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THE GENUS *ARCOPPIA* (ACARI, ORIBATEI, OPPIIDAE) FROM INDIAN SOILS

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INTRODUCTION

The genus *Arcoppia* Hammer, 1977 is an oppiid mite well distributed in the world and is presently represented in the world by nearly fifty species (Subias and Balogh, 1989). In India the genus was first reported by Sarkar (1984) who recorded *A. bidentata* Hammer, 1979 and *A. rotunda* Hammer, 1979 from Tripura. Later Chakraborty and Bhattacharyya (1992) and Bhattacharyya and Chakraborty (1995) recorded one species *A. meadami* Balogh and Balogh (1986) and one subspecies *A. fenestralis orientalis* Balogh and Balogh (1986) from South district of Tripura. During studies on orbatid mite fauna of India the present authors examined five species of *Arcoppia* from soil samples of different Indian states (*viz.*, Himachal Pradesh, Meghalaya, Tripura and West Bengal), all of which are new to science. In this communication the genus *Arcoppia* from Indian soils is discussed which includes description of five new species and a key for the identification of five new and four known species and subspecies of the genus from Indian soils. All measurements are in micron.

The types of all the new species described here are desposited in the National Zoological Collection of Zoological Survey of India, Calcutta.

Genus *Arcoppia* Hammer

Arcoppia Hammer, 1977. *Biol. Skr. Dan. Vid. Selsk.*, **21** (4) : 32.

The genus *Arcoppia* was described by Hammer (1977) from mountainous soils of Northwest Pakistan with a suggestion to include five species described earlier under the genus *Oppia* and one described species of the genus *Damaeosoma* under *Arcoppia*. Balogh (1983) erected a new subfamily Arcoppiinae under the family Oppiidae Grandjean, 1954 and placed *Arcoppia* under this subfamily. Rodriguez and Subias (1984) reviewed the genus *Arcoppia*. Subias and Balogh (1989) gave a list of 47 valid species of *Arcoppia*, some of which were previously described under the genera *Oppia, Damaeosoma* and *Pletzenoppia*.

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Distribution India, S.E.Asia (Borneo, Hongkong, Java, Pakistan, Philippines, Thailand, Vietnam), Japan, Korea, Spain, Africa, Maruitius and Reunion, South America, Cuba, Australia, New Guinea, Pacific Islands (Fiji, Tonga, Tahiti), New Zealand.

Key to Indian species of the genus *Arcoppia*

1(2) Rostrum not tripartite; dialated part of sensillus without tooth..... *rotunda* Hammer, 1979

2(1) Rostrum tripartite; dialated part of sensillus with or without tooth.

3(5) Sensillus with one branch.

4(13) Sensillus with 3-4 branches.

5(8) Length of the branch of sensillus smaller than or nearly equal to the length of the sensillus.

6(7) Larger species (Length 655); rostral setae very long, upper half strongly curved inward, unilaterally barbed, lamellar setae originating anterior to transcostular arch .... *meghalayensis* sp. nov.

7(6) Smaller species (length 510); rostral setae short, upper half not strongly curved inward, smooth; lamellar setae originating in an area enclosed by transcostular arch .... *sambhui* sp. nov.

8(5) Length of the branch of sensillus larger than that of the sensillus.

9(10) Dialated part of sensillus with two tiny tips or teeth; a light furrow in front of interlamellar setae..... *bidentata* Hammer, 1979

10(9) Dialated part of sensillus without teeth; no light furrow in front of interlamellar setae.

11(12) Costular arch complete, enclose two transverse lines; interlamellar area with four pairs of rounded light spots; notogastral setae long, strong, barbed..... *tripuraensis* sp. nov.

12(11) Costular arch incomplete, no transverse lines; interlamellar area with two pairs of rounded light spots; notogastral setae fine, smooth ..... *meadami* Balogh and Balogh, 1986

13(14) Sensillus with four branches, distance r_1-r_1 shorter than distance *ta-ta*; tooth-like prodorsal projection from bothridium ..... *indica* sp. nov.

14(13) Sensillus with three branches; distance r_1-r_1 shorter than or equal to distance *ta-ta*; no tooth-like prodorsal projection from bothridium.

15(16) Anterior branch of sensillus extremely short; distance between r_1-r_1 shorter than distance *ta-ta*; no enclosed lamellar area, no light spots in interlamellar area. .... *fenestralis orientalis* Balogh and Balogh, 1986

16(15) Anterior branch of sensillus moderately long; distance between r_1-r_1 nearly equal to distance *ta-ta*; costular lines form an enclosed lamellar area; two pairs of light spots at the base of interlamellar area..... *montana* sp. nov.

Arcoppia meghalayensis sp. nov.
(Text Figs. 1-2)

Colour : Brown (Prodorsum dark brown).

Size : Length 655, Width 374.

Prodorsum : Little wider than long, heavily chitinized, darker than the rest of the body. Rostrum tripartite, rostral setae very long (78), strongly curved, emerging from small tubercles, directed first outward then inward, unilaterally barbed for two third of its length, distal part free of such barbs. The rostral setae basally comparatively wide, but gradually becoming fine and ending in a pointed tip, their tips almost touch each other. Length of rostral setae nearly 2.5 times greater than their mutual distance. An arcuate, fine line present at the base of rostral setae. The costular and transcostular arches are joined to form a strongly arcuate band which is very broad and uniformly wide, posteriorly terminating near the bothridial cup on each side. Lamellar setae very short (8), nearly 10 times shorter than rostral setae, fine, directed backward and inward, each lamellar setae originating close to each other from an oval field with distinct margins, the fields not similar to the light spots found in the interlamellar area of its congeners, and positioned in front of the anterior margin of the transcostular band. Mutual distance between lamellar setae x1.5 less than that between rostral setae. Lamellar setae originating nearer to interlamellar setae than to rostral setae, the distance between rostral and lamellar setae being nearly twice the distance between lamellar and interlamellar setae. Interlamellar setae (uprooted, not studied) originating in front of a large light area in the interbothridial region, their mutual distance less than that between rostral setae but little more than the mutual distance between lamellar setae. The sensillus (100) with a dialated, fusiform head which gives out one long, fine branch, the length of the branch being almost equal to that of the sensillus. Exobothridial setae strong, fine, smooth with acutely pointed tip.

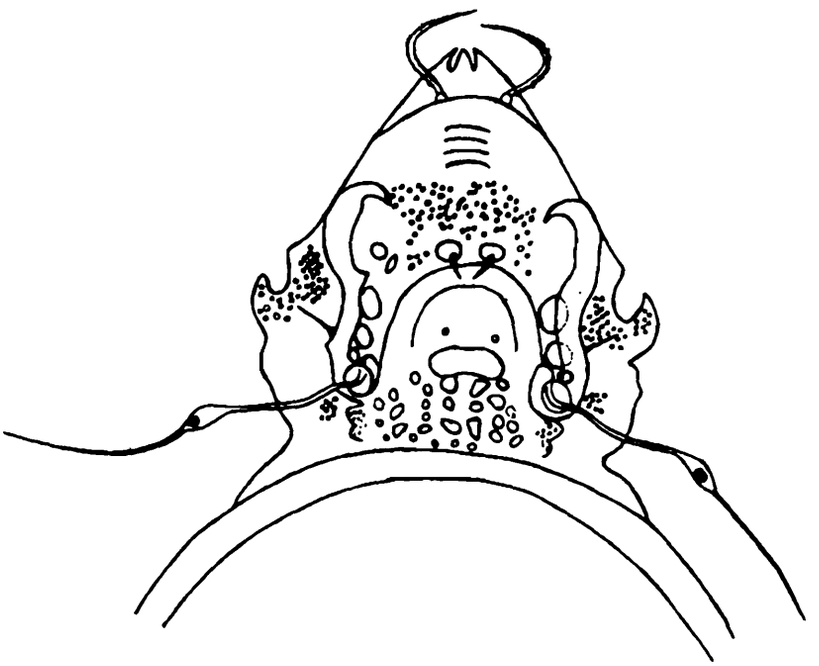

Fig. 1. *Arcoppia meghalayensis* sp. nov. : dorsal aspect.

