphis graffii* Cholodkovsky.

1960. *Neostomaphis* Takahashi, R. *Bull. Univ. Osaka Pref.*, (8) **10**: 2. Type species: *Stomaphis* (*Neostomaphis*) *fagi* Takahashi.

Morphology: Large aphids, 4.0–8.0 mm long. Head slightly rounded. Antennae 6 segmented covered with numerous hairs; flagellum usually with secondary rhinaria or segment IV in apterae, very often similar rhinaria may be present on segment III in alatae, segment III usually with less than 20 secondary rhinaria and segment IV with less than 10 secondary rhinaria; processus terminalis as thick as and much shorter than base of antennal segment VI and bearing some short normal hairs. Eyes with ocular tubercles. Rostrum much longer than the body, segment 4 and 5 distinct. Abdominal dorsum with spinal sclerites variably present on anterior tergites; 8th tergite, usually broadly sclerotised, and with numerous hairs which may be 1.2–2.5 × as long as the basal diameter of antennal segment III. Siphunculi on large sclerotic and hairy cones, but rarely these may be absent as in *S. asiphon* Szel., 1975. Cauda subconical, rounded at apex. Anal plate usually protuberant and broader than long. Gonochaetae may

be in 3 or 4 clustures. Legs with numerous hairs; second tarsal segment of hind legs distinctly longer than those of fore and mid legs. Forewings with radial sector rather long and somewhat curved; media usually twice branched; hind wings with both obliques, sometimes placed wide apart.

Males may be apterous and with rudimentary mouth parts. Oviparae may be without pseudosensoria on hind tibiae and may have head almost fused to the pronotum (Takahashi, 1960).

Discussion: The genus contains about 21 species and the members of this genus could easily be distinguished by the very long rostrum which extends beyond the length of body. Pasek (1953) proposed *Parastomaphis* for the species in which antennae are modified at the apices and Takahashi (1960) proposed a new subgenus *Neostomaphis*, for a species feeding on *Fagus* in Japan, which differs from other species of *Stomaphis* s.s. in having a much longer dorsal side of first segment of hind tarsus. The only species found in India out of 12 species, so far known from Asia, belongs to *Stomaphis* s.s.

Biology: The members of the genus are known to infest a wide variety of broad-leafed trees of genera e.g. *Acer*, *Aesculus*, *Betula*, *Celtis*, *Fagus*, *Populus*, *Quercus*, *Salix*, *Ulmus*, *Zelkowa* etc. besides plants of Coniferae; they usually feed on the bark of the trunk or roots. Association with ants is rather common and many species are known to be associated with ants of genus *Lasius* besides *Camponotus* and *Formica*. Donisthorpe (1930) has described males of *S. quercus* (Linn.) and observed that the males are smaller in size, more slender and possess rudimentary mouth parts and may lack siphunculi; males of *quercus* were collected in October and were seen to be attended by ants.

Distribution: Oriental, Palaearctic and Nearctic Region.

Takahashi (1960) has given a comprehensive account of the species of *Stomaphis* from Japan and Shaposhnikov (1964) has given a key to the species which are found in European part of U.S.S.R.

Type species.—Aphis quercus Linnaeus, 1758. Location of the type is not known.

Stomaphis mordvilkoi Hille Ris Lambers, 1933

(Plate 45; Plate 79, fig. 1)

1933. *Stomaphis mordvilkoi* Hille Ris Lambers, D., *Stylops* **2**: 199.

Apterous viviparous female: Body 6.70–6.80 (–7.30 mm) long with 3.60-3.65 mm as maximum width. Head yellowish brown with a distinct median suture. Antennae yellowish, 6 segmented, about 0.30× as long as the body; segment III slightly less than to almost equal, to segments IV & V taken together and 1.02–1.20×

as long as segment VI; segment IV with 0–3 and V without any (or with 1–3) secondary rhinaria; hairs on flagellum fine, 0.02–0.03 mm long, longest one on segment III about 0.50 × as long as the basal diameter of the segment; processus terminalis 0.23–0.26 × as long as the base of segment VI, and 0.14–0.15 × as long as antennal segment III. Eyes with distinct ocular tubercles. Rostrum very long, reaching much beyond the body (ultimate rostral segment missing in the specimens examined). Thoracic tergites with paired marginal and spinal sclerites, the spinals on prothorax being fused. Abdominal dorsum with similar sclerotic patches spinally arranged in pairs and increasing in size caudad, besides row of small pleural sclerites also visible; stigmal plates sclerotic brown; hairs on the dorsum of abdomen numerous, arising from minute scleroites, those on anterior tergites 0.04–0.06 mm long, 0.60–1.2 × as long as the basal diameter of antennal segment III, on posterior tergites up to 0.07–0.08 mm long and 1.2–1.3 × as long as the mentioned diameter. Siphunculi on large sclerotic cones, width at base of which is equal to or up to 1.2 × as long as the length of antennal segment III. Cauda dark sclerotic bearing many fine hairs. Legs yellowish brown, darker at apices of femora and bases of tibiae; hairs on hind tibiae; 0.03–0.04 mm long, 0.25–0.33 × as long as the width at the middle of hind tibiae; (tarsi broken in the specimens examined).

Colour: Live colour not known.

	Measurements in mm	
	1	2
Length	6.70	6.80
Width	3.60	3.65
Antenna	2.40	2.45
Antennal segments III ...	0.74	0.75
,, IV ...	0.35	0.36
,, V ...	0.41	0.41
,, VI ...	(0.44+0.11)	(0.50+0.11)
Siphunculus, diameter, base ...	0.82	0.70
,, apex ...	0.09	0.09
Cauda	0.30	0.28

(1–2, ex *Juglans* sp., Darjeeling, 3-IX-1929, DHRL.)

Alate viviparous female: Not known.

Sexual forms: Not known.

Nymphs: In one late instar nymph the ultimate rostral segment was clearly divided into segment 4 and 5 and these together are 2.0 × as long as second segment of hind tarsus; segment 4 (0.55 mm) being 4.0 × as long as segment 5 (0.14 mm).

Material examined: Two apterous viviparous females, (cotypes) from "Walnut", Darjeeling, India 3-IX-1929, leg. J.C.M. Gardener,

(No. I.B.E.B. 753) det. D.H.R.L. 3 damaged nymphs (from Forest Research Institute Dehradun) Darjeeling, India, presumably from same collection lot from which the species was originally described as new.

Discussion: This species appears closest to *Stomaphis quercus* Linne, an European species, but can easily be separated from the former by large basal cone of siphunculi and ratio of antennal segment III: VI.

This species was originally found in earth covered galleries on bark of Walnut and since then hardly any reference has been made to this species.

Distribution.—INDIA: West Bengal (Darjeeling). Hille Ris Lambers (1933) mentioned that A. K. Mordwilko in his food plant catalogue of Aphididae of U.S.S.R. (*Works. Appl. Ent.*, 14, Leningrad, 1929) probably referred to this species as occuring on *Juglans manschurica* (p. 35) but no record of this species is available otherwise from U.S.S.R. Shaposhnikov (1964) in his keys to the Insects of European part of the U.S.S.R. (p. 524) has recorded 4 species of *Stomaphis* but that does not include *mordwilkoi* H.RL., Narzikulov (1962) in his Fauna of Tadzhikistan did not mention a single *Stomaphis* under Lachninae (p. 102).

Types.—In British Museum (Nat. Hist.) London [only one slide has been deposited as per the list obtained from Dr. V F. Eastop] and in the collection of D. Hille Ris Lambers, Bennekom, The Netherlands.

Genus **Tuberolachnus** Mordvilko s.l. 1908

1908. *Tuberolachnus* Mordvilko, A., *Annls. Mus. Zool. Acad. Imp. Sci. St. Petersbourg*, **5**(13): 374. Type species: *Aphis viminalis* Boyer.

1920. *Pterochlorus* Baker, A. C. *Bull. U.S. Dep. Agric.*, **828:** 18. Type. species: *Aphis longipes* Dufour.

1968. *Tuberolachniella* Hille Ris Lambers, D., and Basu, A. N. *Ent. Ber Amst.*, **26:** 35 [as subgenus of *Tuberolachnus*]. Type species: *Tuberolachnus* (*Tuberolachniella*) *scleratus* Hille Ris Lambers & Basu.

Morphology: Body large, 4.0–6.0 mm long. Head with a distinct median suture; dorsal cephalic hairs fine, always longer than and may be up to 2.4 × as long as the basal diameter of antennal segment III. Antennae 6 segmented, less than half the length of the body; flagellum with secondary rhinaria on segment IV in apterae and on segments III–IV in alatae; hairs on flagellum stiff, 0.66–1.6 × as long as the basal diameter of antennal segment III; processus terminalis 0.33–0.58 × as long as base of antennal segment VI. Eyes with distinct ocular tubercles. Rostrum reaches hind coxae, ultimate rostral segment may be clearly subdivided into

segments 4 and 5, or not, 0.60–0.66 × as long as second segment of hind tarsus and bearing 14–16 accessory hairs. Abdominal dorsum with "muskelplatten", pale or sclerotic and bearing a conspicuous tubercle on 4th tergite, this may be much smaller in alatae; dorsal hairs fine, 1.2–2.7 × as long as the basal diameter of antennal segment III. Siphunculi on large sclerotic hair-bearing cones. Cauda semioval, sclerotic. Legs variably pigmented, hairs on legs short and stiff, longest one on hind tibiae 0.23–0.70 × as long as the diameter at the middle of hind tibiae. Wings immaculate; forewings with stigma elongate, radial sector nearly straight.

Sexual forms: Not known.

Discussion: The genus was represented by only one species *T salignus* (Gmelin) which feeds on *Salix* spp., till a second species *T scleratus* Hille Ris Lambers and Basu, was described from India under a new subgenus *Tuberolachniella* Hille Ris Lambers and Basu; the subgenus differs from the nominate genus in having sclerotic tergum of apterae, as against pale and membraneous tergum in the nominate genus. The presence of the dorsal tubercle helps to separate the genus from other related genera.

Biology: Of the two species, *T salignus* is known exclusively from different species of *Salix* spp., (e.g. *alba*, *babylonica*, *elegantissima*, *gracilistyla*, *koriyanagi*, *regalis*, etc.). This species appears in early winter and builds up population till February, on the stem of willow trees. *T scleratus* forms large colonies on the under surface of leaves, petioles and young shoots of *Eriobotrya petiolata* and *Eriobotrya dubia* during May and June. These species are known to occur only in the temperate hill areas of the region. Ants are not commonly seen in association but sometimes *Camponotus* sp., may attend on *T saligna*. Sexual forms have never been recorded in the region.

Distribution: Widely distributed except in AUSTRALIA.

Type species: Aphis viminalis Boyer 1841 (=*Aphis saligna* Gmelin 1788). Location of the type is not known.

Key to the species of **Tuberolachnus** s.l.

Apterous viviparous female:

1(2)	Tergum pale, membraneous. Rostral segment 4 and 5 not clearly subdivided, segment 5 being wider than long. Dorsal tubercle longer than wide. On *Salix babylonica*	*T salignus* (Gmelin)
2(1)	Tergum sclerotic. Rostral segment 4 and 5 clearly subdivided, segment 5 being longer than wide. Dorsal tubercle wider than long. On *Eriobotrya petiolata*.	*T.* (*Tuberolachniella*) *scleratus* Hille Ris Lambers & Basu

Tuberolachnus salignus (Gmelin 1776)

(Plate 46–47; Plate 79; fig. 2)

1776. *Aphis salicis* Sulzer, J. H., *Abq. Ges. Ins. Linn. System.*, 1776: **1,** 105.

1790. *Aphis saligna* Gmelin, J. F. *Garoli a Linne' Systema Naturae.* Ed. XIII, acuta, reformata (1788–1793) Tom. I [1790], pars.

1835. *Lachnus punctatus* Burmeister, H., *Handb. Ent.*, **2:** 93.

1840. *Aphis salicina* Zelterstedt., J. W., *Aphididae* Latr. *Insecta Lapp. des. yoss.* Lipsiae, 1840, 311.

1841. *Aphis viminalis* Boyer de Fonscolombe, M., *Annls. Soc. ent. Fr.*, **10:** 184.

1841. *Aphis vitellinae* Hartig, T., Germar's *Z. Entomol.*, **3:** 369.

1862. *Dryobius riparius* Snellen van Vollenhoven, S. C., *Tijdschr. Entomol.* **5:** 95.

1891. *Lachnus fuliginosus* Buckton, G. B., *Indian Mus. Notes.*, **2**(1): 40.

1918. *Tuberolachnus viminalis*, Das, B., *Mem. Indian Mus.*, **6:** 257.

1929. *Pterochlorus salignus* ,Theobald, F. V., *The Plant lice or Aphididae of Great Britain*, **3:** 104. Headley Bros. Ashford, Kent.

1932. *Lachnus nigripes* Takahashi, R., *Philip. J. Sci.*, **48:** 69.

1937. *Lachnus ? tatakaensis* Takahashi, R. *Philip J. Sci.*, **63:** 1.

1952. *Tuberolachnus salignus*, Borner, G., *Mitt. thuring bot. Ges.*, **3:** 45.

1962. *Tuberolachnus saligna*, Ghosh, A. K. and Raychoudhuri, D. N. *J. Bombay nat. Hist. Soc.*, **59**(1): 250.

Apterous viviparous female: Body large oval, 5.0–5.8 mm long. Head dark brown with many fine hairs, 0.08–0.10 mm long, 1.25–1.50 × as long as the basal diameter of antennal segment III. Eyes large with distinct ocular tubercles. Antennae dusky brown, 0.36–0.46 × as long as the body; flagellum nearly smooth except processus terminalis which is distinctly imbricated; segment III without any secondary rhinaria, segment IV with 1–3 small circular secondary rhinaria; segment III longer than segments IV+V taken together; hairs on flagellum stiff, longest one on segment III, 0.051–0.059 mm long, shortest one 0.044 mm long, these being 0.88–1.16 × and 0.66–1.0 × as long as the basal diameter of the segment, respectively; processus terminalis 0.40–0.55 × as long as base of segment VI and 0.8–0.09 as long as antennal segment III. Rostrum reaches hind coxae, ultimate rostral segment stout, brown, 0.60–0.65 × as long as second segment of hind tarsus and bears at least 14–16 accessory hairs. Abdominal dorsum pale, membraneous, bearing some dark segmental "muskelplatten" on 1st–6th tergites, besides a slender sclerotic transverse band on 8th tergite; stigmal plates large, sclerotic brown; 4th tergite with a large, conical conspicuous dark brown dorsal tubercle which is wider than its length; hairs on the dorsum of abdomen numerous, with fine apices, longest one on anterior tergites, 0.099–0.129 mm long, shortest one 0.074–0.081 mm long, these being 1.9–2.2 × and 1.2–1·8 × as long as the basal diameter of antennal segment III, respectively; 8th tergite with many fine hairs,

longest one 0.111–0.129 mm long, 1.9–2.4 × as long as the mentioned diameter. Siphunculi on large, dark. hair-bearing cones. Cauda dark brown to black, semioval and bearing many fine hairs. Legs black, except at basal 0.75 portion and very apices of femora, which are yellowish; sometimes basal parts of tibiae may also be yellowish; hairs on legs short and stiff, sometimes longer, longest one on hind tibiae 0.043–0.050 mm long, 0.23–0.48 × as long as the diameter at the middle of hind tibiae; first tarsal segments with at least 16 ventral hairs.

Colour: Light brown to dark in life.

Measurements in mm

	1	2	3
Length	5.8	5.8	5.5
Width	3.5	3.3	3.4
Antenna	2.8	2.6	2.0
Antennal segment III ...	1.20	1.10	0.85
,, IV ...	0.45	0.42	0.27
,, V ...	0.55	0.51	0.30
,, VI ...	(0.18+0.10)	(0.18+0.09)	(0.19+0.07)
urs.	0.24	0.24	0.24
$ht._2$	0.33	0.34	0.33
Siphunculus diameter, base ...	0.55	0.54	0.55
,, apex ...	0.16	0.15	0.15

(1, 2, ex. *Salix* sp., Darjeeling, 31-V-1969, CU; 3, ex. *Salix* sp. Shillong, 17-XI-1972, ZSI.)

Sexual forms: Not known.

Alate viviparous female: Body 4.8–5.25 mm long. Head dark brown with a distinct median suture; dorsal hairs long and fine, longest one up to 0.016 mm long and 2.1 × as long as the basal diameter of antennal segment III. Antennae brownish, darker on the basal segments, 0.37–0.38 × as long as the body; flagellum feebly imbricated, segment III with 10–14 large oval secondary rhinaria and segment IV with 2–4 similar rhinaria; hairs on flagellum with acute apices, longest one on segment III, 0.062–0.066 mm long, shortest one 0·044–0.048 mm long, these being 1.4–1.5 × and 1.0–1.1 × as long as the basal diameter of the segment, respectively; processus terminalis 0.33–0.35 × as long as base of segment VI and 0.10 × as long as antennal segment III. Thoracic tergum sclerotic, brown. Abdominal dorsum pale membraneous, bearing scattered "muskelplatten" and paired marginal sclerites besides a broad transverse sclerotic band on 8th tergite; hairs on the dorsum of abdomen numerous, longest one on anterior tergites 0.092–0.103 mm long, shortest one 0.066–0.072 mm long, these being 2.0–2.3 × and 1.5–

1.6 × as long as the basal diameter of antennal segment III, respectively; dorsal tubercle much smaller than in apterae, siphunculi on dark hair-bearing cones. Cauda bearing many fine hairs. Legs yellowish brown with knee joints and apical portions of tibiae and whole of tarsi dark; longest hair on hind tibiae 0.060–0.066 mm long, 0.6–0.7 × as long as the diameter at the middle of hind tibiae. Wing venation normal.

Colour: Brownish to dark in life.

	Measurements in mm	
	1	2
Length	5.25	4.87
Width	2.7	2.5
Antenna	2.0	1.9
Antennal segment III ...	0.75	0.76
,, IV ...	0.30	0.27
,, V ...	0.33	0.38
,, VI ...	(0.21+0.07)	(0.21+0.07)
urs.	0.20	0.20
$ht._2$	0.36	0.35
Siphunculus, diameter, base ...	0.69	0.60
,, apex ...	0.14	0.14

(1, ex *Salix* sp., Darjeeling, 31-V-1969, CU; 2, ex *Salix* sp., Shillong, 17-XI-1972, ZSI.)

Sexual forms: Not known.

Nymphs (Apterous 1st instar): Body 1.58 mm long, elongate. Head dark brown; dorsal hairs with acute apices, longest one on frons 0.073 mm long, 0.50 × as long as the basal diameter of antennal segment III. Antennae 4 segmented, little less than 0.50 × as long as the body; segment III with 16–18 hairs, longest one 0.056 mm long, shortest one 0.036 mm long, these being 1.3 × and 0.09 × as long as the basal diameter of antennal segment III; processus terminalis 0.60 × as long as the base of last antennal segment. Rostrum reaches well beyond siphunculi, ultimate rostral segment 0.71 × as long as second segment of hind tarsus and bearing 10 accessory hairs besides preapicals. Abdominal dorsum pale, membraneous, with some scattered scleroites and sclerotic stigmal plates; dorsal tubercle hardly discernible; hairs on the dorsum of abdomen fine, flagellate, longest one on anterior tergites, 0.06 mm long, shortest one 0.03 mm long, these being 1.5 × and 0.75 × as long as basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.08 mm long. Siphunculi on brown sclerotic cones. Cauda dark sclerotic. Legs pale brown to brown.

Colour: Pale brown in life.

Measurements in mm

Length	...	...	...	1.58
Width	...	...	...	0.72
Antenna	...	...	...	0.72
Antennal segment	I	...	...	0.08
,,	II	...	...	0.08
,,	III	...	...	0.38
,,	IV	...	...	(0.12+0.07)
urs.	...	...	...	0.16
$ht._2$	...	...	...	0.23
Siphunculus, diameter, base			...	0.16
,,		apex	...	0.06

(ex. *Salix* sp., Shillong, 10-XII-1975, ZSI.)

Material examined: Four apterous and 4 alate viviparous females and 2 nymphs from *Salix babylonica*, Shillong, Meghalaya, India, 21-V-1970, coll. S. Biswas; (ZSI); two apterous and 2 alate viviparous females, from *Salix* sp. Shillong, Meghalaya, India, 17-XI-1972, coll. S. Biswas; (ZSI); 5 apterous viviparous female from *Salix* sp., Shillong, Meghalaya, India, 7-XI-1974, coll. A. K. Ghosh; (ZSI); 5 apterous and 3 alate viviparous females and 5 nymphs; from *Salix babylonica;* Shillong, Meghalaya, India, 10-XII-1975, coll. A. C. Sukla; (ZSI); 3 apterous viviparous females, from *Salix* sp., Lamahat, Darjeeling district, West Bengal, India, 31-V-1969, coll. M. R. Ghosh (CU).

Discussion: The species was first recorded from Northwestern India (now in Pakistan) as a new species, *Lachnus fuliginosus* by Buckton who based his description on the material sent from Indian Museum, Calcutta. Das (1918) while discussing its occurrence in Lahore region, correctly synonymised *L. fuliginosus* Buckton with *Tuberolachnus viminalis* (Boyer), the latter being now considered as a synonym of *T salignus* (Gmelin). Doncaster (1973) pointed out that perhaps the material sent to G.B. Buckton in 1891 contained two species i.e. apterae of *salignus* and alate of *Pterochloroides persicae* (Cholod.).

Das (op. cit.) recorded coccinellid larvae and syrphid larvae predating on this species in Lahore, and such predation has also been noticed in Northeastern region. In both the regions, the species appears in early winter and builds up population up to February, although some specimens have also been collected in May; only once, an ant of genus *Camponotus* was seen in association at Shillong, Meghalaya. Laboratory culture of the species yielded a hymenopteran parasite, *Lipolexis scutellaris* Mack., in September, at Shillong; this parasite is otherwise known to attack *Aphis gossypii* Glover, *A. citricola* v.d. Goot and *Toxoptera aurantii* (Boyer) in the region.

In all cases, this large black aphid species infests stems of Willow trees (*Salix* spp.,) and often it has been noted along with a species of *Cavariella* in Northeastern Hill Region, which could easily be separated by their smaller size and green colour. Essig (1912) and Gomez Menor (1962) have redescribed this species in detail from North America and Europe.

Distribution.—Northwest INDIA and Eastern INDIA; otherwise widely distributed in the world except in AUSTRALIA.

Types.—Not known, probably lost.

Tuberolachnus (Tuberolachniella) scleratus

Hille Ris Lambers and Basu 1966

(Plate 48; Plate 79, figs. 3–4)

1966. *Tuberolachnus* (*Tuberolachniella*) *sclerata* Hille Ris Lambers, D. and Basu, A. N., *Ent. Ber. Amst.*, **26**: 34.

1976. *Tuberolachnus* (*Tuberolachniella*) *scleratus*, Eastop, V. F., and Hille Ris Lambers, D., Survey World's Aphids, 554.

Apterous viviparous female: Body pear shaped 4.0–5.0 (5.25 mm) long with 2.20–3.0 mm as maximum width. Head dark brown with a distinct median suture; dorsal hairs on head long, fine, up to 0.08–0.10 mm long, and 2.0–2.3 × as long as the basal diameter of antennal segment III. Antennae 0.34 × to nearly 0.40 × as long as the body, basal segments dark brown, rest yellowish brown except basal part of segment III, which is paler; flagellum almost smooth and bearing many, rather stiff hairs, longest one on segment III, 0.05–0.07 mm long, 1.25–1.60 × as long as the basal diameter of the segment, shortest one, 0.03–0.04 mm long, about 0.77–1.0 × the mentioned diameter; secondary rhinaria usually absent on segment III (only one specimen with 3–4 rhinaria on segment III, according to H.R.L. & Basu); segment IV with 3(1–5) round secondary rhinaria; processus terminalis 0.32–0.45 × (0.58 ×) as long as the base of segment VI and 0.06–0.10 × as long as antennal segment III. Eyes large with distinct ocular tubercles. Rostrum reaches at least hind coxae, ultimate rostral segment obtuse, distinctly subdivided into segments 4 and 5; segments 4+5, 0.65–0.77 × (0.60–0.66 ×) as long as second segment of hind tarsus; segment 4 with at least 14 accessory hairs and about 2.8–3.1 (–2.4) × as long as segment 5. Thoracic and abdominal dorsum sclerotic, dark brown, marginally reticulated. Abdominal dorsum with small intersegmental and isolated sclerites, the latter bearing hairs; stigmal pori on dark sclerotic plates; a large reddish brown dorsal processus or tubercle present on abdominal tergite 4, this being 0.11 × as long as its width at base; hairs on dorsum of abdomen numerous, long and fine, longest one on anterior tergites, 0.07–0.10 mm long, shortest one 0.05–0.06 mm long, these being 1.8–2.3 × and 1.2–

1.6 × as long as basal diameter of antennal segment III, respectively; longest hair on 8th tergite 0.10–0.12 mm long, nearly 2.5–2.7 × as long as the mentioned diameter. Siphunculi on broad hairy cones, basally concolorous with rest of abdomen, darker near apical rim, at base nearly 1.30–1.50 × as wide as the length of antennal segment III and 4.5–5.0 × as wide as apex. Cauda almost black, semilunar, bearing many fine hairs. Legs with apices of femora and whole of tibiae, black, tarsi paler than tibiae, rest pale brown; longest hair on hind tibiae 0.06–0.07 mm long, 0.34–0.46 × as long as the diameter at the middle of hind tibiae; first tarsal segments with at least 15(–20) hairs.

Colour: Blackish in life (H.R.L. and Basu, 1966).

Measurements in mm

	1	2	3
Length	4.0	4.9	4.4
Width	2.38	3.17	2.76
Antenna	1.60	1.86	1.52
Antennal segment III ...	0.62	0.79	0.67
,, IV ...	0.25	0.30	0.23
,, V ...	0.22	0.30	0.22
,, VI ...	(0.15+0.06)	(0.16+0.05)	(0.14+0.05)
Rostral segments 4+5 ...	(0.18+0.06)	(0.21+0.07)	(0.19+0.06)
$ht._2$	0.31	0.38	0.37
Siphunculus diameter, base ...	0.60	0.64	?
,, apex ...	0.14	0.15	?

(1, ex. *Eriobotrya petiolata* Darjeeling, 2-VI-1957, DHRL; 2–3, ex. *Eriobotrya dubia*, Darjeeling, 15-XI-1968, SKD.)

Alate viviparous female: Not known.

Sexual forms: Not known.

Nymphs: Not known.

Material examined: One apterous viviparous female (Paratype) from *Eriobotrya petiolata*, Darjeeling, India, 2-VI-1957, coll. A. N. Basu, det. D.H.R.L. (DHRL); three apterous viviparous females from *Eriobotrya dubia* Darjeeling, India, 15-XI-1958, coll. S. G. Narayanan (SKD).

Discussion: It has been rightly pointed out in the original description that the dorsal tubercle being much wider than high, this species could be distinguished from *Tuberolachnus salignus* (Gmelin) feeding on willows. Further, the sclerotic tergum and the distinct segment 5 of rostrum which is longer than wide, helps to separate the present species from the willow aphid.

Although Hille Ris Lambers and Basu (1966) mentioned that this sepcies is fairly common in May and June in Darjeeling, West Bengal, reports about its occurrence are rather scanty and till date alates remain undescribed. These aphids are reported to form large colonies on undersides of leaves, petioles and young shoots and on leaves they are said to arrange themselves on both side of midrib and large veins.

Distribution.—INDIA: West Bengal (Darjeeling).

Types.—In the collections of D. Hille Ris Lambers, Bennekom, the Netherlands.

Tribe TRAMINI

Body covered with numerous hairs with acute apices. Head with a median suture in alatae or alatiform apterae, which may be indistinct or absent in apterae. Eyes in apterae small, sometimes of three or few facets only, in alatae, large, and in alatiform apterae variable. Antennae 6 segmented and about 0.50 × as long as the body; flagellum without secondary rhinaria; primary rhinaria at apices of segment V and VI, faintly ciliated or not; processus terminalis always shorter than base of antennal segment VI and bearing some normal hairs besides 5–9 short apical setae. Rostrum reaches 3rd–5th abdominal sternites. Abdominal dorsum in apterae, with pigmented sclerotic areas on 7th and 8th tergites but in alatae with transverse segmental sclerotic bars besides marginal sclerites. Siphunculi, when present, placed on hairy cones. Cauda broadly rounded. Legs long; hind legs with first tarsal segment much reduced, second tarsal segment greatly elongate and bearing a pair of claws; empodial hairs very short. Forewings with radial sector curved, media faint, usually once or twice branched; hind wings with both obliques.

Many members of five genera under the tribes i.e. *Protrama* Baker, *Trama* Heyden, *Neotrama* Baker, *Tactilotrama* Borner and *Eotrama* Hille Ris Lambers are known to have alatiform apterae and brachypterous intermediates and these may be more common than true apterae or alatae (Eastop, 1953). Heie (1967) opined that with their extremely prolonged hind tarsi, Tramini seems to be a specialised collateral branch of Lachninae, their reduced eyes being regarded as an apomorphic character.

It is interesting to note that Hymenopteran parasites are unknown for any species under Tramini and this has been explained in view of the hypothesis that members of Tramini perhaps moved to the roots of herbaceous plants from woody plants in the past, but their parasite fauna were unable to adapt to this radical change (Mackauer, 1965).

Two subtribes viz. Protramina and Tramina are recognised under the tribe. Del Guercio (1909), Mordvilko (1935), Eastop (op. cit.) have given detailed accounts of the tribe, Shaposhnikov (1964) has given a key to the species found in the European parts of U.S.S.R.

Key to the sub-tribes of **Tramini**

1(2) Siphunculi always present. Eyes of both apterae and alatae large and with ocular tubercles. Processus terminalis at least 0.25 × as long as the base of segment VI and bearing 6 or more hairs besides terminal setae. Alatae with more than 20 secondary rhinaria on antennal segment III.. .. *Protramina*

2(1) Siphunculi absent or present. Eyes of alatae large, of apterae variable, may be small or of three facets only. Processus terminalis at most up to 0.25 × as long as base of segment VI and bearing 0–1 hairs besides terminal setae. Alatae with 0–5 secondary rhinaria on antennal segment III.. .. *Tramina*

Two species are known under the Tribe Tramini from India and both of these belong to the only known genus under subtribe Protramina, e.g. *Protrama* Baker.

Genus **Protrama** Baker 1920

1920. *Protrama* Baker, A. C., *Bull. U.S. Dep. Agric.*, **826**: 19; Eastop, V. F. 1953. *Trans. R. ent. Soc. Lond.*, **104**(10): 389. Type species: *Trama radicis* Kaltenbach.

Morphology: Body 2.5–5.0 mm long. Head with a distinct median suture in most apterae and all alatae. Eyes large, with distinct ocular tubercles. Antennae 6 segmented; flagellum with secondary rhinaria at least on segment III–IV in alatiform apterae, and on segment III–VI in alatae; antennal segment VI usually longer than segment V; processus terminalis 0.33–0.75 × as long as base of segment VI in alatiform apterae, and more than 0.50 × of it in alatae, and bearing at least 6 normal hairs, besides apical setae. Ultimate nostral segment with 6–12 dorsal hairs besides lateral ventral hairs and preapical ones. Abdominal dorsum usually with segmentally arranged transverse sclerotic areas and marginal sclerites in alatiform apterae and alatae but in true apterae, dorsum may be unpigmented except around siphunculi. Siphunculi on elevated cones which may be confluent with the marginal sclerites of 5th and 6th tergites in alatiform apterae and alatae. Cauda semilunar. Legs long and variably pigmented; second segment of

hind tarsus 0.50–0.90 × as long as hind tibia. Forewings usually with media once or twice branched.

Sexual forms mostly unknown; males are apterous and bear secondary rhinaria on antennal segment III–VI and exhibit distinct genitalia (Verma, 1969). Oviparae are also stated to be apterous but no distinctive character is available for the same (Eastop, 1953).

Discussion: The genus contains about 9 species most of which could largely be separated by the ratio of hind tarsus to hind tibia and number of dorsal hairs on ultimate rostral segment; often, size of body and presence of alatiform character in apterae are also considered for separation of the species. Two Species both enclemic in orign, are known from the region.

Most of the earlier authors before Baker (1920), and some even afterwards, considered the species of this genus under *Trama* or *Lachnus*. Eastop, (op. cit.) has listed detailed generic synonymy.

Biology: The species of this genus usually infest roots of the host plants, most of which belong to Asteraceae (=Compositae) and Ranunculaceae but two species from Central Asia are known from Paoceae & Papilionaceae (*Robinia*); one species recorded in the region reveal additional host plants belonging to Polygonaceae (*Rumex*) and Boraginaceae (*Cynoglossum*). It may be mentioned that *Tactilotrama* Borner, which is being considered as a distinct genus, has been separated because of its association with roots of *Rumex* besides different types of tibial hairs, but the present study revealed that even true *Protrama* may be associated with roots of *Rumex*. Most of the species of *Protrama* are known to lead anholocyclic life cycle.

Distribution.—The genus is known only from Eurasia and North AFRICA (Eastop, op. cit.). Eastop (op. cit.) has provided an account of British species of *Protrama* and Stroyan (1964) has discussed about some of the recently described central Asian species, while describing a new species from INDIA.

Type species.—*Trama radicis* Kaltenbach, 1843. The type was fixed by Baker (op. cit.) and Eastop (op. cit.) has opined that Kaltenbach's material consisted of two species. *Protrama radicis* and *Neotrama caudata* (Del Guercio). Location of the type material is unknown.

Key to the species of **Protrama**

Apterous viviparous female:

1(2) Body 3.03–3.08 mm long. Antennal segment III 0.55–0.65 mm long, always much shorter than segments IV and V taken together. Processus terminalis 0.18–0.21 × as long as antennal segment

	III. Abdominal dorsum with segmental sclerotic areas. On *Artemisia, Cynoglossum, Erigeron, Myriactis, Rumex* and *Salvia* spp.	*P. longitarsus sclerodensus* Kumar
2(1)	Body 3.8–5.0 mm long. Antennal segment III, 1.10–1.15 mm long, nearly equal to segments IV and V taken together. Processus terminalis 0.11–0.12 × as long as antennal segment III. Abdominal dorsum without segmental sclerotic areas except tergal bands on 7th and 8th or only on 8th tergite. On *Helianthus tuberosus*..	*P. penecaeca* Stroyan

Protrama longitarsus sclerodensus Kumar

(Plate 49; Plate 80)

1973. *Protrama longitarsus sclerodensus* Kumar Rabinder, *Orient. Ins.*, **7**(1): 11.

1981. *Protrama salviae* Rishi, N. P. and Bhagat, R. C. *Entomon* **6**(2): 123 Syn. n.

Apterous viviparous female: Body 2..8–3.08 mm long (3.03–3.05 mm). Head distinctly divided by a median suture, dark brown, sclerotic, densely covered with hairs, which are 0.04–0.06 mm long, longest one, up to 1.3 × as long as the basal diameter of antennal segment III. Antennae concolourous with head, 0.61–0.68 × as long as the body; flagellum almost smooth, segment III, 0.55–0.58 mm long (0.63–0.65 mm), 1.81–2.1 × (2.4–2.5 ×) as long as ultimate rostral segment, without any secondary rhinaria; segment IV with 2–6 and V with 2–5 secondary rhinaria; primary rhinaria at the apex of segment V and segment VI large; hairs on the flagellum fine, numerous, longest one on segment III, 0.053–0.066 mm long, shortest one 0.030–0.040 mm long, these being 1.1–1.3 × and 0.6–0.8 × as long as the basal diameter of the segment, respectively; processus terminalis 0.44–0.47 × as long as base of antennal segment VI and 0.21–0.22 × (0.18–0.20 ×) as long as antennal segment III. Rostrum reaches 5th abdominal sternite; segment 4 with 16 accessory hairs besides of 6 preapicals. Abdominal dorsum pale bearing transverse spinal sclerites, (which may sometimes be absent) which have irregular bare spaces on 1st–7th tergite and a solid band like sclerite on 8th tergite, besides lateral abdominal sclerites which may be variably developed and some scattered pleural sclerotes; hairs on the dorsum of abdomen numerous, longest one on anterior tergites up to 0.083 mm long, shortest one up to 0.066 mm long, these being 1.5 × and 1.3 × as long as the basal diameter of antennal segment III, respectively; hairs on 7th and 8th tergites 0.083–0.086 mm long, up to 1.8–1.9 × as long as the mentioned diameter. Siphunculi on brown sclerotic

cones. Cauda broadly rounded. Legs stout, femora and tibiae darker, mid femora 1.18–1.43 × as long as antennal segment III; hind tibia 2.5–2.7 × as long as antennal segment III and 4.5–5.20 × (5.4–5.8 ×) as long as antennal segment IV; hind tarsus 0.65–0.74 × (0.63 ×) as long as hind tibia.

Colour: Dark brown to blackish in life.

Measurements in mm

	1	2
Length	3.08	2.86
Width	1.7	1.7
Antenna	1.87	1.88
Antennal segment III ...	0.58	0.55
,, IV ...	0.28	0.31
,, V ...	0.38	0.38
,, VI ...	(0.25+0.21)	(0.27+0.012)
Rostral segments 4+5 ...	0.31	0.28
hind tibia	1.44	1.48
$ht._2$	1.06	1.04
Siphunculus, diameter, base ...	0.05	0.05
,, apex ...	0.23	0.24

(ex. 1, *Artemisia* sp., Simla, KDV, 2, ex. *Salvia moorcroftiana*, Harven, RCB.)

Alate viviparous female: Not known.

Sexual forms: Not known.

Nymphs (Apterous, early instar): Body 1.87 mm long, completely pale. Head with a median suture; eyes small. Antennae 5 segmented, 0.61 × as long as the body; flagellum without any secondary rhinaria; hairs on flagellum fine, 0.033–0.050 mm long, 0.40–0.60 × as long as the basal diameter of antennal segment III; segment III, 1.58 × as long as ultimate rostral segment; processus terminalis 0.58 × as long as base of last segment and bears many fine hairs. Abdominal dorsum pale, dorsal hairs fine, numerous. Siphunculi on slightly elevated, almost colourless, cones. Legs pale; mid femora 1.13 × as long as antennal segment III, 3.25 × as long as antennal segment IV and 3.42 × as long as ultimate rostral segment, hind tarsus 2, 0.80 × as long as hind tibia.

Colour: Pale in life.

Measurements in mm:

	Length	Width	Antenna	Antennal segments III	IV	V	urs.	hind tibia	$ht._2$
1.	1.87	?	1.15	0.41	0.28	(0.18+0.10)	0.26	0.89	0.72

(ex. *Myriactis wallichi*, Narkanda, 26-IX-1974, ZSI.)

Material examined: One apterous viviparous female, from roots of *Artemisia* sp., Simla, Himachal Pradesh, India, date not indicated. coll. K. D. Verma (KDV): 8 apterous nymphs from roots of *Myriactis wallichi* Narkanda, Himachal Pradesh, India, 26-IX-1974, coll. L. K. Ghosh, (ZSI); one apterous viviparous female and 4 nymphs from an unidentified host, Taksing, Subansiri district, Arunachal Pradesh, India, 25-XII-1974. coll. J. M Julka (ZSI); two apterous viviparous females, from *Salvia moorcroftiana*, Harven, Kashmir coll, R. C. Bhagat.

Discussion: The subspecies differs from the nominate species, *longitarsus* (Ferrari) which is known from continental Europe, in the ratio of length of body to the sum of antennal segments III-VI; in the nominate species this being 2.3–2.4 × as against 1.6–1.8 × in the subspecies. The subspecies could also be separated from *Protrama flavescens* (Koch), another european species, in the ratio of hind tibia to antennal segment III and to antennal segment IV and in the presence of secondary rhinaria in antennal segment IV and V etc., as has been pointed out by Kumar (1973).

Rishi and Bhagat (1981) described a new species, *Protrama salviae* from *Salvia moorcraftiana* (Labiatae) in Kashmir and differentiated the new species from *penecaeca* Stroyan. On examination of two paratypes obtained on loan from Dr. R. C. Bhagat, it becomes clear that *salviae* and the present subspecies is the same and *salviae* as such is treated here as a synonym of *sclerodensus*. It appears that some error has crept in the measurements of holotype, like length of processus terminais is shown as "0.05 mm" which in both the paratypes is 0.12 mm; also no secondary rhinaria could be noticed in the paratypes examined.

Kumar (op. cit.) recorded the species from roots of *Artemisia* sp., (3-VIII-1966) from Fagu, Himachal Pradesh where they were found 1"—3" below the ground along with primary roots of the host plants. Ants of *Myrmica* sp. were seen in attendance. Subsequently it has also been recorded from roots of *Cynoglossum denticulatum* (28-IX-1974), *Erigeron canadensis* (27-X-1974), *Myriactis wallichi* (26-IX-1974 and 29-IX-1974) and *Rumex* sp., (5-X-1974) by L. K. Ghosh, Zoological Survey of India, Calcutta (Personal communication) from Himachal Pradesh and from roots of an unidentified plant at Subansiri district of Arunachal Pradesh, and *Salvia* in Kashmir.

Distribution.—INDIA: Kashmir, Himachal Pradesh, and Arunachal Pradesh.

Types.—In the collections of British Museum (Nat. Hist.) London and Dr. Rabinder Kumar, Department of Entomology, University of Wyoming, Laramie, Wyoming, U.S.A.

Protrama penecaeca Stroyan 1964

(Plates 50–51; Plate 81)

1964. *Protrama penecaeca* Stroyan, H. L. G., *Indian J. Ent.*, **26**: 211.

1969. *Protrama penecaeca*, Verma, K. D., *Bull. Ent.*, **10**(1): 102.

Apterous viviparous female: Body large ovoid, 4.0–4.4 mm (3.8–5.0 mm) long. Head dusky brown, with a distinct median suture; dorsal cephalic hairs fine, 0.05–0.07 mm long, longest one 1.2 × as long as the basal diameter of antennal segment III. Antennae yellowish brown, 0.75 × as long as the body; segment III nearly equal to segments IV+V together, broader towards apex and bearing 5–10 (4–10) secondary rhinaria; segment IV with 4–7 (3–8) and V with 4–6 (3–7) and base of segment VI frequently with 1–2, similar rhinaria; hairs on flagellum fine, numerous, frequently sharply bent over at apex, longest one on segment III, 0.060–0.066 mm long, shortest one 0.033 mm long, these being 1.2–1.3 × and 0.66 × as long as the basal diameter of the segment, respectively; processus terminalis nearly 0.33 × (–0.40 ×) as long as base of segment VI and 0.11–0.12 × as long as antennal segment III, and bearing 12–16 long normal hairs besides apical setae; primary rhinaria large, oval. Eyes reduced, ocelli absent. Rostrum reaches at least 3rd abdominal sternite, segments 4 and 5 distinct, segment 4 with 18–20 accessory hairs, including 7–9 dorsal accessory hairs. Abdominal dorsum pale, bearing a row of pleural and some marginal "muskelplatten" on each side, besides sclerotic stigmal plates; 8th tergite with a pair of broad irregular sclerites which fuse in the middle; hairs on the dorsum of abdomen numerous, all with acute apices, longest one on anterior tergites, 0.083 mm long, shortest one, 0.056–0.060 mm long, these being 1.67– × and 1.12–1.20 × as long as the basal diameter of antennal segment III, respectively; longest hair on posterior tergites up to 0.100 mm long and 2.0 × as long as the mentioned diameter. Siphunculi on small sclerotic cones, cauda dark sclerotic. Legs stout, brown and hairy; mid femur 0.94 × as long as antennal segment III; hind tibia 2.06 × (–2.2 ×) as long as antennal segment III and 4.13 × (4.4–4.8 ×) as antennal segment IV; hind tarsus 0.70 × as long as hind tibia.

Colour: Probably dirty greenish in life or greyish white or green with brown appendages.

Measurements in mm:

	Length	Width	Antenna	Antennal segments				Rostral segments 4+5	hind tibia	$ht._2$
				III	IV	V	VI			
1.	4.0	2.43	3.05	1.10	0.55	0.59	(0.35+0.12)	0.33	?	?
2.	4.4	2.98	3.30	1.15	0.53	0.65	(0.41+0.14)	0.36	2.30	1.52

(1–2, ex *Helianthus tuberosus*, Jammu, 21-XII-1961, HLGS.)

Alate viviparous female: Not known.

Sexual forms (from Verma 1969).

