Rec. zool. Surv. India : **106**(Part 4) : 1-12, 2006

ORIBATID MITES OF TRIPURA, INDIA – FAMILY OTOCEPHEIDAE (ACARINA : ORIBATIDA) WITH DESCRIPTION OF TWO NEW SPECIES

A.K. SANYAL, SUSMITA SAHA* AND S. CHAKRABORTY**

Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053

INTRODUCTION

The Oribatid mites are commonly inhabit the soil ecosystem as the most abundant representative of microarthropods. Their role in humification process, transmission of cestode parasites, producing diseases in man and domestic animals and capacity as biological indicators are well recognized. A survey programme was therefore, undertaken to explore the soil oribatid fauna of south district of Tripura, India. The results of the study of a part of the collected specimens reveal the occurrence of two new species *viz.*, *Acrotocepheus punctatus* and *Archegotocepheus robustus.*

The measurements of the specimens are given in micron (μm). The type specimens are deposited in the National Zoological Collection, Zoological Survey of India, Kolkata.

Key to the genera of the family OTOCEPHEIDAE from Tripura

1(2) Pedotecta 2 + 3 distinct but not so conspicuous, triangular or trapezoid in shape .... *Dolicheremaeus* Jacot, 1938

2(1) Pedotecta 2 + 3 conspicuously developed, axe-shaped in ventral view and tail fin-shaped in dorsal view

3(4) Two pairs of prodorsal condyles and tow pairs of notogastral condyles present; anal setae 3 pairs, adanal fissure (*iad*) adanal in position ..... *Acrotocepheus* Aoki, 1965

4(3) Only one pair of notogastral condyle present, anal setae 2 pairs, adanal fissure (*iad*) apoanal in position ..... *Archegotocepheus* Mahunka, 1988

**236, G. T. Road, Mahesh, Hooghly, West Bengal-712 202, India*

***Department of Zoology, University of Kalyani, West Bengal-741 235, India*

Genus *Acrotocepheus* Aoki, 1965

1965. *Acrotocepheus* Aoki, *Bull. natn. Sci. Mus., Tokyo,* **8**(3) : 260.

Type-species : *Acrotocepheus quateorum* Aoki, 1965.

While revising the genus *Otocepheus*, Aoki (1965) divided the genus into 2 subgenera *viz.*, *Otocepheus* (*Otocepheus*) Berlese 1905 and *Otocepheus (Acrotocepheus)* Aoki, 1965. He established subgenus *Acrotocepheus* with the type species *Otocepheus* (*Acrotocepheus*) *quateorum* Aoki, 1965 from New Guinea. In the same work he described four more new species *viz.*, *O.* (*A.*) *excelsus*, *O.* (*A.*) *holtmanni*, *O.* (*A.*) *philippinensis* and *O.* (*A.*) *duplicornutus*. Aoki in the same year transferred *Acrotocepheus* from subgenus to genus status.

Balogh and Mahunka (1967) described a subspecies *A. duplicornutus discrepans* and one species *A. triplicornutus* from Vietnam. Balogh (1970) reported two more new species *A. bucephalus* and *A. consimilis* from Sri Lanka. Aoki (1973) established new species *A. gracilis* from Japan. The eleventh species *A. besucheti* was described by Mahunka (1974). In the year 1979, Cropuz-Raros described a new species *A surigaoensis* from Philippines. Mahunka (1987) reported *A. burckhardh* and *A. horakae* from east Malaysia. He again (1989a) identified two new species, *A. lienhardi* and *A. wallacei* from Singapore. In the same year (1989b) Mahunka reported *A. diehli* from Sumatra. Corpuz-Raros (1990) reported *A. pangasuganensis* and *A. tupasae* from Philippines.

The Genus *Acrotocepheus* was first reported from India as well as from Tripura by Sanyal (2000).

Generic Diagnosis : Rostrum normal, sometimes with a narrow flat edge; lateral lamelliform expansion (*spa. l.*) distinctly developed, protruding laterally beyond lateral margin of prodorsum, terminating at or near insertion of rostral setae, tutorium distinctly developed, gently arched in lateral view; lamellae subparallel to each other, extending anteriorly more or less beyond insertion for lamellar setae; dorsal bothridial plate (*tbd*) completely or incompletely covers bothridium, not markedly protruding laterally, but smoothly continued from lamella; ventral bothridial plate (*tbv*) well developed and broadly triangular, sensillus with fusiform head; lateral and median prodorsal condyle (*co. nl.*) conspicuously developed; marginal ridge (*vm*) completely or incompletely developed; a pair of gland (*gla*) and 5 pairs of notogastral fissures present; *gla* and *im* situated close to each other nearly in level of *ti*; *ih* located anterior to r_3 and tip between p_2 and p_3, while *ips* either anterior or posterior to r_3; adanal fissure (*iad*) typically aligned longitudinally or situated adjacent to anal aperture (exceptionally aligned transversely and somewhat distant from anal aperture).

Distribution : INDIA : Tripura. *Elsewhere* : Indonesia (Sumatra), Japan, New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam.

Acrotocepheus punctatus sp. nov.

(Figs. 1-8)

Colour : Dark to medium brown.

Measurements : Length of the body : 462; width of the body : 189.