The prodorsum bears distinct granulate structures scattered at its middle part, above the arcuate transcostular line. Four small, thin, short, slightly convex transverse lines exist in the area behind the fine arcuate line at the base of the rostral setae and anterior to the granulate area. Three light areas are present between the lateral margin of the costular line and the lateral ridge, their size decreasing from anterior to posterior side. The microsculpture at the posterior part of the prodorsum is composed of distinct, small fields of varying size and shape; apparently arranged in several longitudinal rows. The lateral aspect of the basal half of the prodorsum from the base of leg I to the anterior margin of notogaster is sculptured with prominent granules. A small chitinized area showing minute granules exists immediately below the bothridial cup.

Notogaster : The notogastral shield of the holotype badly damaged, so could not be studied.

Epimeral region : Epimeral region shows some complexity. The area between the tip of infracapitulum and ep_2 appears to be darker than the rest part of the ventral side due to comparatively stronger chitinization. ep_2 appears to be partly covered by a chitinized shield which overlaps the lower, less chitinized epimeral area. Plates of ep_1 incompletely separated from each other, ep_3 and ep_4 fused together. A pair of chitinized tooth-like projection exists at the antero-medial aspect of ep_2. Epimeral setal formula 3-1-2-3, all epimeral setae minute, smooth. The epimeral plates with distinct reticulation on their surface, the margin of each reticulated field very prominent and strong, especially on ep_4.

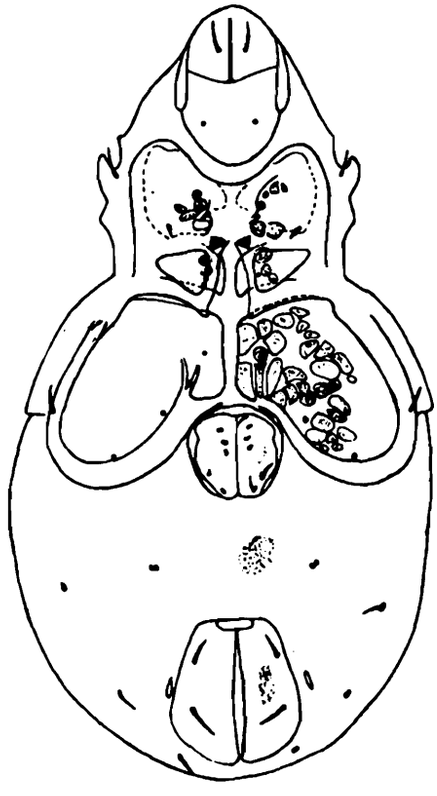

Fig. 2. *Arcoppia meghalayensis* sp. nov. : ventral aspect.

Anogenital region : Genital aperture as long as broad. Genital setae six pairs, minute (7-9). Genital plate finely punctate. There are two thickened areas on the anterolateral and posterolateral aspect of each genital plate. Anal aperture as long as broad, tapering slightly towards its anterior aspect. Anal setae smooth, thin, with finely pointed tip. Anal plate finely punctate. Adanal setae three pairs, ad_3 preanal, ad_2 paranal and ad_1 postanal. All adanal setae smaller than anal setae. Fissure *iad* lying close to the lateral margin of anal aperture, being parallel to it. Ventral plate showing fine punctation.

Legs : Monodactylous.

Holotype : Adult female, INDIA : East Garo Hills : Meghalaya : Rongnil, 8.x.1988, from litter and soil, coll. B.J. Sarkar.

Paratypes : Two females, data same as holotype.

Remarks : The new species from Meghalaya can be included in the species group of *Arcoppia* having a single branch of the sensillus. This group includes species like *bidentata* Hammer, 1979, *corniculifera* (Mahunka, 1978), *dissimile* (Berlese, 1905), *grucheti* (Mahunka, 1978), *incerta* Balogh and Balogh, 1983, *kaindicola* Balogh and Balogh, 1986, *meadami* Balogh and Balogh, 1986, *praearcuata* Balogh and Balogh, 1986, *robustior* (Berlese, 1913), *rotunda* Hammer, 1979, *viperea* (Aoki, 1959), etc. Besides, it resembles species of *Arcoppia* like *brachyramosa* Hammer, 1977, *corniculifera* (Mahunka, 1978), *fenestralis* (Wallwork, 1961), *perqeli* Mahunka, 1982, *tuberosa* Mahunka, 1988, *varia* Hammer, 1979, etc. due to the presence of tuberculate microsculpture at the base of the prodorsum. However, the new species can be distinguished from the above species mainly due to the presence of very large rostral setae with its upper half strongly curved inward so that their tips meet each other; the area anterior to lamellar setae showing prominent tubercles; lamellar setae originating anterior to transcostular line and not behind it as in other *Arcoppia* species; and epimere II partly covered by a chitinized shield.

Some characters in the new species, specially the presence of lamellar setae anterior to the transcoustlar line and prominent tubercles in front of lamellar setae are very peculiar which may be worth creating a seperate supra-species category for this species. But it is felt at present that more specimens with similar character combinations have to be examined before suggesting creation of a new taxa on the basis of these characters.

Arcoppia tripuraensis sp. nov.

(Text Figs. 3-6)

Colour : Brown.

Size : Length 404, Width 235.

Prodorsum : Rostrum tripartite. Rostral setae (28) twice as long as their mutual distance (14), smooth, thin, directed forward, curved outward at the basal half then inward at the upper half. A thin, short line joins the base of the rostral setae. The distinct costular line is broad, well chitinized, extend posteriorly upto half way between costular and transcostular setae. Anteriorly

the costular lines converge inwards and are joined by a short, slightly thinner and less chitinized transcostular line. A faint arcuate line exists anterior to the transcostular line. Lamellar setae originate very colse to the inner border of the costular line, slightly below the point where costular line meets the transcostula. Lamellar setae (21) smooth, thin, directed forward being curved outward at the basal half then inward at the upper half, smaller than their mutual distance (26). Interlamellar setae (44) longest of all prodorsal setae, smooth and longer than their mutual distance (35), originate lateral to the light areas, sensillus (54) with a moderately long stalk and a dialated head which gives out a long, setiform branch. The branch (63) is longer than the sensillus. Three faint rounded pseudoscales exist adjacent to the upper margin of the sensillus in a linear arrangement.