Apterous male: Head with numerous hairs and a median suture; eyes reduced to triommatidia. Antennae 0.80 × as long as the body, hairy; segment III with 1–2, IV with 4–5, V with 3–5 and VI with 2–3 secondary rhinaria of variable sizes arranged in a row; processus terminalis, 0.33 × as long as base of segment VI and 0.08 × as long as antennal segment III. Rostrum reaches beyond hind coxae. Abdominal dorsum pale; some dorsal hairs arise from small sclerites. Siphunculi on small pigmented cones. Genitalia dark sclerotic, well developed.

Colour: Not known.

Measurements in mm:

	Length	Antennal segments				ht.$_2$
		III	IV	V	VI	
1.	3.6	0.93	0.46	0.60	(0.35+0.073)	1.41

Nymphs (Apterous, early instar): Body pale. Antennae pale, 0.65 × as long as the body; flagellum smooth, without any secondary rhinaria; hairs on flagellum 0.033–0.053 mm long, up to 0.70 × as long as the basal diameter of antennal segment III; processus terminalis 0.50 × as long as base of segment VI. Abdominal dorsum pale, bearing numerous hairs, 0.036–0.066 mm long, up to 0.87 × as long as the basal diameter of antennal segment III. Siphunculi appearing as mere rings, Legs yellowish, mid femur 1.04 × as long as antennal segment III; hind tibia 2.84 × as long as antennal segment III and 4.77 × as long as antennal segment IV; hind tarsus 0.74 × as long as hind tibia.

Colour: Pale in life.

Measurements in mm:

	Length	Antenna	Antennal segments				Rostral segments 4+5	hind tibia	ht.$_2$
			III	IV	V	VI			
1.	2.91	1.88	0.50	0.30	0.43	(0.24+0.12)	0.032	1.44	1.07

(ex *Helianthus tuberosus*, Jammu, 21-XII-1961, HLGS.)

Material examined: Two apterous viviparous females and 5 nymphs, (Paratypes) from *Helianthus tuberosus*, Jammu, India, 21-12-1961, coll. M. L. Sharma, det. H. L. G. Stroyan (HLGS).

Discussion: This species differs from other known species by its large size and in exhibiting a reversed polarity of alatiform

character expression gradient between anterior and posterior part of the body, viz. apterae having long antennae, large number of secondary rhinaria and complete median suture as in alatiform apterae but lacking ocelli, tergal pigmented bands on anterior abdominal tergites and having small eyes and siphuncular cones etc. (Stroyan 1964). From other Asian species like *Tactilotrama antennata* Mordvilko, it differs in having only one type of tibial hairs and from *P. luppovae* Narzikulov and *P. orientalis* Narzikulov, it may be separated by the body size, smaller eyes and different ratios of hind tarsus to hind tibia.

Both apterous viviparous and oviparous morphs of the species have been collected from roots of *Helianthus tuberosus* during December. Nothing more is known about its biology.

Distribution.—INDIA: Jammu.

Types.—In the collections of British Museum (Nat. Hist.) London; some paratypes in the collections of Regional Research Laboratory, Jammu, Tawi, Dr. D. Hille Ris Lambers. Bennekom, The Netherlands and Plant Pathology Laboratory, Harpenden England.

HOST PLANTS OF *Lachninae* RECORDED IN THE REGION

Abies pindrow
- *Cinara confinis*

Artemisia sp.
- *Protrama longitarsus sclerodensus*

Berchemia floribunda
- *Longistigma? liquidambarus*

Castanopsis sp.
- *Lachnus tropicalis*

Cedrus deodara
- *Cinara indica*

Cynoglossum denticulatum
- *Protrama longitarsus sclerodensus*

Erigeron canadensis
- *Protrama longitarsus sclerodensus*

Eriobotrya dubia
- *Nippolachnus bengalensis*
- *Tuberolachnus scleratus*

Eriobotrya petiolata
- *Nippolachnus himalayensis*
- *Tuberolachnus sclerata*

Helianthus tuberosus
- *Protrama penecaeca*

Jugalns sp.
Stomaphis mordvilkoi
Lithocarpus dealbata (=Quercus dealbata)
Lachnus tropicalis
Lithocarpus elegans (=Quercus spicata)
Lachnus tropicalis
Myriactis wallichi
Protrama longitarsus sclerodensus
Photinia arguta
Nippolachnus bengalensis
Picea smithiana
Cinara comata
Pinus kesiya (=insularis)
Cinara atrotibialis
Eulachnus thunbergii
Schizolachnus orientalis
Pinus patula
Cinara maculipes
Pinus roxburgii (=longifolia)
Cinara atrotibialis
Pinus wallichiana (=excelsa)
Cinara eastopi
Cinara lachnirostris
Cinara maculipes
Pseudessegilla brachychaeta
Plectranthus japonicus (=coetsa)
Indocinara hottesis
Prunus amygdalus
Pterochloroides persicae
Prunus armenica
Pterochloroides persicae
Prunus communis
Pterochloroides persicae
Prunus cornuta
Pyrolachnus imbricatus
Prunus persicae
Pterochloroides persicae
Pyrus communis
Nippolachnus piri
Pyrolachnus pyri
Pyrus khasiana
Nippolachnus piri
Pyrus pashia
Nippolachnus bengalensis

Quercus phylyraeoides
Lachnus tropicalis
Quercus incana
Lachnus acutihirsutus
Quercus sp.
Lachnus acutihirsutus
Rosa moschata
Maculolachnus submacula
Rubus sp.
Maculolachnus rubi
Rumex sp.
Protrama longitarsus sclerodensus
Salix babylonica
Tuberolachnus saligna
Salix fraglis
Lachnus longirostrum
Salvia mooreroflіana
Protama longitarsus sclerodensus

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INDEX TO GENERA AND SPECIES

[Valid names of species are printed in Roman type, names given in synonymy preoccupied, or changed generic assignment etc. are printed in italic type. Numbers in bold indicate page containing detailed description]

PLATES

(All figures represent apterous viviparous female unless otherwise indicated)

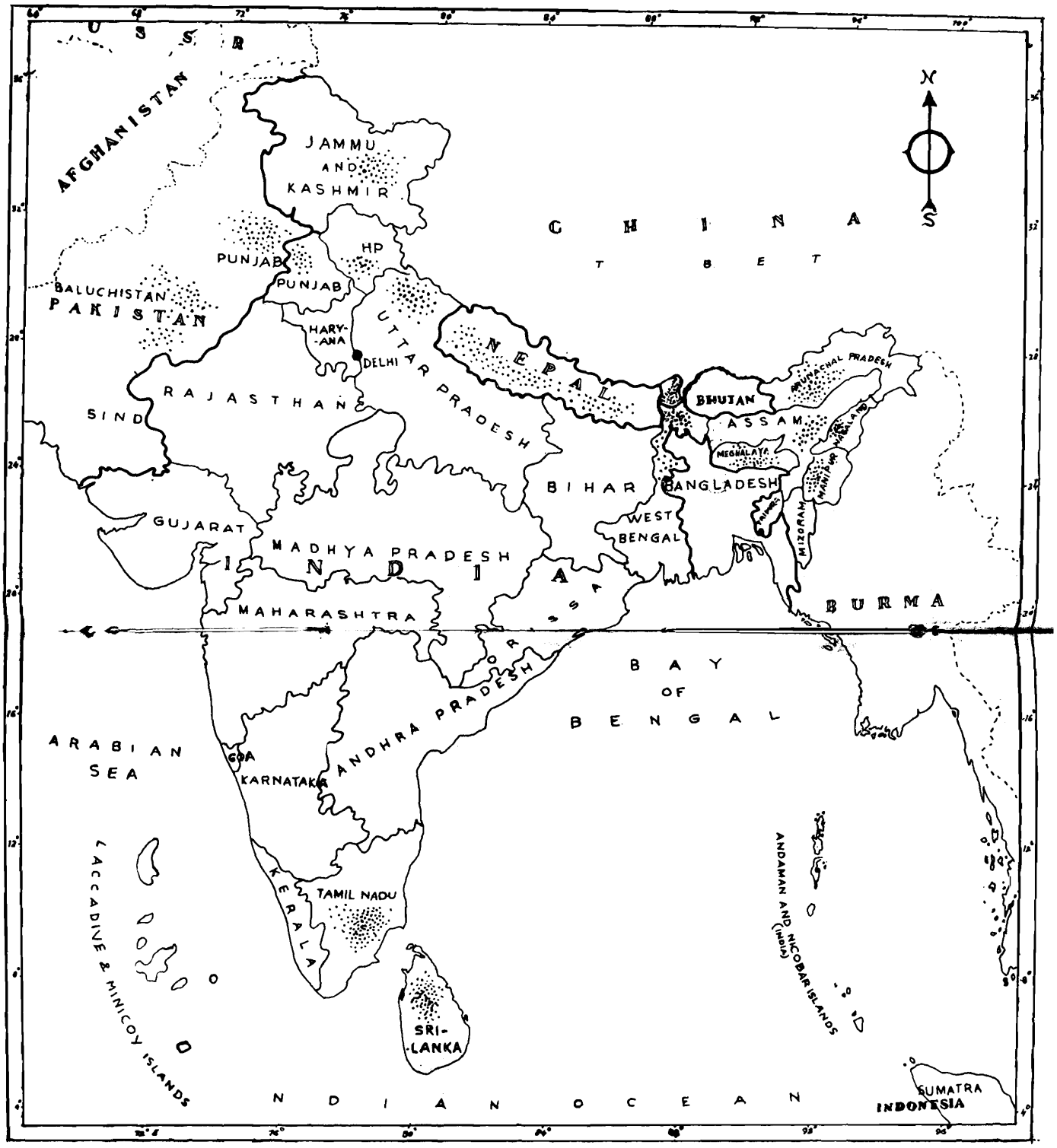


PLATE 1

Map of India and adjacent countries showing distribution of Lachninae.

PLATE 2

Cinara atroalbipes David *et al.*

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

PLATE 2

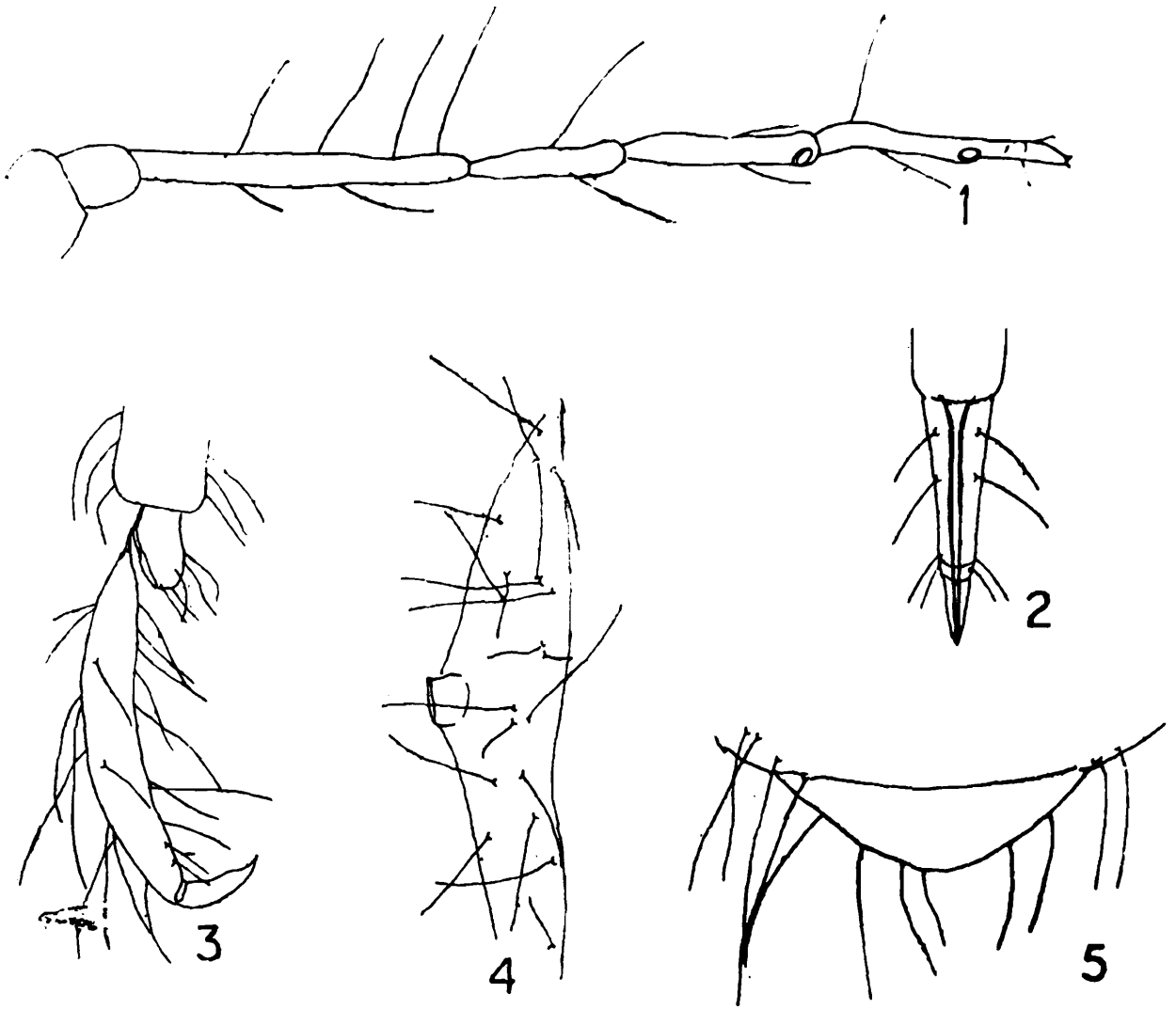


PLATE 3

Cinara atrotibialis David & Rajasingh

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda,
6. antenna of alate viviparous female.

PLATE 3

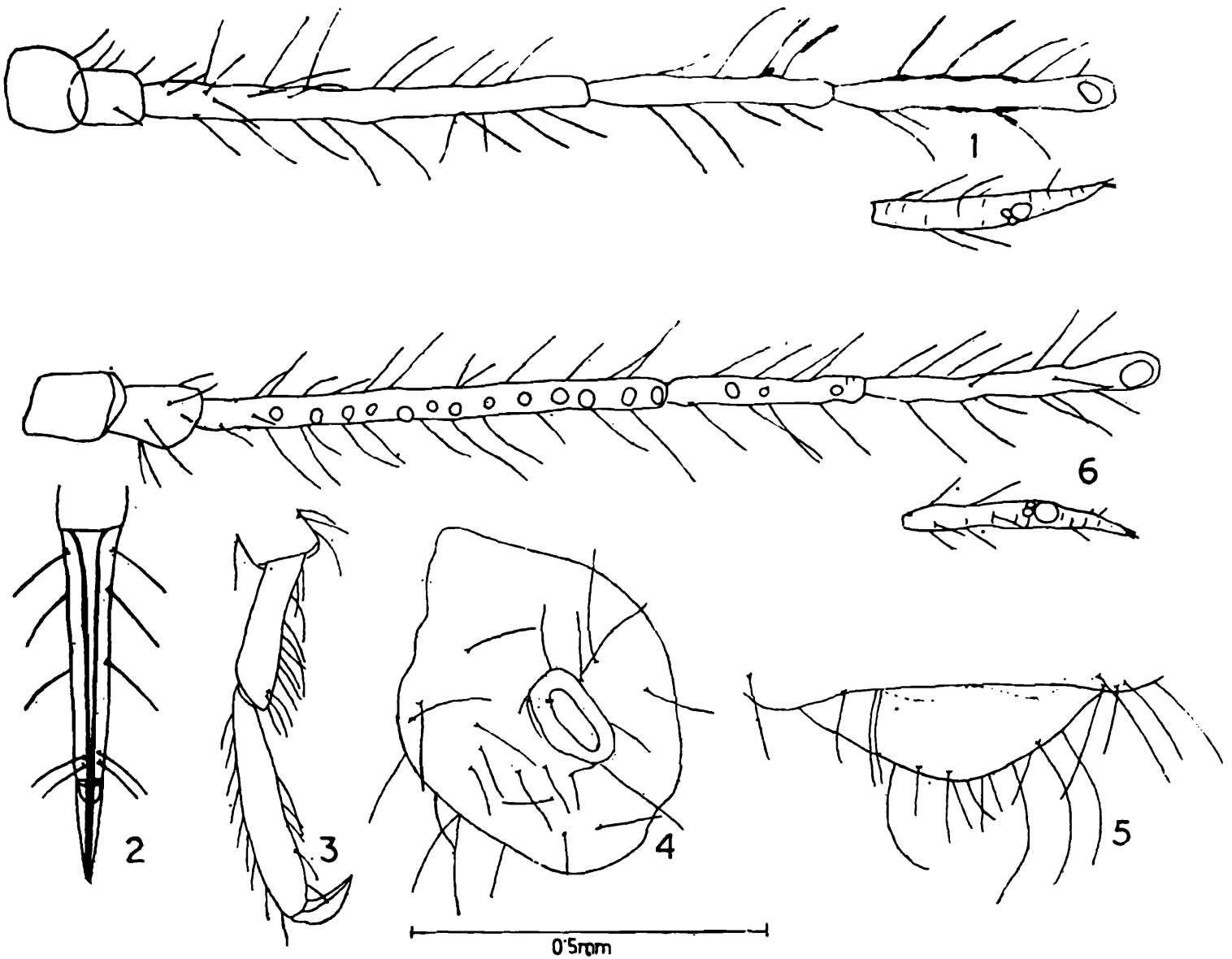
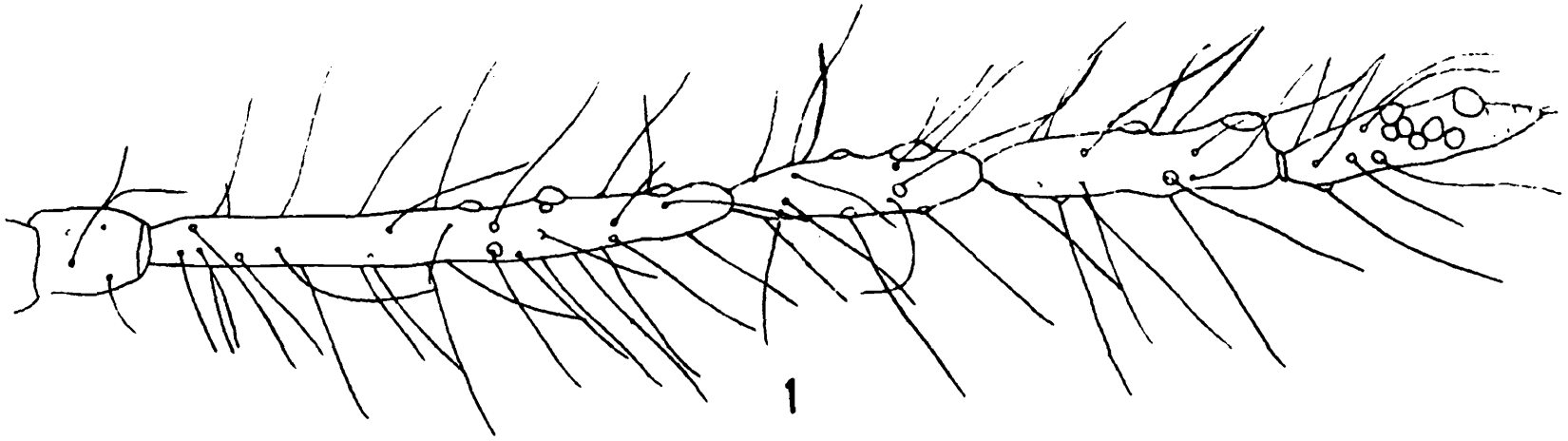


PLATE 4

Cinara chaetorostrata L. K. Ghosh, & Raychaudhuri,

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda
(all of alate viviparous female).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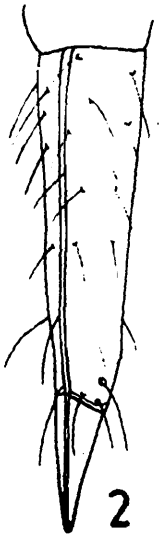
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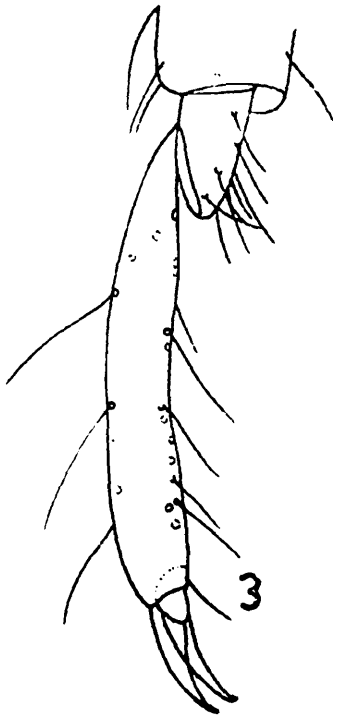
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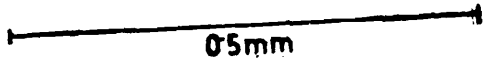
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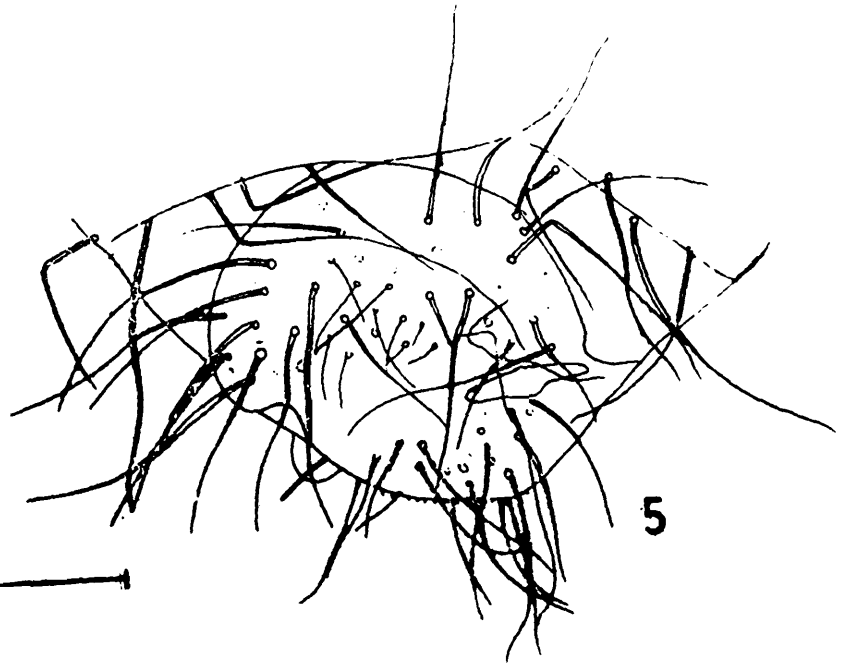
5

PLATE 5

Cinara comata Doncaster

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda,
6. antenna of alate viviparous female.

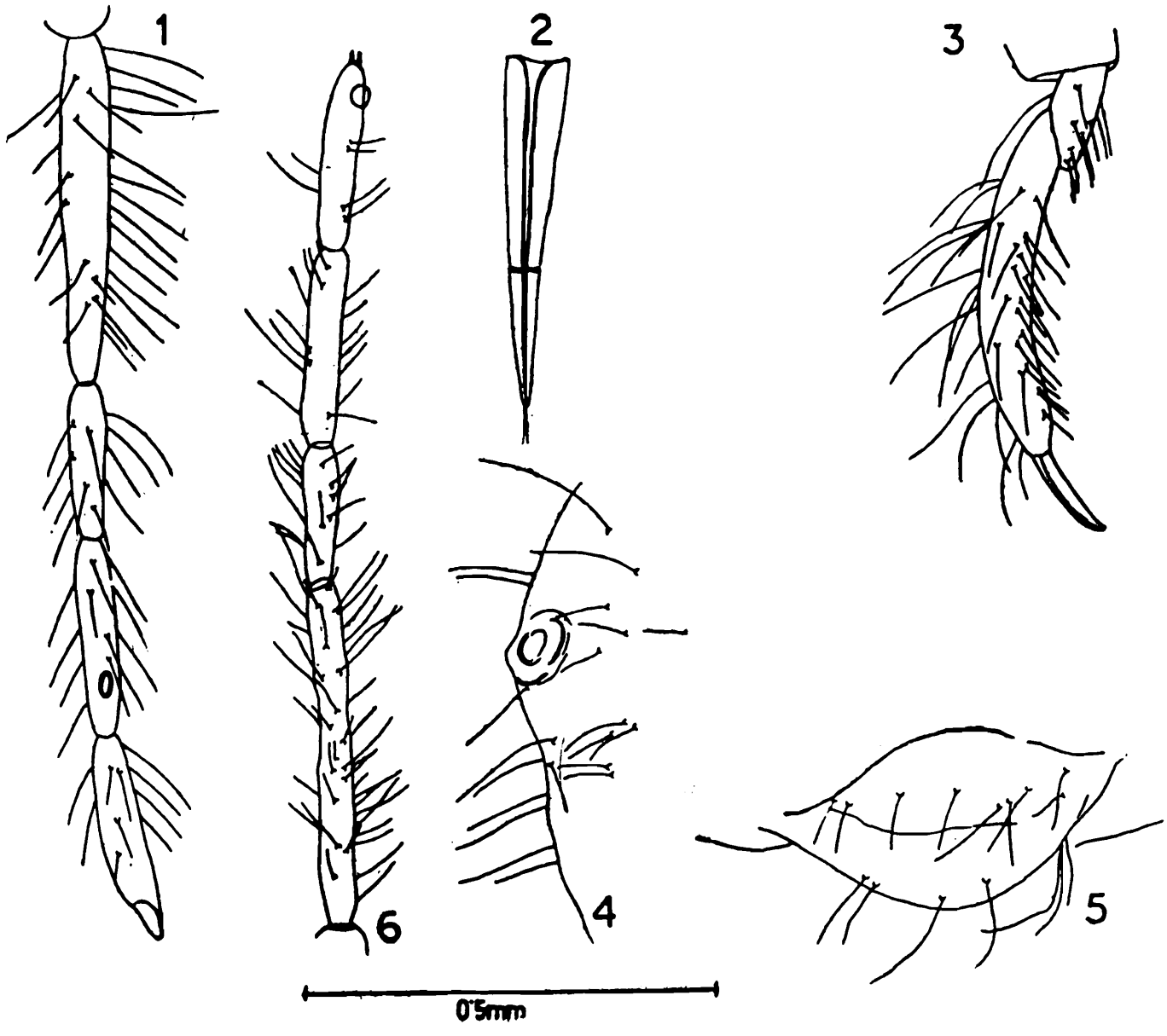
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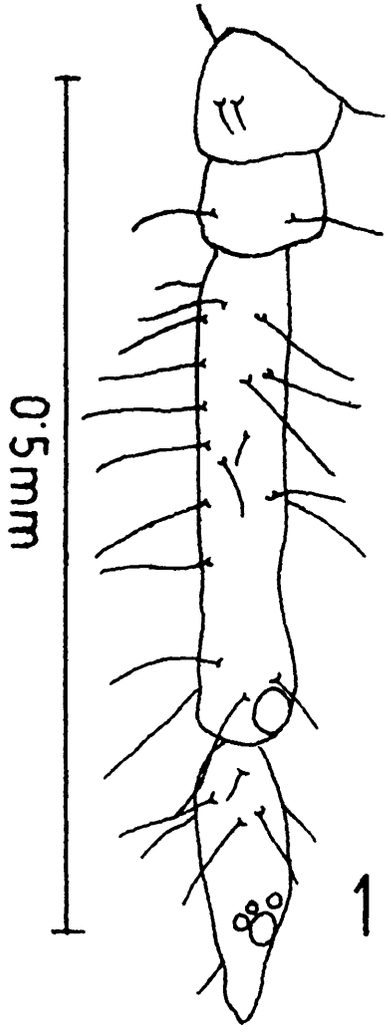
PLATE 6

Cinara comata Doncaster

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus
(all of nymphs).



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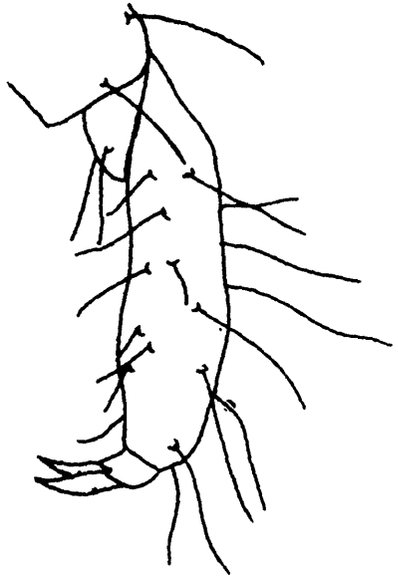

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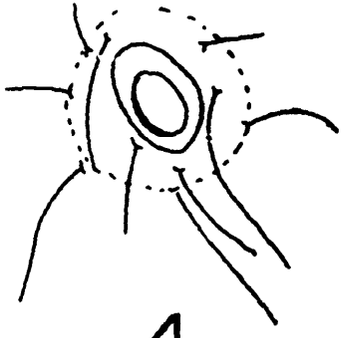

4

PLATE 7

Cinara confinis (Koch)

FIGS. 1. antenna of alate viviparous female,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus.

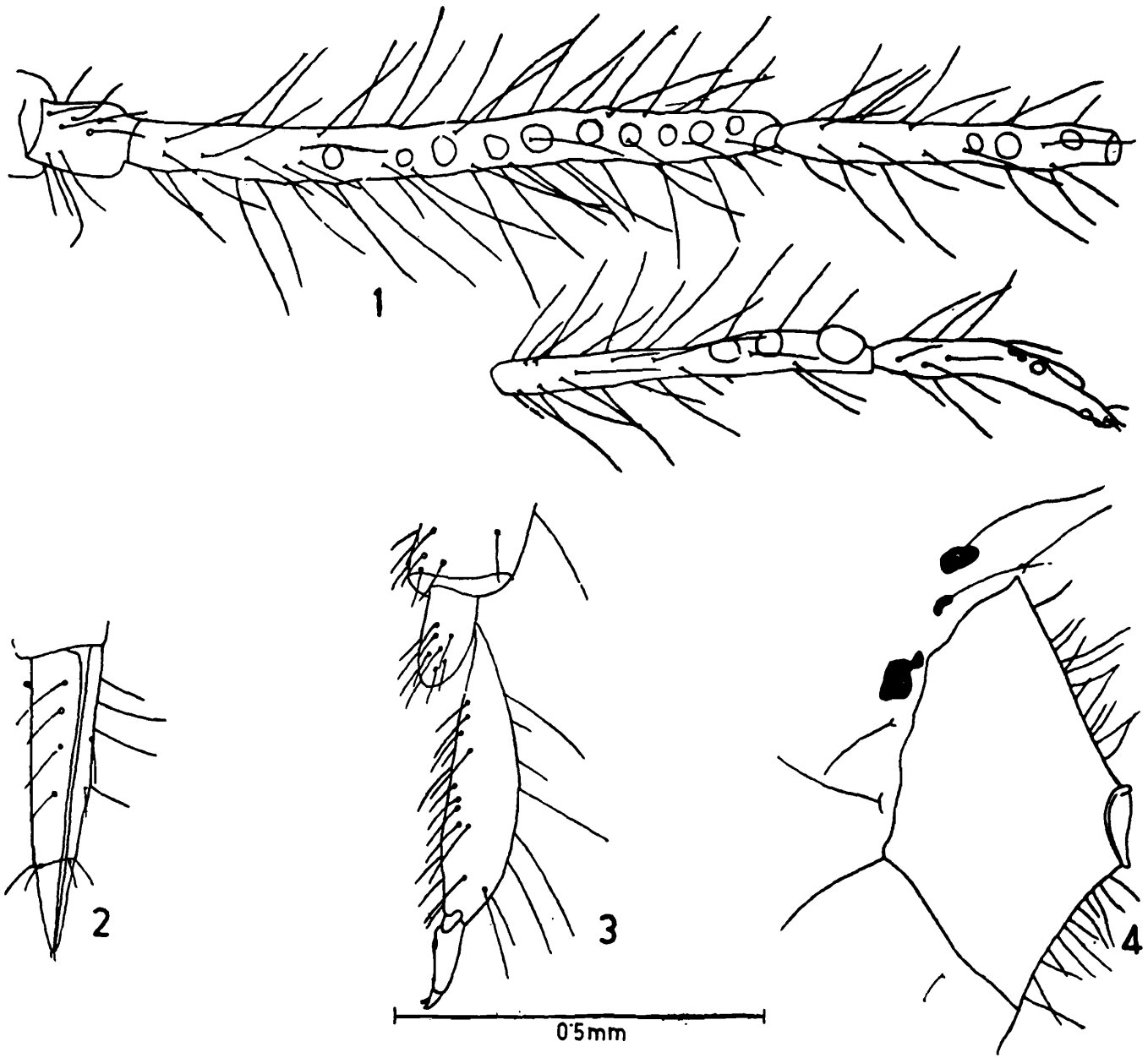
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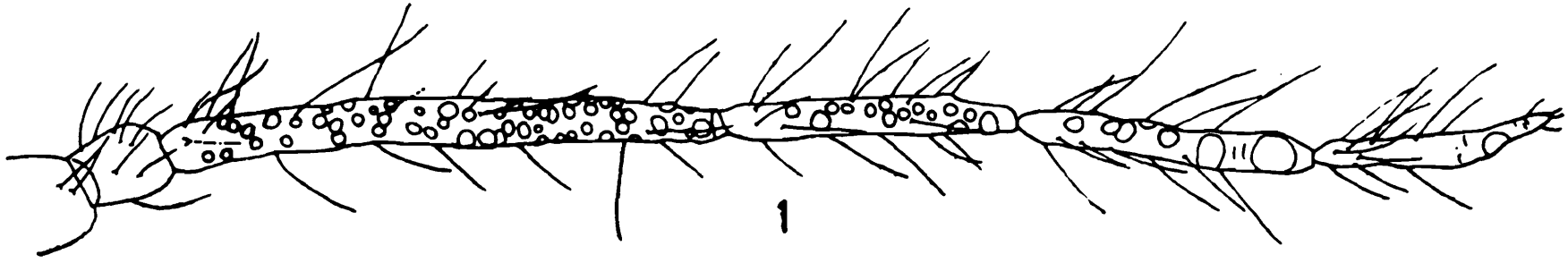
PLATE 8

Cinara confinis (Koch)

FIGS. 1. antenna of alate male,
2. hind tarsus,
3. male genitalia,
4. part of hind tibia of oviparous female.

PLATE 8



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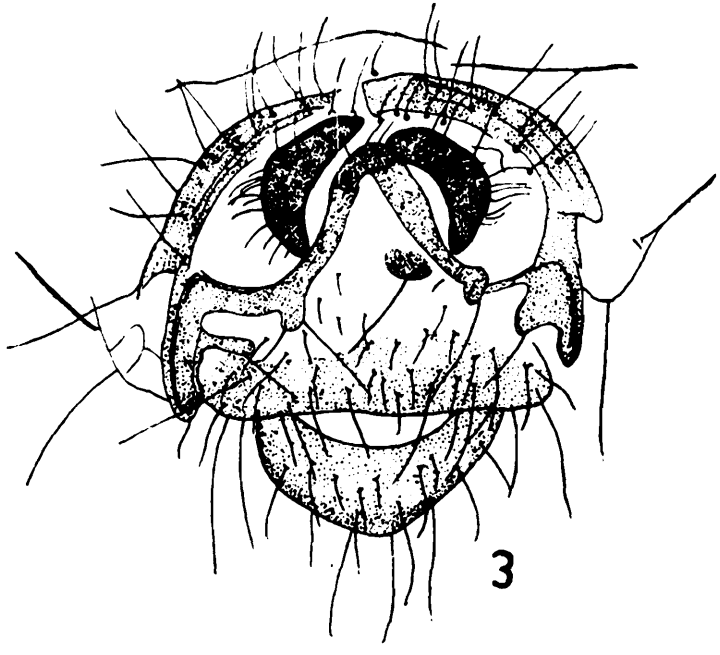

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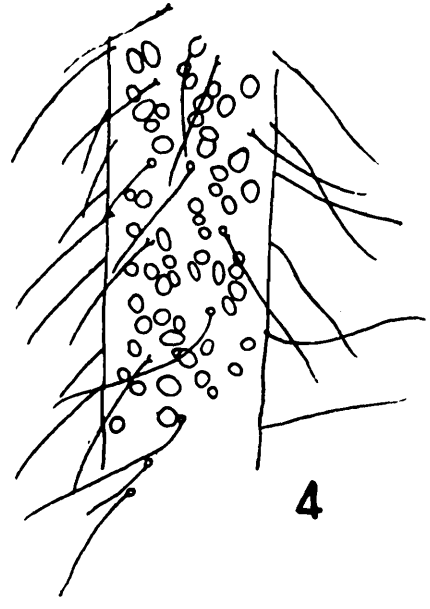

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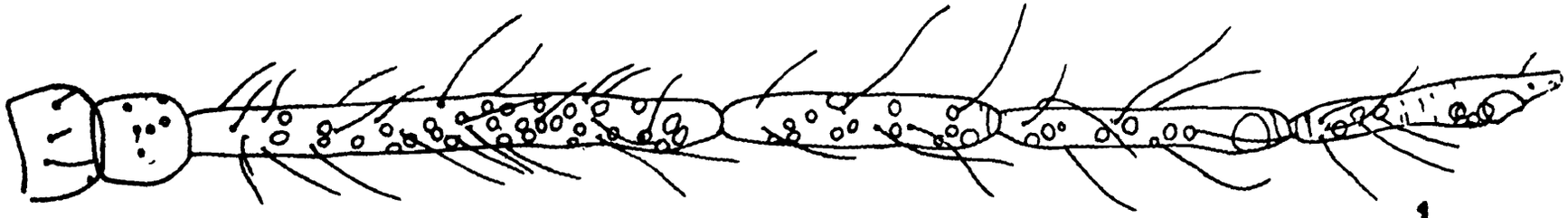
PLATE 9

Cinara confinis tenuipes Chakrabarti & Ghosh

FIGS. 1. antenna,
2. genitalia of alate male.



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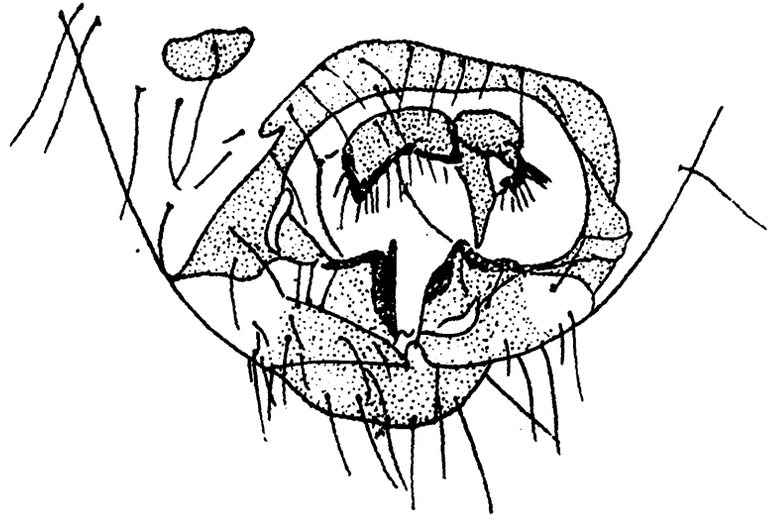

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PLATE 10

Cinara confinis tenuipes Chakrabarti & Ghosh

FIGS. 1. antenna,
2. ultimate rostral segment,
3. second segment of hind tarsus,
4. siphunculus,
5. cauda.

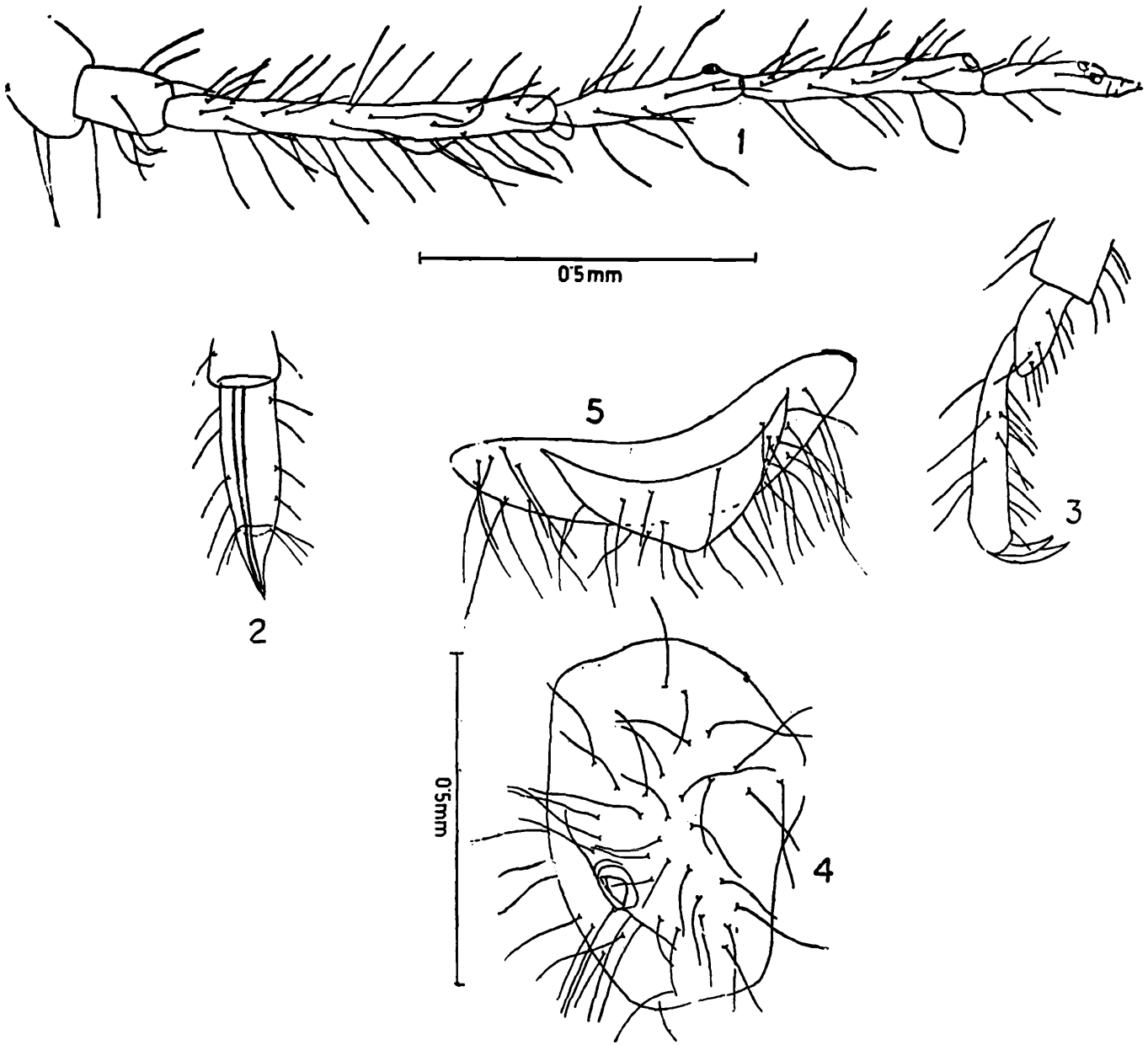
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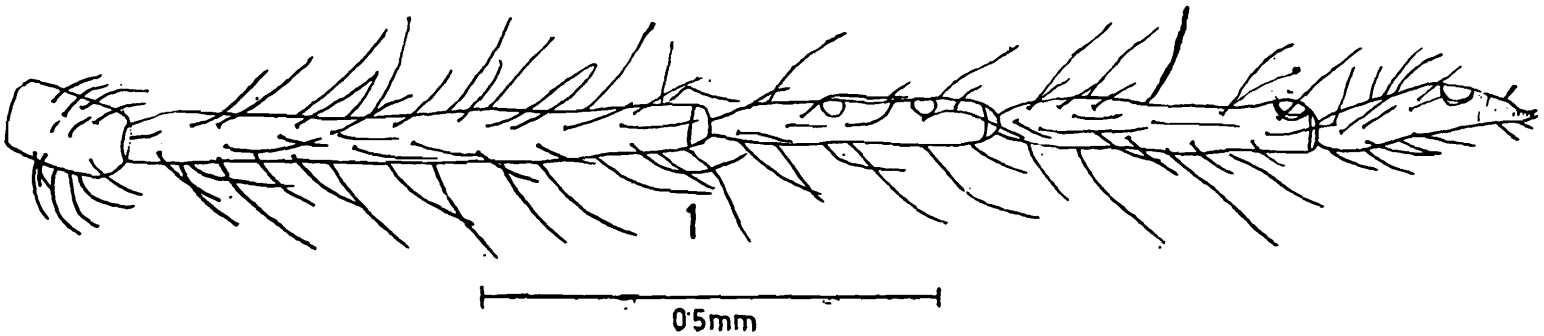
PLATE 11

Cinara eastopi Pintera

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. abdominal dorsum and cauda.