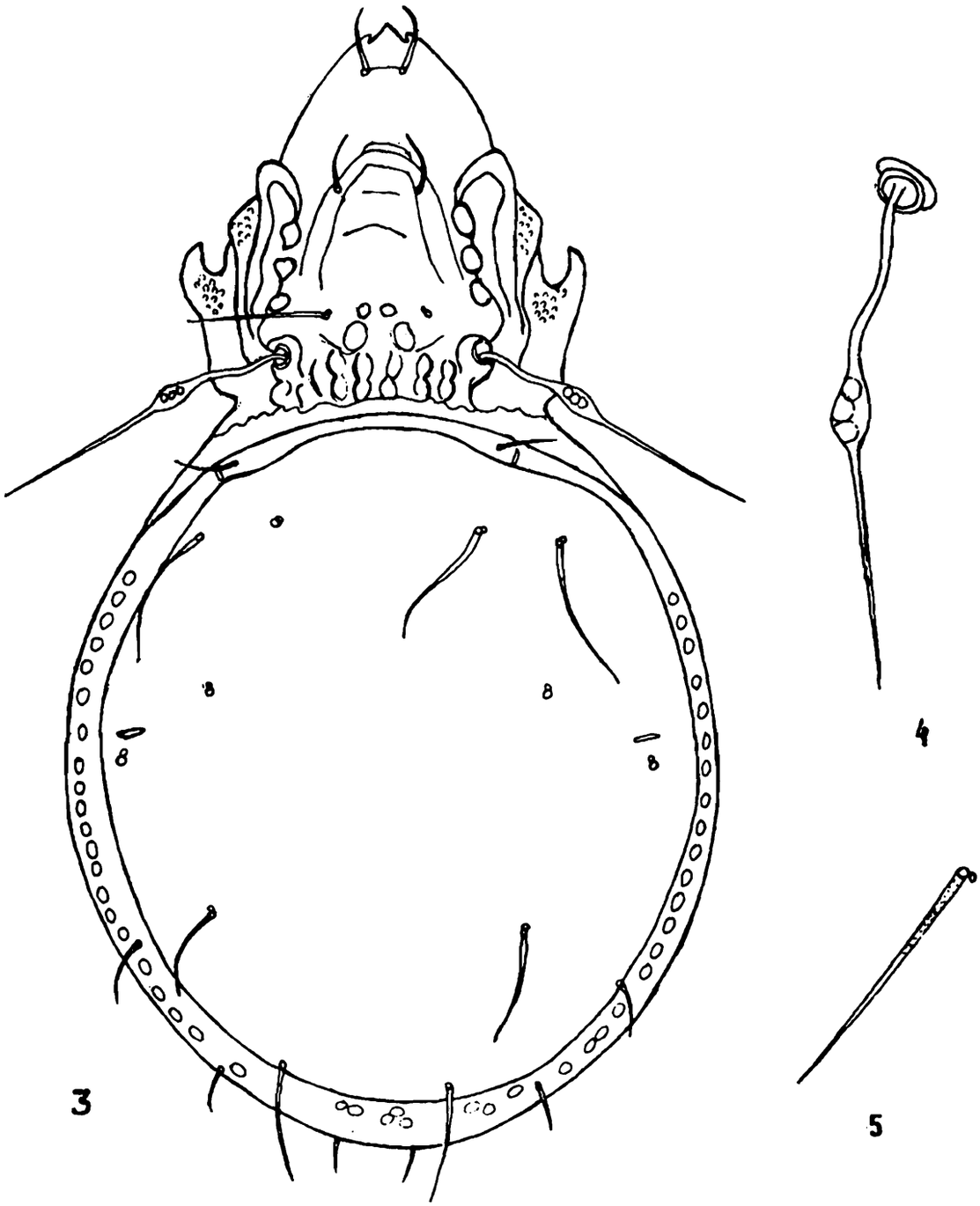

Fig. 3-5. *Arcoppia tripuraensis* sp. nov. : 3, dorsal aspect; 4, sensillus; 5, notogastral seta.

The prodorsum shows two prominent transverse lines in the area enclosed by the costular line, the lower one is slightly curved. Two pairs of light areas observed in between the interlamellar setae. Two faint curved diagonal streaks touch the lower large light area. The basal part of the prodorsum immediately above the dorsosejugal suture shows few rounded, tuberculate microsculptures, arranged in four rows. The field between the lateral ridge and lateral margin of prodorsum covered with granules. There are three light areas of almost equal size arranged vertically in the area between the lateral ridge and lamellar line.

Notogaster : Oval in shape with 10 pairs of setae (some of which uprooted, not studied) and broad chitinous band along the entire margin of the notogaster. Notogastral setae long, thin and slightly barbed on their outer margin. Setae *ti, te* being longer than the other observable setae. The mutual distance of notogastrical setae is greatest between *ms-ms* (127) followed by r_2-r_2 (117), *ta-ta* (82), *ti-ti* (70). There are some small oval-shaped markings along the lateral and posterior margin of the notogaster.

Epimeral region : All apodemes are thick and irregular, (ep_1) more thickened medially, irregular shaped and with six radiating corners. There are small nodulous structures on the ventral plate at the posterolateral aspect of ep_4. Epimeral plates show light areas of irregular shape. Epimeral setal formula 3-1-2-3. All epimeral setae smooth.

Anogenital region : Genital plate nearly as long as broad with six pairs of small, smooth genital setae. Each genital plate with a thickened margin at its anterolateral aspect, setae g_1 originating from this thickened area. Anal plate little longer than broad, oval, setae smooth, long (14). Adanal setae 3 pairs, long (12-16) and smooth. ad_3 preanal, ad_2 paranal and ad_1 postanal. Fissure *iad* situated close to the lateral margin of anal aperture, lying parallel to the slightly anteriorly tapering lateral margin of anal field.

Legs : Monodactylous.

Holotype : Adult female, INDIA : Tripura : Karbuk (Amarpur) : 5 km south of Patichari, 4.iii.1992, from soil with decomposed leaves, coll. S. Saha.

Paratypes : 1 female, data same as holotype; 2 females, Tripura : Jolaibari (Belonia), 4.vii.1993, from soil with decomposed leaves below shrub, coll. S. Saha

Remarks : The new species from Tripura shows affinity with the species of *Arcoppia* having single branch of sensillus, and also with some other species showing tuberculate microsculpture on the prodorsum (see Remarks after *A. meghalayensis* sp. nov.). But it differs from other species in the shape of sensillus. The new species shows some similarities with *A. arcualis* (Berl., 1913) in having tripartite rostrum, in the shape of costular and transcostular line and interlamellar setae, presence of 2 pairs of light areas and slightly unilaterally barbed notogastral setae. But the new species differs from *A. arcualis* by the presence of smooth rostral and lamellar setae, a line joining the bases of rostral setae, a faint concave line in front of transcostular line, a pair of transverse line in the area enclosed by costular line, three light areas in the space between the lateral line and costular line and prominent tuberculate microsculpture. The sensillus is single branched in the new species, but in *A. arcualis* the sensillus is with two branches. Moreover, the dorso-sejugal suture is more or less straight in *A. arcualis* but it is concave in the new species, setae

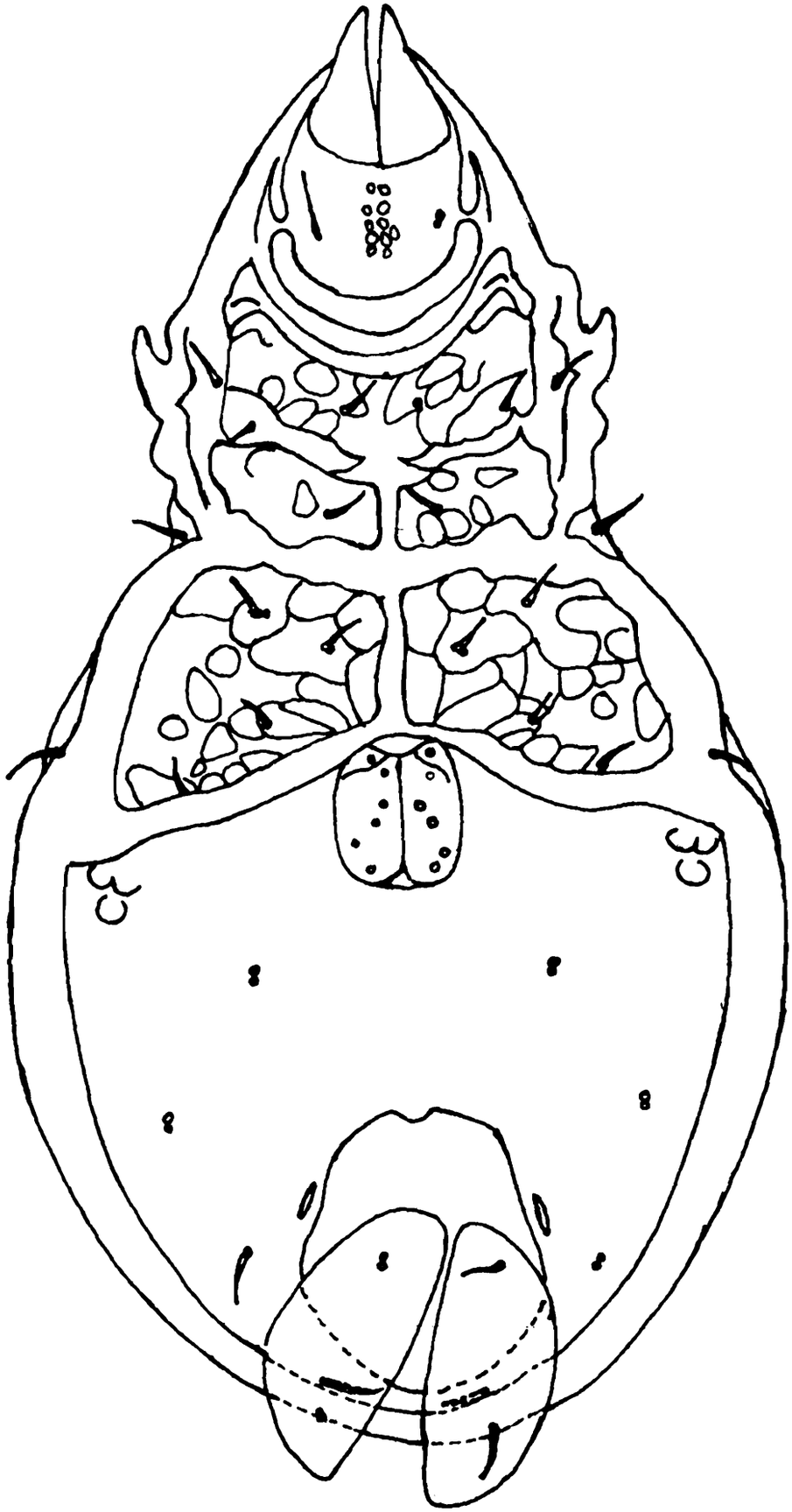

Fig. 6. *Arcoppia tripuraensis* sp. nov. : ventral aspect.

p_3 and p_2 exist more or less parallely in the new species, but r_2 exists posterolateral to p_3 in *A. arcualis*.

Arcoppia sambhui sp. nov.
(Text Figs. 7-8)

Colour : Yellowish brown.

Size : Length 510, Width 270.

Prodorsum : Prodorsum longer than wide. Rostrum tripartite, rostral setae (37) thin with finely pointed tip, surface of rostral setae smooth, the setae originating from small tubercles situated immediately in front of a thin, arcuate line and directed forward, their tips curved inward. Mutual distance between rostral setae is little less than their length. The costular line is uniformly broad, distinct, extending posteriorly upto halfway between lamellar and interlamellar setae. Anteriotly it is directed medially joining the transcostula which is as broad as the costula. Lamellar setae (22) shortest of all prodorsal setae except exobothridial setae. Lamellar setae originate inside the transcostular arch, being located close to the point where costular line meets the transcostular line. Lamellar setae curved anteromedially, their tips touching each other. Interlamellar setae very long (62), x1.7 as long as rostral setae and x3 as long as lamellar setae, fine with finely pointed apical part, extended posteriorad beyond the anterior margin of the notogaster, its apex reaching beyond the origin of setae *ta*. The sensillus (78) with a slightly thickened, fusiform head which give out a single branch (59) with finely pointed tip. The length of the branch is less than the length of the sensillus. Three faint, rounded pseudoscales are observed in the thickened head of the sensillus.

The anterior half of the prodorsum is devoid of any granulate structure. The prodorsum, however, shows some faint, short, curved transverse lines on a punctated field midway between the origin of lamellar and interlamellar setae. A pair of faint rounded 'light spots' present in the area between the bases of interlamellar setae. The lateral margin of the basal half of prodorsum, between base of leg I and anterior margin of notogaster, covered with granulations which are often attached to one another so that each granule cannot be distinctly identified. The basal part of prodorsum immediately above anterior margin of notogaster shows microsculpture of rounded nature, the rounded areas being scattered on a punctated field.

Notogaster : Notogaster oval, longer than broad, with a distinct, broad chitinous band along the entire margin of the notogaster. Notogastral setae 10 pairs, thin, smooth, with finely pointed apex. the arrangement of the notogastral setae generally conforms the type found in other species of *Arcoppia*. Among the middle row of setae r_2-r_2 has the greatest mutual distance (157) followed in order by *ta-ta* and *ms-ms* (both 114), r_1-r_1 (107), *ti-ti* (81) and p_1-p_1 (8). Fissure *ia* situated near seta *ta* immediately behind the broad anterior margin of the notogaster, *im* above r_3 and *ip* midway between p_1 and p_2. The notogaster shows fine punctation on the whole surface.

Epimeral region : Epimeral plates of epimere I incompletely separated from one another and also with ep_1, ep_3 and ep_4 fused together. Epimeral setal formula 3-1-2-3. All epimeral setae smooth,

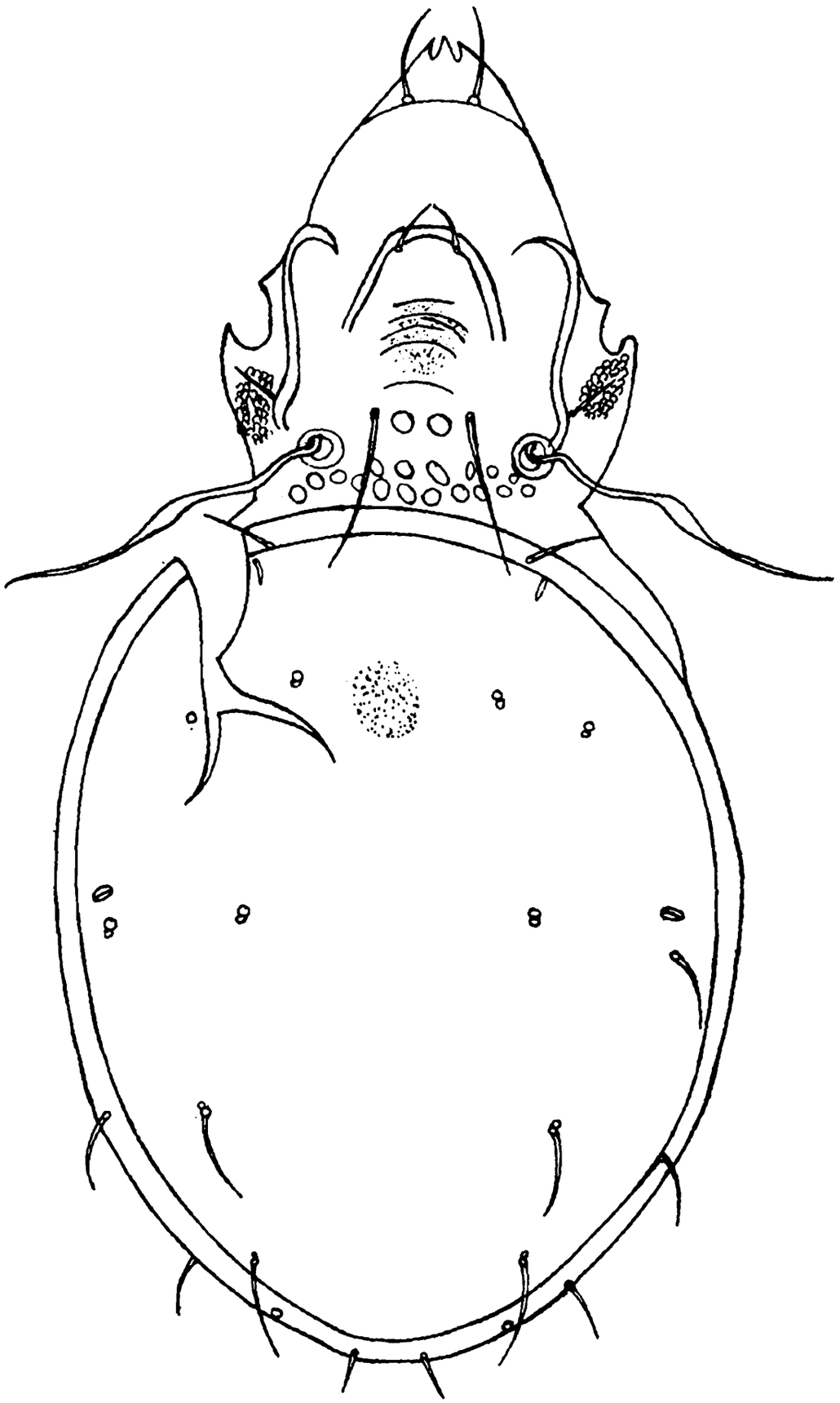

Fig. 7. *Arcoppia sambhui* sp. nov. : dorsal aspect.