1
0·5mm

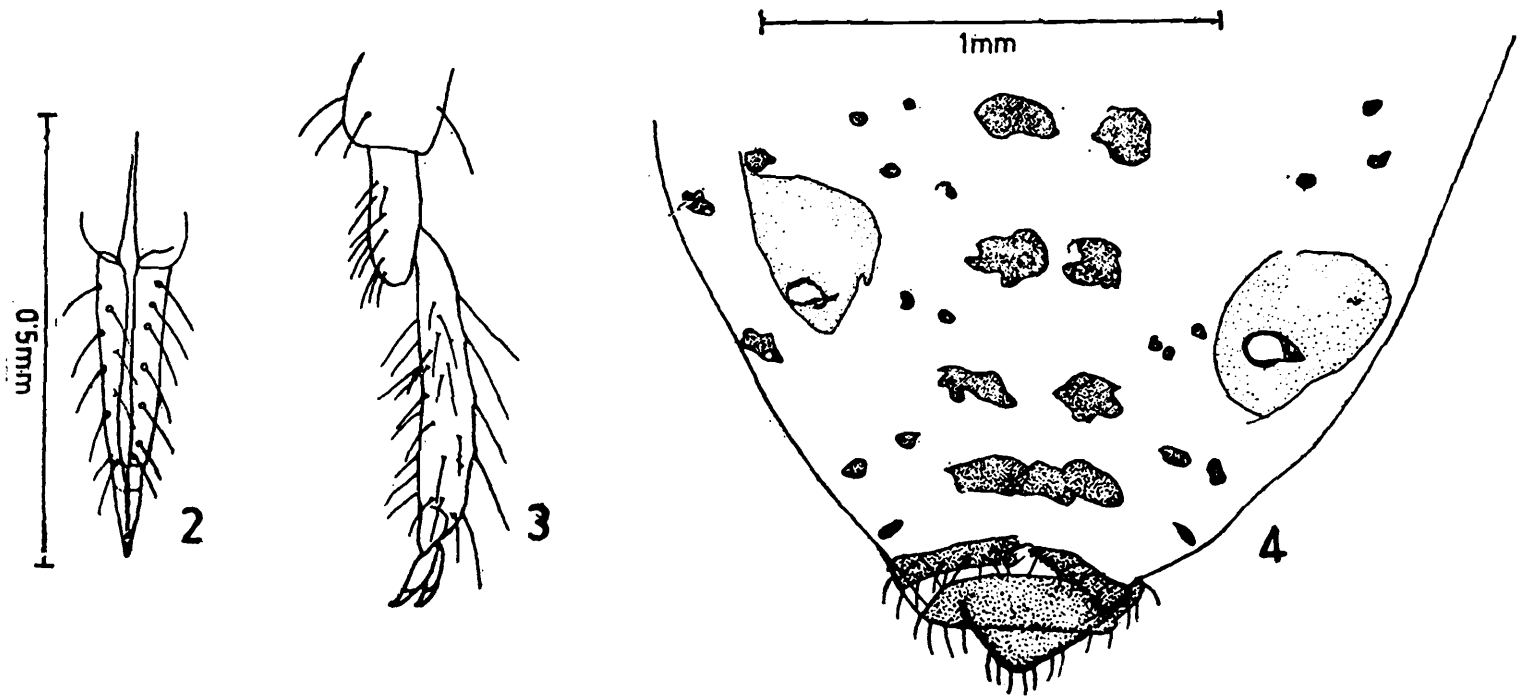

0·5mm
2
3
1mm
4

PLATE 12

Cinara eastopi Pintera

FIG. 1. antenna of alate viviparous female.

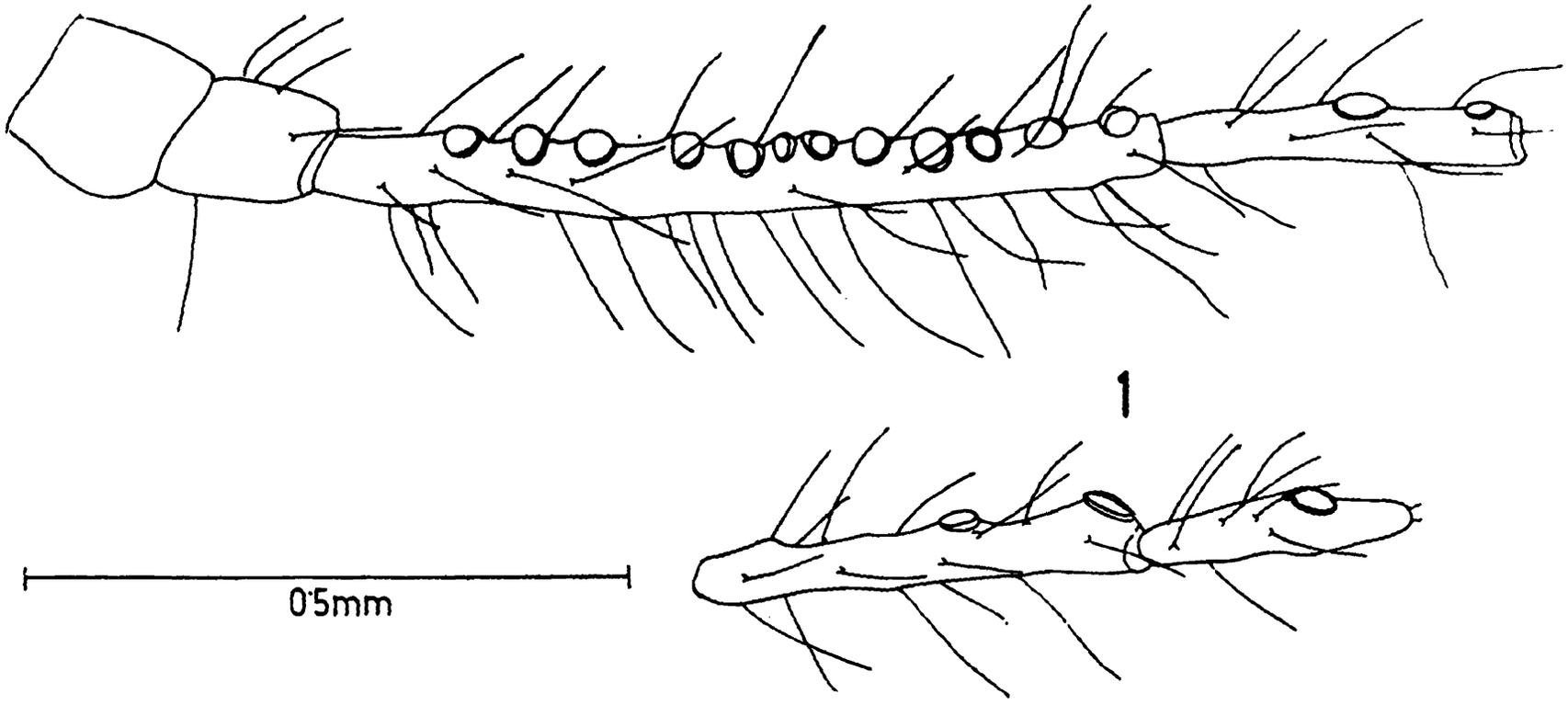

1
0·5mm

PLATE 13

Cinara indica Verma

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

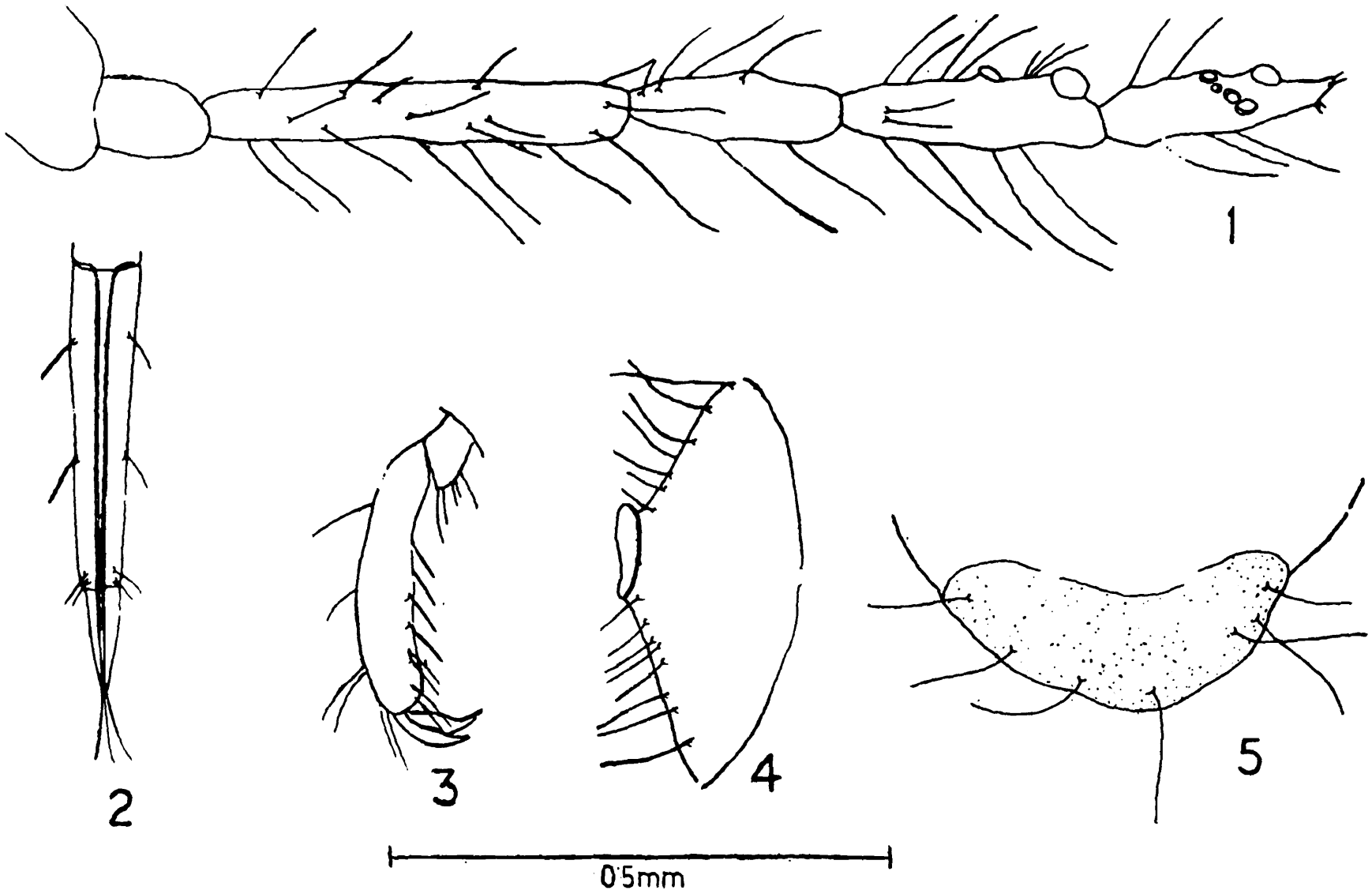

1
2
3
4
5
0·5mm

PLATE 14

Cinara indica Verma

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda of alate viviparous female.

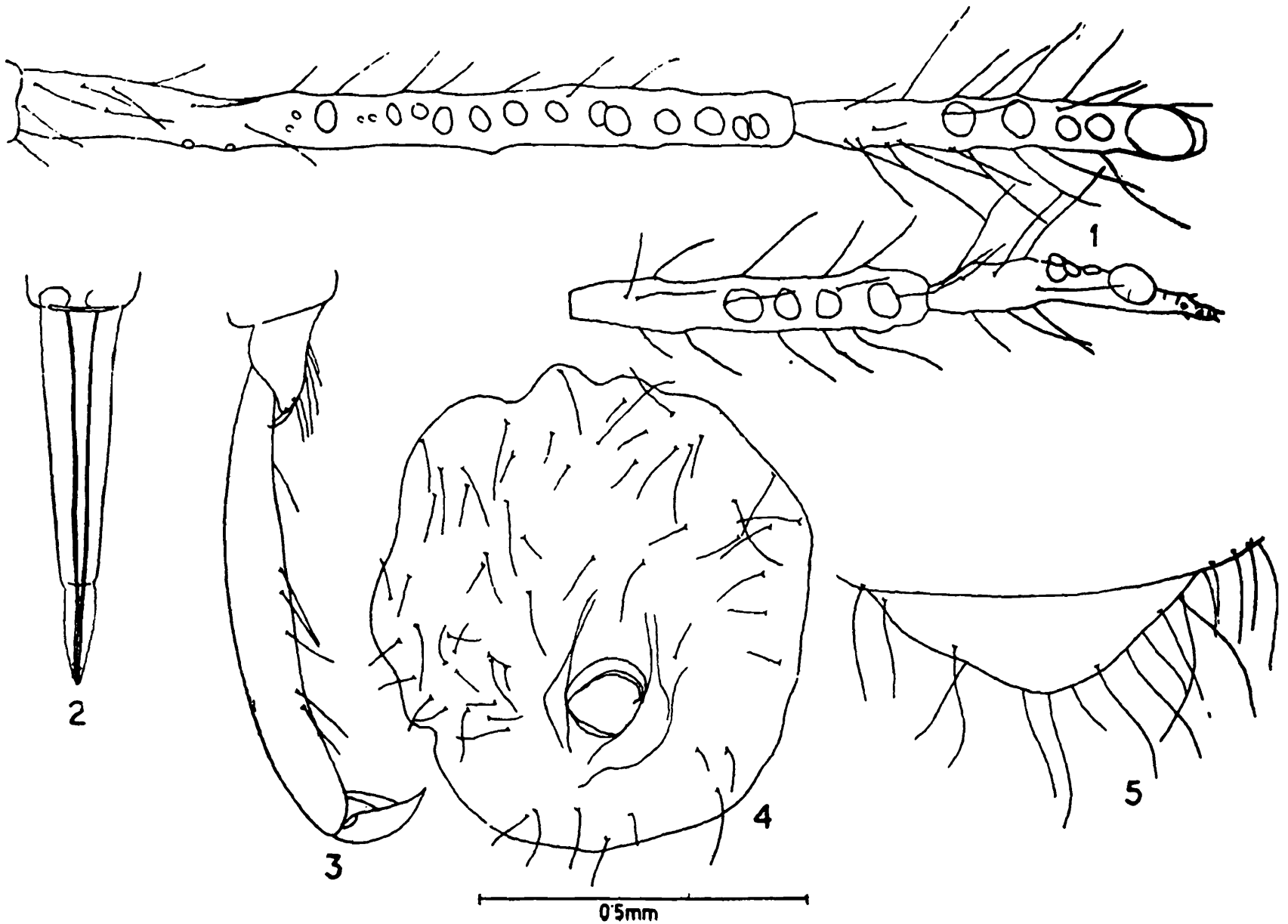
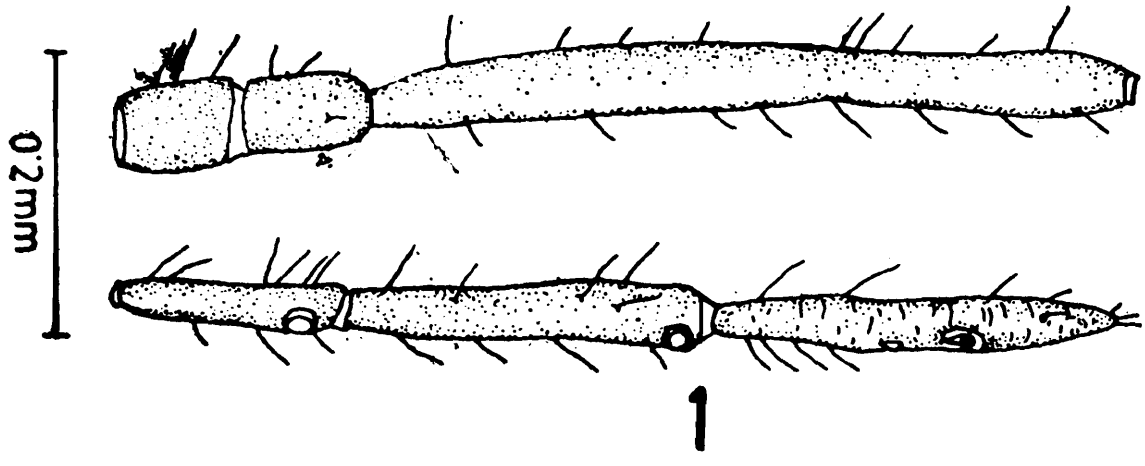

1
2
3
4
5
0·5mm

PLATE 15

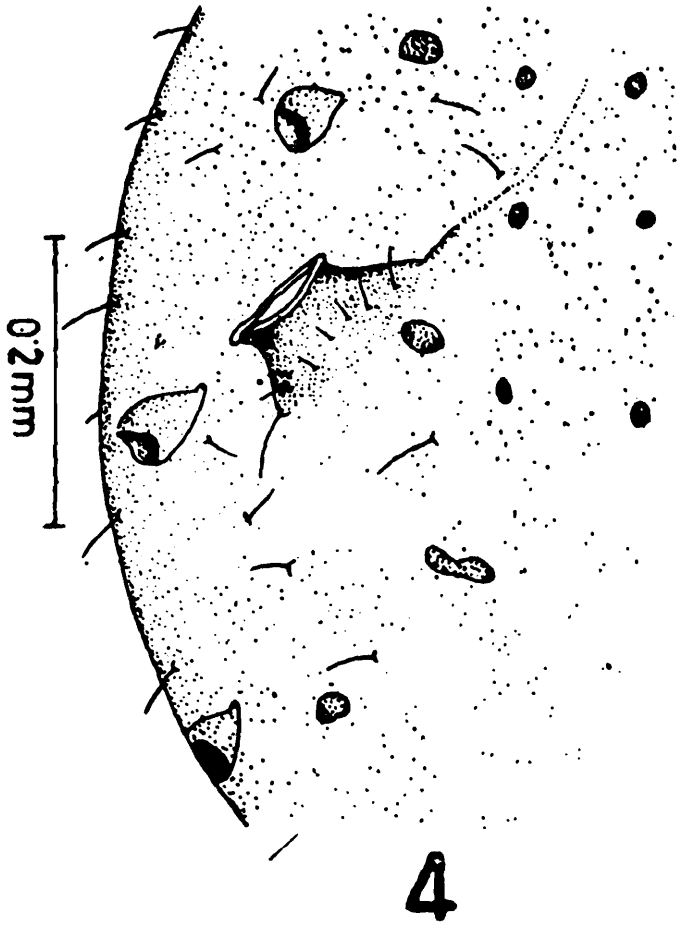
Cinara lachnirostris H.R.L.

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus.

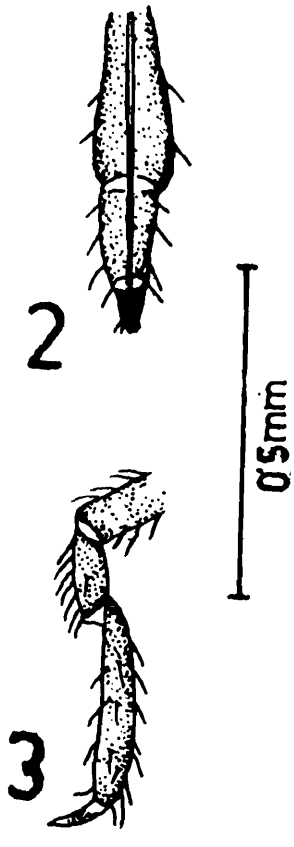
PLATE 15



1



4



2

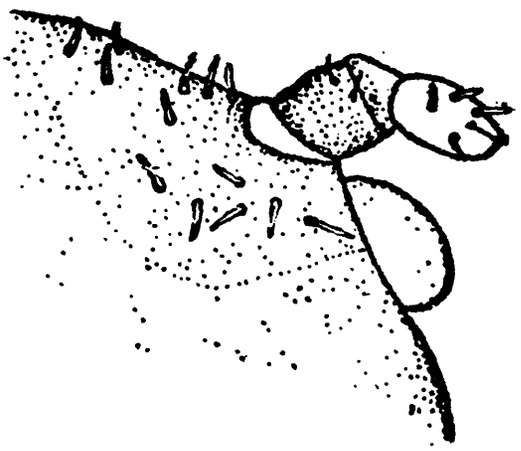
3

PLATE 16

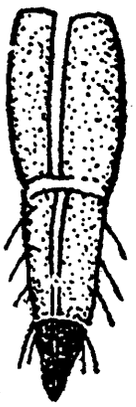
Cinara maculipes H.R.L.

FIGS. 1. head,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. part of hind femora,
6. part of hind tibia.

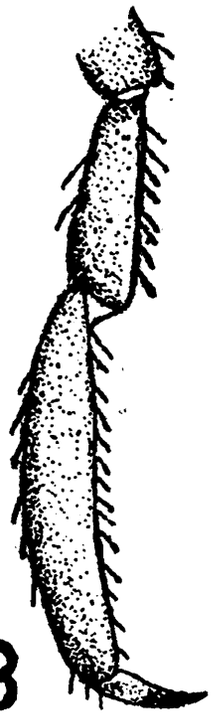
PLATE 16



1

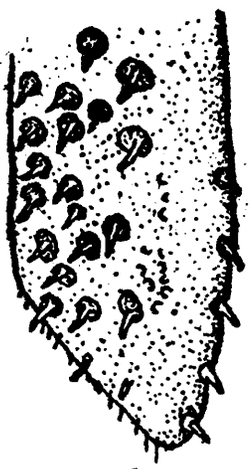


2

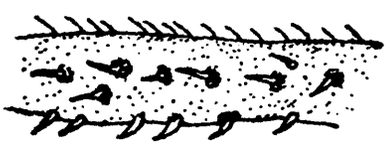


3

0·5mm



4



5

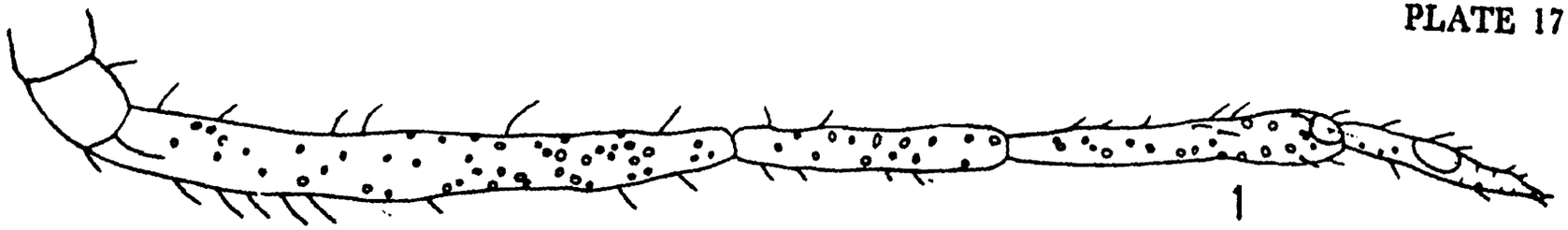
6

PLATE 17

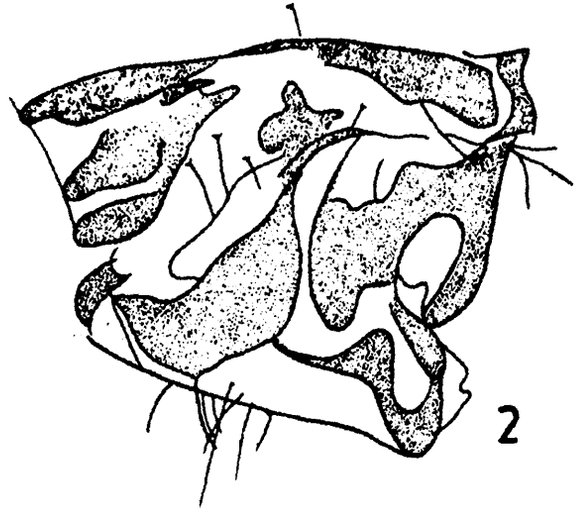
Cinara maculipes H.R.L.

FIGS. 1. antenna of alate male,
2. male genitalia.

PLATE 17



1



2

0·5mm

PLATE 18

Cinara pilicornis (Hartig.)

FIGS. 1. whole body,
2. antenna,
3. antennal segment VI,
4. hind tarsus
(from V F. Eastop, 1972).

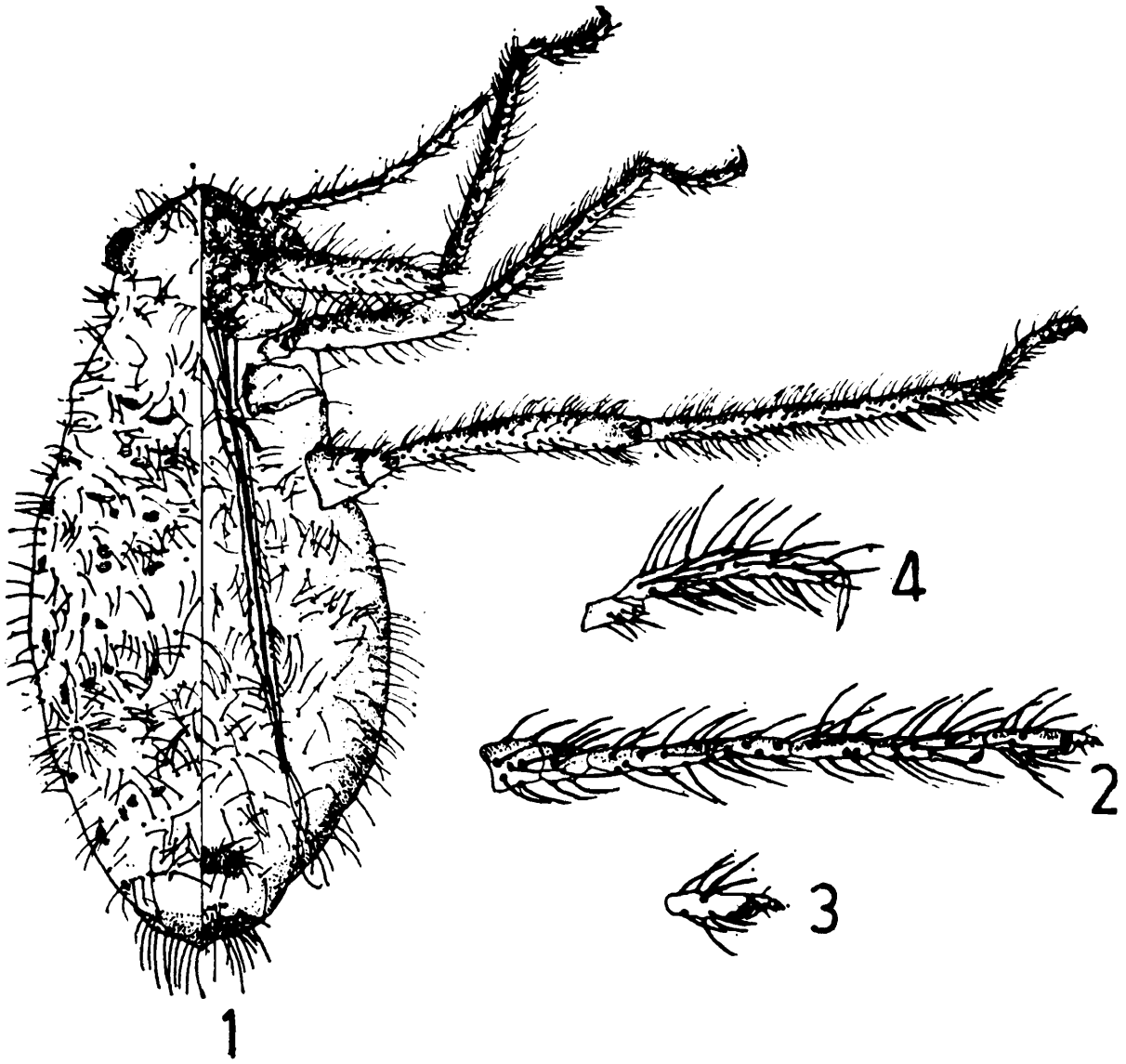
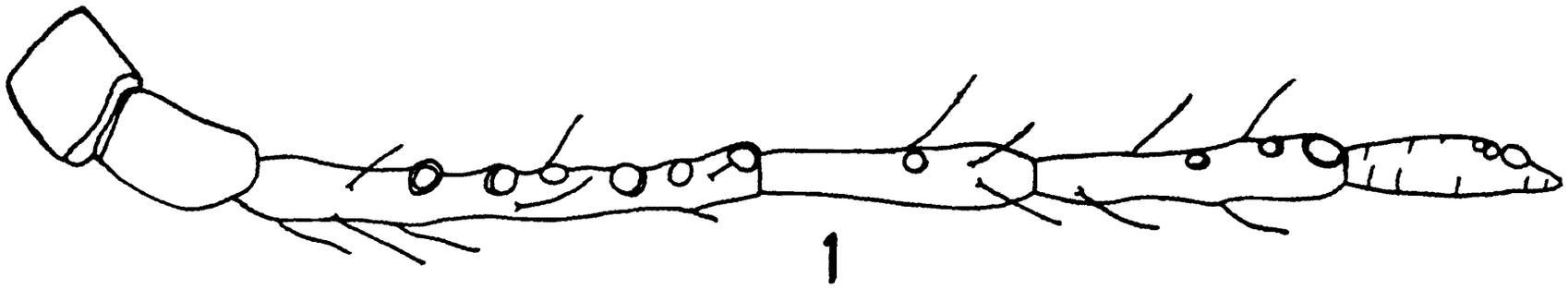

1
2
3
4

PLATE 19

Cinara pilicornis (Hartig.)

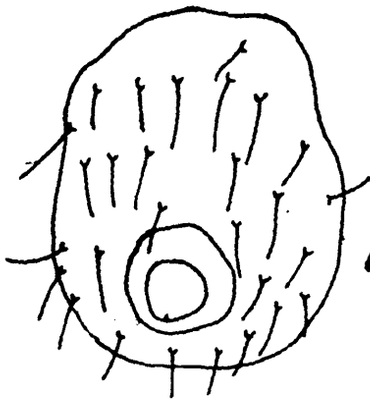
FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.



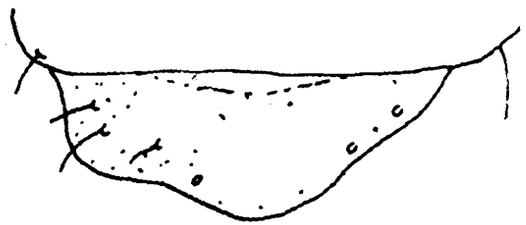
1

2

3



4



5

0·5mm

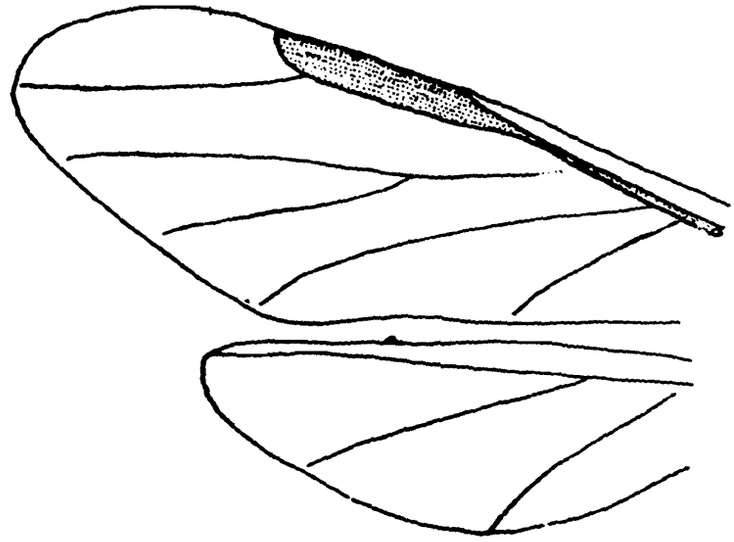
PLATE 20

Cinara similis (v.d. Goot)

FIGS. 1. antenna,
2. wings
(from van der Goot, 1917)

PLATE 20

1



2

PLATE 21

Cinara tujafilina (Del Guercio)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

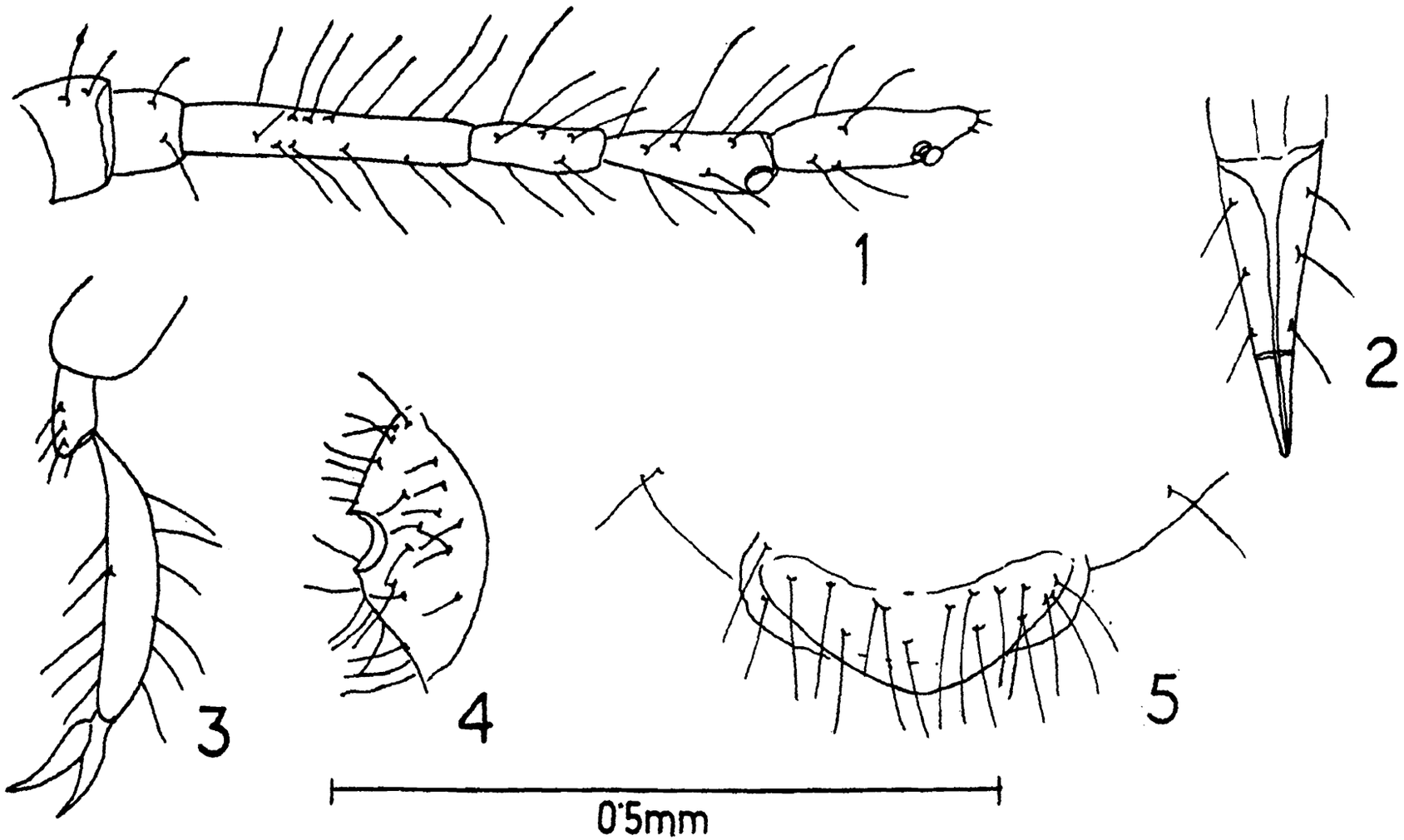
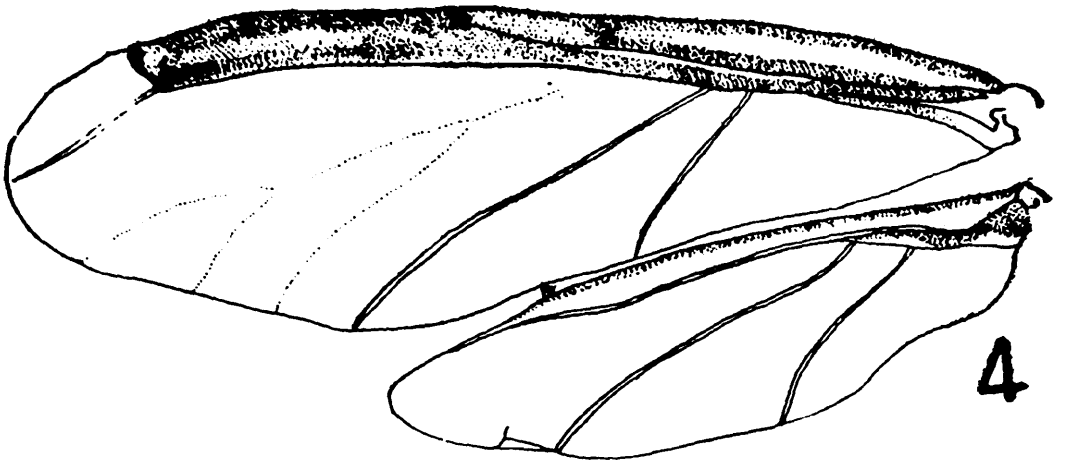
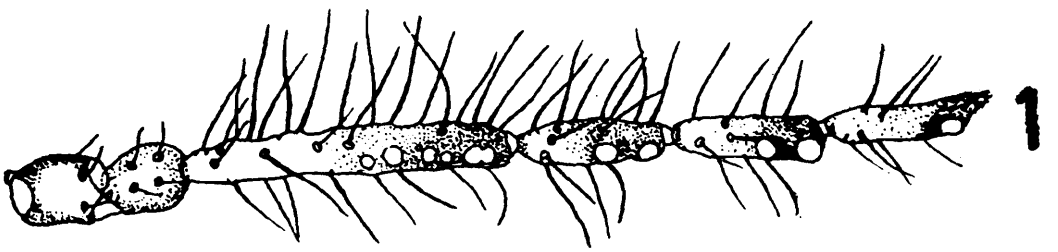

1
2
3
4
5
0·5mm

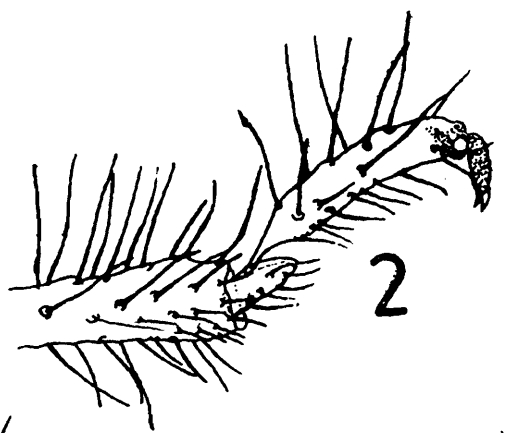
PLATE 22

Cinara tujafilina (Del Guercio)

FIGS. 1. antenna,
2. hind tarsus,
3. siphunculus,
4. wings (from V F. Eastop, 1972).
(all of alate viviparous female)


4


1


2

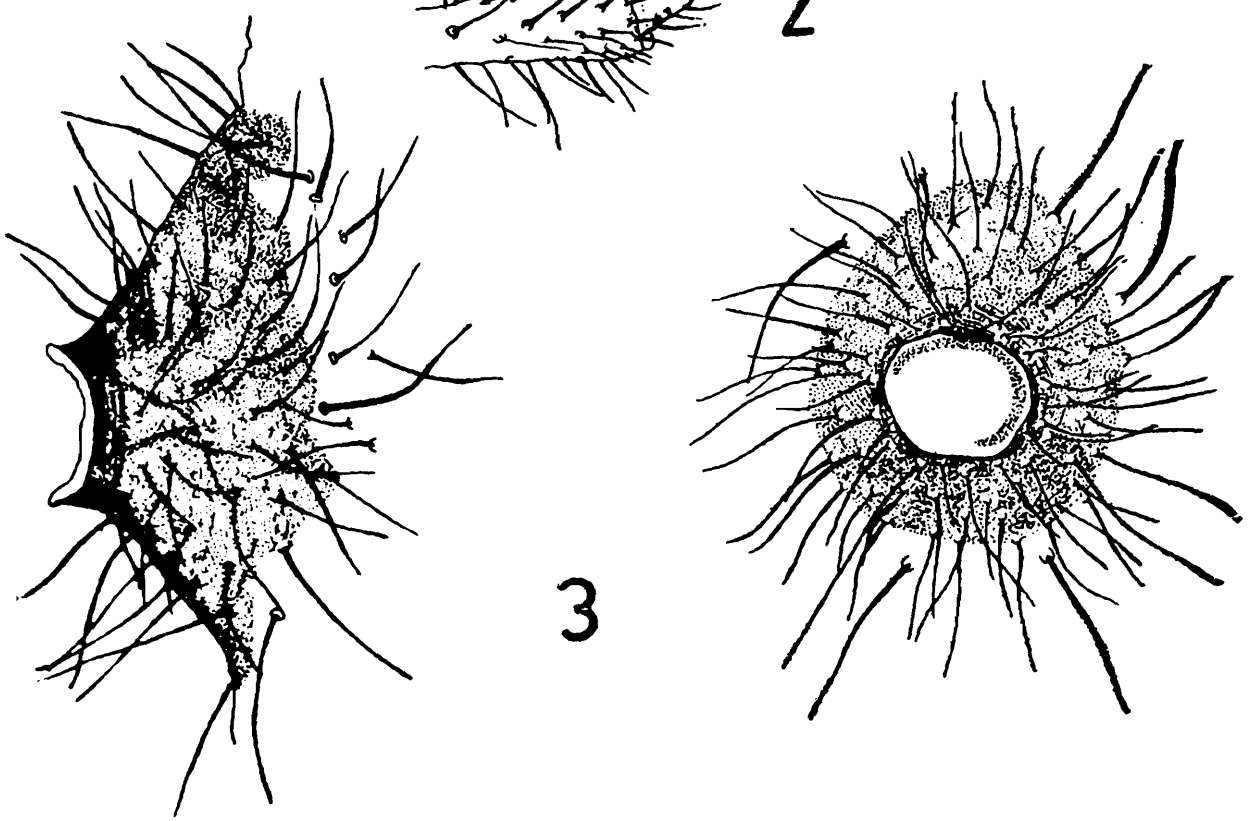

3

PLATE 23

Indocinara hottesis Ghosh *et al.*

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

PLATE 23

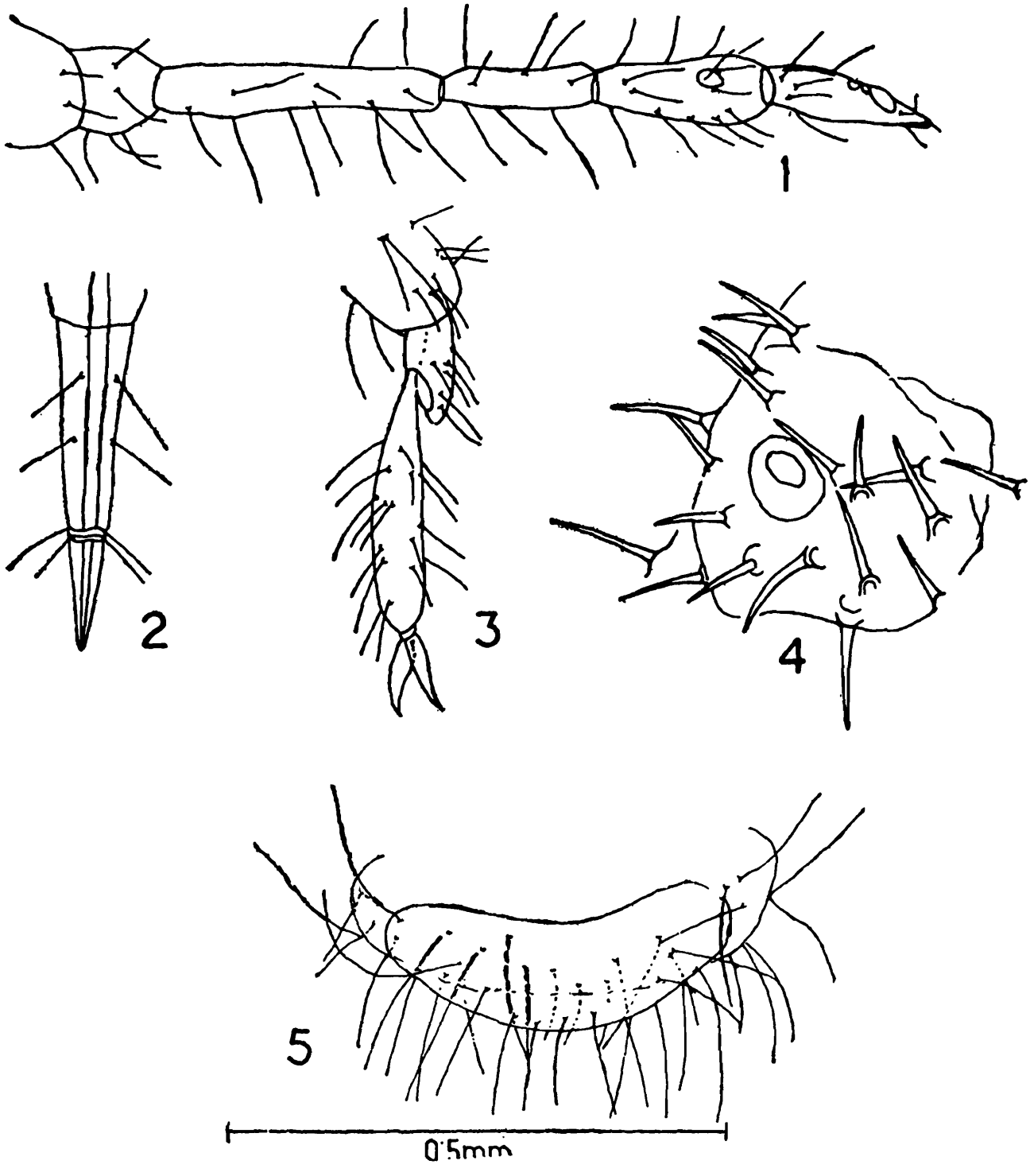
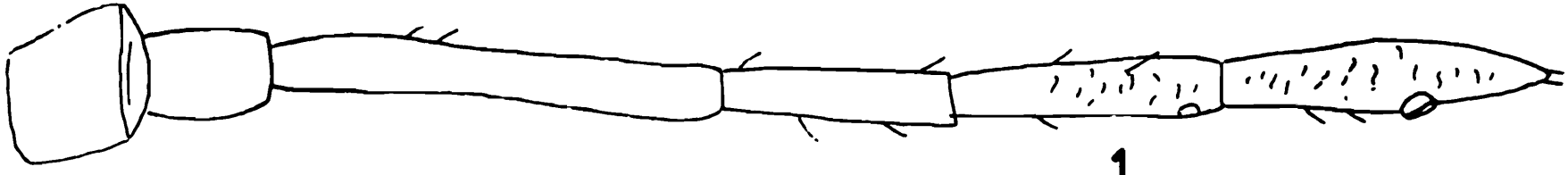


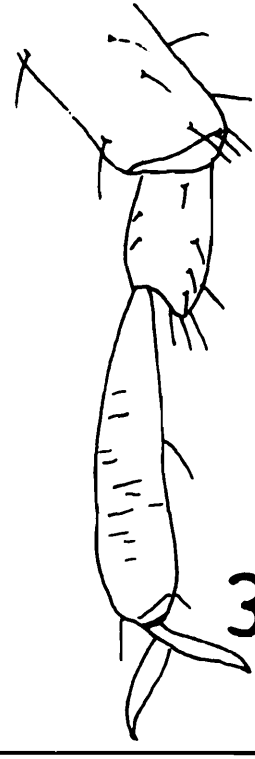
PLATE 24

Eulachnus pumilae Inouye

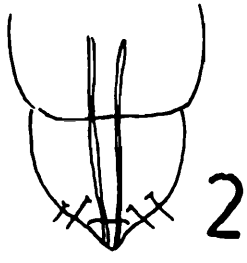
FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. cauda.