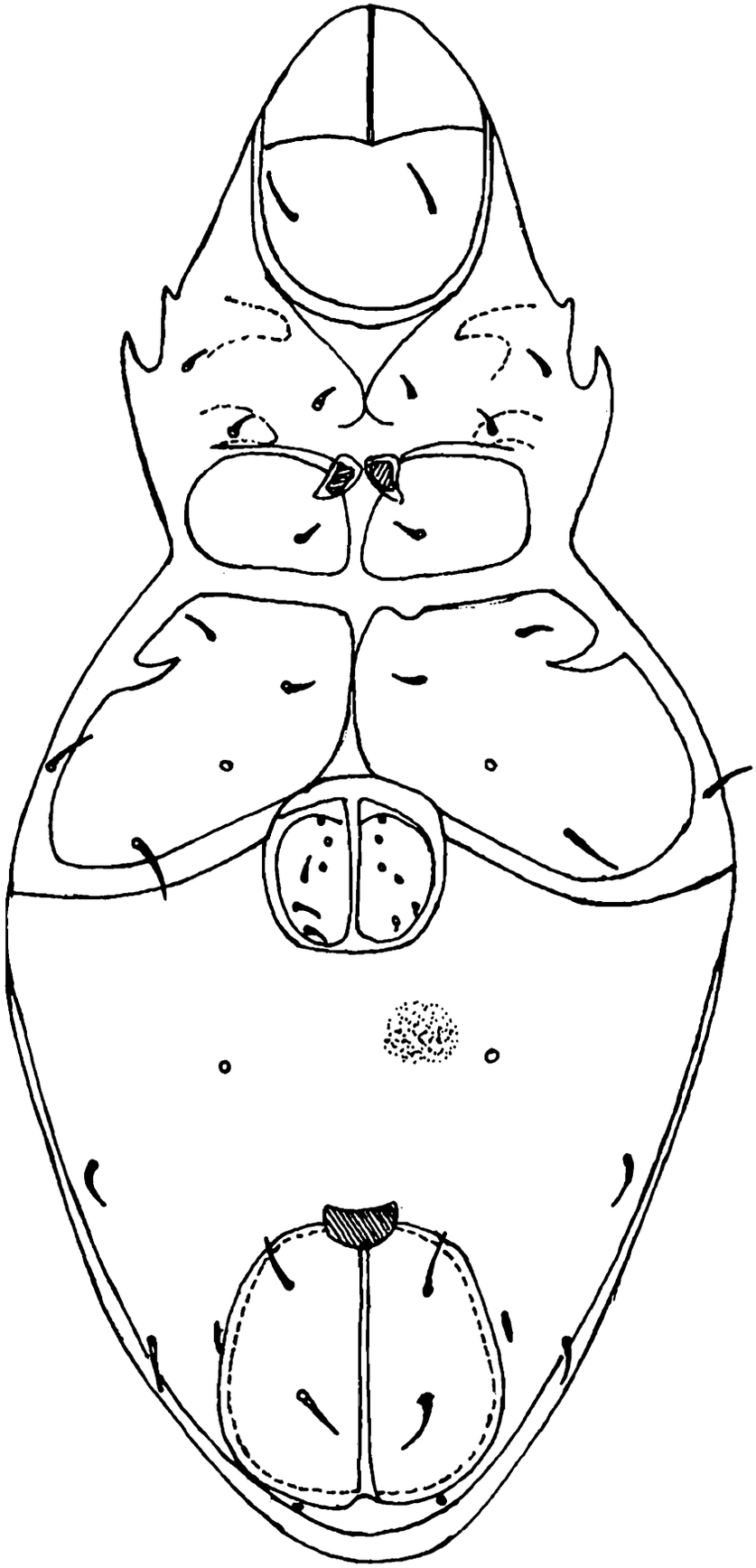

Fig. 8. *Arcoppia sambhui* sp. nov. : ventral aspect.

short (except *4b*), strong. At the anteromedial aspect of ep_3 a pair of triangular area, each housing a dark chitinized tooth, can be observed. Epimeral plates I-IV without any light area or other sculpture.

Anogenital region : Genital aperture nearly as long as broad. Genital plate with 6 pairs of genital setae which are very short (4-5.5) and smooth. The anal aperture is little more broad than long, anal setae (15-18) thin, an_1 only little longer than an_2. Anal plate showing fine punctations. Adanal setae located close to the posterolateral margin, ad_2 situated halfway between ad_1 and ad_3. Adanal setae shorter than anal setae, all adanal setae equally long (13), fine and smooth, ad_3 preanal in position, ad_2 paranal and ad_1 postanal. Fissure *iad* lying parallel to the lateral margin of anal field.

Legs : Monodactylous.

Holotype : Adult female, INDIA : West Bengal : South 24-Parganas : Mathurapur, 15.vii.1992, from soil at 10-15 cm depth, coll. Sambhu N. Chakraborty.

Paratypes : One female, data same as holotype.

Remarks : The new species from West Bengal shows affinity with the species of *Arcoppia* having single branch of the sensillus and also with some other species showing tuberculate microsculpture on the basal aspect of the prodorsum (see remarks after *A. meghalayensis* sp. nov.). However, the shape of the sensillus of the new species, especially the head, differs from that in other species except *A. kaindicola* Balogh and Balogh, 1986 which again differs from the new species in the length of interlamellar setae and in the absence of prodorsal microsculpture in *kaindicola*. The new species also shows some similarity with *A. corniculifera* (Mahunka, 1978) in having long interlamellar setae extending posteriorad beyond the anterior margin of notogaster, shape of costular and transcostular line, type of rostral setae, etc. But the new species differs from *corniculifera* in the nature of prodorsal tuberculate microsculpture, nature of head of sensillus and arrangement of some notogastral setae, especially in their relative position i.e. p_2 and p_3 originating posterolateral to r_2 and r_3 respectively.

Arcoppia montana sp. nov.
(Text figs. 9-10)

Colour : Brown.

Size : Length 327, Width 263.

Prodorsum : Rostrum tripartite. Rostral setae originating from small tubercles situated on a thin arcuate line at the anterior part of the prodorsum. Rostral setae (28) less than twice their mutual distance (18), directed forward being curved outward at the basal half, then inward at the upper half. The rostral setae appear smooth, at best with faintly rough surface, but not barbed. The faint costular lines are first diverging a little outward at the basal part then converging at the upper half to meet the transcostula which is a straight, horizontal band. The two costular lines are joined by a very faint line at their bases, thus forming a somewhat enclosed lamellar area. Lamellar setae (uprooted, not studied) originating close to the lower margin of the transcostula, with the same

mutual distance as between rostral setae. Interlamellar setae (uprooted, not studied) originating from 'light spots' and having a smaller mutual distance (13). Sensillus with a flat, dialated head which give out three asymmetrical branches, the lowermost branch longest and the uppermost branch shortest. The longest branch (35) having nearly the same length as that of the sensillus (33). Exobothridial setae setiform, smooth, short (14), directed outward and lateriorad. Exobothridial region finely granulate.

Only two pairs of faint 'light spots' are seen at the base of interlamellar setae, the setae originating from the larger, upper pair. The area between costular line and lateral ridge showing few pairs of rounded 'light spots' The basal part of prodorsum, immediately above the anterior margin of notogaster, shows a microsculpture of tubercles of different shape.

Notogaster : Notogaster oval in shape, with a broad, chitinous band along the entire margin of notogaster except at the anteriormost part between the base of seta *ta*. Notogastral setae 10 pairs (of which some are uprooted, recognised only by their alveoli), setiform, short, smooth. None of the notogastral setae reach the origin of the next row of setae. Length of notogastral setae varies between 12-18. Mutual distance of notogastral setae greatest between *ms-ms* (77), followed in decreasing order by r_2-r_2 (76), r_1-r_1 (70), *ta-ta* (68), *ti-ti* (65) and p_1-p_1 (26). Fissure *ia* situated below seta *ta*, *im* above r_3 and *ip* between p_1 and p_2.

Epimeral region : Each plate of ep_1 and ep_2 incompletely separated from each other. ep_3 and ep_4 fused together. The epimeral plates show faint light spots of irregular shape and size. Epimeral setal formula 3-1-2-3. All epimeral setae minute, smooth, setae on ep_2 arising from light spots.

Anogenital region : Genital aperture nearly as long as broad. Genital setae 6 pairs, minute, smooth. A distinct, small, band like structure present at the anterior part of genital plate. Aggenital setae a little longer than genital setae, smooth. Anal plate little longer than broad, anal setae smooth, long (12) but shorter than ad_3 and ad_2. Fissure *iad* parallel to the anal field. 3 pairs of adanal setae which are long, smooth, ad_3 and ad_2 having twice the length of aggential setae, ad_1 minute. Setae ad_3 preanal, ad_2 situated lateral to the lower end of *iad*, ad_1 postanal.

Legs. : Monodactylous.

Holotype : Adult female, INDIA : Himachal Pradesh : Kangra District : 7 km. north of Binwa, 2500 m., 30.v.1990, from litter and soil under Oak (*Quercus* sp.), coll. D. Sengupta.

Paratype : One female, data same as holotype.

Remarks : The new species from Himachal Pradesh belongs to the species-group of *Arcoppia* having three branches of the sensillus. It shows closest resemblance with *A. brachyramosa* Hammer, 1977 mainly in the features like tripartite rostrum; thin, convex and transverse line at the base of rostral setae; 3-branched sensillus; nature of costular and transcostular line and tuberculate microsculpture at the base of prodorsum. But *A. montana* sp. nov. can be distinctly separated from *A. brachyramosa* on the basis of following characters : rostral setae without barb, their length less than twice their mutual distance; lamellar setae having the same mutual distance as between rostral setae; head of sensillus with distinctly asymmetrical branches, the longest branch having nearly the same length as that of the sensillus; nature of microsculpture at the base of

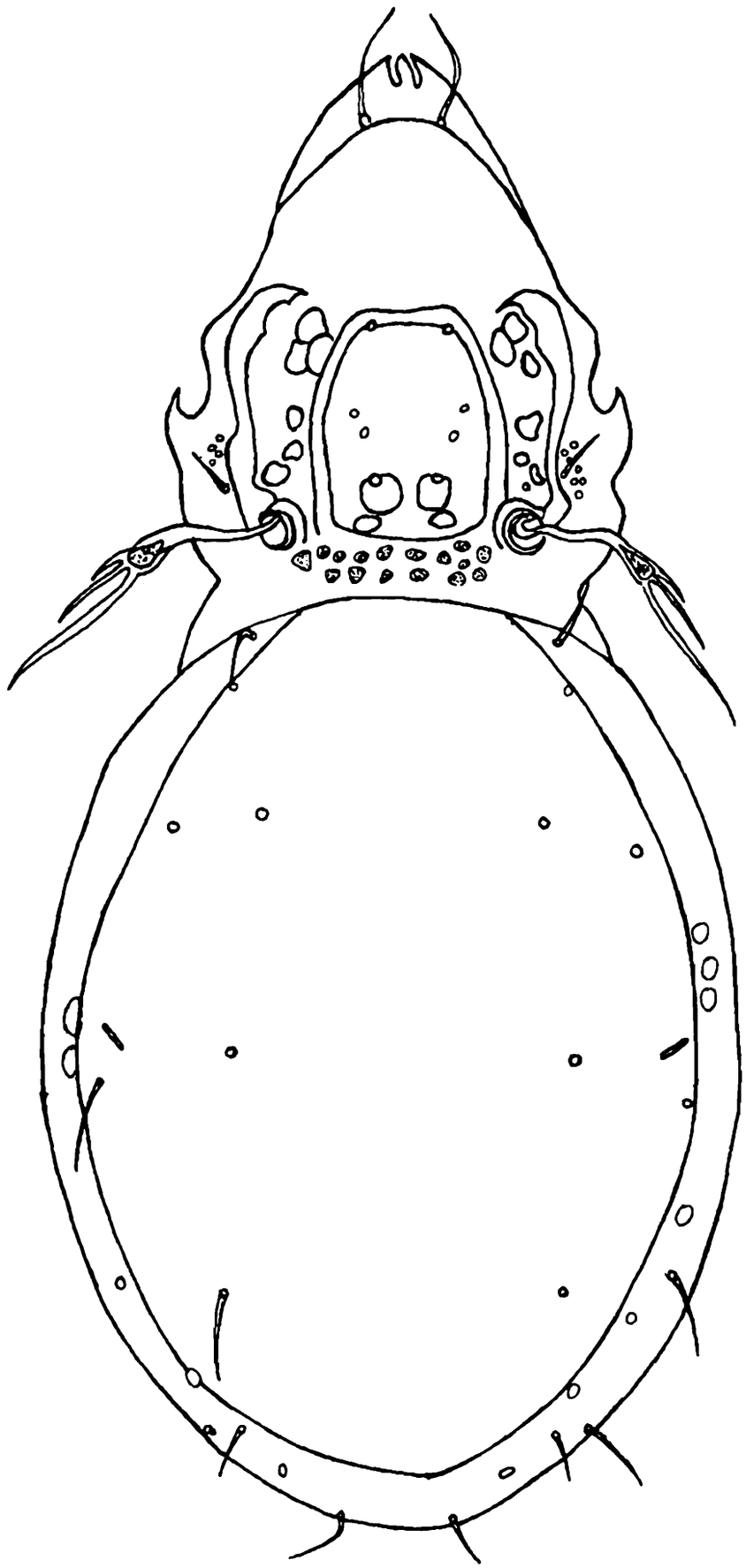

Fig. 9. *Arcoppia montana* sp. nov. : dorsal aspect.