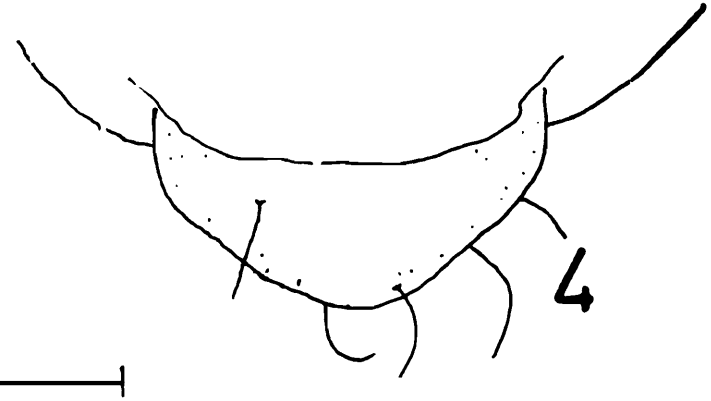
1



3



2



4

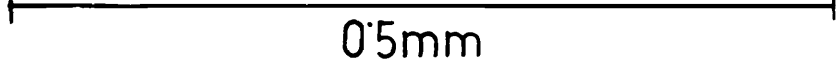


PLATE 25

Eulachnus thunbergii Wilson

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. antenna of alate viviparous female.

PLATE 25

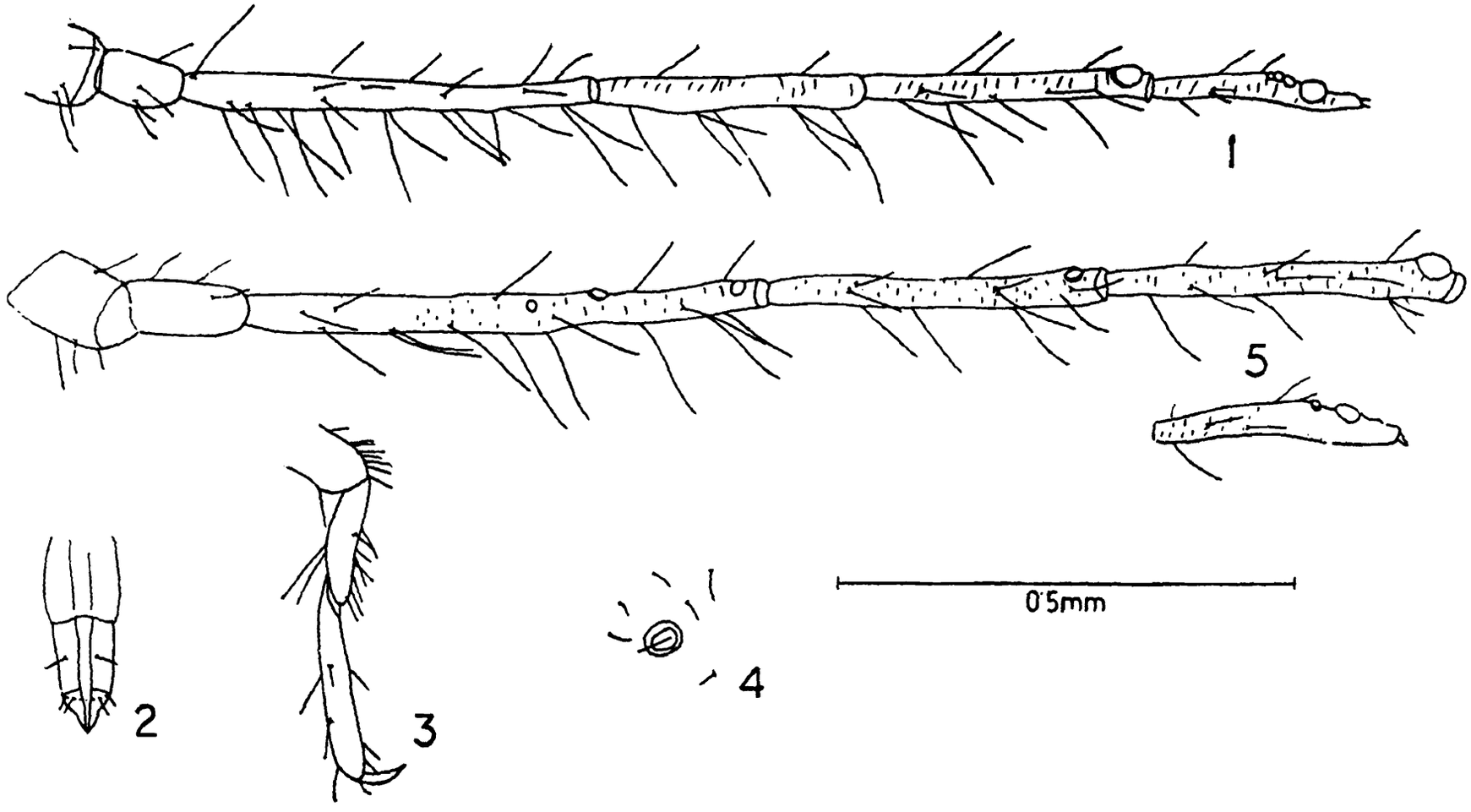


PLATE 26

Pseudessigella brachychaeta H.R.L.

FIGS. 1. head,
2. antenna,
3. ultimate rostral segment,
4. hind tarsus,
5. abdomen.

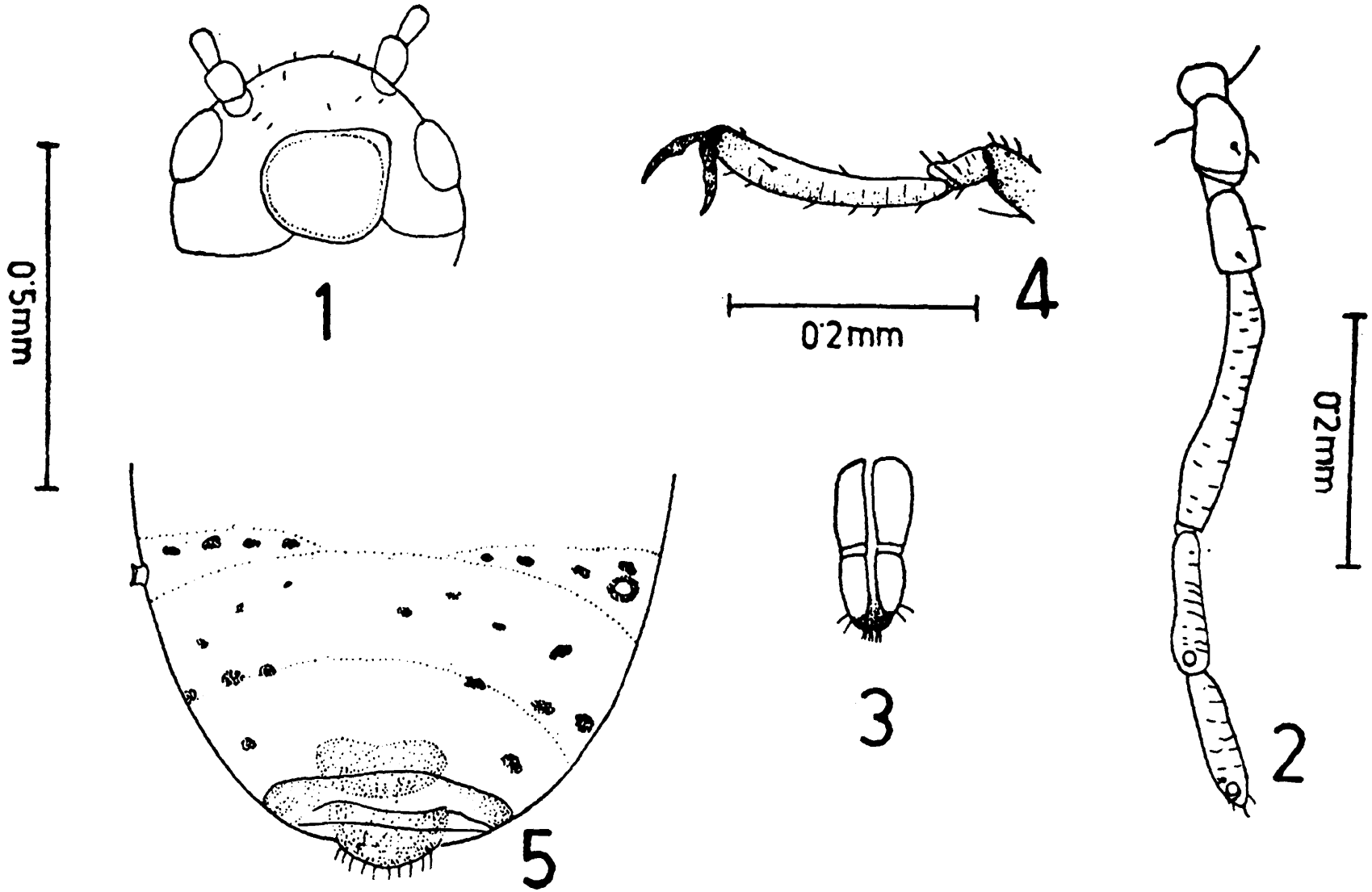
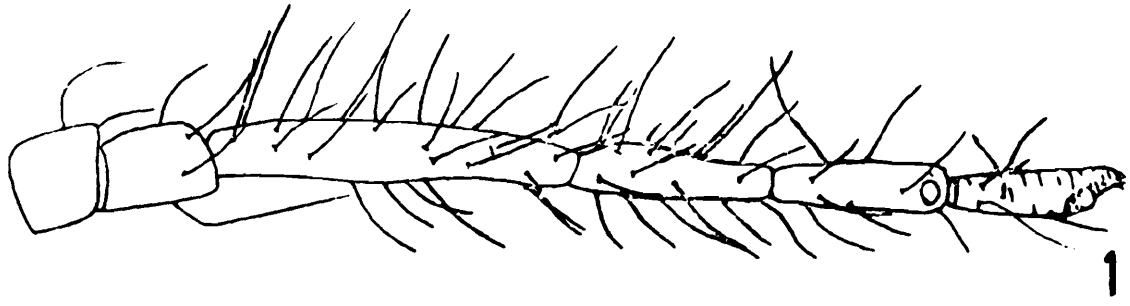

0·5mm
1
0·2mm
4
0·2mm
3
2
5

PLATE 27

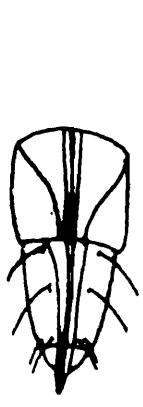
Schizolachnus orientalis (Tak)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

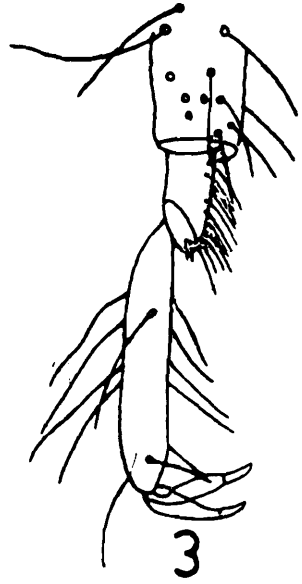


1

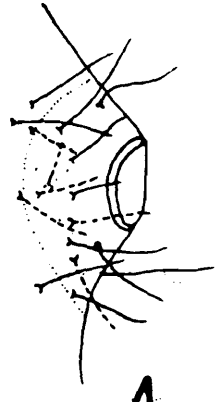
0·5mm



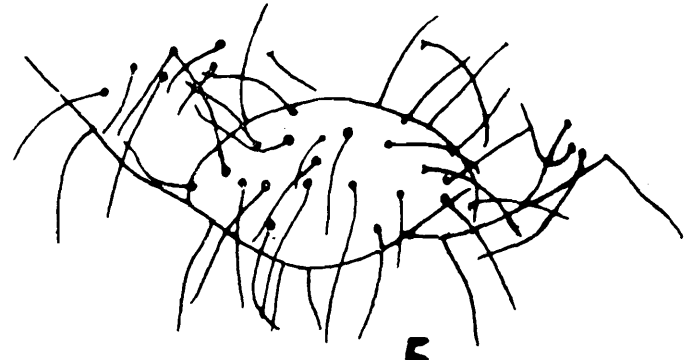
2



3



4



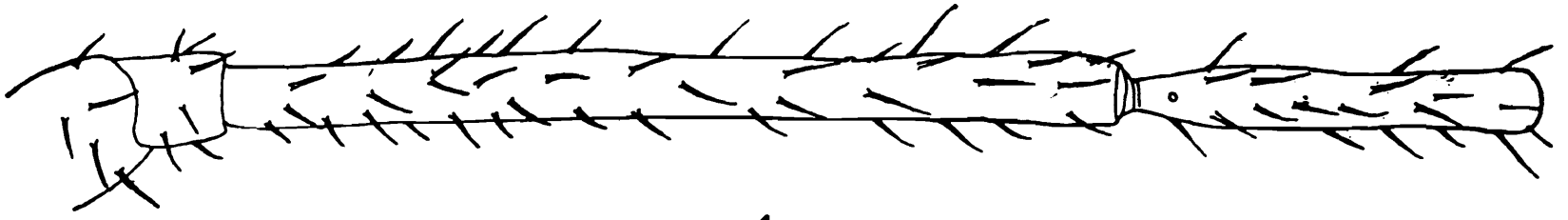
5

0·5mm

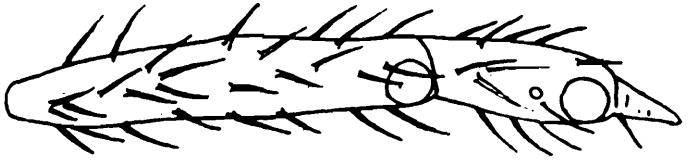
PLATE 28

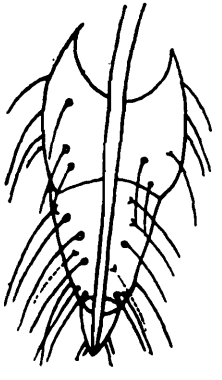
Lachnus acutihirsutus Kumar & Burkhardt

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

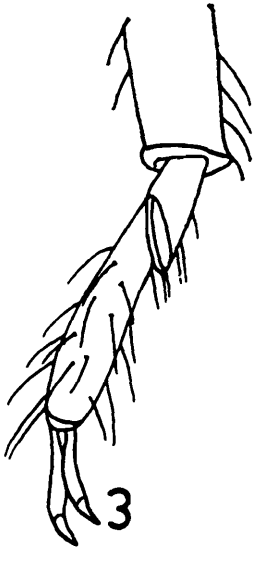


1

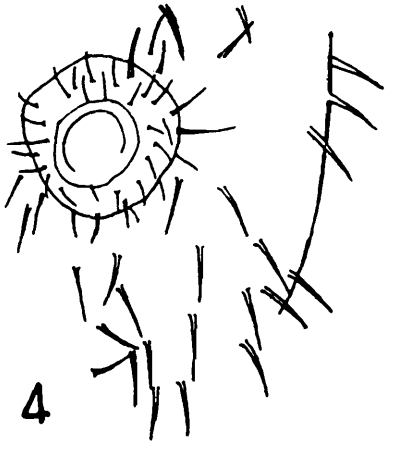




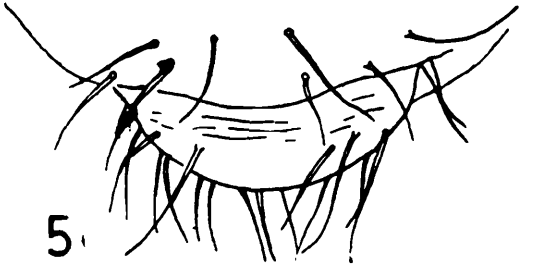
2



3



4



5

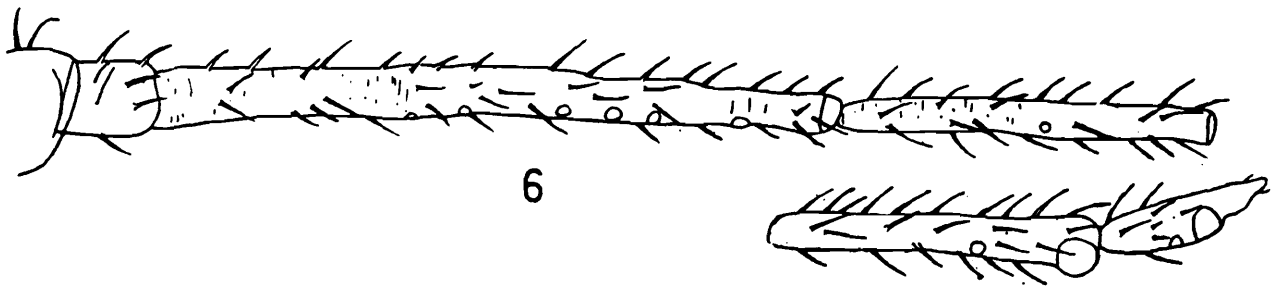
0·5mm

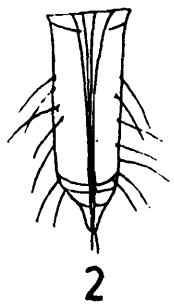
PLATE 29

Lachnus longirostrum David and Ghosh

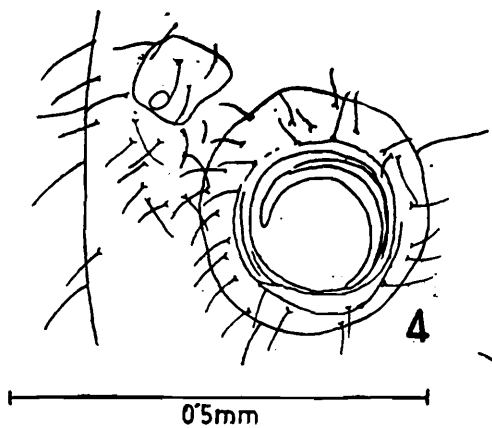
FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda,
6. antenna of alate viviparous female.


1


6


2


3


4
0·5mm

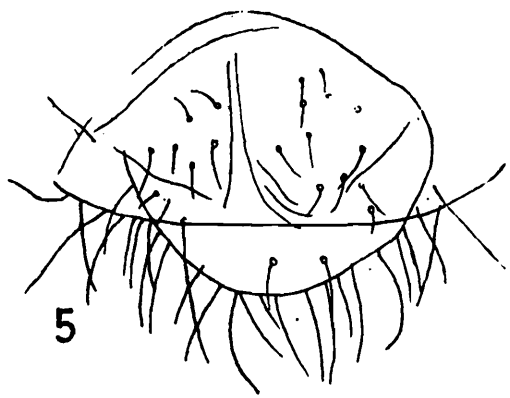

5

PLATE 30

Lachnus tropicalis (v.d. Goot)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda,
6. antenna of alate viviparous female.

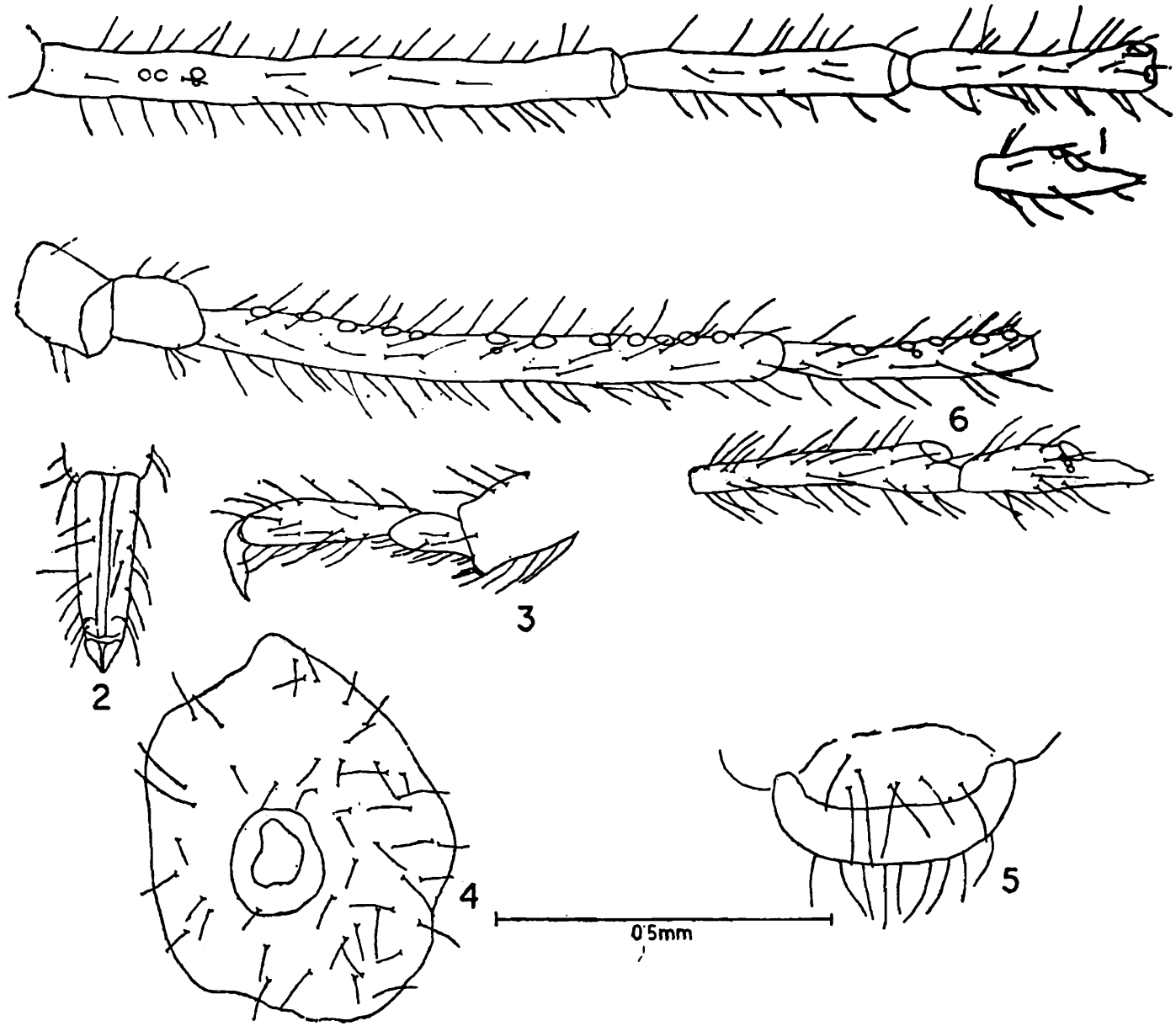
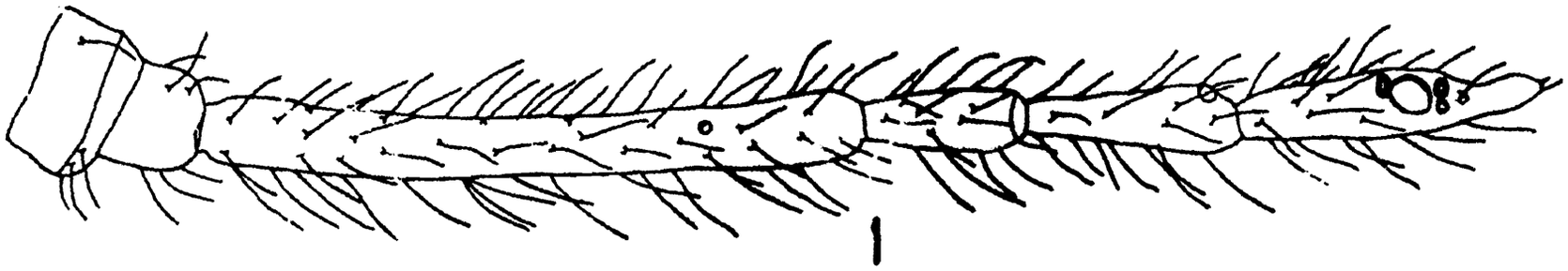

1
6
2
3
4
5
0·5mm

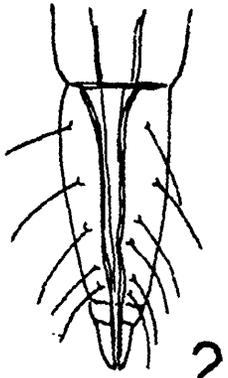
PLATE 31

Lachnus longisetosus sp. nov.

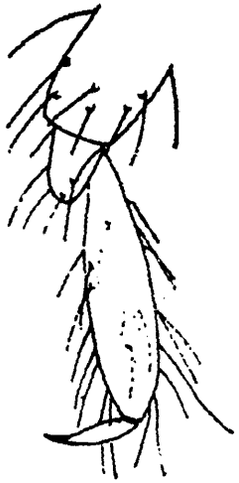
FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus
(all of alate viviparous female).



1



2



3

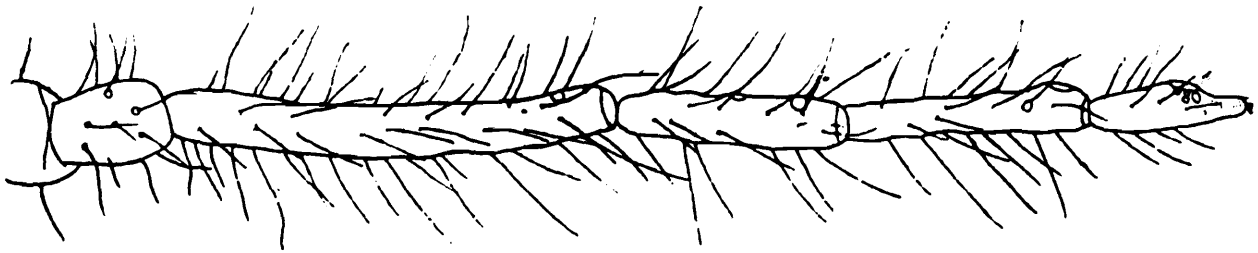
4

0·5mm

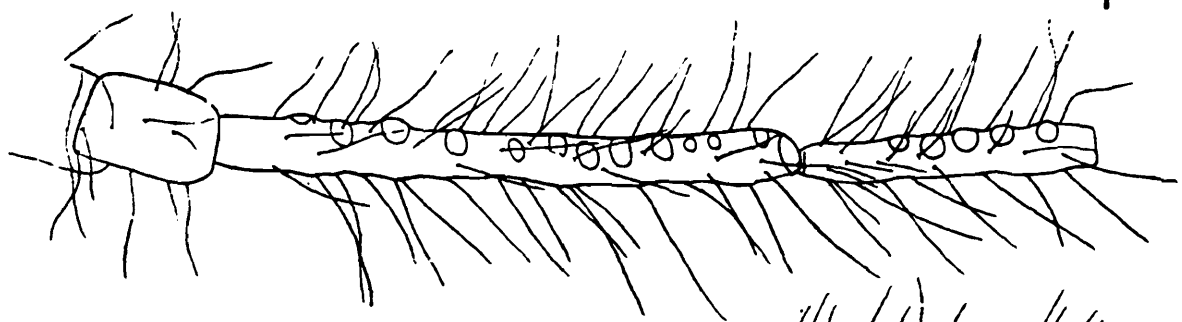
PLATE 32

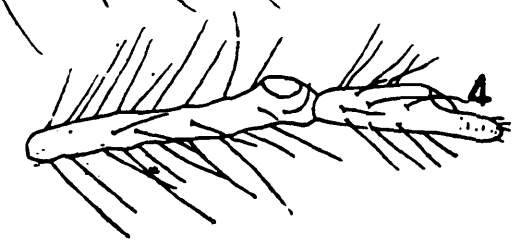
Longistigma ? *liquidambarus* Takahashi

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. antenna of alate viviparous female,
5. forewings.



1

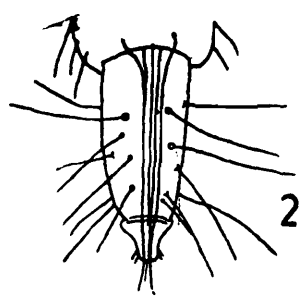




4

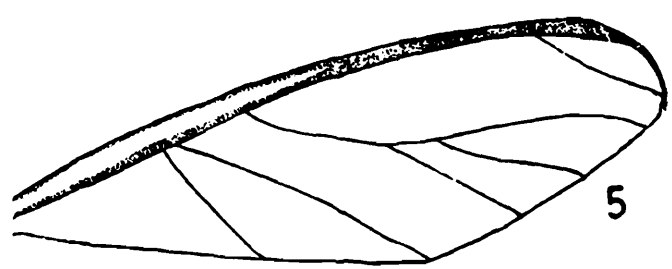
0·5mm

3



2

1mm



5

PLATE 33

Maculolachnus rubi Ghosh & Raychaudhuri

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

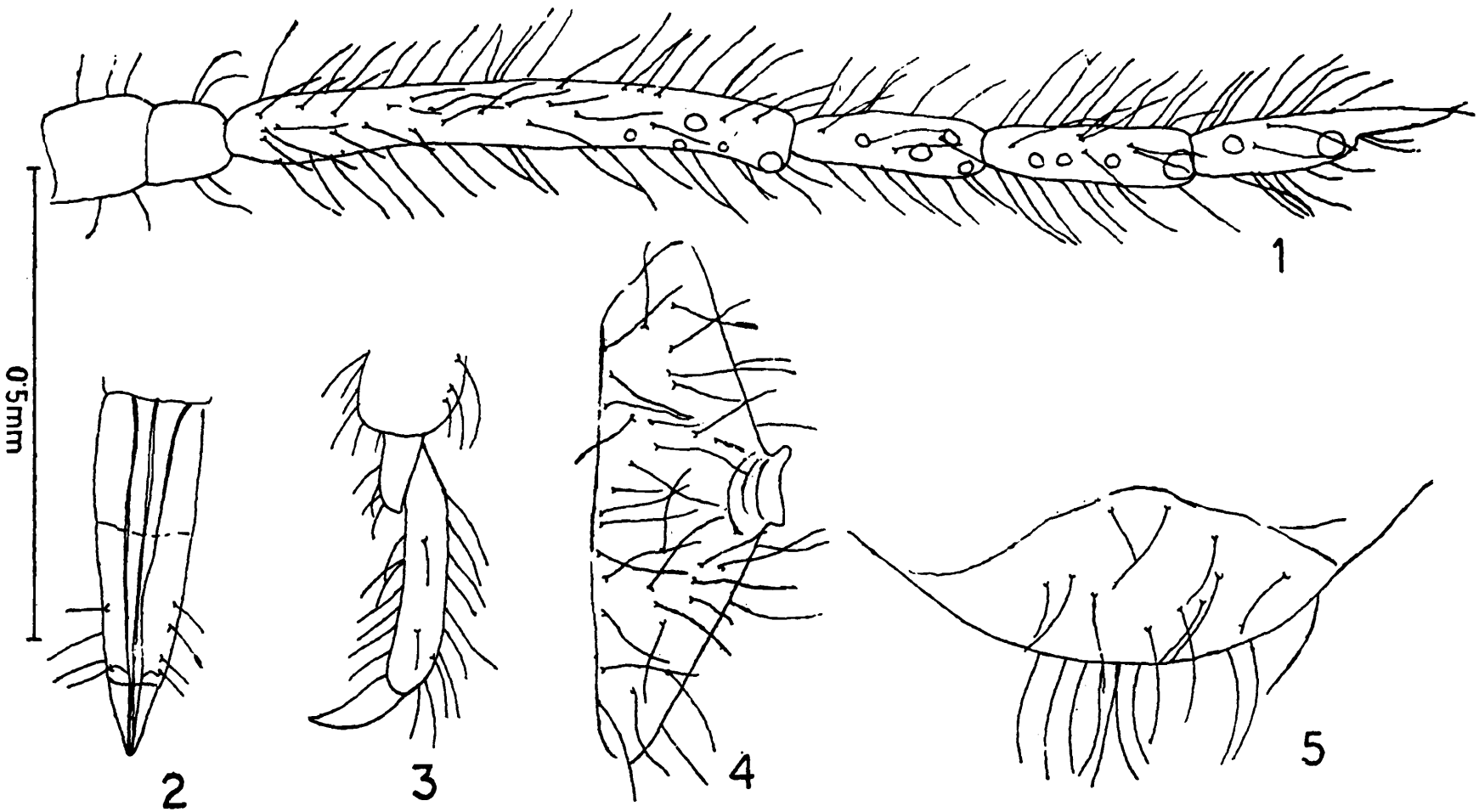

0·5mm
1
2
3
4
5

PLATE 34

Maculolachnus submacula (Walker)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus
5. cauda.

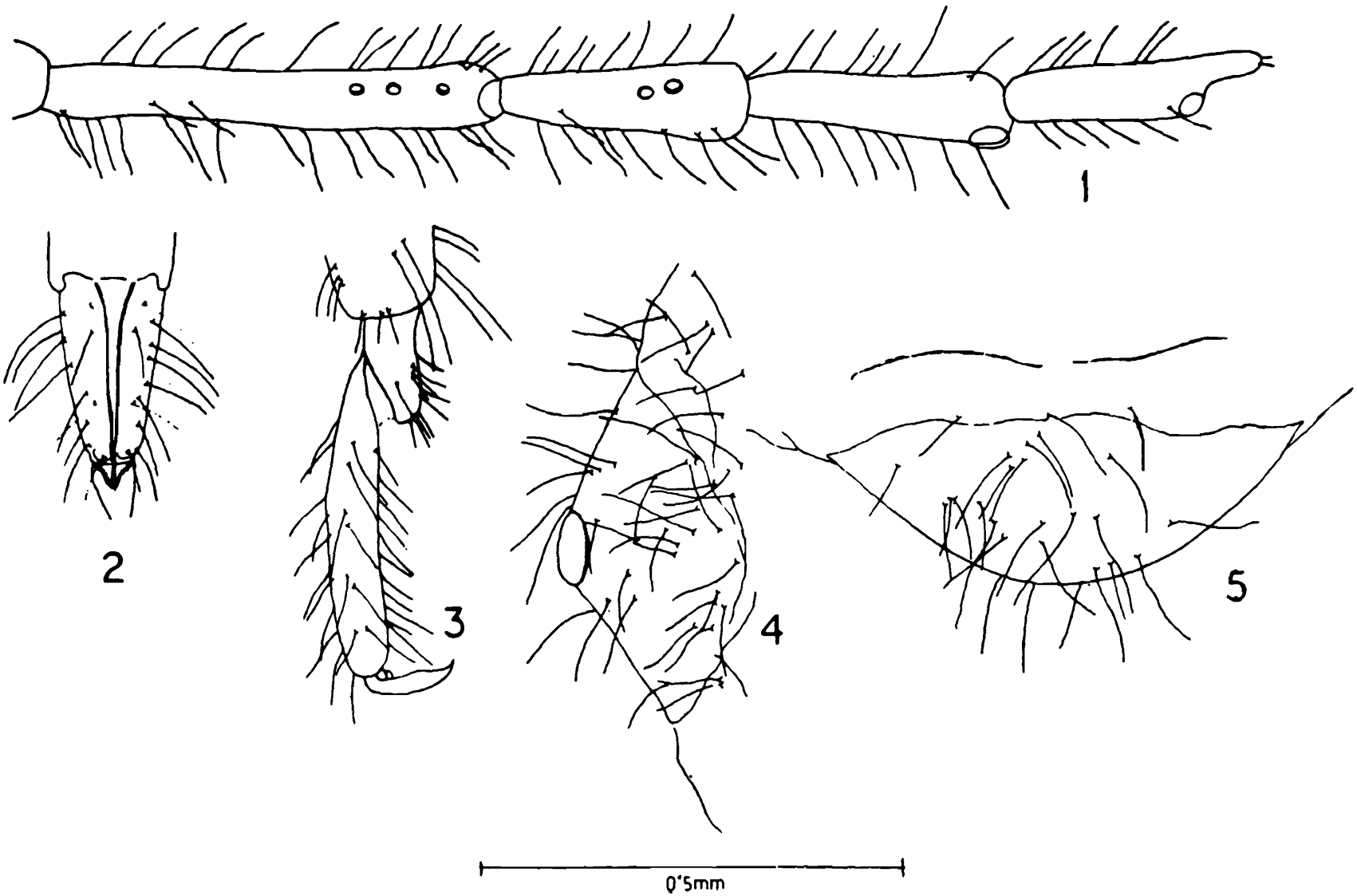
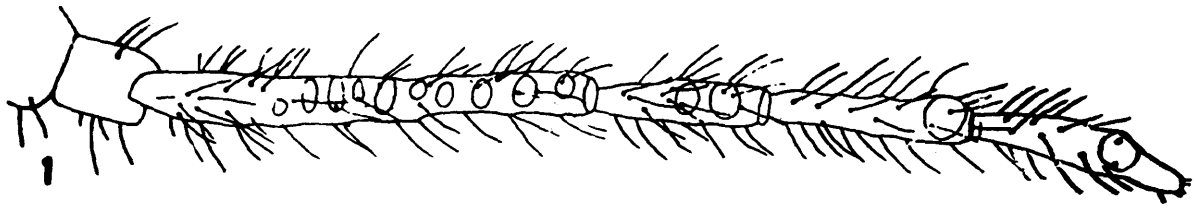

1
2
3
4
5
0·5mm

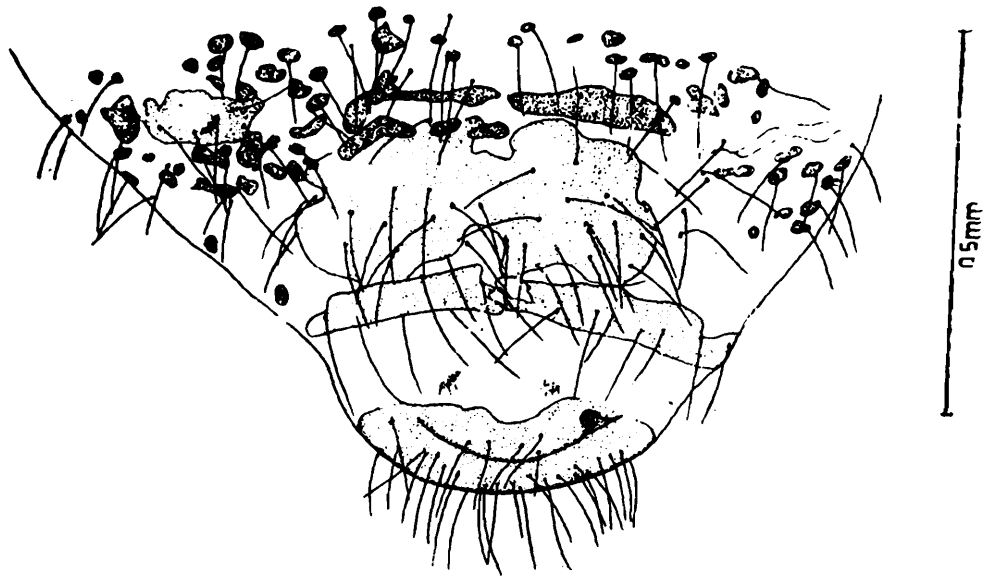
PLATE 35

Maculolachnus submacula (Walker)

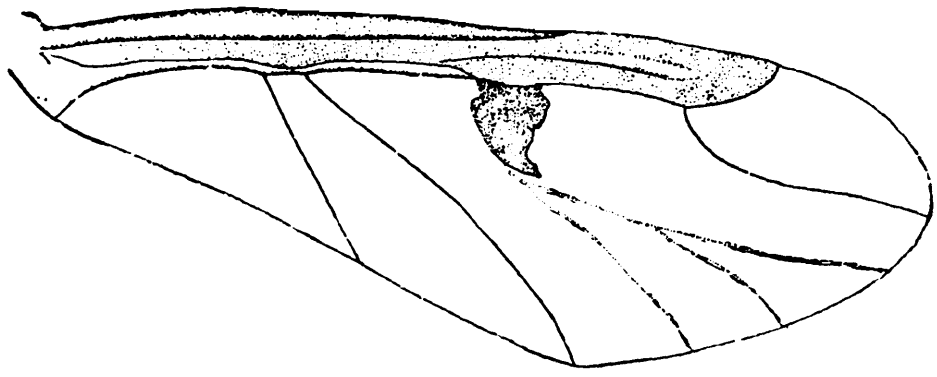
FIGS. 1. antenna,
2. abdomen,
3. forewing, all of alate viviparous female.