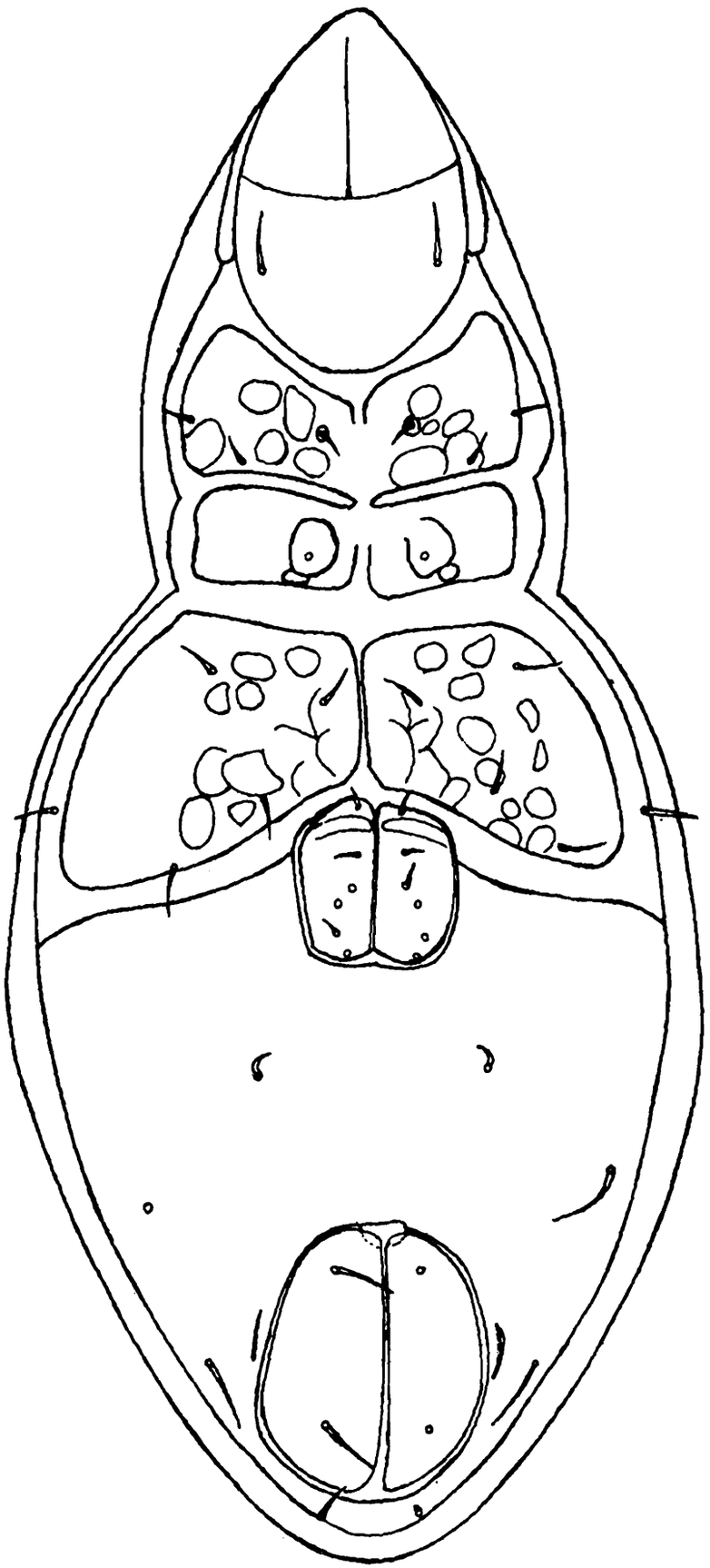

Fig. 10. *Arcoppia montana* sp. nov. : ventral aspect.

prodorsum different; anterior border of notogaster without chitinous band but lateral and posterior parts with prominent band; shorter notogastral setae which are devoid of barbs; small chitinous band at the anterior aspect of genital plate; epimeral, aggential, anal and adanal setae smooth.

Arcoppia indica sp. nov.
(Text Figs. 11-12)

Colour : Yellowish brown.

Size : Length 292, Width 144.

Prodorsum : Rostrum tripartite. Rostral setae originating from small tubercles situated on a thin, arcuate line at the anterior part of the prodorsum. Rostral setae (21) long, thin, smooth, less than twice their mutual distance (16), directed forward being curved outward at the basal half, then inward at the upper half. The costular lines are distinct which originate from the bothridium and converge anteriorly to join the prominent horizontal transcostular band. A thin, concave line exists in front of the anterior border of transcostula. A faint, broken line joins the basal part of the costular lines and extends between the bothridia, thus forming an enclosed area on the prodorsum. The lamellar setae (uprooted, not studied) originating close to the posterior border of transcostula with slightly greater mutual distance (18) than that of rostral setae. The interlamellar setae (16) thin, smooth, shorter than their mutual distance (28). Sensillus with a flat, dialated head beset with pseudoscales and with four distal branches (one paratype shows five distal branches). The length of the branches gradually increases from anterior to posterior aspect, measuring18-25. The larger branch (25) is shorter than the length of the stalk of the sensillus (30).

A pair of light areas are found near the base of each interlamellar setae. Two broad tooth like prodorsal projections exist below the bothridia, their tips facing the lower border of the bothridium, the latter with some posteriorly directed processes. There are three large light spots in the area between lamellar line and lateral ridge on each side. The integument on the lateral aspect of the basal half of the prodorsum shows conspicuous, chitinous, ribbon like microsculptures which touch the dorsosejugal suture and are alternately short and long.

Notogaster : Oval in shape, devoid of any microsculpture, with 10 pairs of setae (some of which were uprooted and could not be seen) and broad chitinous band along the entire margin of the notogaster. Notogastral setae moderately long (9-23), simple, very thin and finely pointed at the tip. The distance between *ms-ms* (84) is greatest, followed in decreasing order by r_2-r_2 (80), *ta-ta* (70), *ti-ti* (61), r_1-r_1 (54) and p_1-p_1 (16). Fissure *ia* situated below *ta, im* between *ms* and r_3 and *ip* between p_1 and p_2.

Epimeral region : Each half of epimere incompletely separated from the other, ep_2 completely separated from each other, ep_3 and ep_4 fused together. Epimeral setal formula 3-1-3-3. The epimeral plates show faint light spots of irregular shape and size. All epimeral setae smooth.

Anogenital region : Genital plate as long as broad (28). There are 6 pairs of smooth and short (7) genital setae. 3 pairs of adanal setae (ad_1-4.5, ad_2-9 and ad_3-14), smooth. ad_2 located nearer

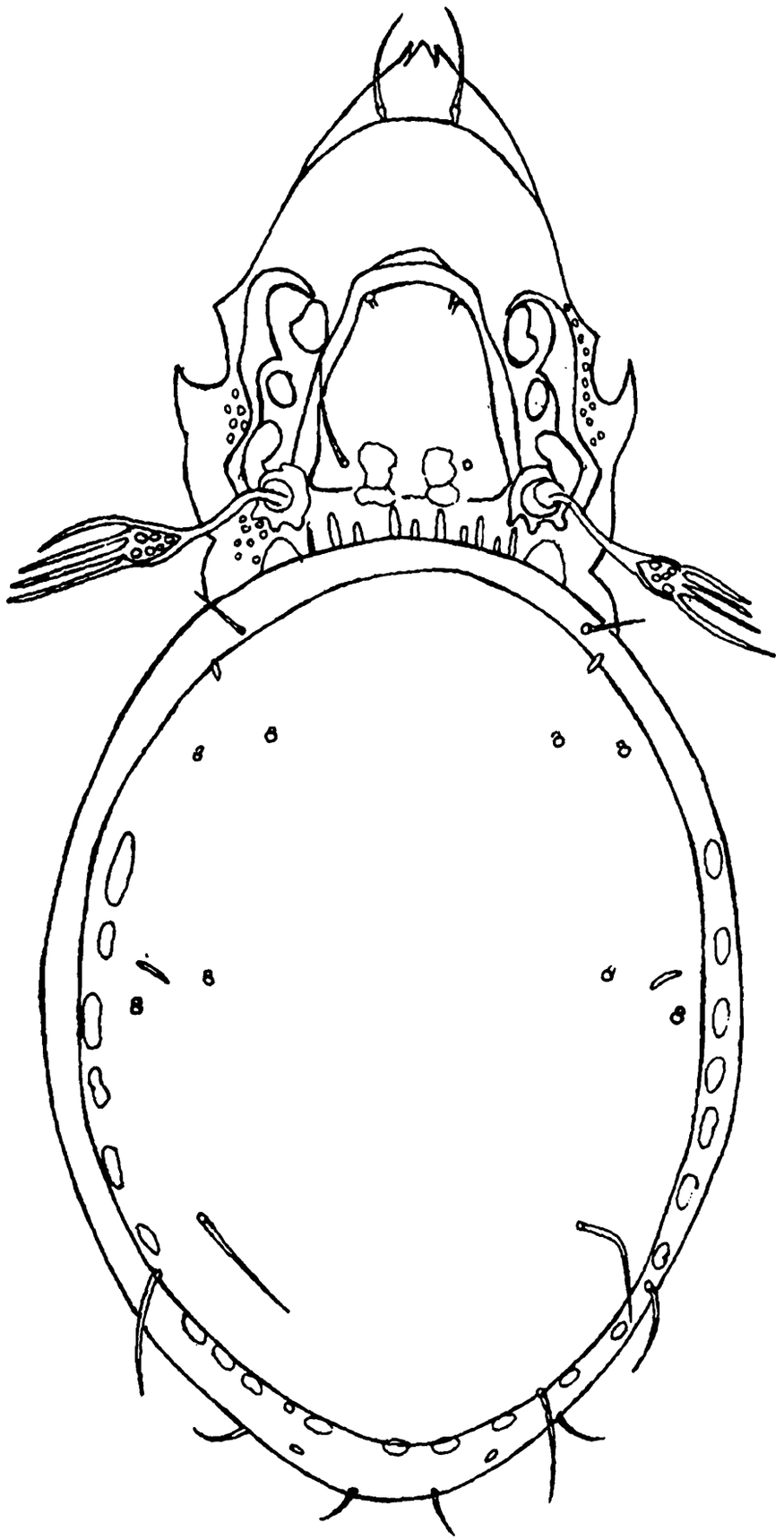

Fig. 11. *Arcoppia indica* sp. nov. : dorsal aspect.

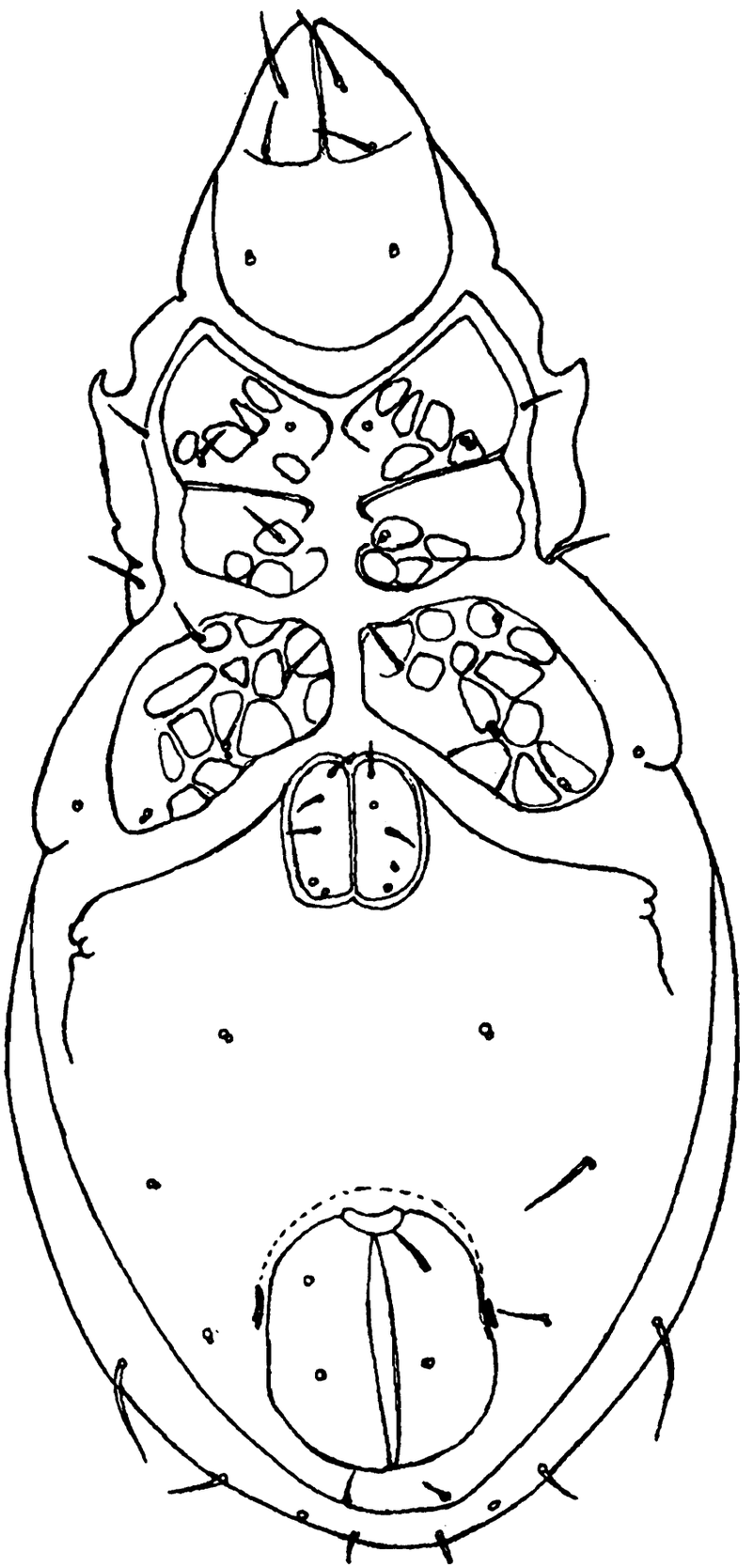

Fig. 12. *Arcoppia indica* sp. nov. : ventral aspect.

to ad_3 than to ad_1, ad_1 postanal, ad_2 paranal and ad_3 preanal. Anal plate little longer than broad, anal setae smooth, fine, shorter (9) than both ad_3 and ad_2. Fissure *iad* paranal, located very close to lateral margin of anal aperture.

Legs : Monodactylous.

Holotype : Adult female, INDIA : Tripura : Rang Kang, 5 km towards Natunbazar from Amarpur, 4.ii.1992, from decomposed leaves beside paddy fields, coll. S. Saha.

Paratypes : 5 females, data same as holotype.

Remarks : The new species closely resembles *A. vittata* Hammer, 1979 in the presence of sensillus with flat head having four branches, shape and position of notogastral setae and position of fissure *ia* and *im*. But the new species can easily be distinguished from Hammer's species by the presence of a faint line at the anterior of transcostula, the head of the sensillus beset with pseudoscales and four distal branches which are gradually increasing in length, two tooth like prodorsal projections opposite the posterior margin of bothridium, posterior margin of bothridial cup with three projections in new species. Further in the new species the posterior half of the prodorsum with fine, prominent granules. In *vittata*, there are four short conspicuous chitinous ribbons between the pseudostigmata, but in the new species, there are about ten such structures of two types, long and short, which are alternately arranged.

SUMMARY

The genus *Arcoppia* Hammer, 1977 from Indian soils is discussed in this paper. Five new species, *viz.*, *A. meghalayensis* (Meghalaya), *A. tripuraensis* (Tripura), *A. sambhui* (West Bengal), *A. montana* (Himachal Pradesh) and *A. indica* (Tripura) are described. A key is provided for identification of nine Indian species which include five new species described and four known species, *viz.*, *A. bidentata* Hammer, 1979, *A. rotunda* Hammer, 1979, *A. meadami* Balogh and Balogh, 1986 and *A. fenestralis orientalis* Balogh and Balogh, 1986 which were earlier recorded from India.

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