1



2

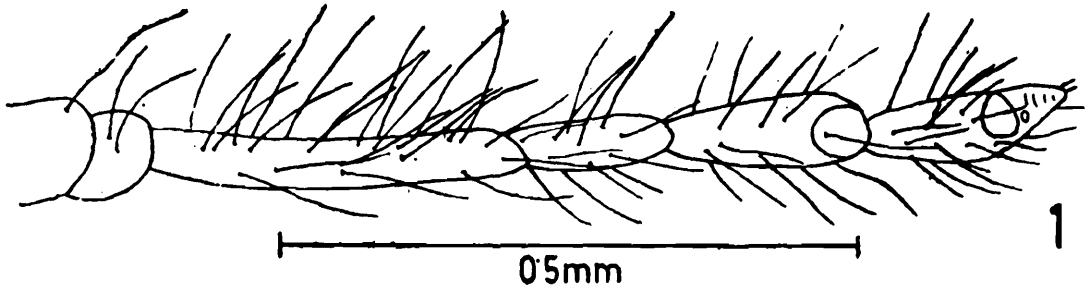


3

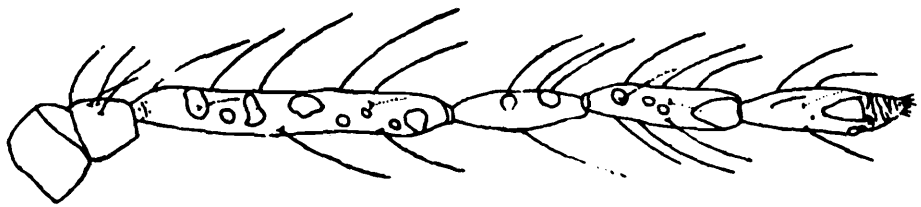
PLATE 36

Nippolachnus bengalensis Basu & H.R.L.

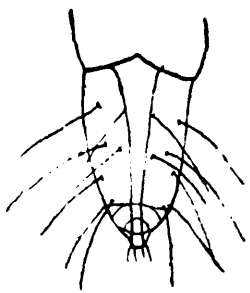
FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. antenna of alate viviparous female.



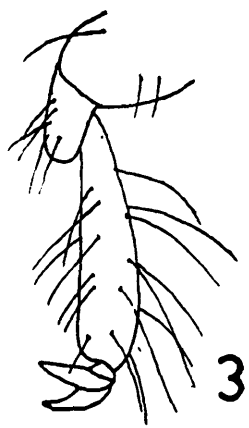
1



5



2



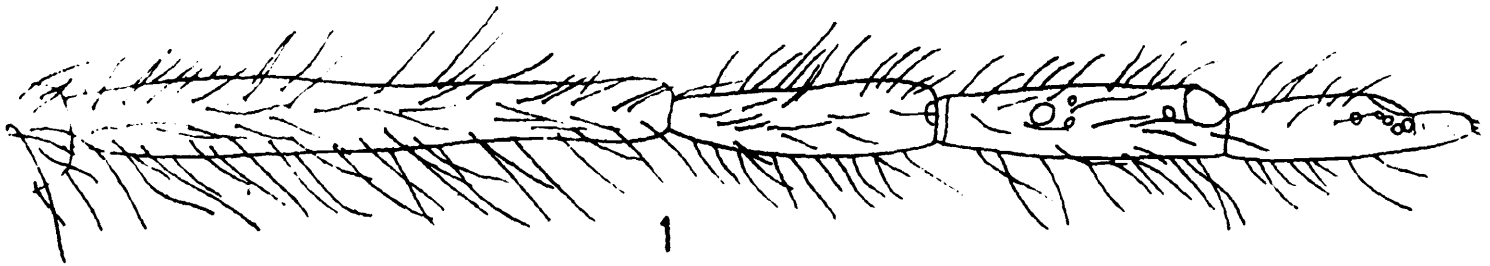
3

4

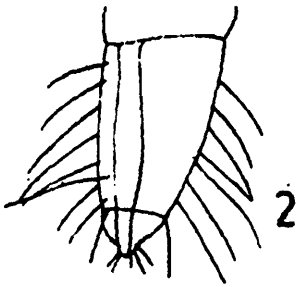
PLATE 37

Nippolachnus himalayensis (v.d. Goot)

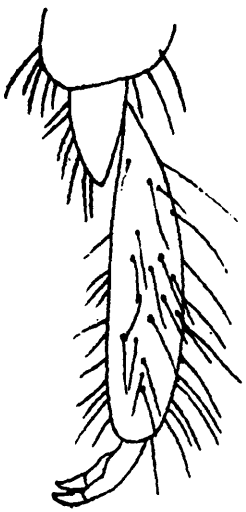
FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.



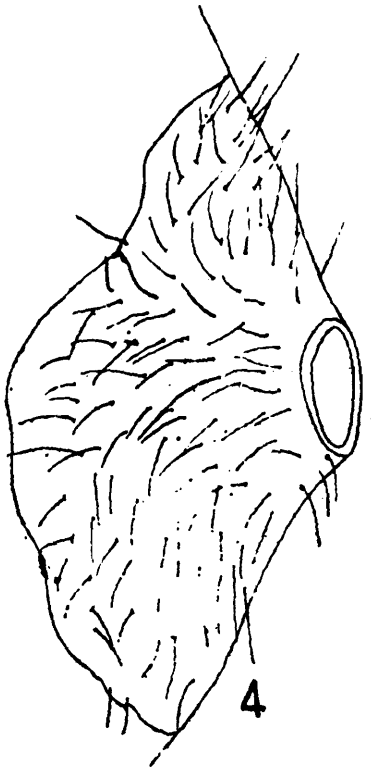
1



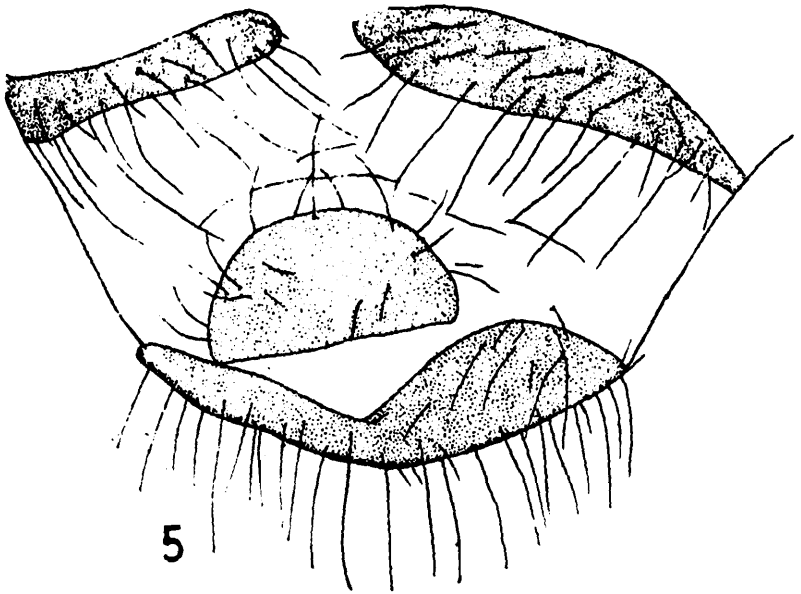
2



3



4



5

0·5mm

PLATE 38

Nippolachnus piri Matsumura

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

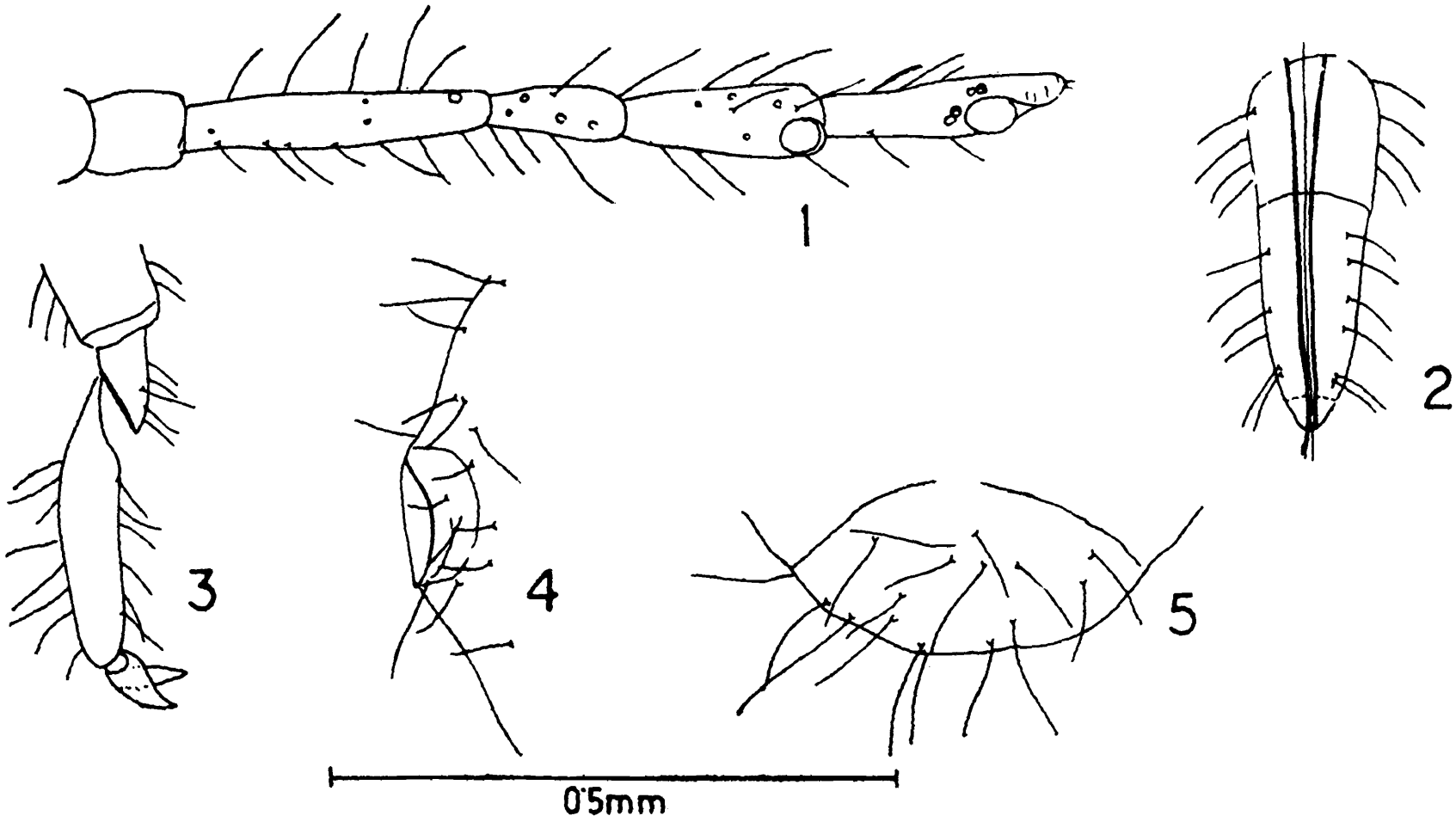
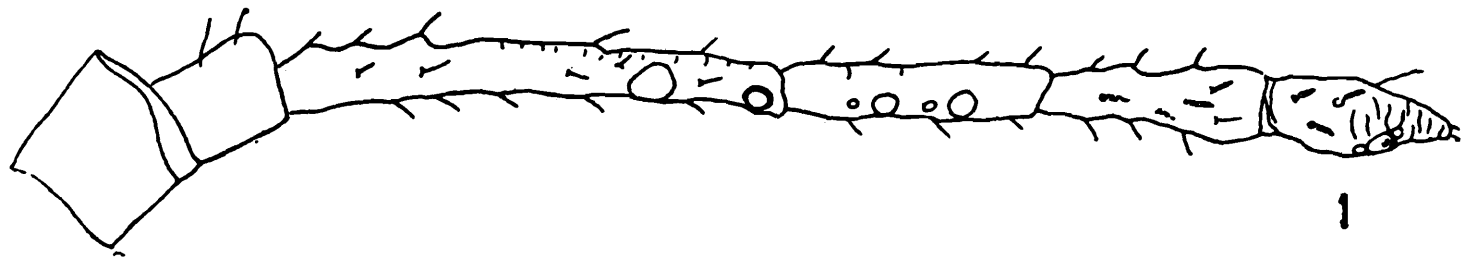

1
2
3
4
5
0·5mm

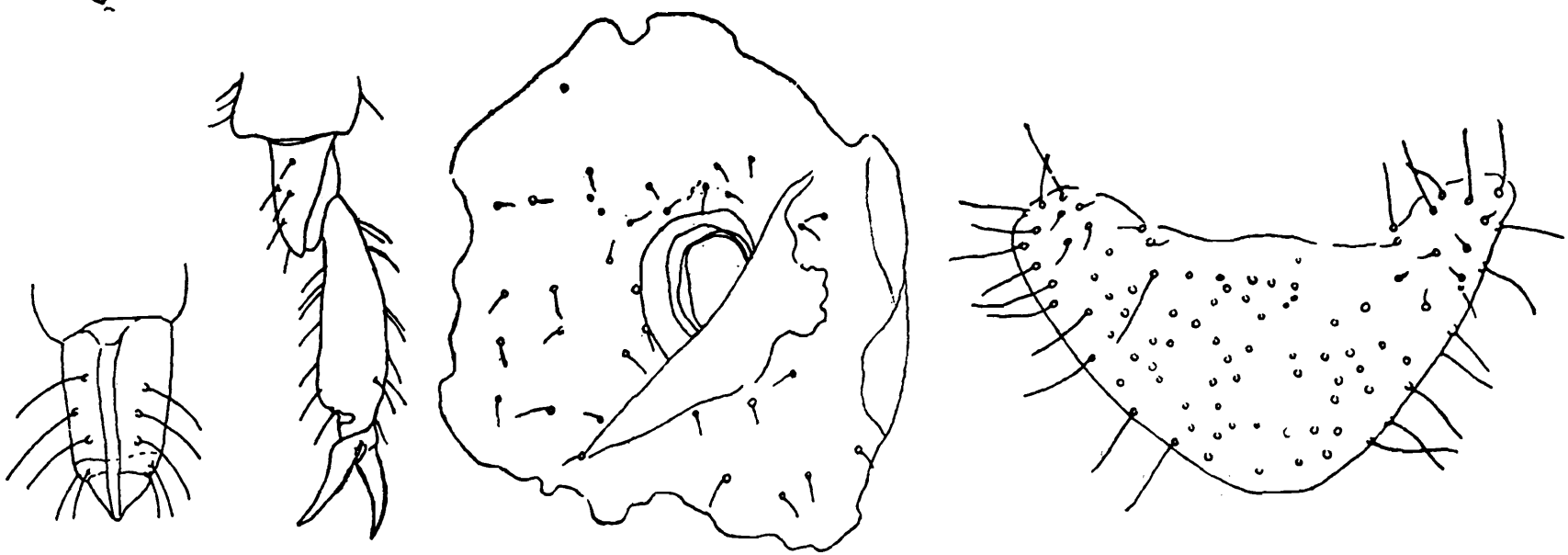
PLATE 39

Pterochloroides persicae (Cholod)

FIGS. 1 antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.



1



2 3 4 5

0·5mm

PLATE 40

Pterochloroides persicae (Cholod)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. abdominal dorsum,
5. siphunculus,
6. forewing
(all of alate viviparous female).

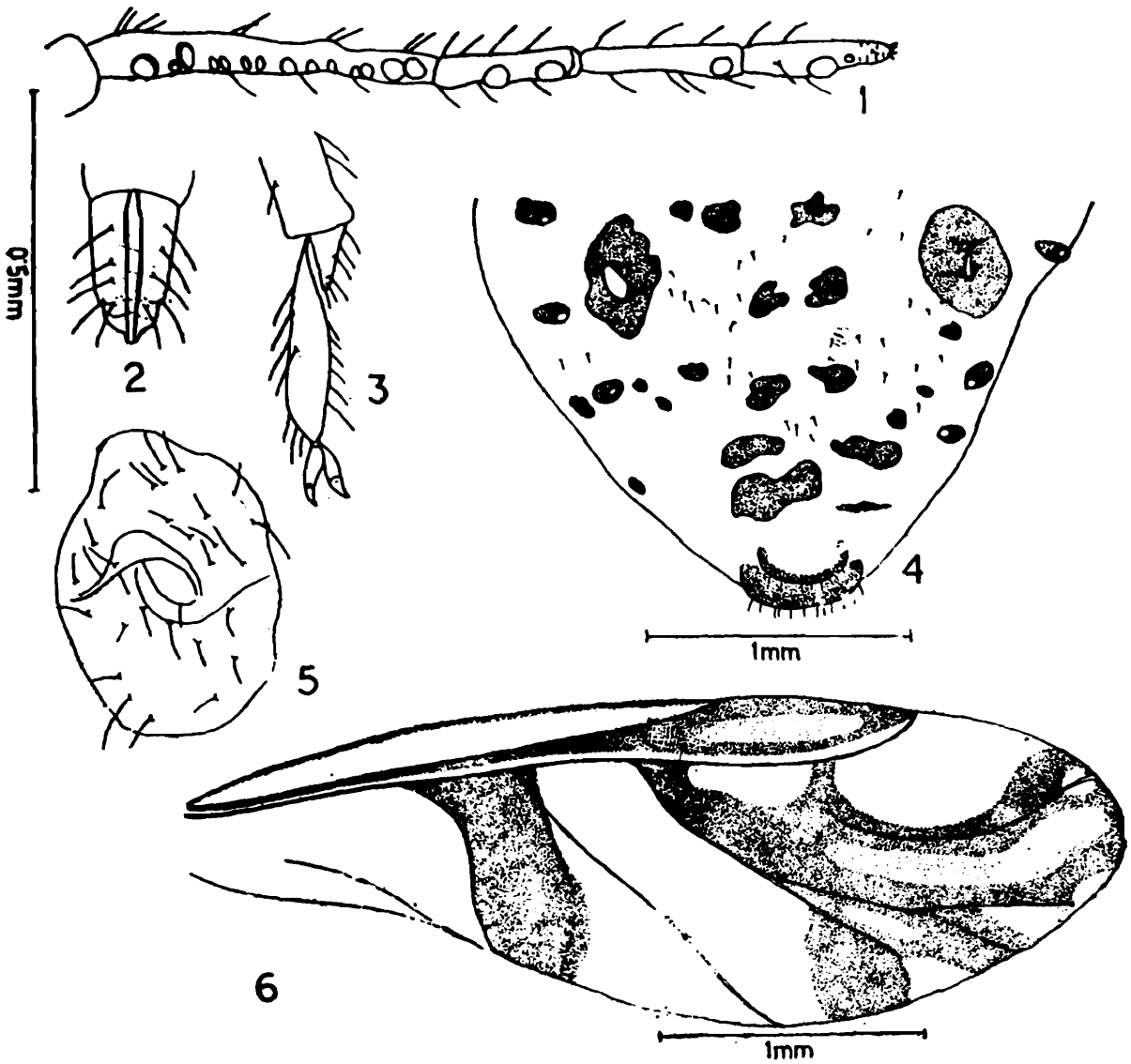

1
0·5mm
2
3
4
1mm
5
6
1mm

PLATE 41

Pterochloroides persicae (Cholod)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda
(all of nymph).

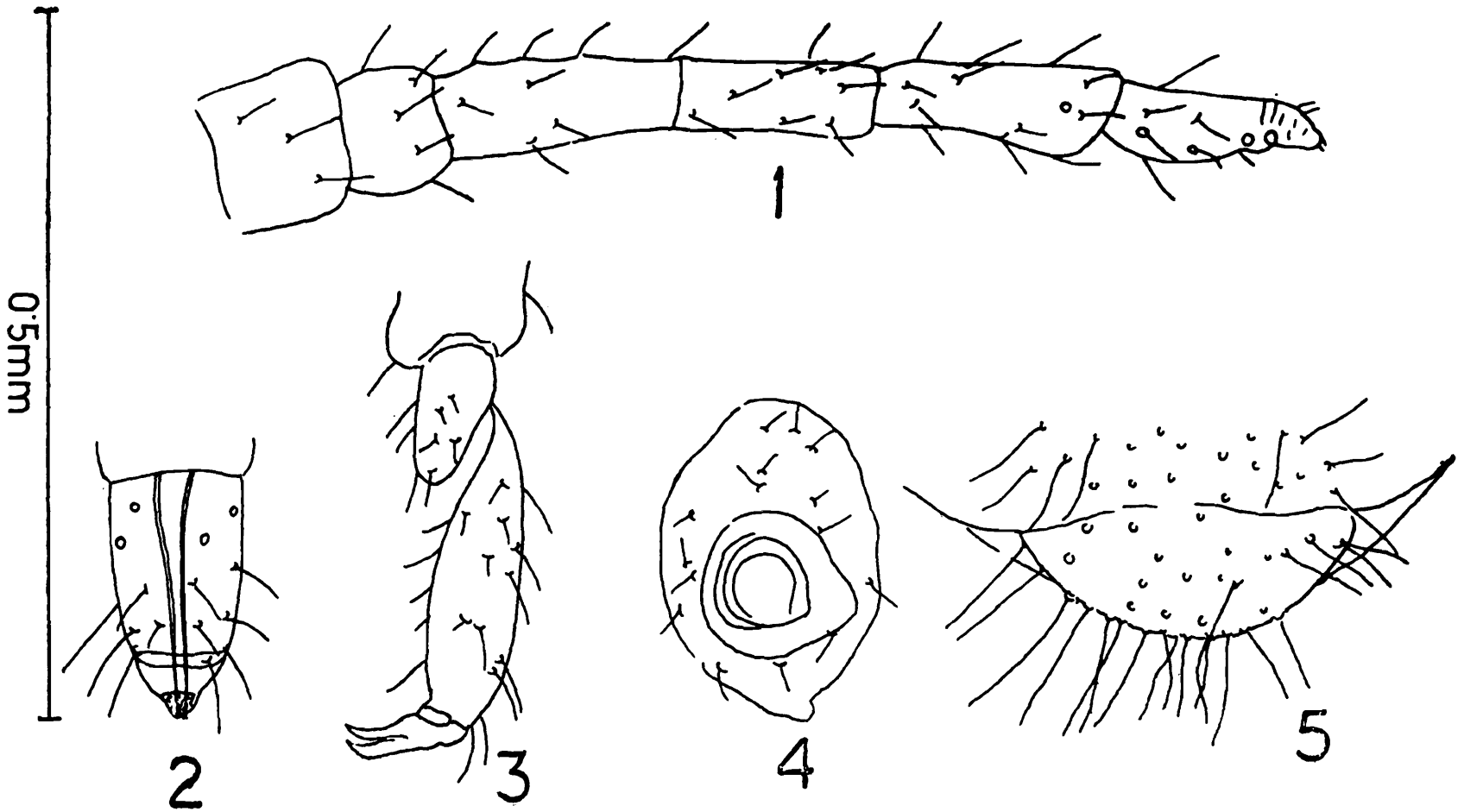

0·5mm
1
2
3
4
5

PLATE 42

Pyrolachnus imbricatus David, Narayanan, Rajasingh

FIGS. 1. antenna,
2. ultimate rostral segment, (hairs not shown)
3. hind tarsus,
4. dorsal abdominal pattern & hairs,
5. siphunculus,
6. cauda.

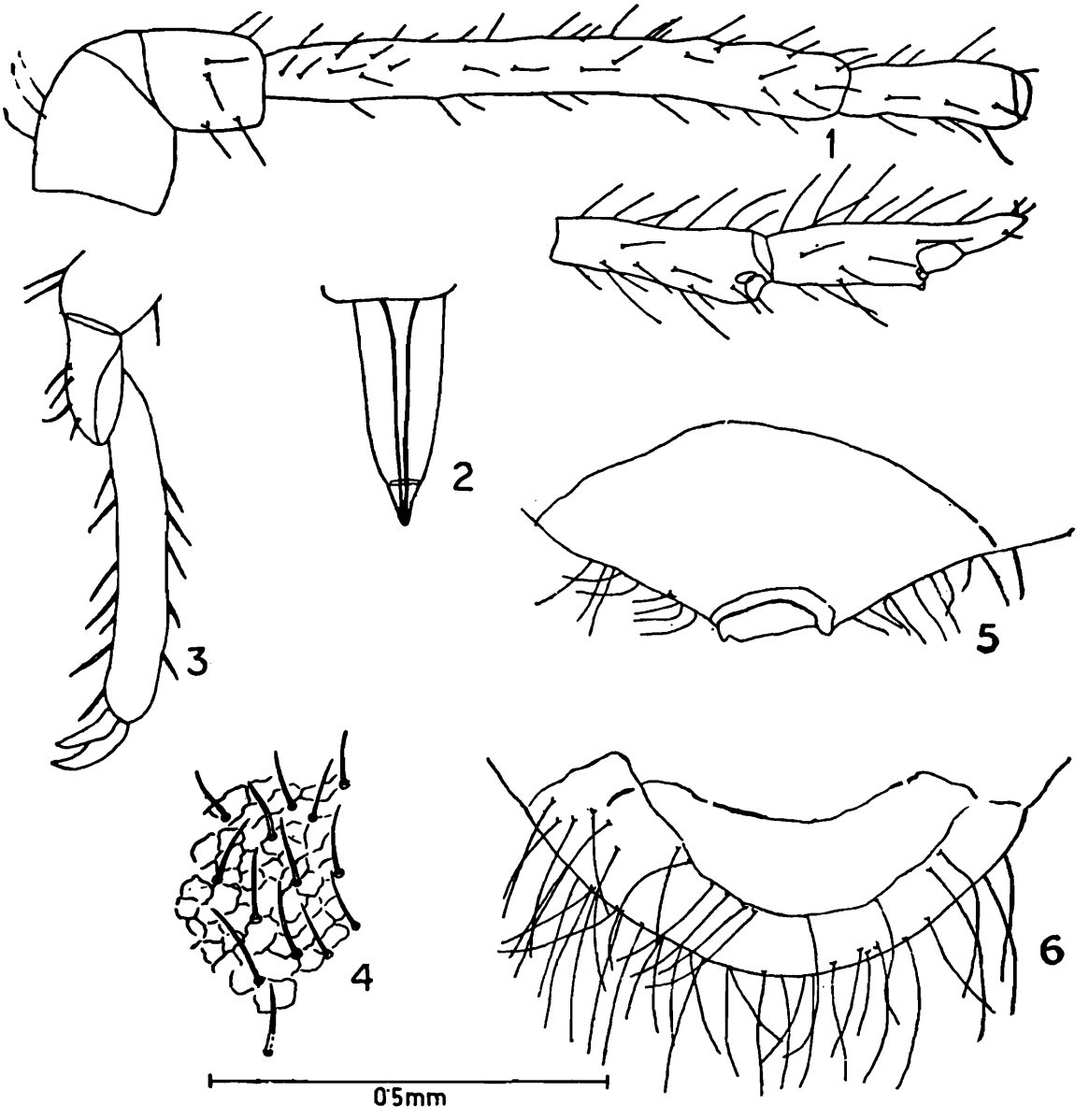
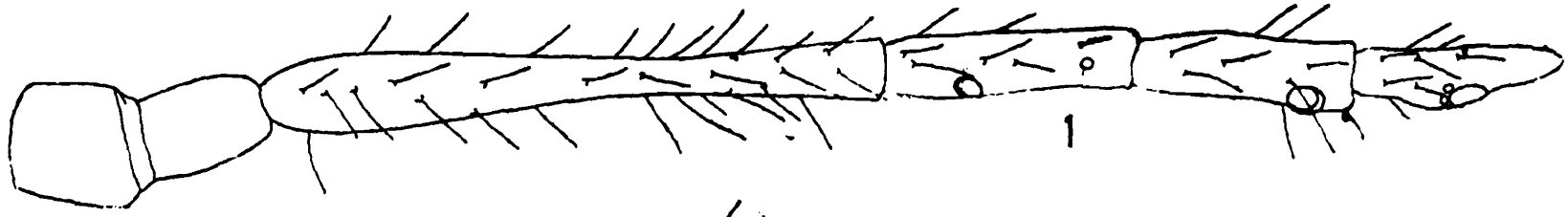
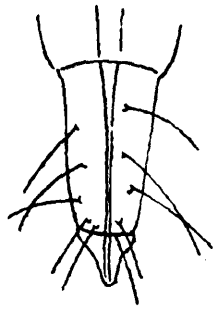

1
2
3
4
5
6
0·5mm

PLATE 43

Pyrolachnus pyri (Buckton)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.


1


2


3


4
0·5mm

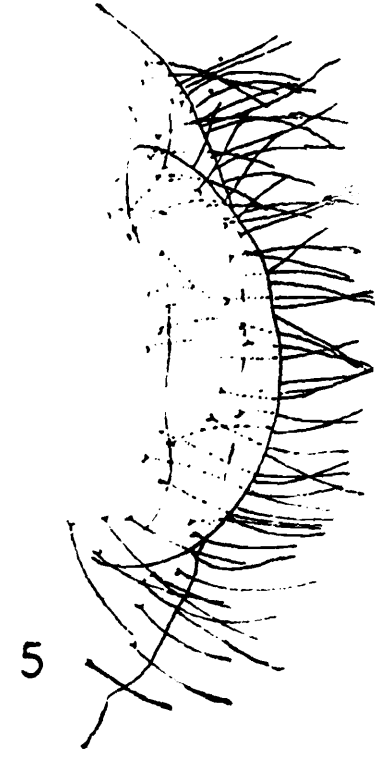

5

PLATE 44

Pyrolachnus pyri (Buckton)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus
5. cauda
(all of alate viviparous female).

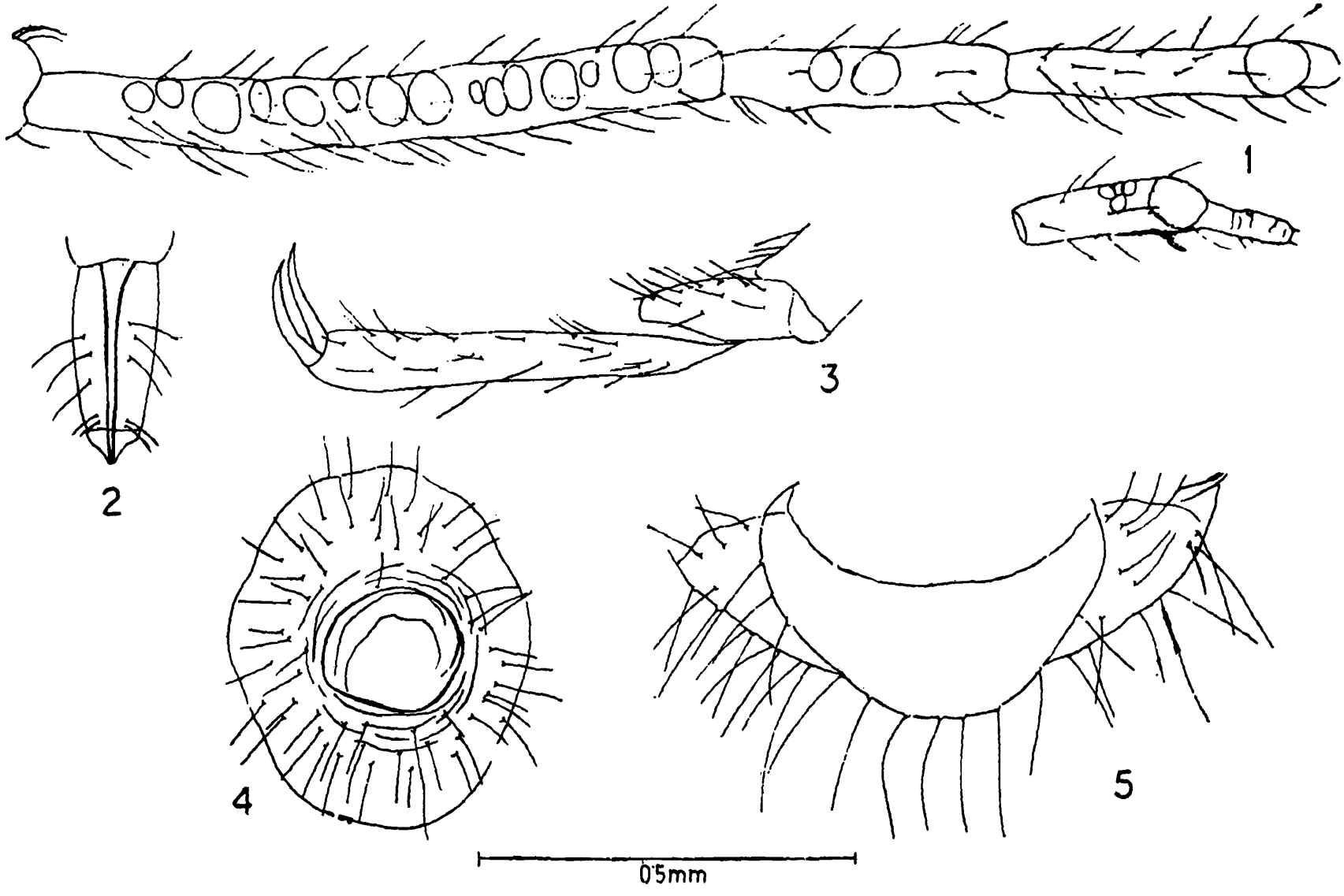
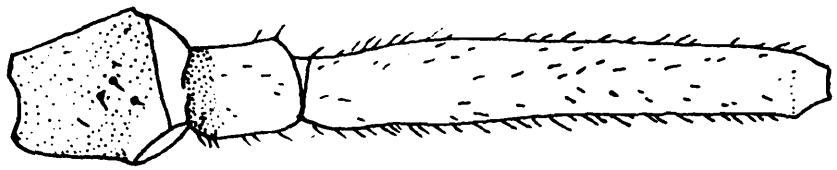

1
2
3
4
5
0·5mm

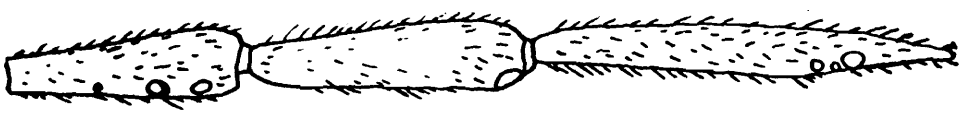
PLATE 45

Stomaphis mordwilkoi H.R.L.

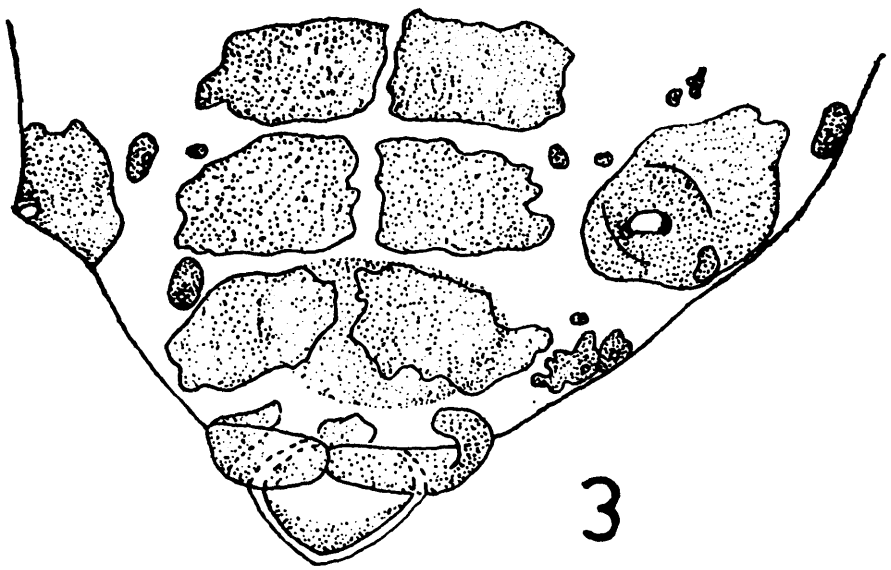
FIGS. 1. antenna,
2. hind tarsus,
3. abominal dorsum.



1

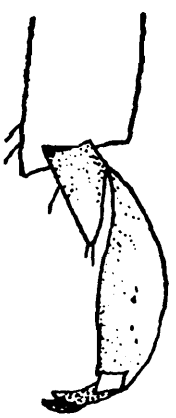


0·5mm



3

1mm



2

0·5mm

PLATE 46

Tuberolachnus saligna (Gmelin)

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

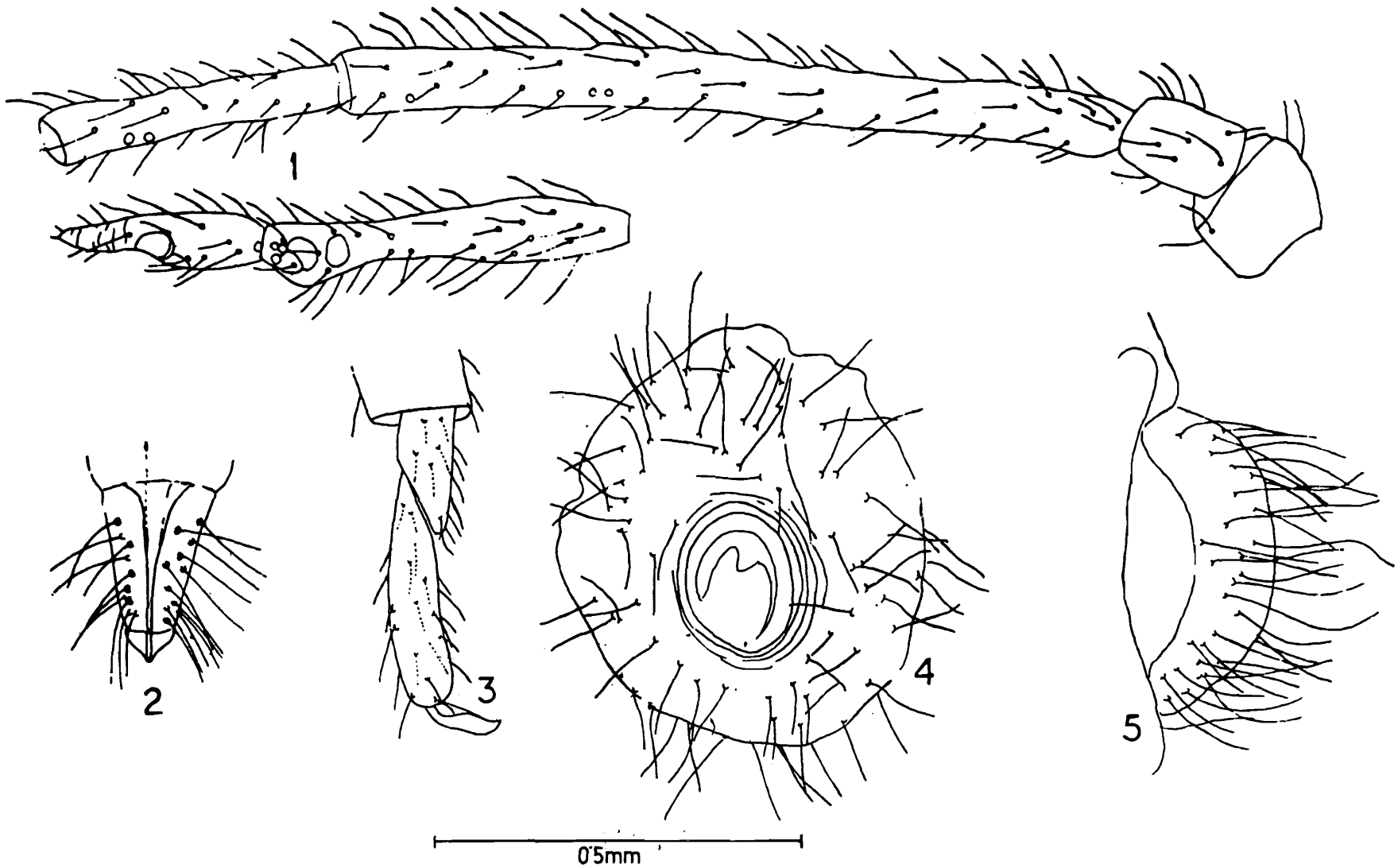

1
2
3
4
5
0·5mm

PLATE 47

Tuberolachnus saligna (Gmelin)

FIGS. 1. antenna,
2. dorsal tubercle
(all of alate viviparous female).

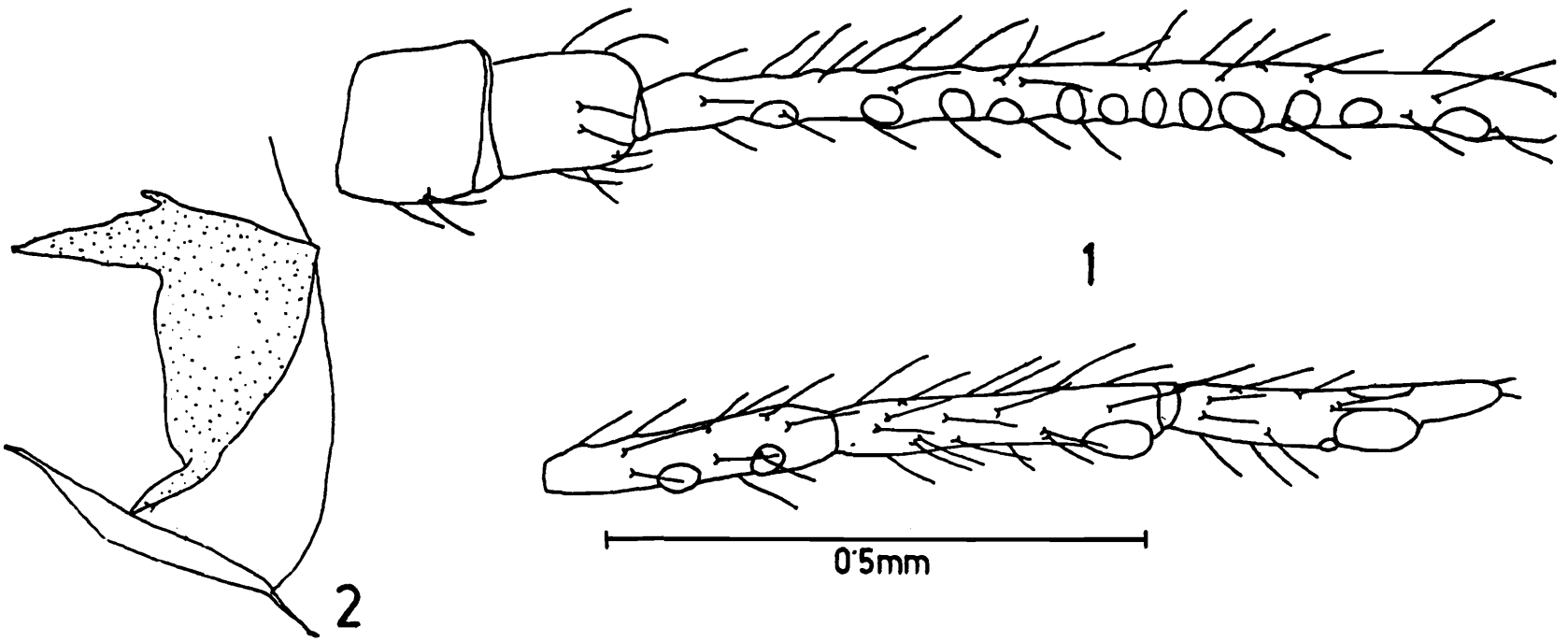
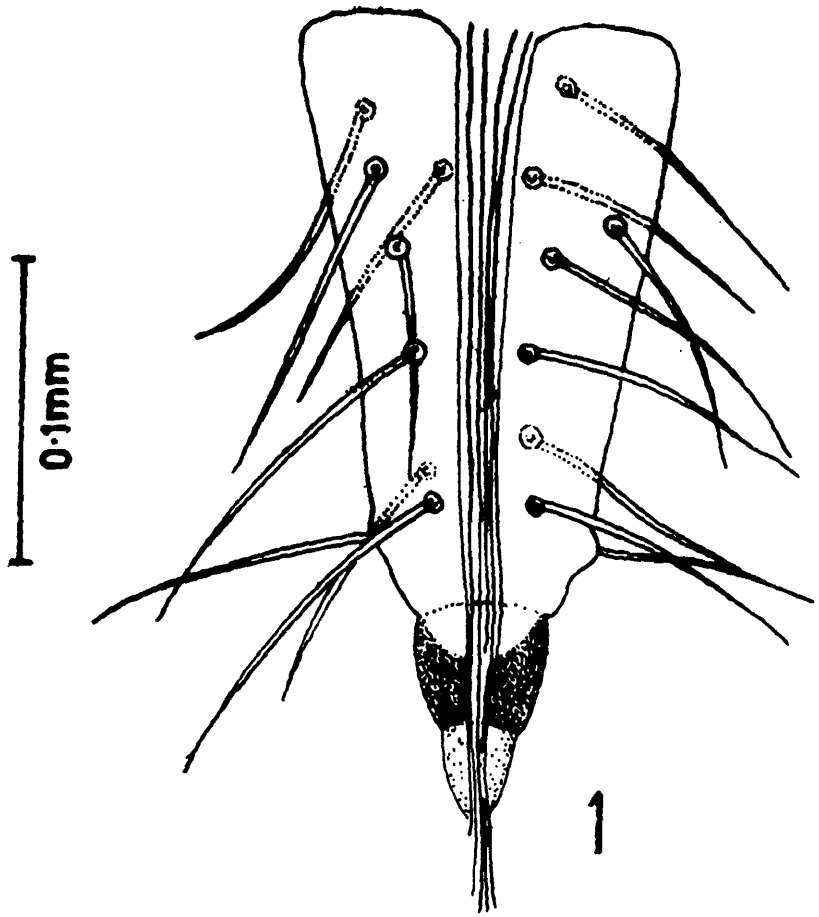

1
2
0·5mm

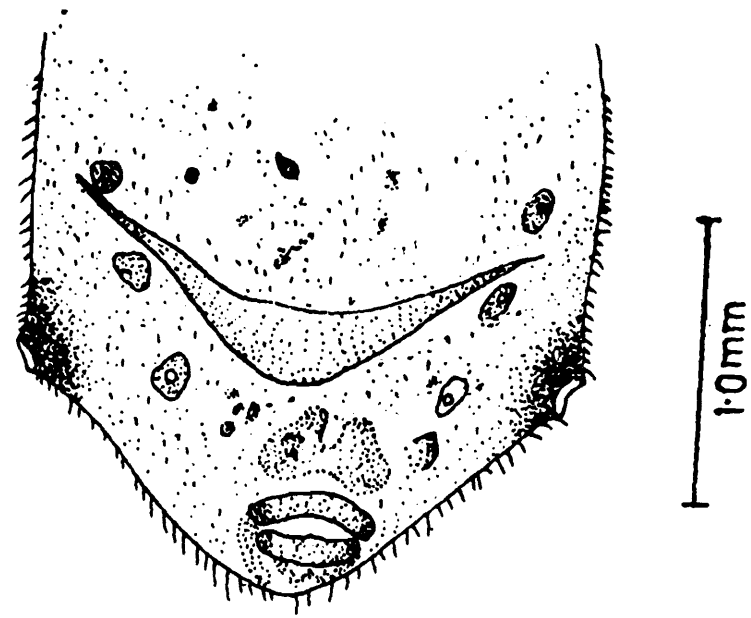
PLATE 48

Tuberolachnus scleratus H.R.L. & Basu

FIGS. 1. ultimate rostral segment
2. abdominal dorsum.



1

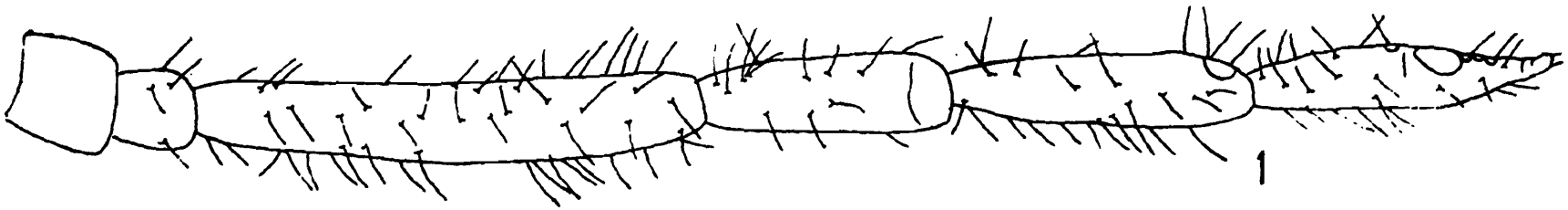


2

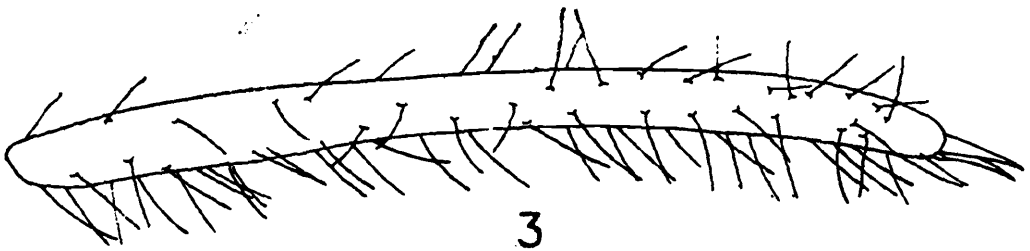
PLATE 49

Protrama longitarsus sclerodensus Kumar

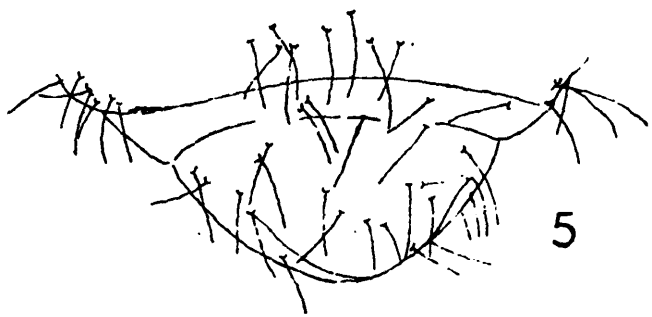
FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.


1


2


3


4


5

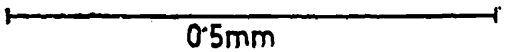

0·5mm

PLATE 50

Protrama penecaeca Stroyan

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus,
5. cauda.

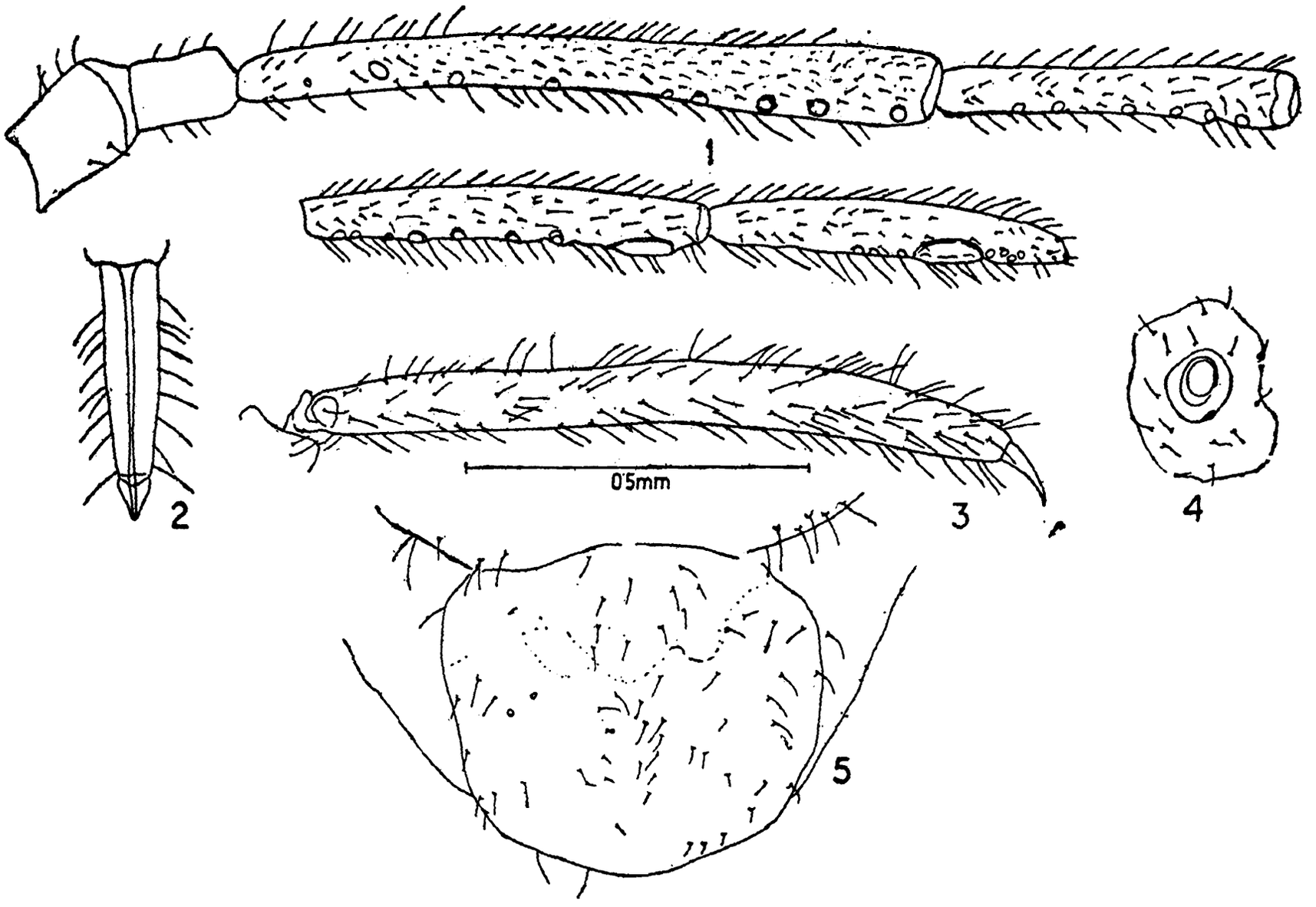

1
2
0·5mm
3
4
5

PLATE 51

Protrama penecaeca Stroyan

FIGS. 1. antenna,
2. ultimate rostral segment,
3. hind tarsus,
4. siphunculus
(all of nymphs).

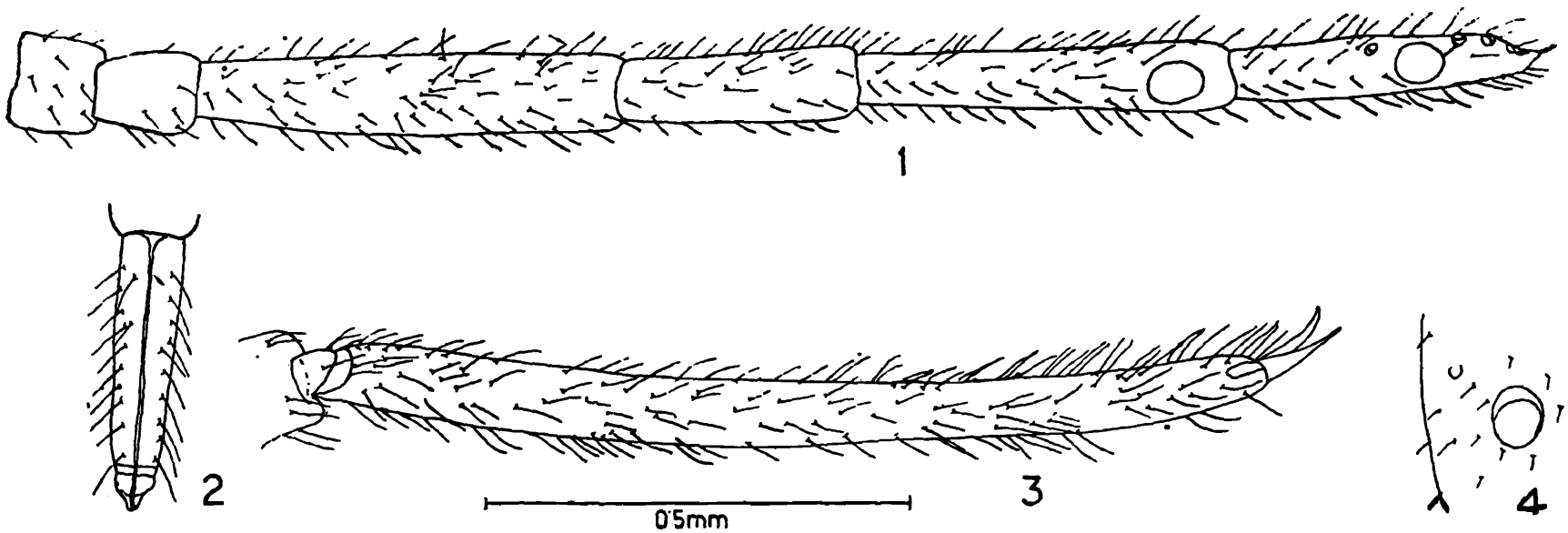

1
2
3
4
0·5mm

PLATE 52

Cinara atroalbipes David, Narayanan, Rajasingh

FIGS. 1. abdominal dorsum ×48;

Cinara atrotibialis David and Rajasingh,

2. abdominal dorsum ×35,

3, 4. antenna of alate viviparous female × 48.

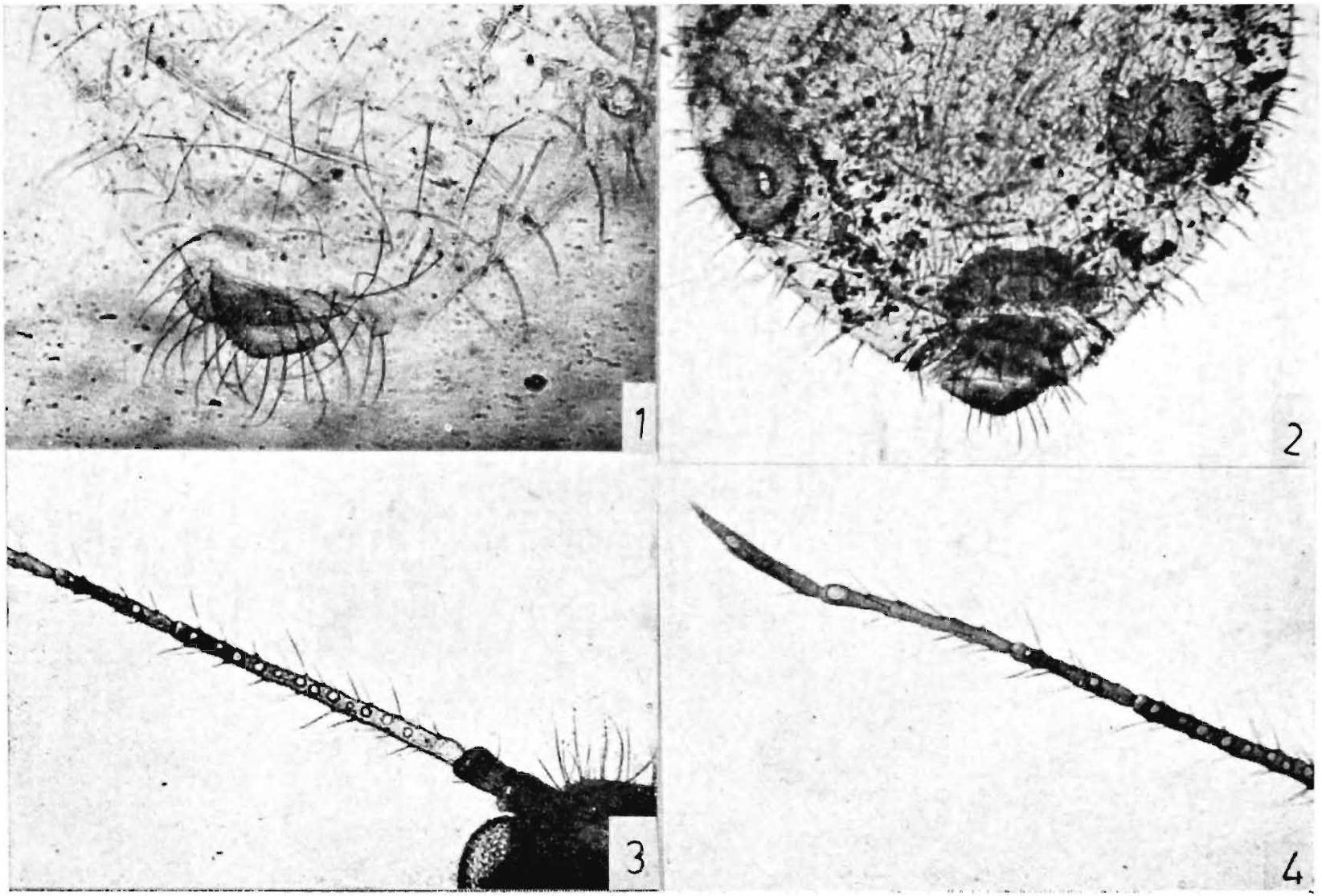

1
2
3
4

PLATE 53

Cinara chaeterostrata L. K. Ghosh & Raychaudhuri

FIGS. 1, 2. antenna ×80,
2. abdominal dorsum ×25,
4. hind tarsus, ×80
(all of alate viviparous female.)

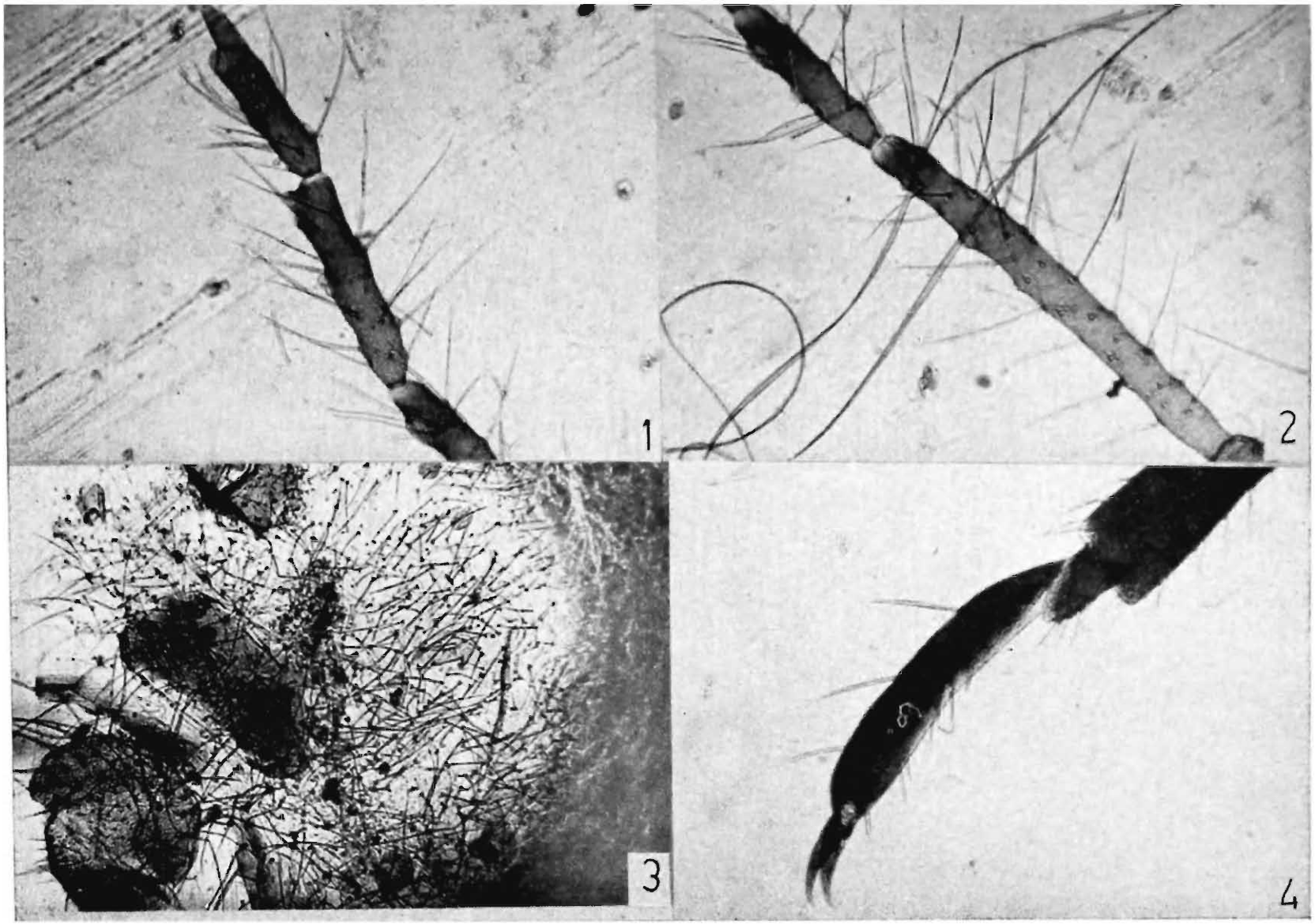

1
2
3
4

PLATE 54

Cinara comata Donc.

FIGS. 1. head ×100,
2. antenna ×80,
3. antennal segment VI ×350,
4. ultimate rostral segment ×100.

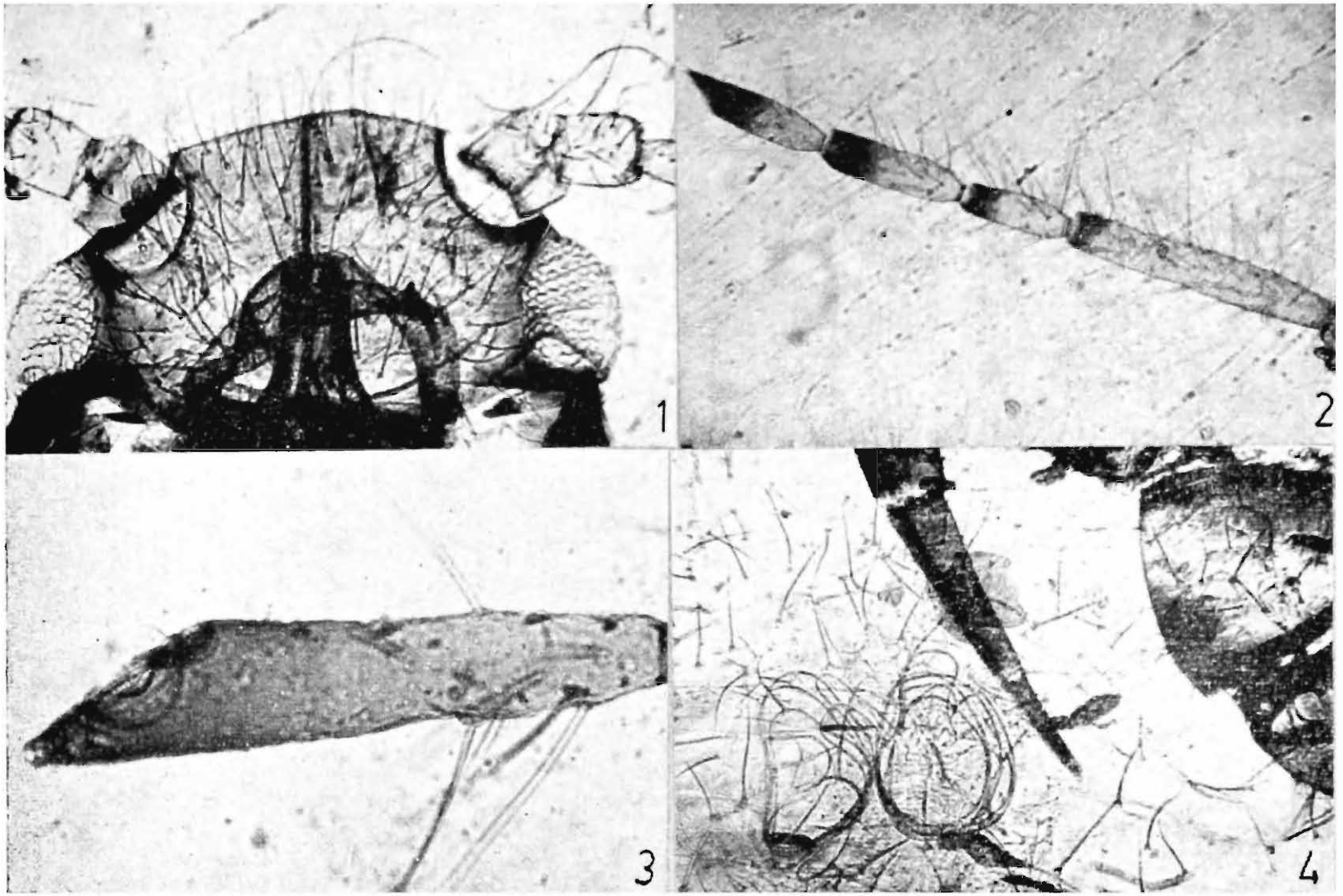

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PLATE 55

Cinara comata Donc.

FIGS. 1. femora ×40,
2. hind tarsus ×80; *Cinara confinis* (Koch)
3. dorsal hairs ×40,
4. abdominal pattern ×40.

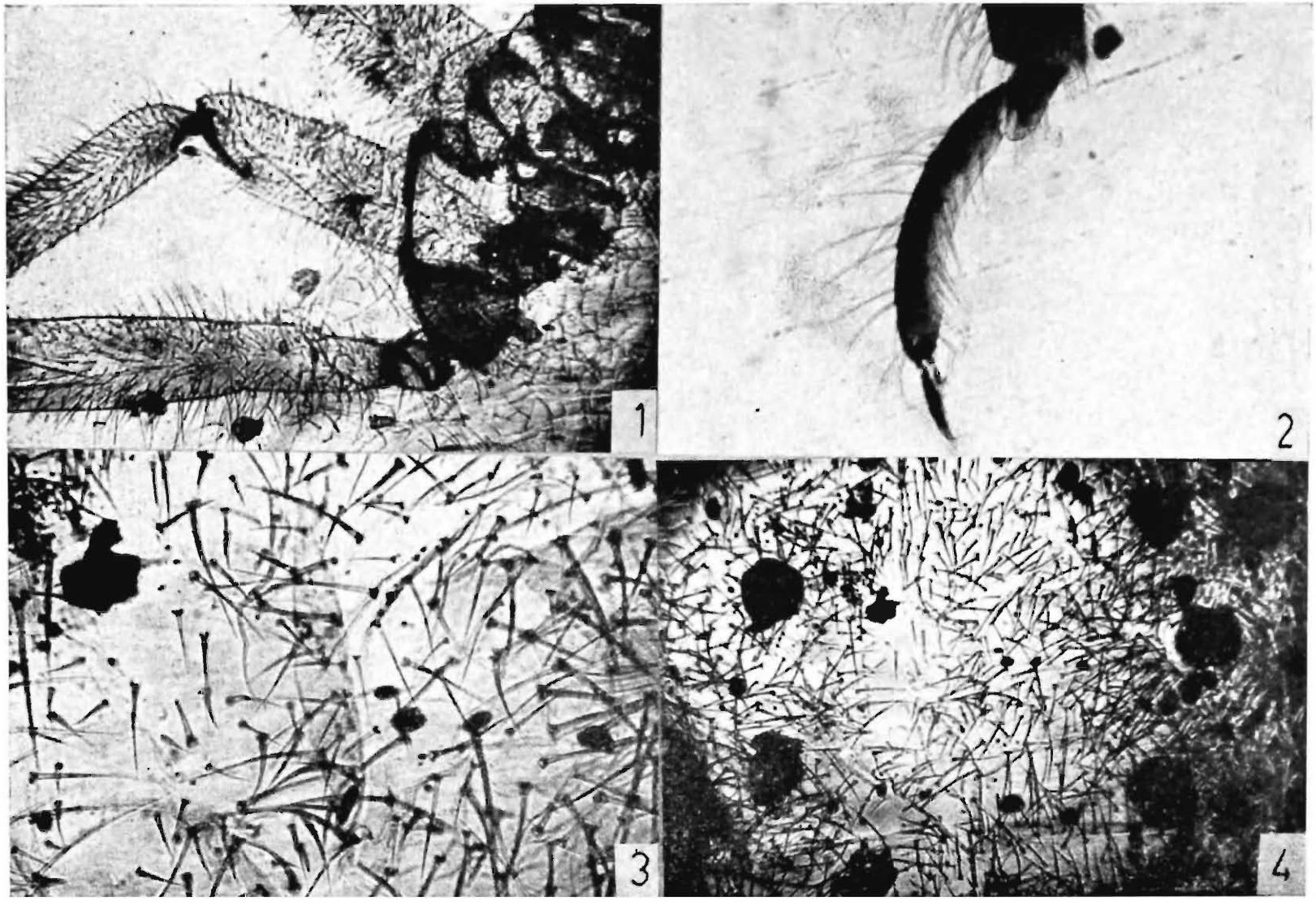
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PLATE 56

Cinara confinis (Koch)

FIGS. 1. antenna of male ×48,
2. male genitalia ×48;

Cinara confinis tenuipes Chakrabarti & Ghosh

3. abdominal dorsum ×48,
4. male genitalia ×48.

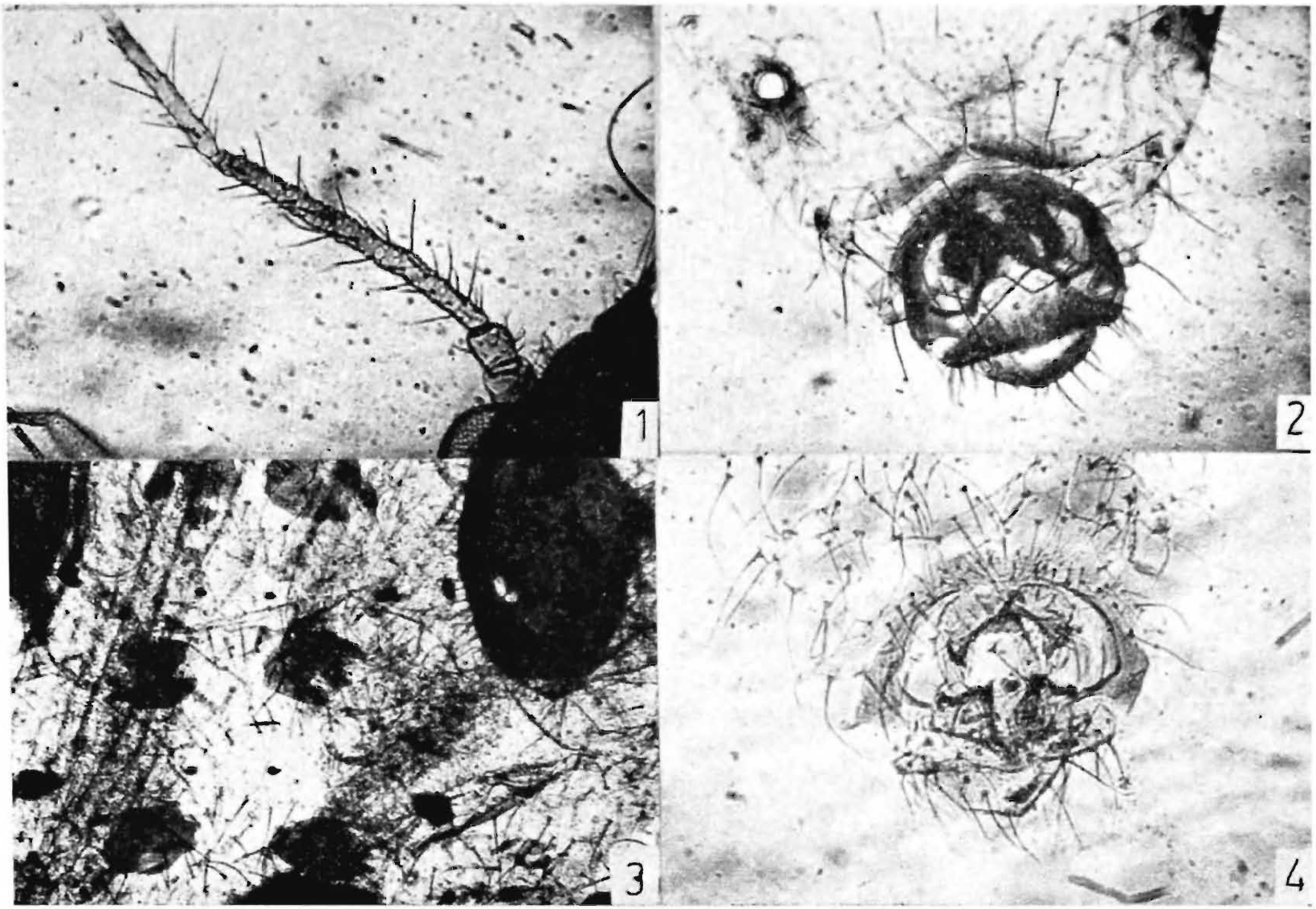
1
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PLATE 57

Cinara eastopi Pintera

FIGS. 1. antenna (part) ×80,
2. ultimate rostral segment ×100,
3. abdominal dorsum ×100,
4. siphunculus ×100.

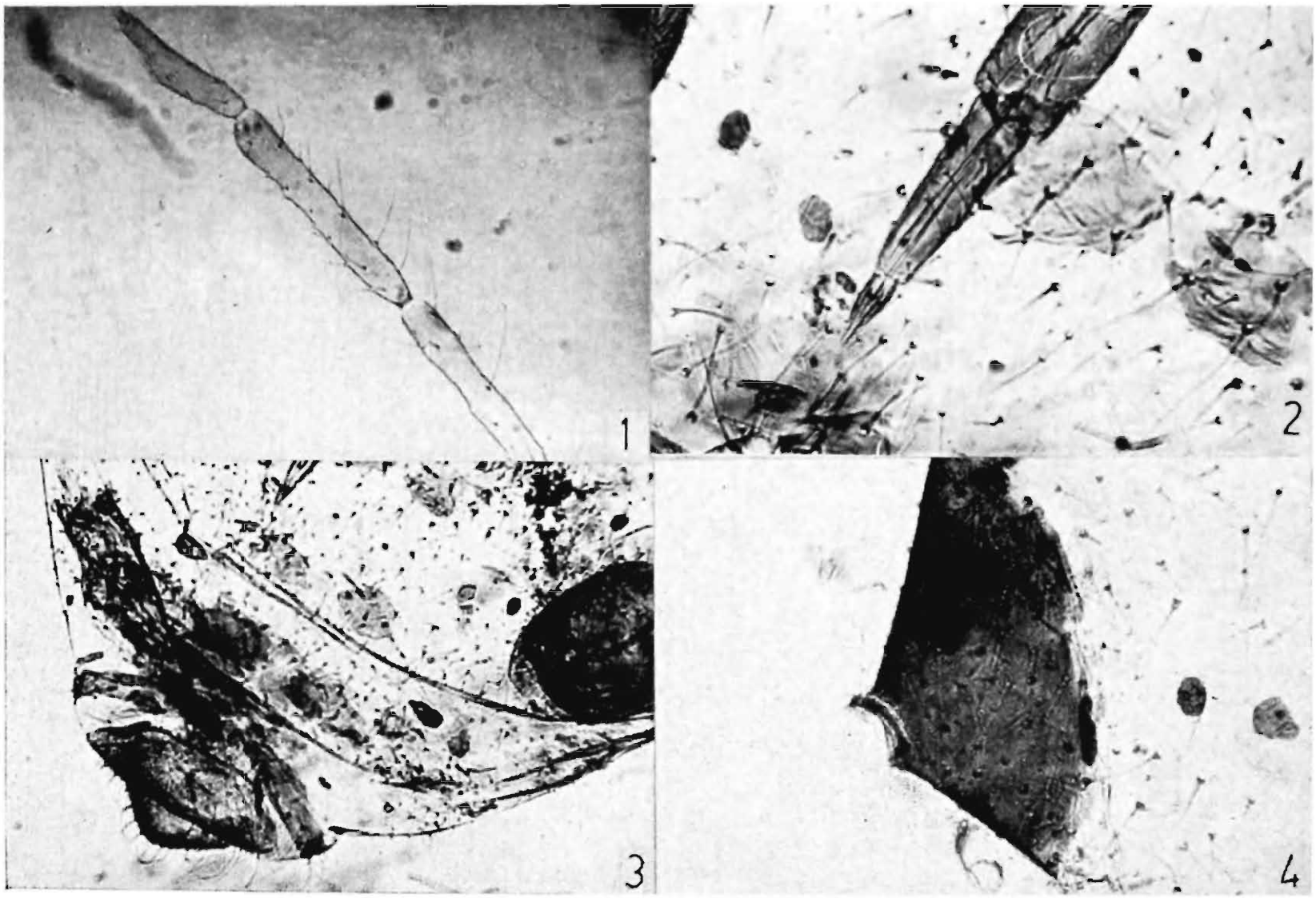
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PLATE 58

Cinara indica Verma

FIGS. 1. anterior half of body ×35,
2. dorsal hairs ×100,
3. abdomen ×48,
4. hind tarsus ×100.

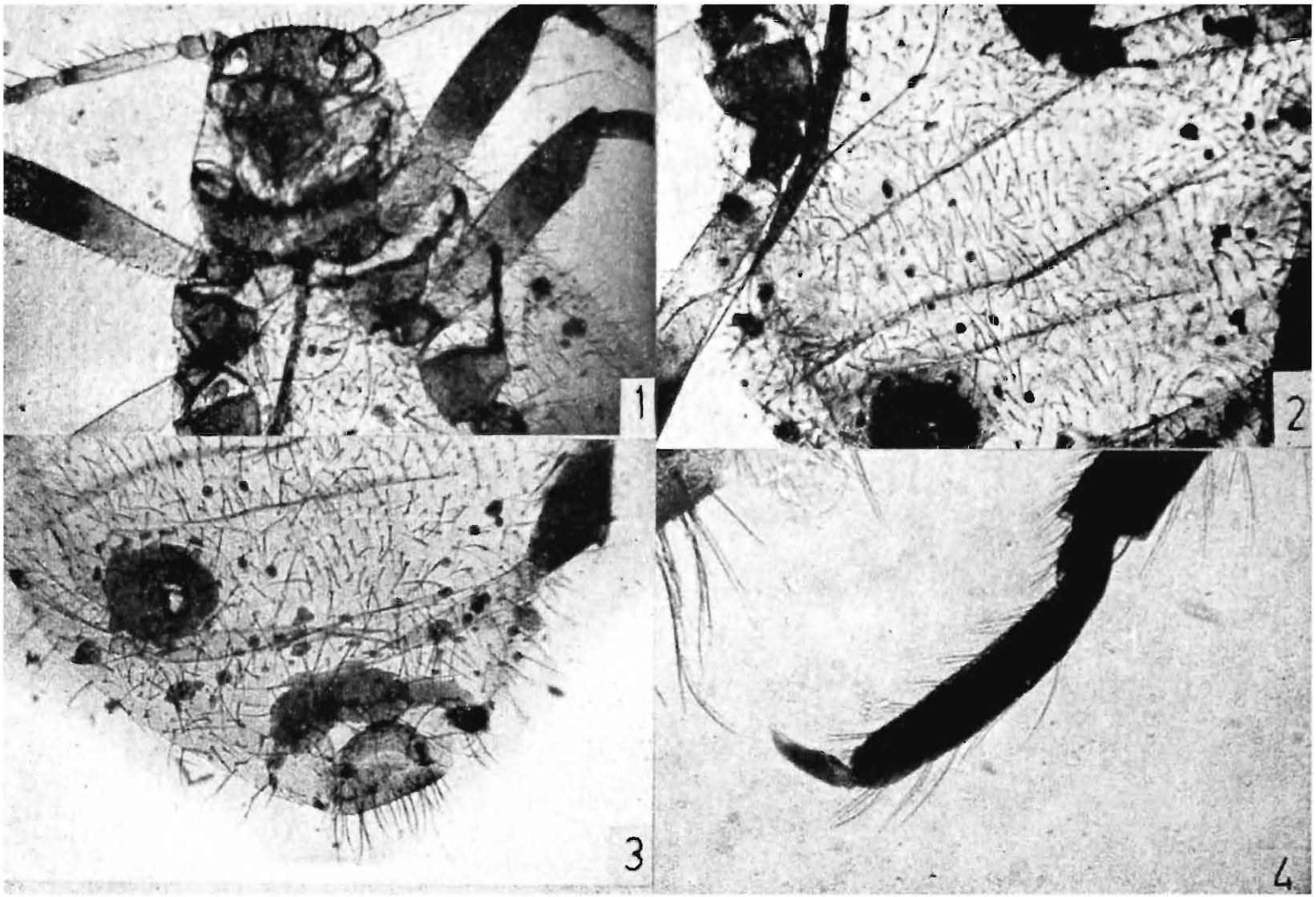
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PLATE 59

Cinara lachnirostris H.R.L.

FIGS. 1. head ×35;
Cinara maculipes H.R.L.
2. Head ×52,
3. dorsal hairs ×100,
4. pantherine spots on femora ×100.

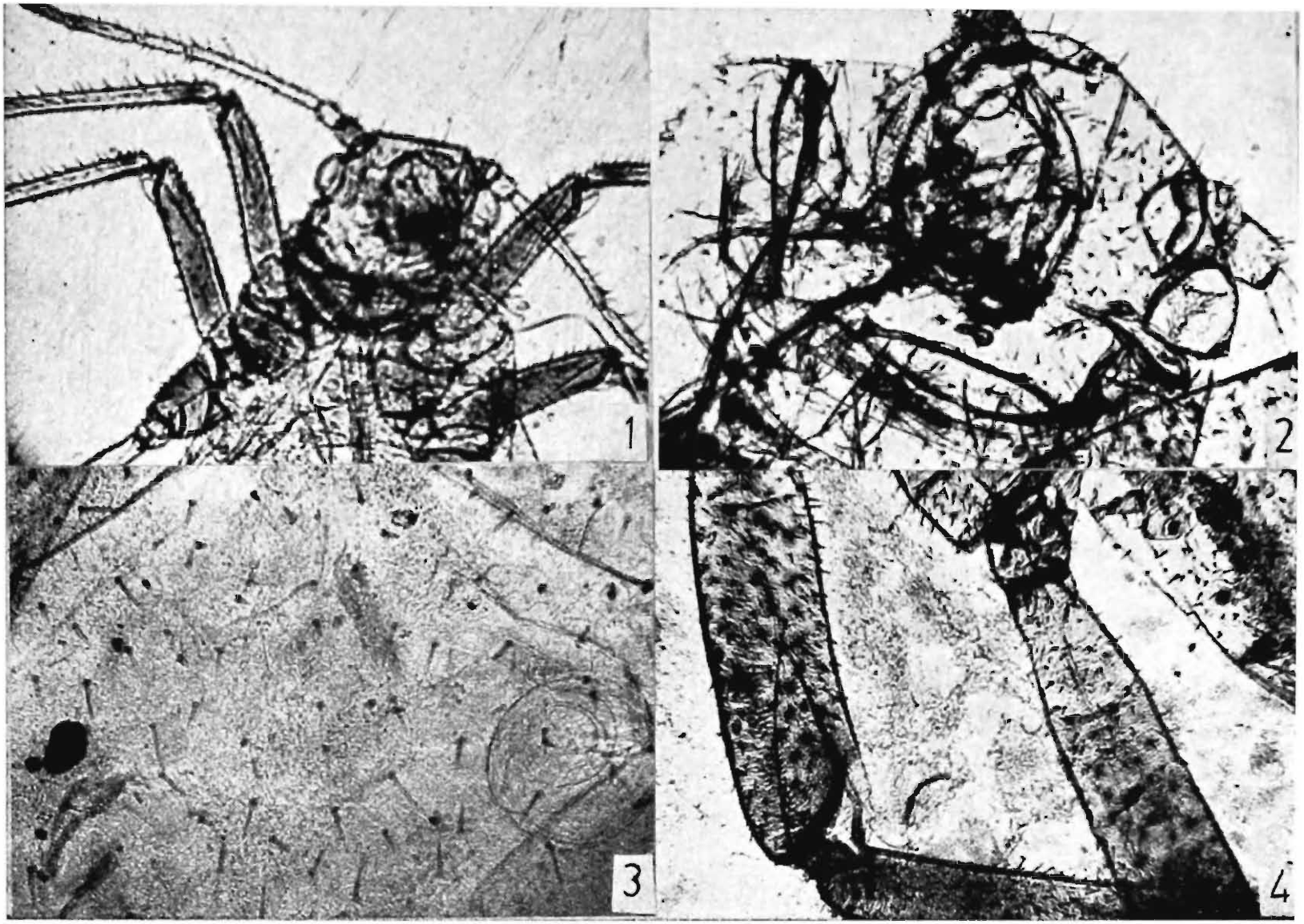
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PLATE 60

Cinara maculipes H.R.L.

FIGS. 1 hind tarsus ×80;
Cinara pilicornis (Hartig),
2. antenna ×80,
3. ultimate rostral segment ×100,
4. abdominal dorsum ×80.
(all of alate viviparous female.)

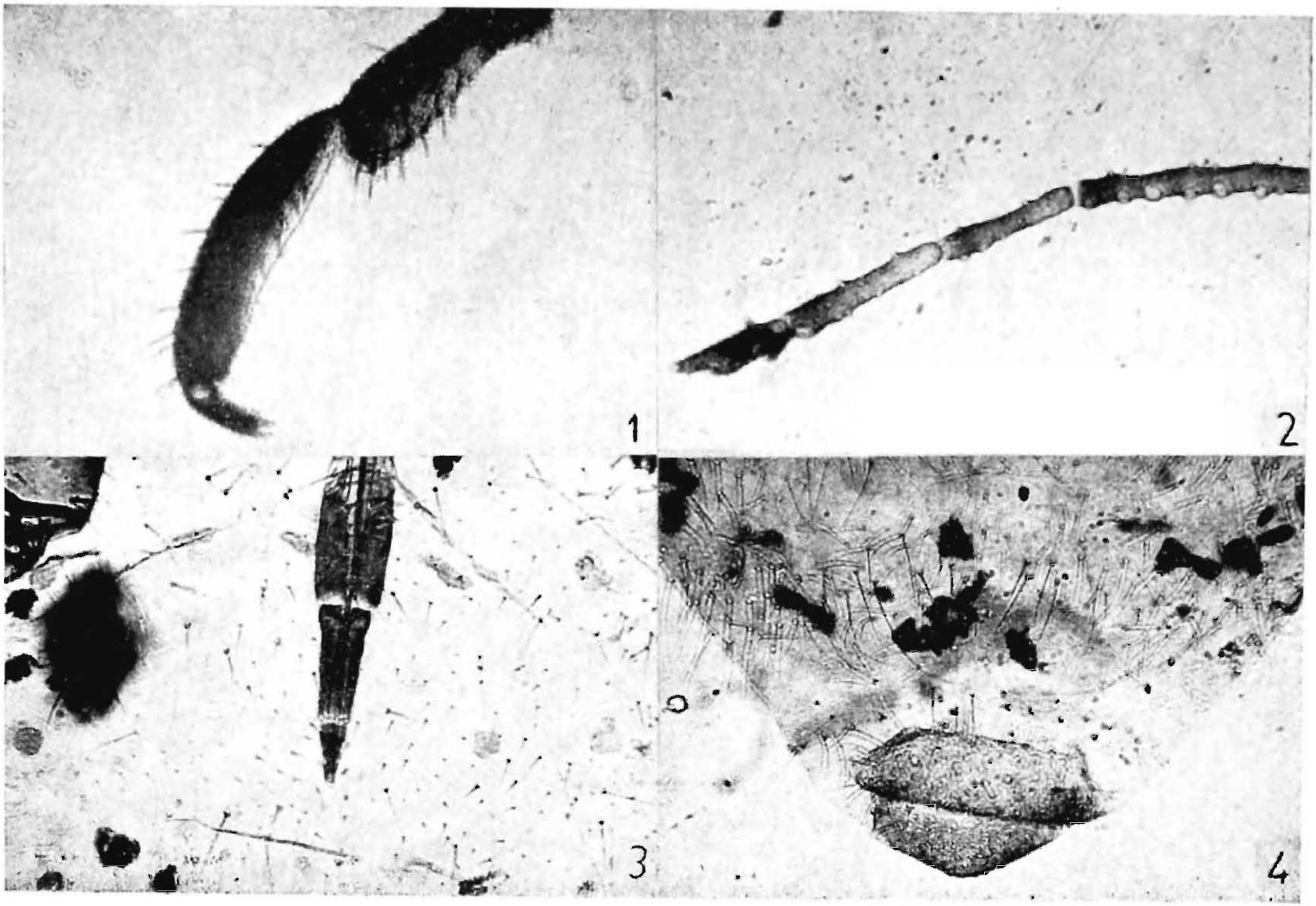
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PLATE 61

Cinara tujafilina (Del Guercio)

FIGS. 1. antenna ×100,
2. ultimate rostral segment ×80,
3. abdominal dorsum ×40,
4. hind tibia and tarsus ×80.

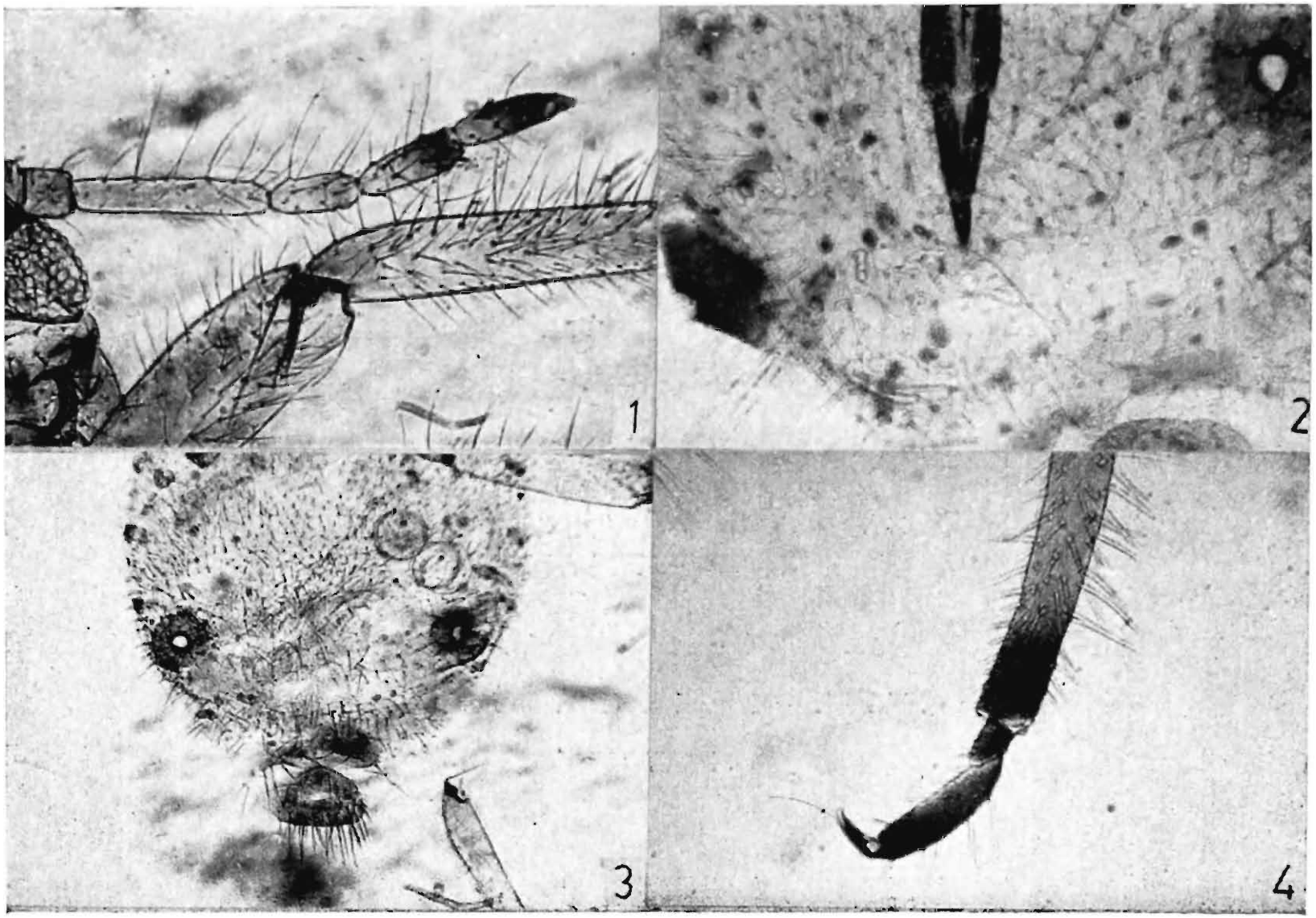
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PLATE 62

Indocinara hottesis Ghosh, Basu, Raychaudhuri

FIGS. 1. ultimate rostral segment ×100,
2. dorsal hairs ×100,
3. abdominal dorsum ×40,
4. hind tibia of oviparous female ×100,
5. hairs on dorsum of nymph ×80.

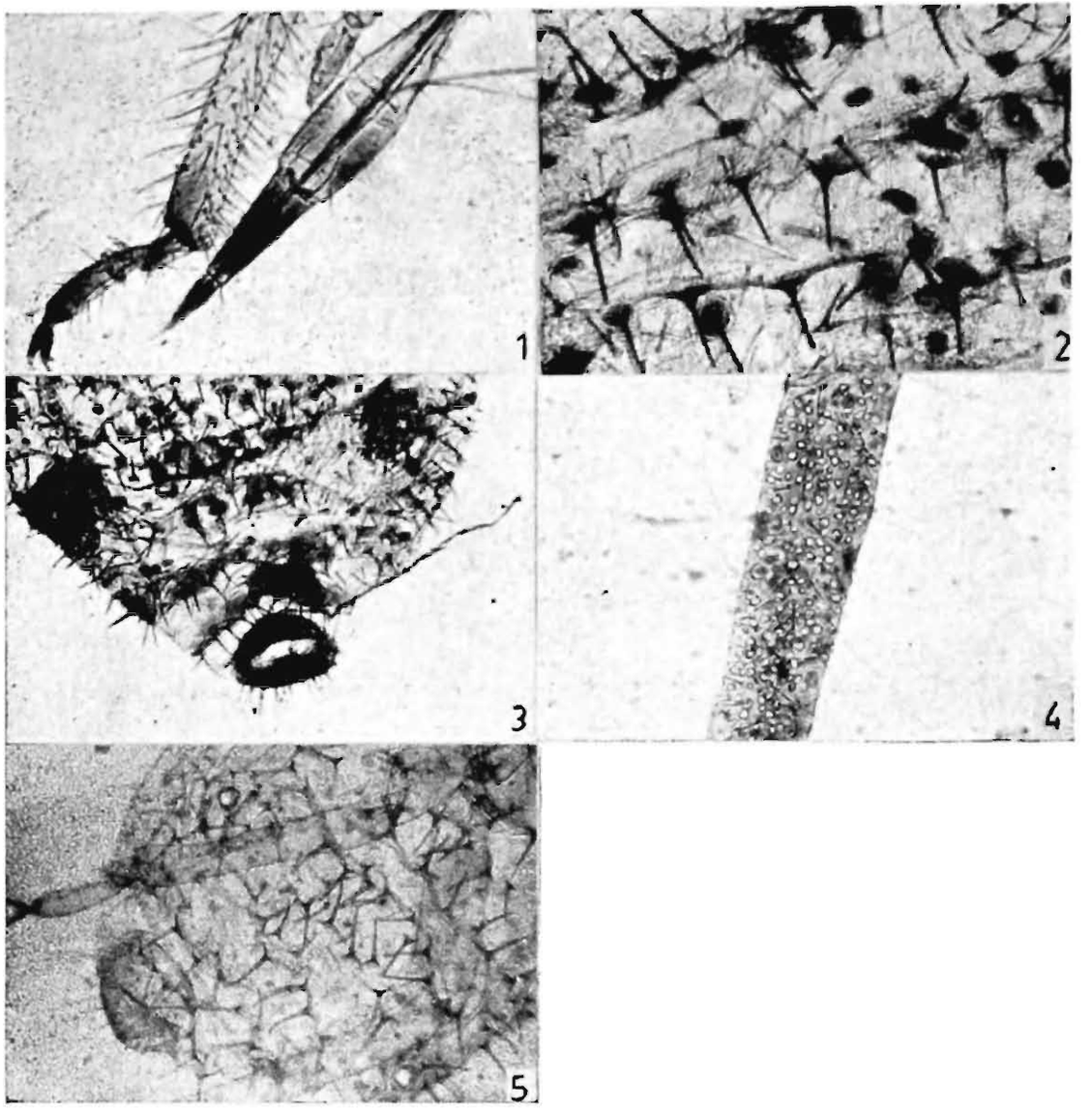
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PLATE 63

Eulachnus pumilae Inouye

FIGS. 1. head ×40,
2. antennal segment III ×350,
3. abdominal dorsum ×100,
4. hind tibia and tarsus ×100.

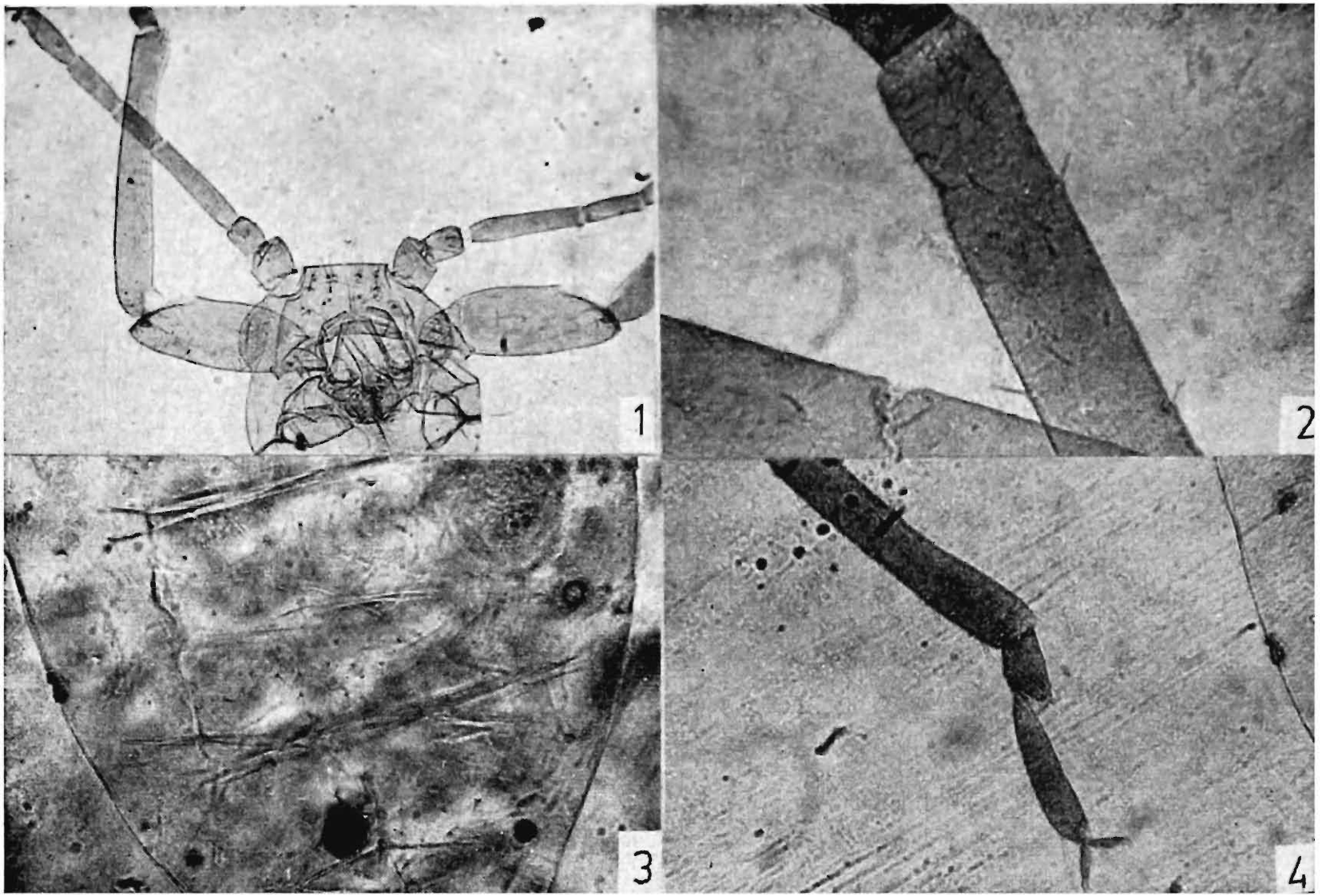
1
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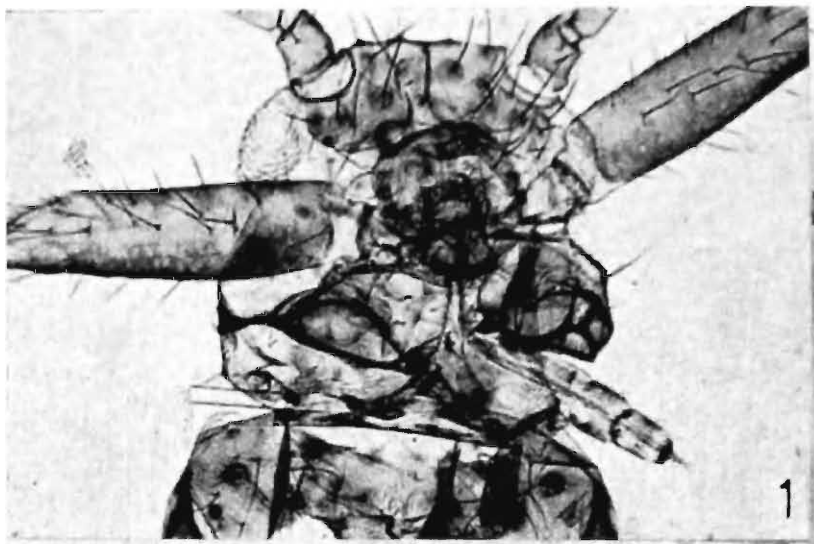
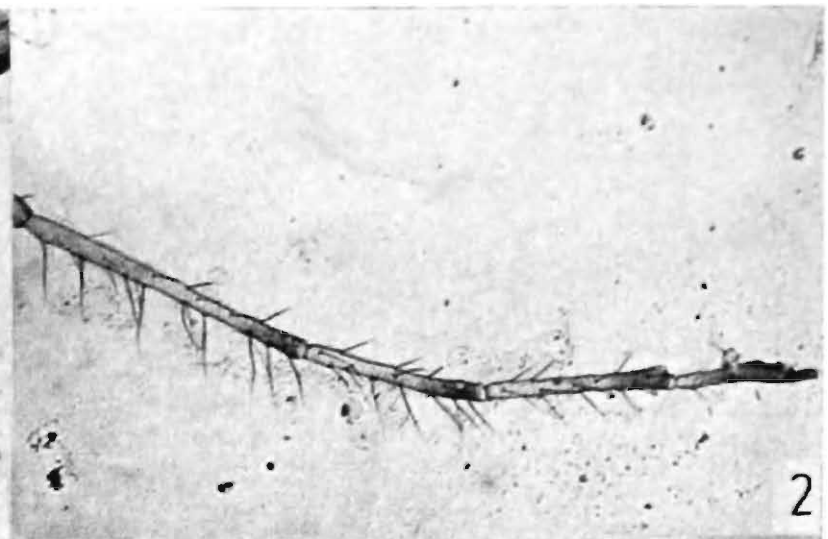
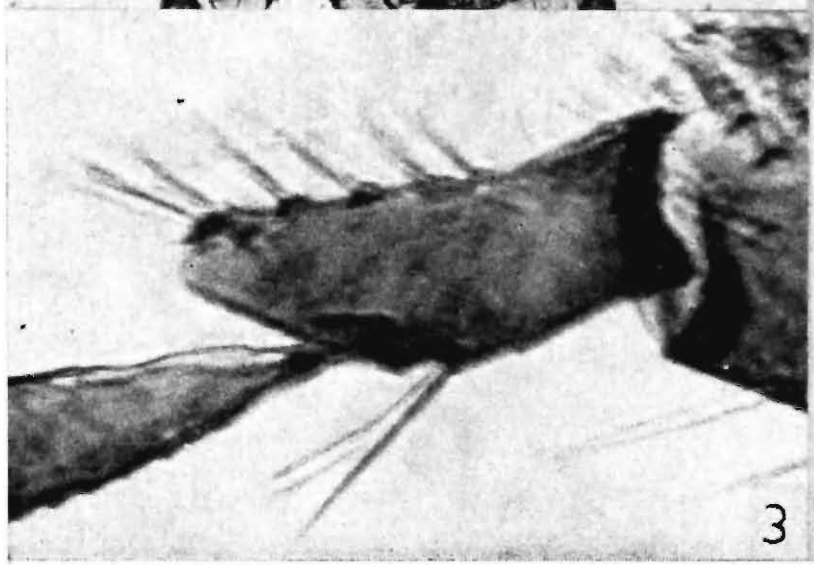
PLATE 64

Eulachnus thunbergii (Wilson)

FIGS. 1. head ×60,
2. antenna ×60,
3. abdominal dorsum ×60,
4. first segment of hind tarsus ×450.


1


2


3

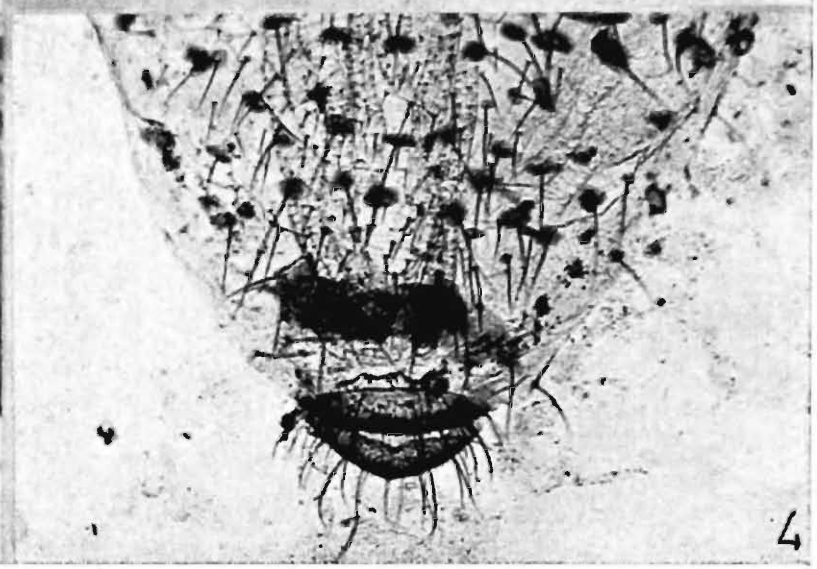

4

PLATE 65

Pseudessigella brachychacta H.R.L.

FIGS. 1. head ×35,
2. abdomen ×35,
Schizolachnus orientalis (Tak)
3. ultimate rostral segment ×100,
4. hind tarsus ×100.

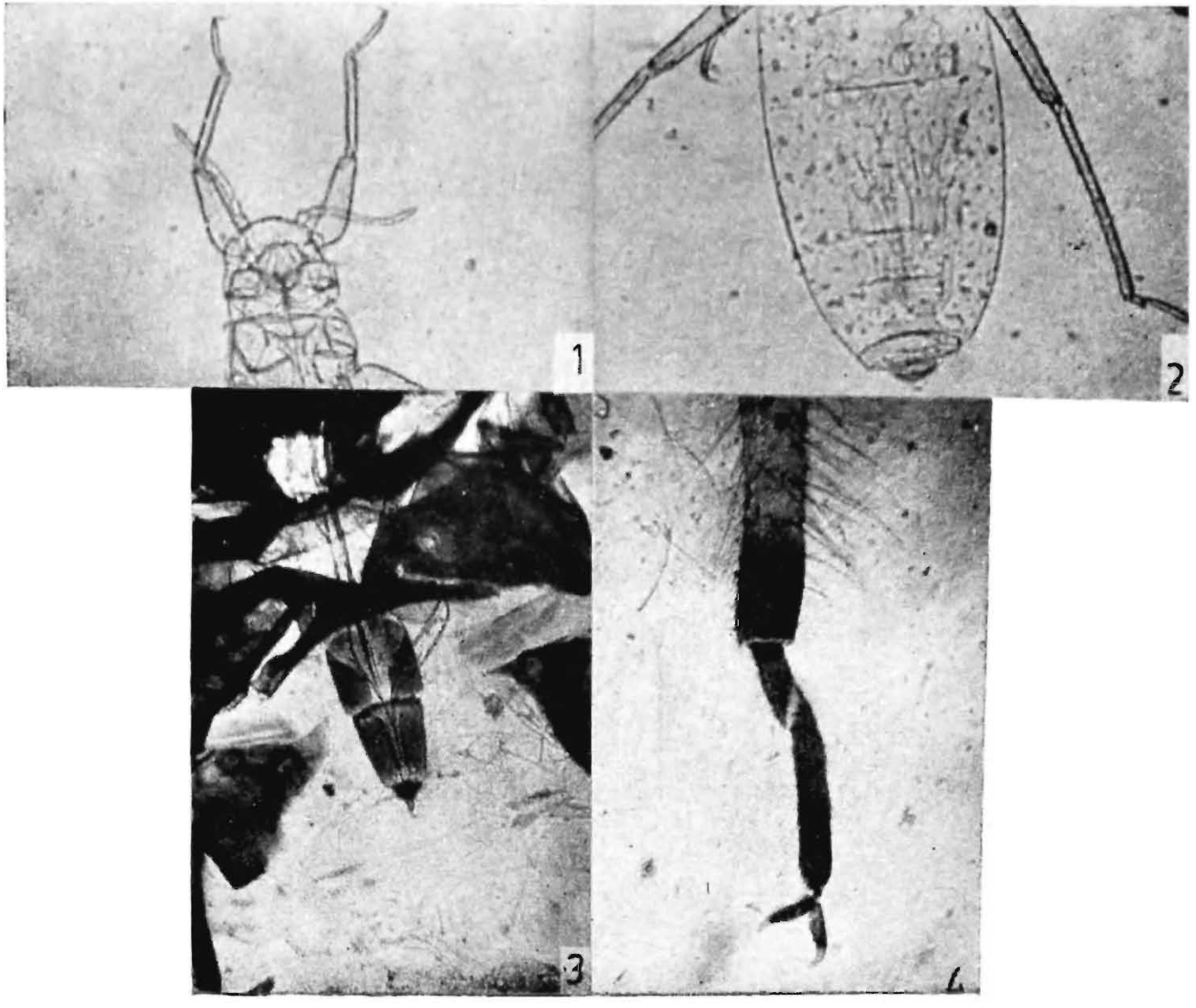

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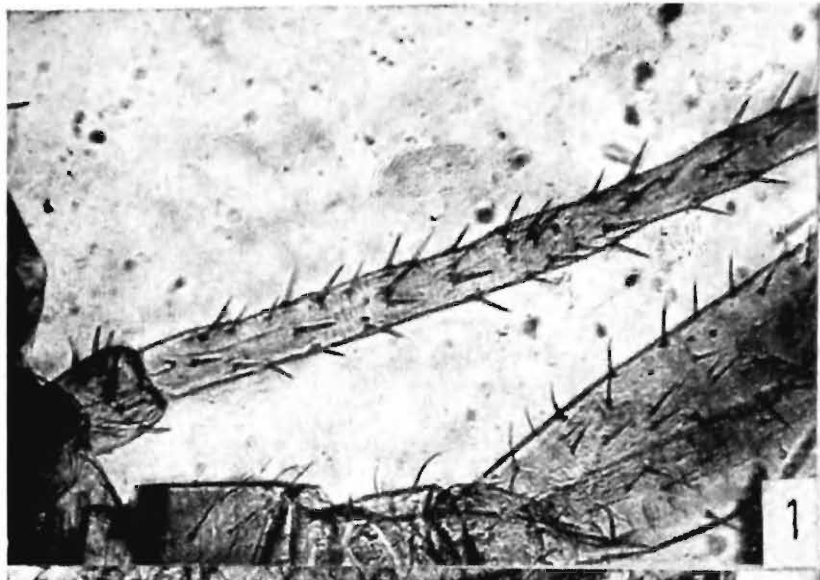
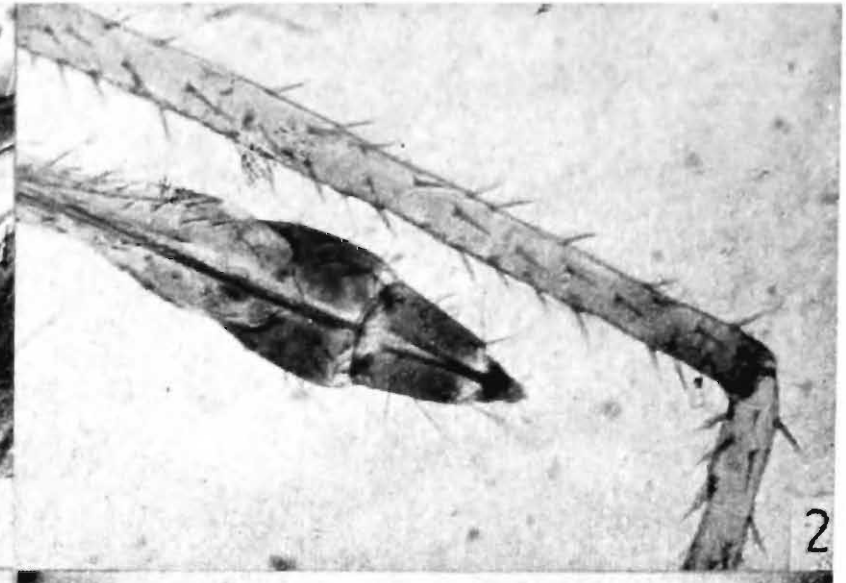
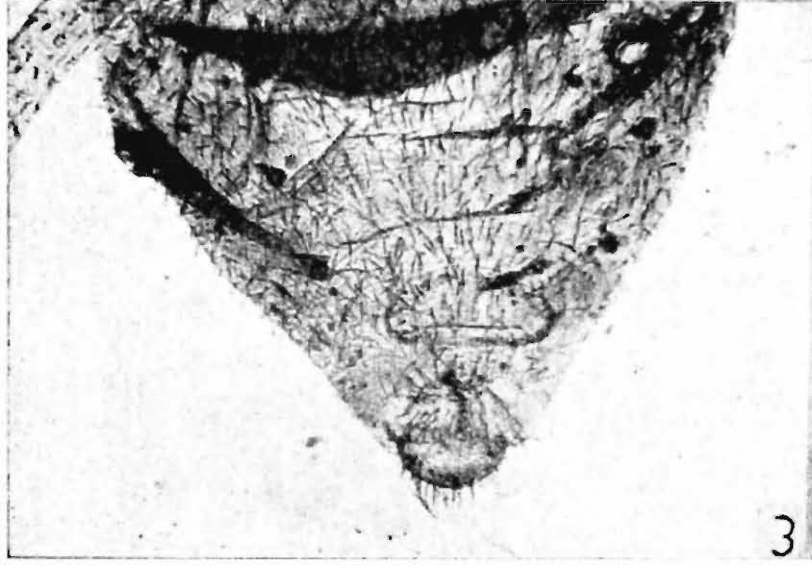
PLATE 66

Lachnus acutihirsutus Kumar & Berkhardt

FIGS. 1. hairs on antennal segment III and fore femora ×100,
2. ultimate rostral segment ×100,
3. abdominal dorsum ×100,
4. forewing of alate viviparous female × 20.


1


2


3

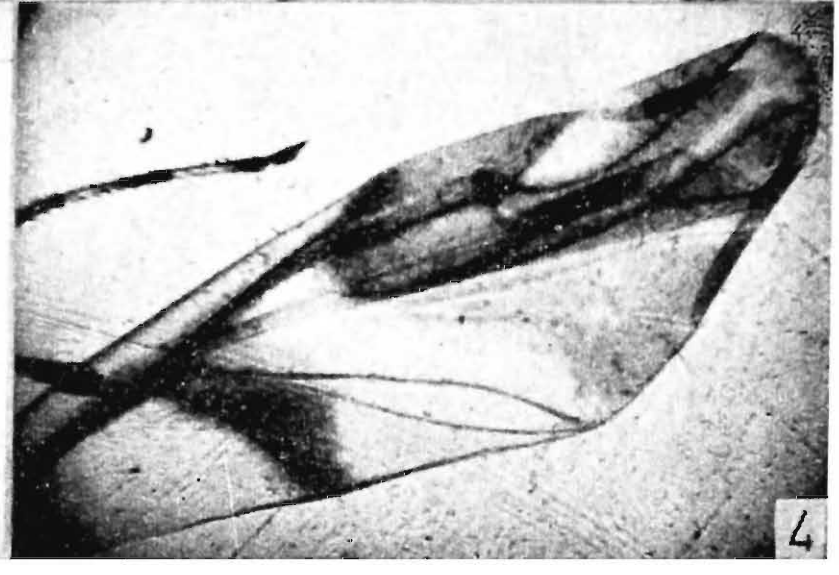

4

PLATE 67

Lachnus longirostrum David and Ghosh

FIGS. 1. antenna ×52.
2. hind tibia ×52,

Lachnus longisetosus sp. nov.

3. abdominal dorsum ×80,
4. forewing ×20, of alate viviparous female.

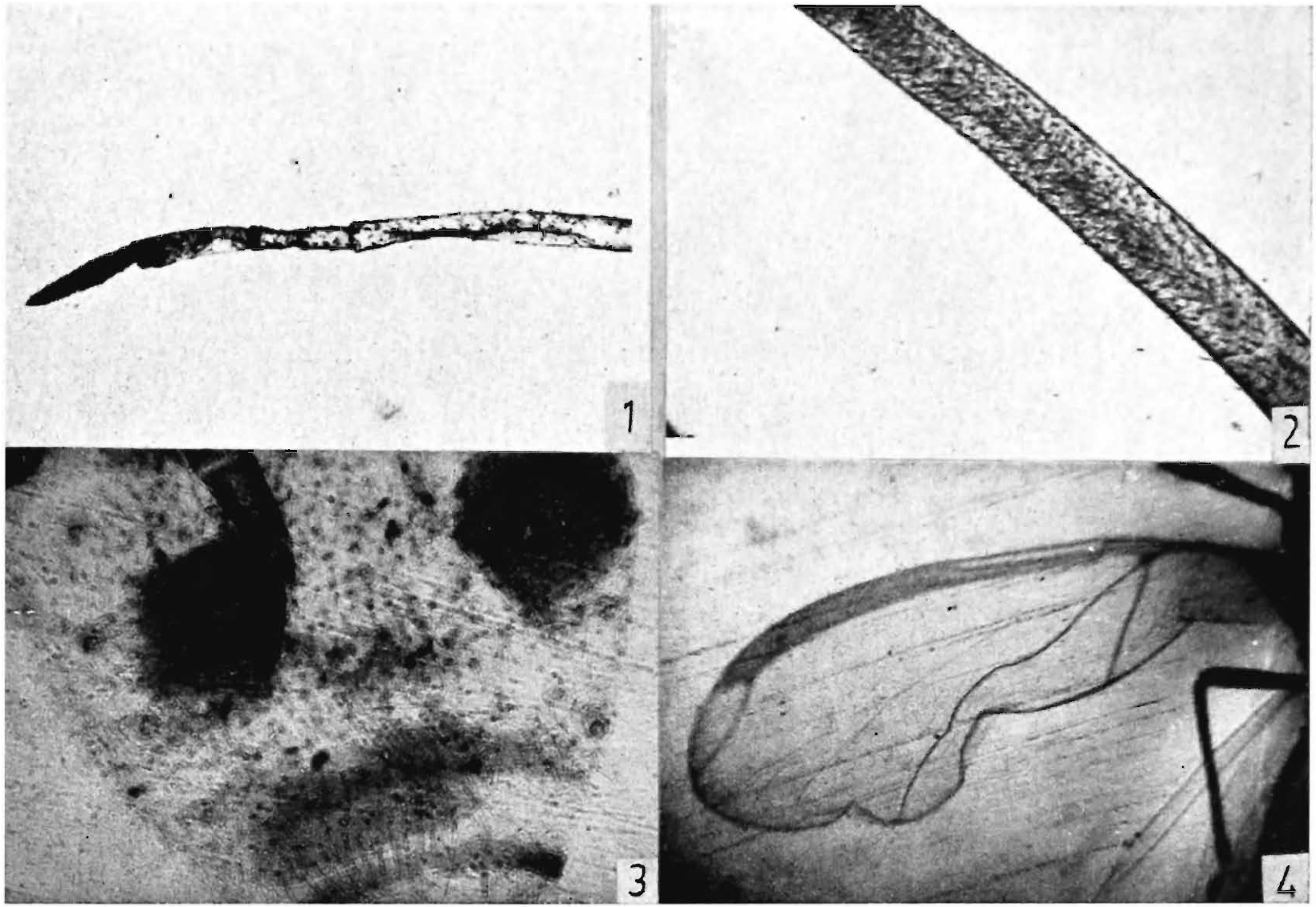

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PLATE 68

Lachnus tropicalis (v.d.Goot)

FIGS. 1. antennal segment III ×52,
2. abdominal dorsum ×52,
3. antennal segment III of alate ×100,
4. wings of alate viviparous female ×20.

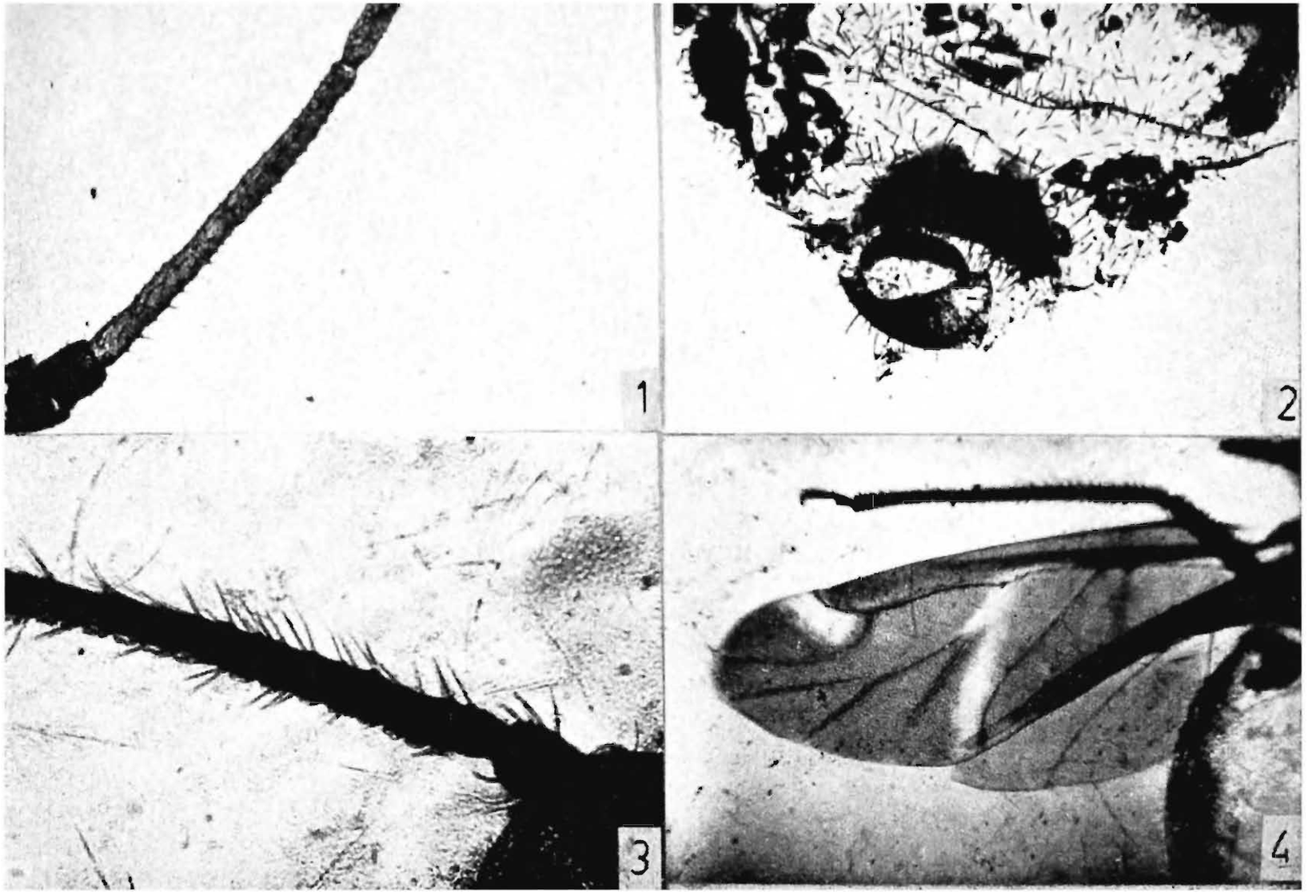
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PLATE 69

Longistigma ? *liquidambarus* (Takahashi)

FIGS. 1. ultimate rostral segment ×100,
2. abdominal dorsum ×100,
3. forewing of alate viviparous female ×20,
4. antenna of nymph ×100.

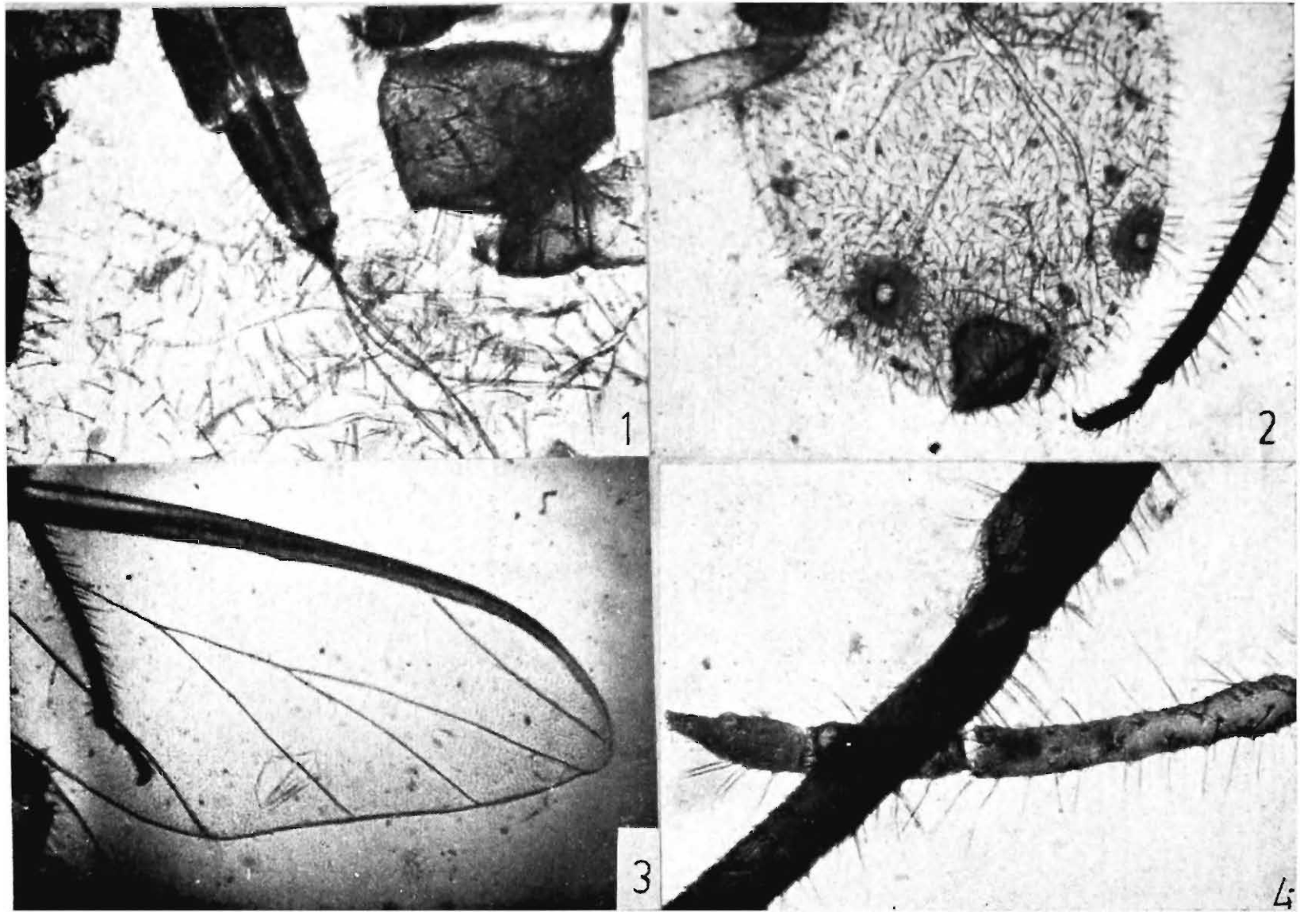
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PLATE 70

Maculolachnus rubi Ghosh & Raychaudhuri

FIGS. 1. flagellum ×80,
2. ultimate rostral segment ×350,
3. abdominal dorsum ×52,
4. posterior part of abdomen ×100.

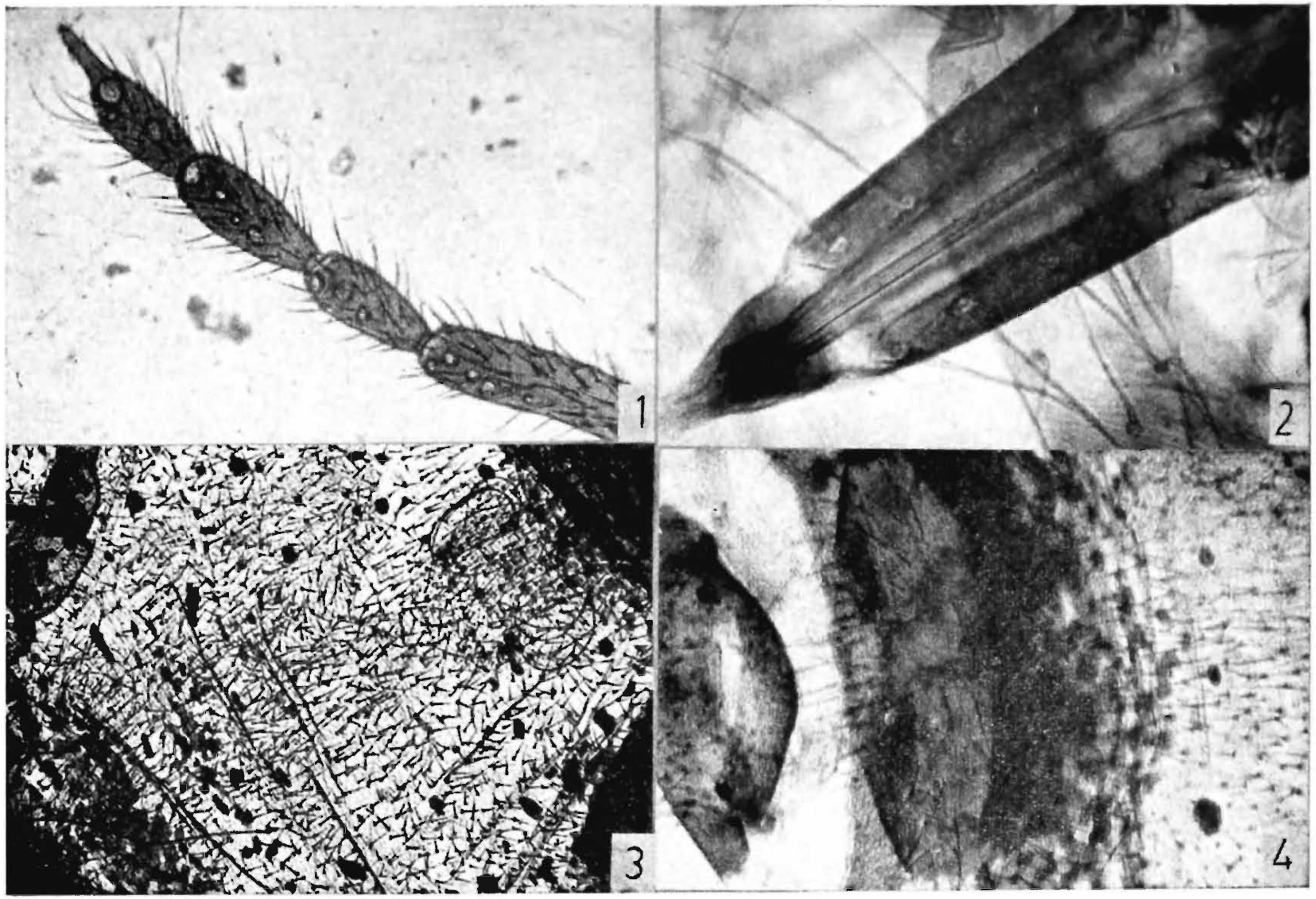
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PLATE 71

Maculolachnus submacula (Walker)

FIGS. 1. abdomen ×35,
2. ultimate rostral segment ×100,
3. abdomen ×35, and
4. forewing of alate viviparous female ×20.

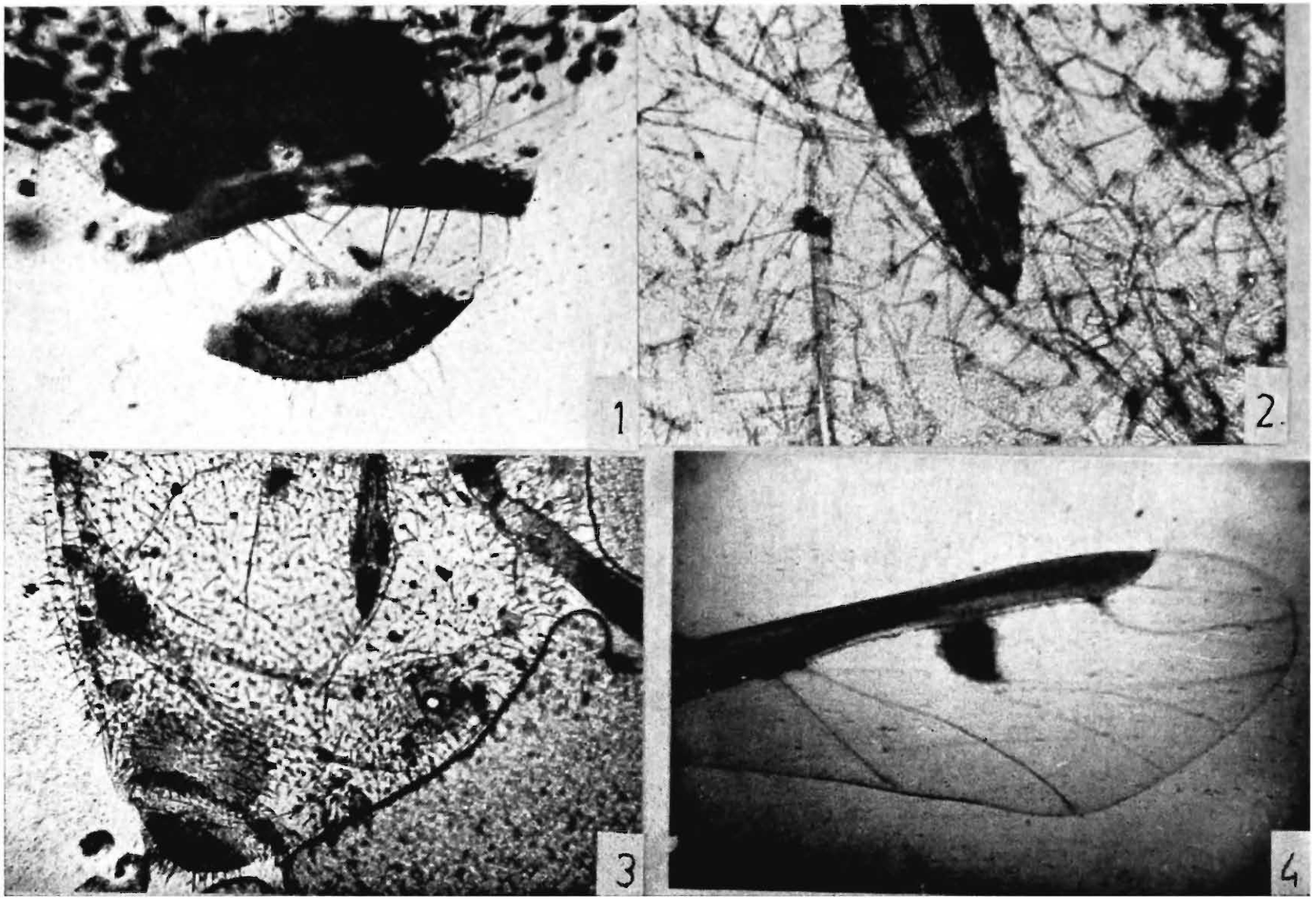
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PLATE 72

Nippolachnus bengalensis Basu & H.R.L.

FIGS. 1. anterior part of body & antennae ×35,
2. hind leg ×40,
3. anterior part of body of alate ×35,
4. abdominal dorsum of alate viviparous female ×35.

PLATE 72

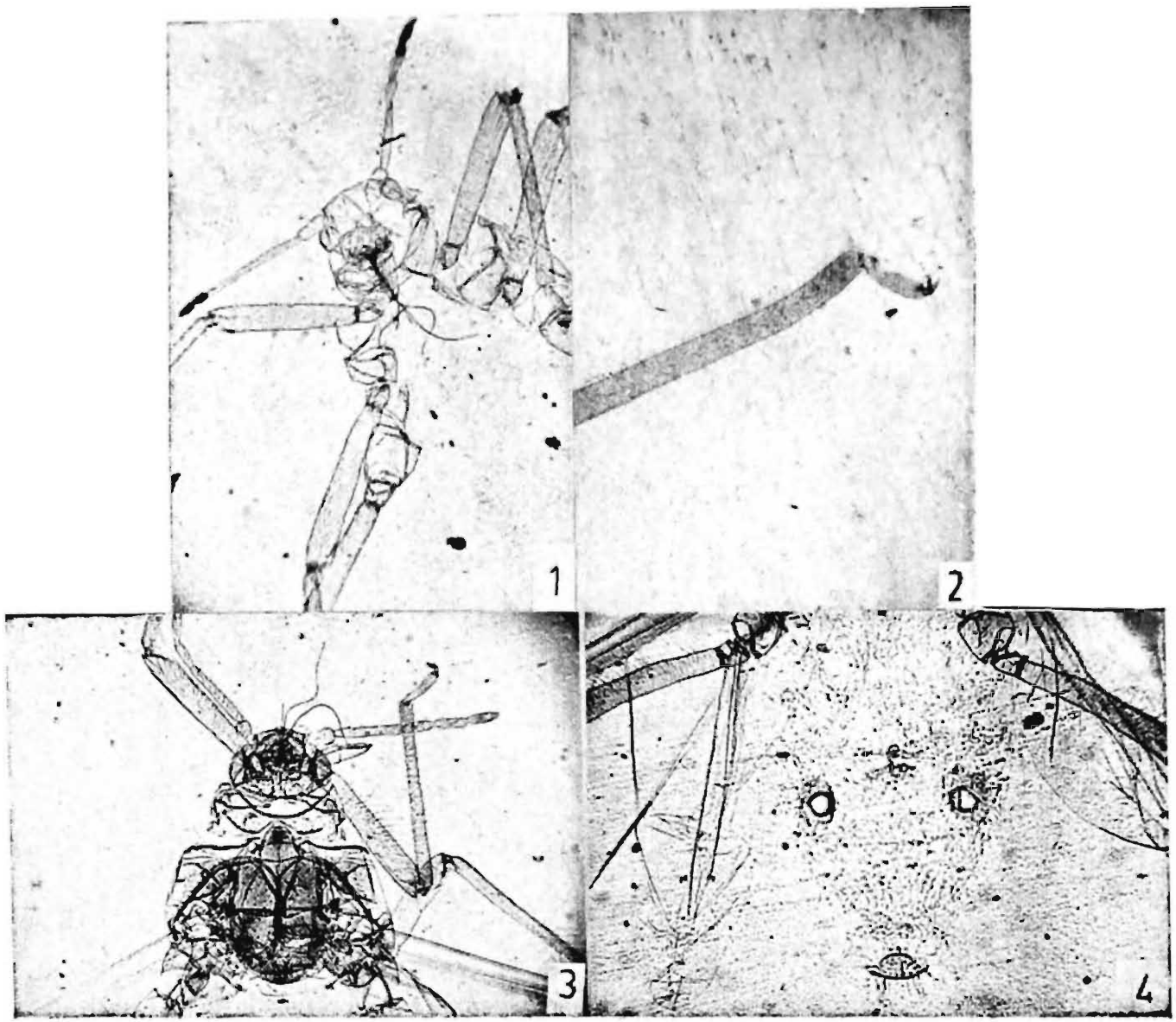

PLATE 73

Nippolachnus himalayensis (v.d. Goot)

FIGS. 1. anterior part of body and legs ×35,
2. head and cephalic hairs ×40,
3. hind leg ×35.

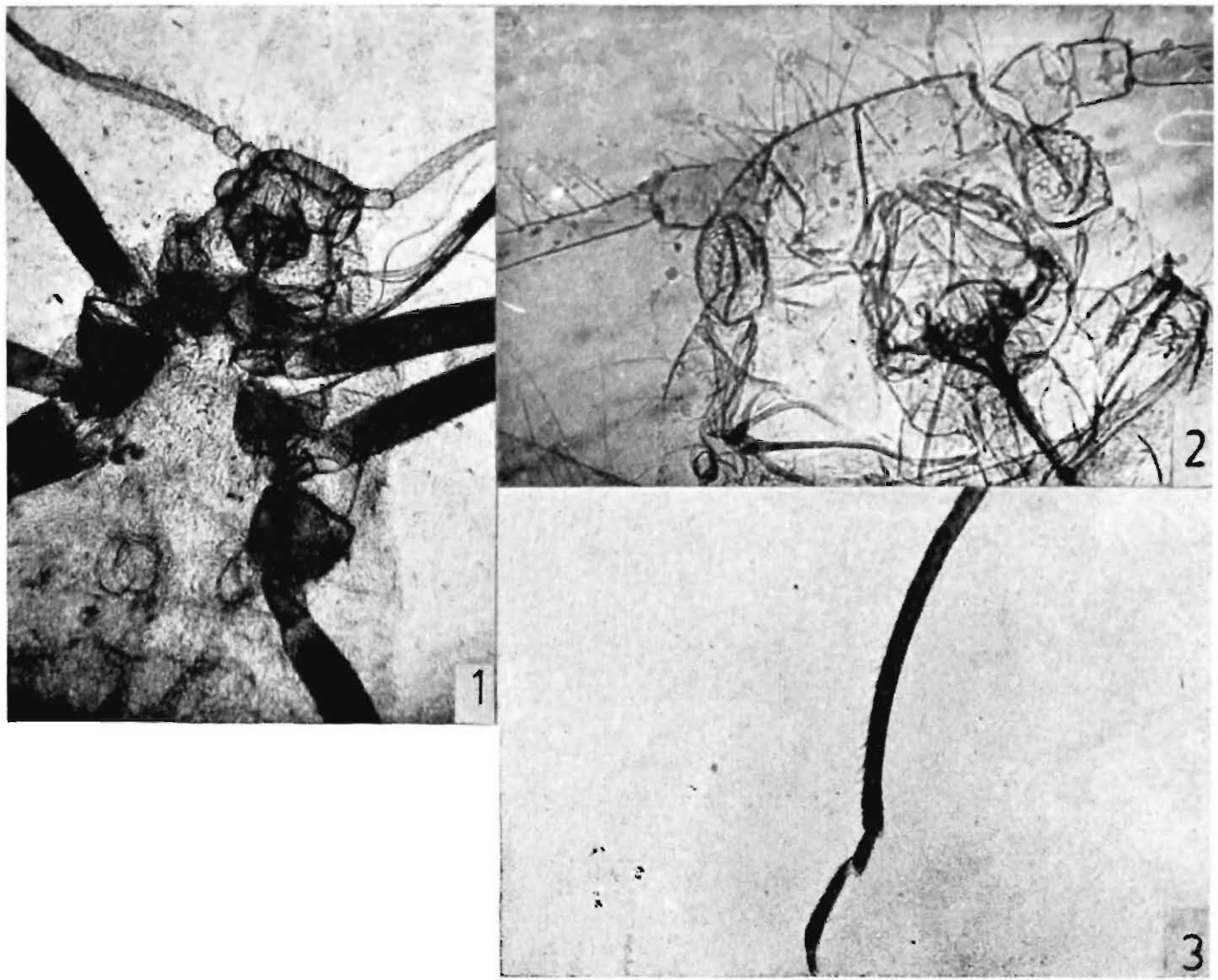
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PLATE 74

Nippolachnus piri Matsumura

FIGS. 1. antenna ×80,
2. ultimate rostral segment ×350,
3. abdominal dorsum ×80,
4. hind tarsus ×80.

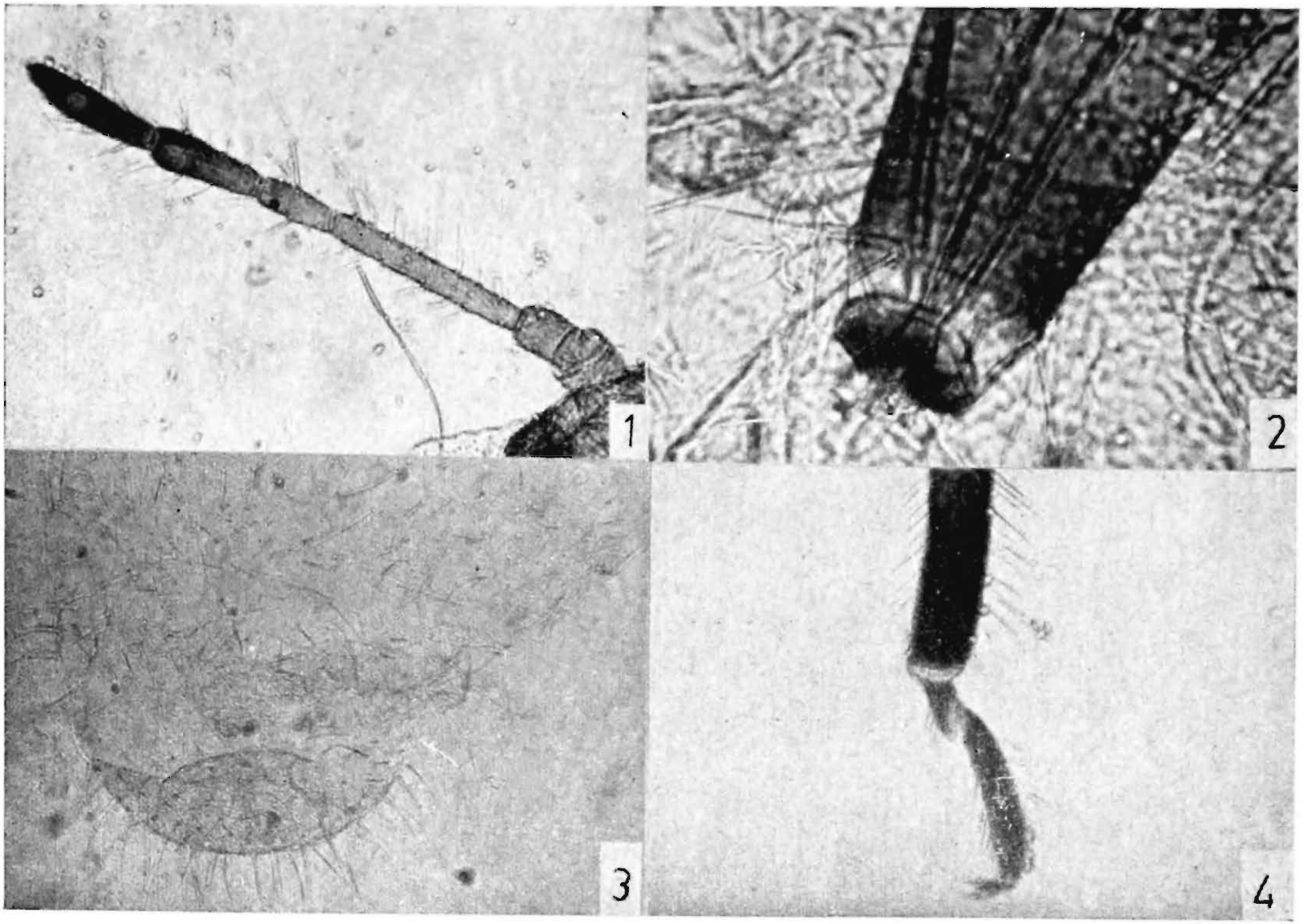
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PLATE 75

Nippolachnus piri Matsumura

FIGS. 1. antenna ×80,
2. abdominal dorsum ×100, of alate viviparous female.

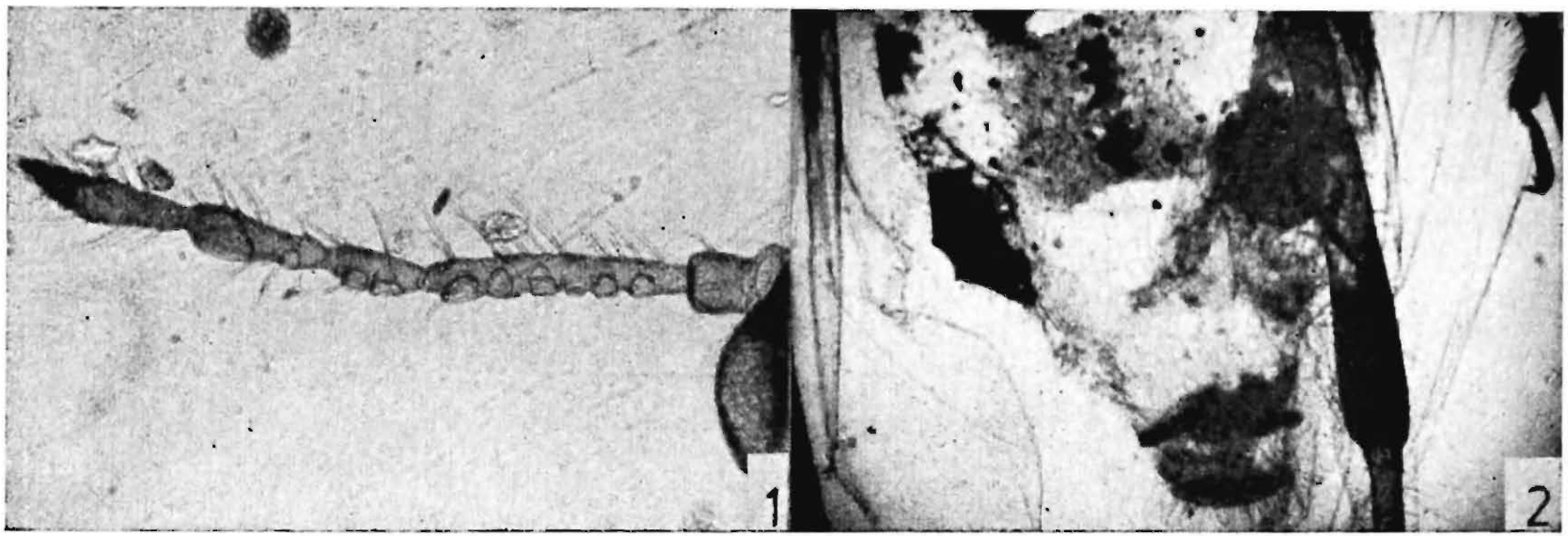
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PLATE 76

Pterochloroides persicae (Cholod.)

FIGS. 1. head ×80,
2. ultimate rostral segment ×80,
3. abdominal dorsum ×20,
4. hind tarsus ×80.

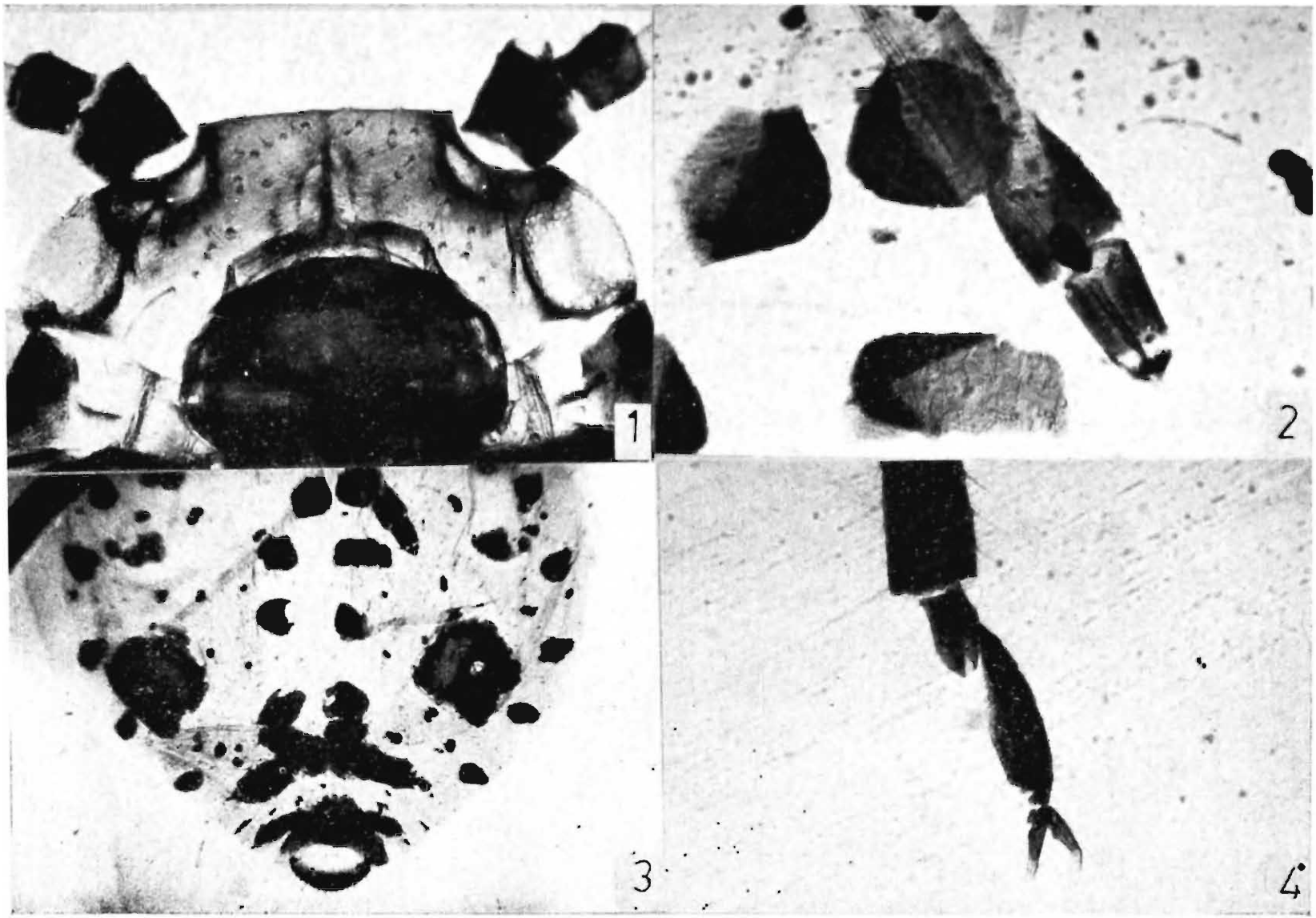
1
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PLATE 77

Pterochloroides persicae (Cholod.)

FIGS. 1. antenna ×52,
2. forewing of alate viviparous female ×20,
3. abdomen of apterous nymph ×40.


1


2

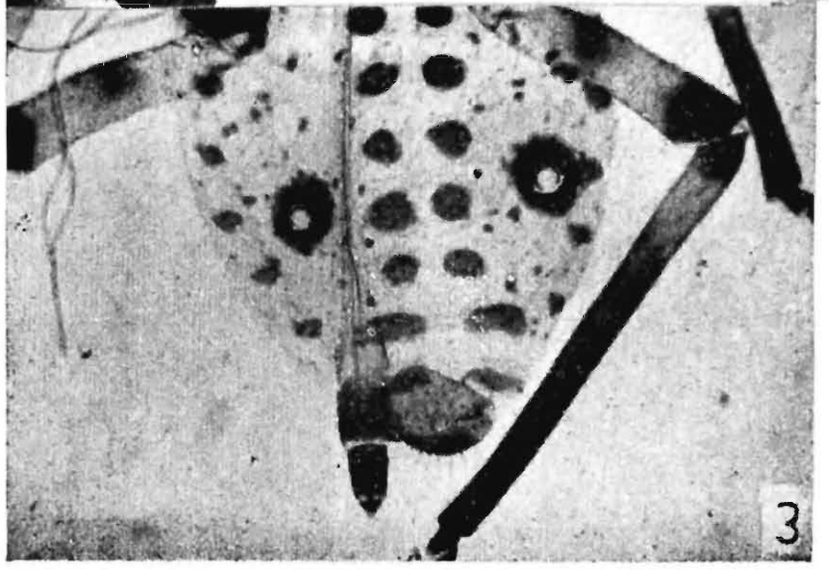
3

PLATE 78

Pyrolachnus imbricatus David, Narayanan, Rajasingh

FIGS. 1. dorsum of abdomen ×100,
2. posterior part of abdomen ×40,

Pyrolachnus pyri (Buckton),

3. dorsum of abdomen ×100,
4. posterior part of abdomen ×35.

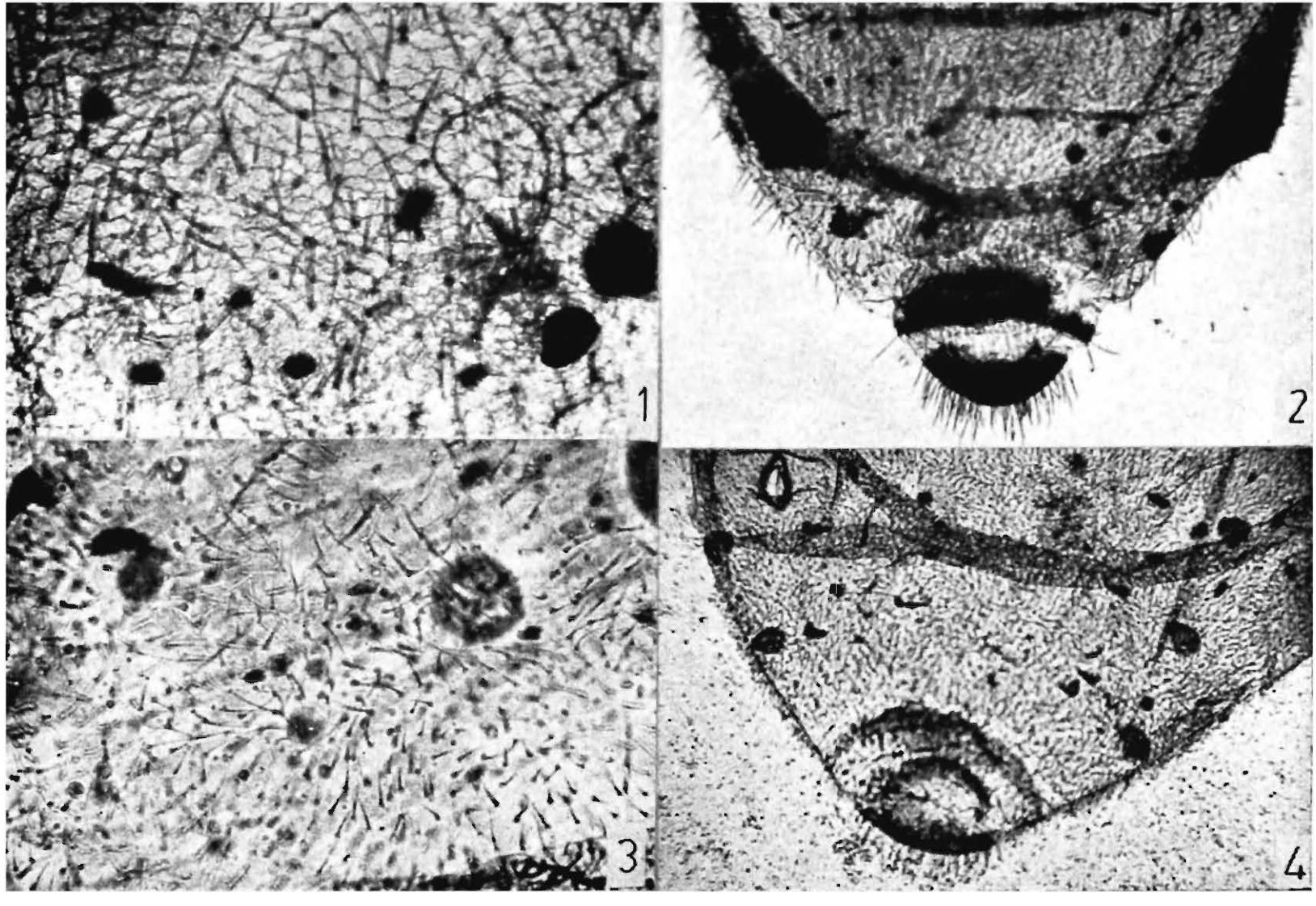
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PLATE 79

Stomaphis mordwilkoi H.R.L.

FIGS. 1. dorsal pattern and siphunculus ×35;

Tuberolachnus saligna (Gmelin)

2. dorsal tubercle ×35

Tuberolachnus sclerata H.R.L. & Basu;

3. ultimate rostral segment ×80,
4. dorsal tubercle ×35.

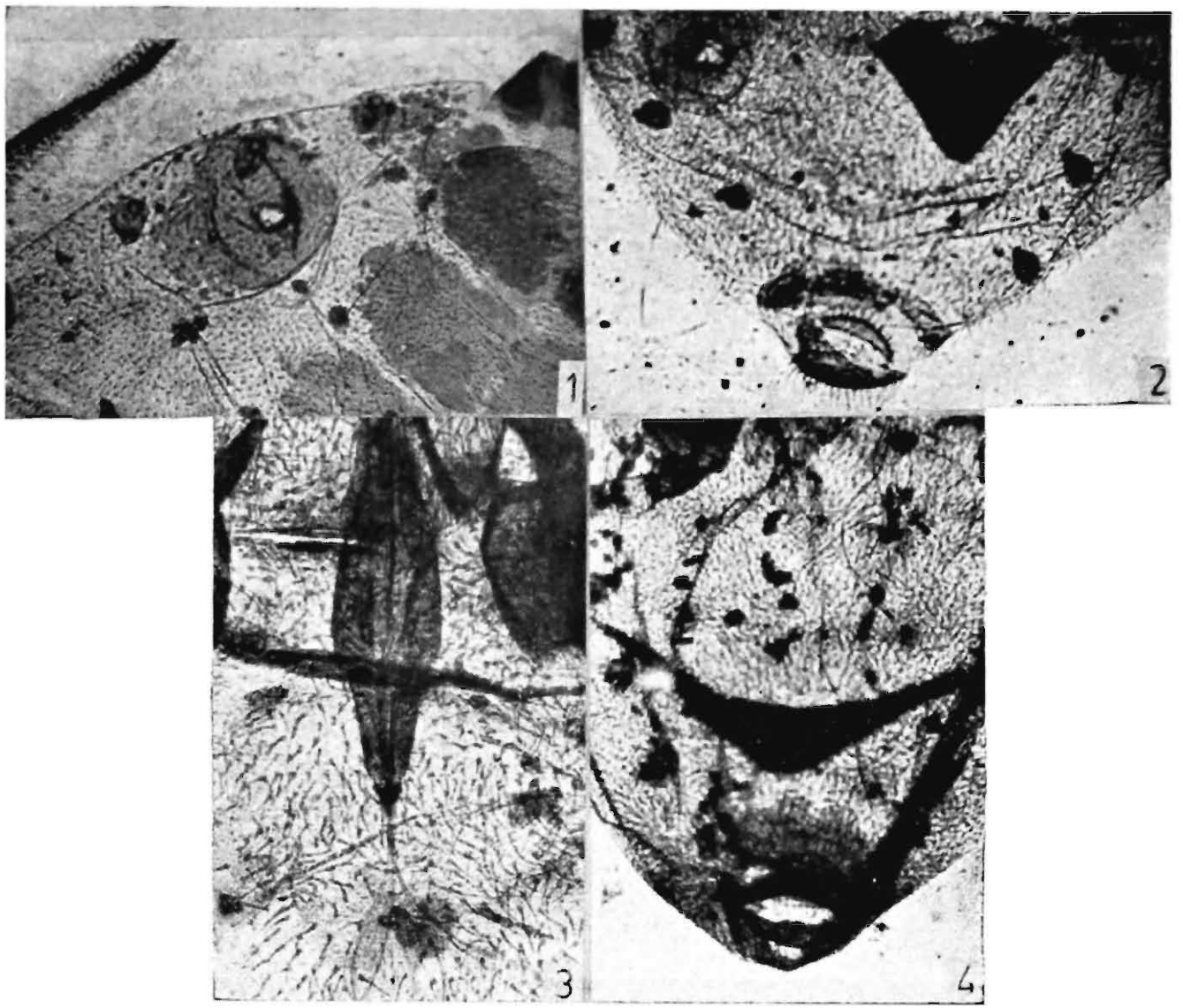
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PLATE 80

Protrama longitarsus sclerodensus Kumar

FIGS. 1. antennal segments V and VI ×80,
2. abdominal dorsum ×100,
3. posterior part of abdomen ×80,
4. part of second segment of hind tarsus ×80.

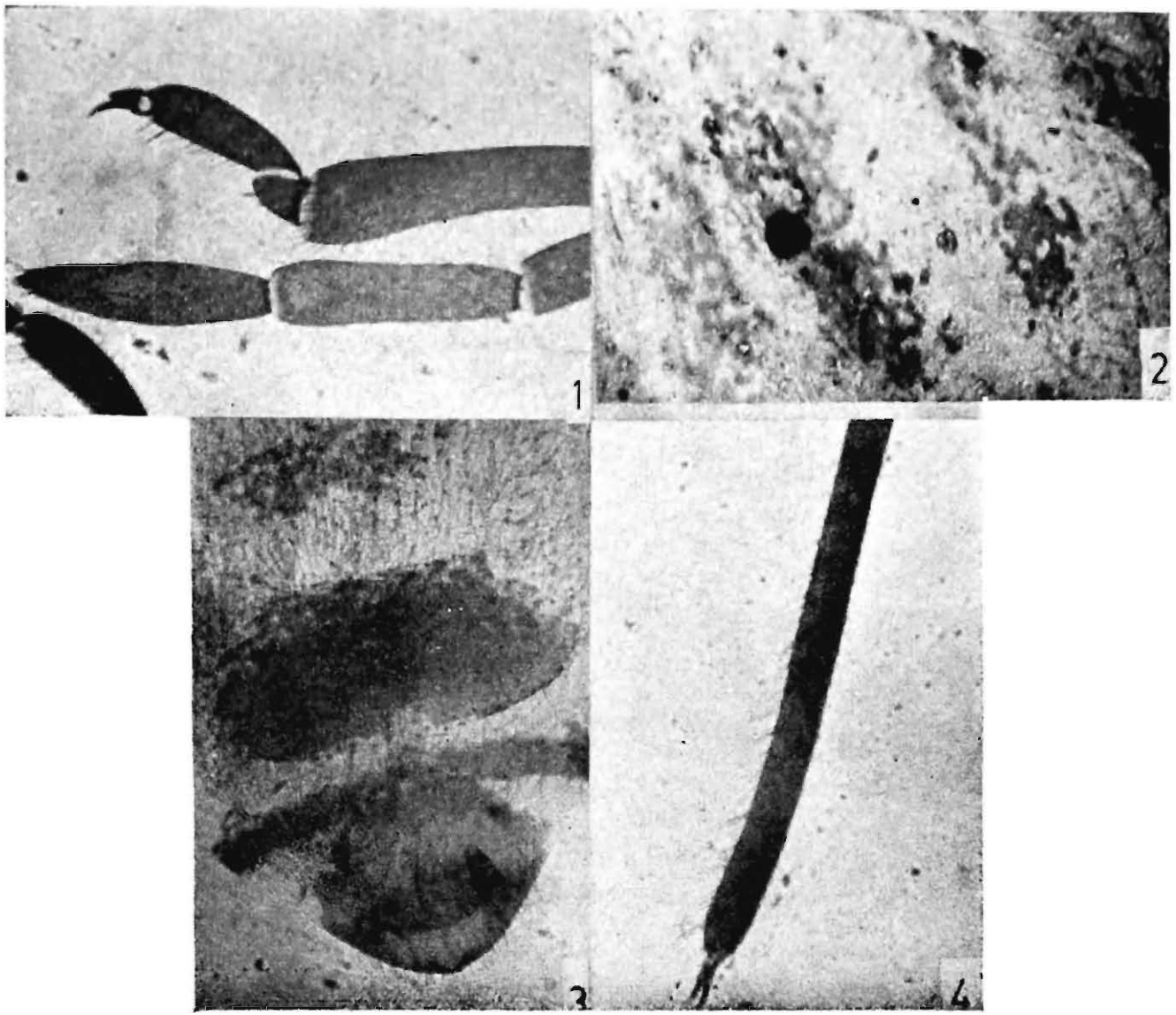
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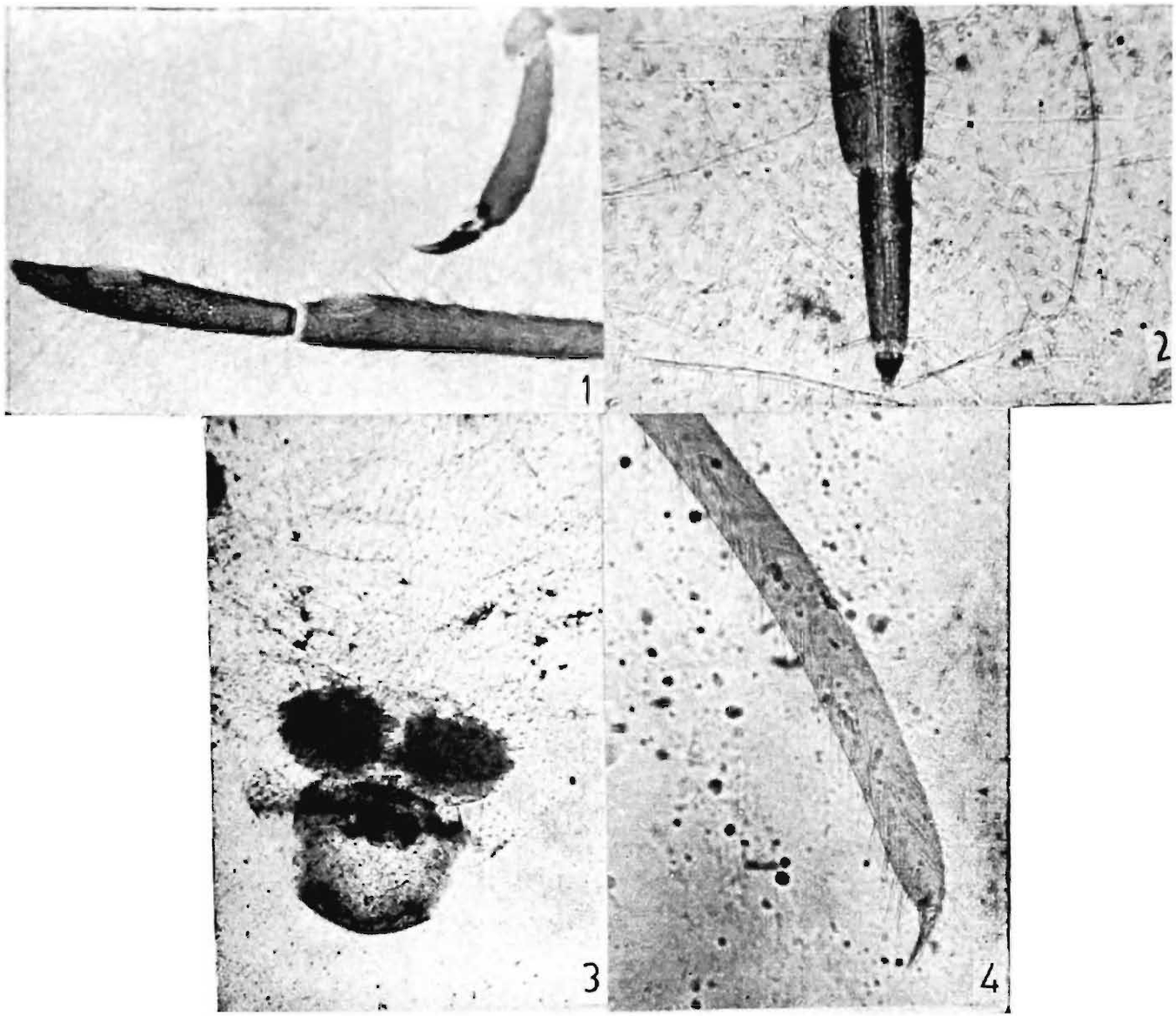
PLATE 81

Protrama penecaeca Stroyan

FIGS. 1. antennal segments V and VI ×80,
2. ultimate rostral segment ×80,
3. posterior part of abdomen ×40,
4. part of second segment of hind tarsus × 80.


1
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3
4

Born in 1938, Dr. A. K. Ghosh has been actively working on Indian Aphidoidea for the last 22 years. After a spell of teaching and research in Calcutta, Dr. Ghosh proceeded to University of Wisconsin, Madison, U.S.A. for higher studies and research in Plant Pathology and Entomology, specially on "long range dispersal of aphid vectors of plant viruses", with a Fulbright grant. After his return in late 1967 he continued his work in the Department of Zoology, University of Calcutta till 1972 and for last 10 years he has been associated with the Zoological Survey of India. Dr. Ghosh published his first book "Aphids of Economic importance in India" in 1975 and started work on "Fauna of India: Aphidoidea" and published the first part in 1980. During the same period he also contributed as an author to the volume entitled "Aphids of North East India and Bhutan" (editor: D. N. Raychudhury) which has been published in 1980. Dr. Ghosh was invited to chair a session and present a paper in the First International Symposium on Evolution and Biosystematics of Aphids held in Jabolonna, near Warsawa, Poland, in 1981. A member of various scientific Societies, he has so far published 116 research papers in India and abroad; besides being the author of three books, he has edited two other books in recent years.