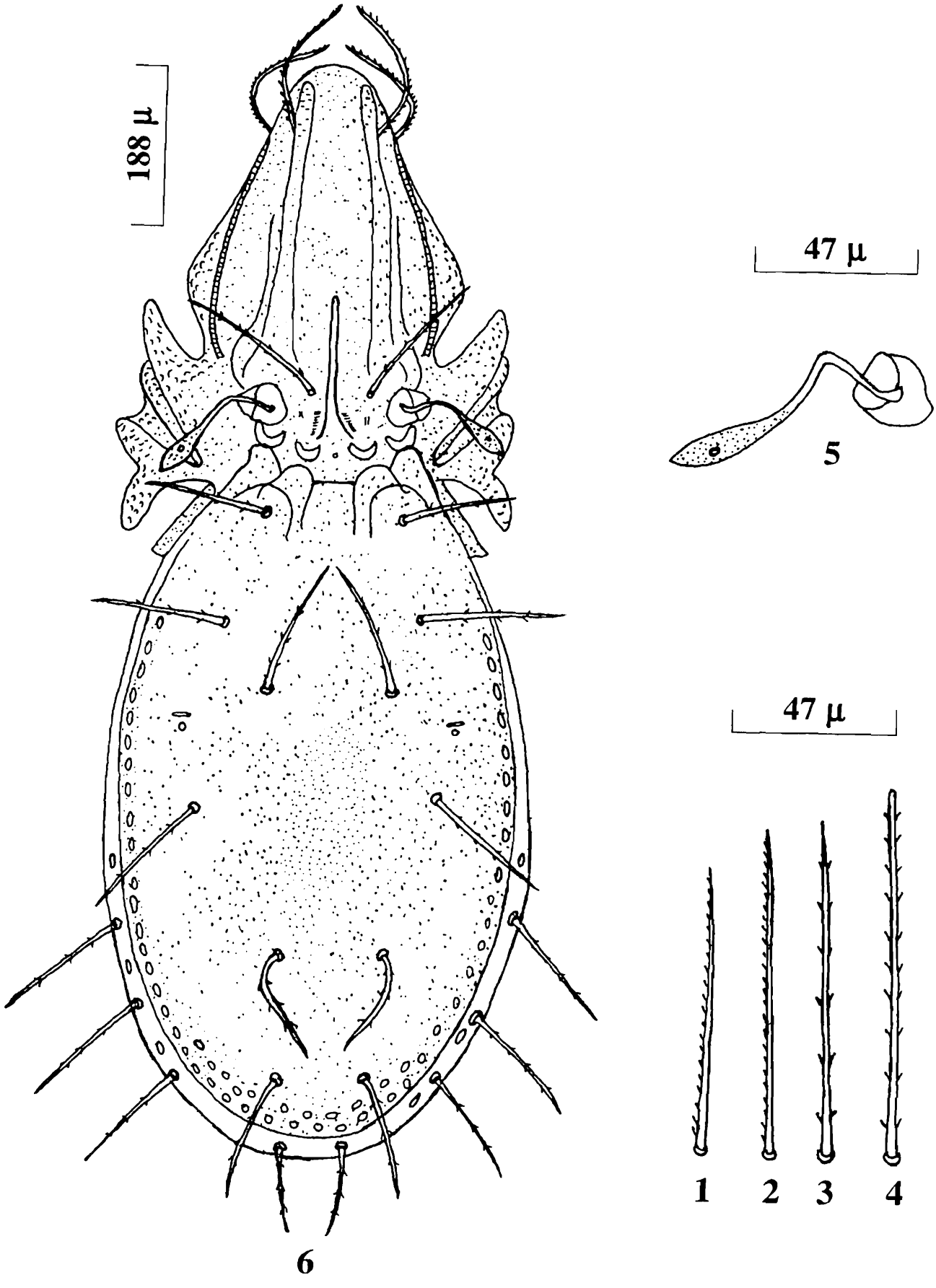
Prodorsum : A distinct *spa. l.* present on each side of prodorsum, never protruding beyond lateral margin of propodosoma, no tooth on *spa. l.*; tutoria distinctly developed; lamellae rather broad, of same width along their length, reaches rostrum and running subparallel with each other; outer margin of *tba* almost straight, smoothly continued from that of lamella, *tbv* broadly triangular in shape; sensillus clavate in shape, but with a rather pointed apex and apical margin slightly rough; rostral setae moderately long (37), curved inward, thin, attenuating into a fine tip, thickly barbed unilaterally (very weakly in distal half); lamellar setae long (48) whip like, bending inward, barbed unilaterally; interlamellar setae longer (67) than lamellar setae, weakly roughened and 2.2 X as long as their mutual distance; interlamellar wrinkles poorly developed; a pair of longitudinal rows of crescent-shaped ornamentations found in postero-median part of prodorsum; *co.pl.* almost semicircular, overlapping tip of *co. pl.* on each side; *co. pm.* nearly semicircular.

Pedotecta : Pedotecta 1 (*pd* 1) rather strongly excavated at anterior margin, surface distinctly foveolated; anterior end of subpedotectum (*spd*) angulate; dorsal and lateral sides of *pd 2-3* distinctly granulated; *pd-4* only partly visible in dorsal aspect.

Notogaster : Elongated surface densely punctuated and with foveoli (arranged marginally), anterior border of notogaster concave; *co.nl.* of a characteristic shape, inner angulation of each condyle very prominent and separated from main part as a subcondyle, so that each condyle, as a whole, appears to be double-structured, outer portion of *co. nl.* rounded anteriorly, directed latero-anterior, interspace between *co. nl.* 18; *cp. nm.* absent; *vm* prominent; 10 pairs of notogastral setae, slightly roughened along their length; relative length to length of notogaster (RLN) varies from 15–22; *gla* situated in between insertions of *ti* and *ms*, 5 pairs of relatively long notogastral fissures present, *im* located close to *gla*, *ia* aligned oblique to *ta*, *ih* aligned parallel to *ms*, *ips* in between insertions for p_3 and r_3 and *ip* in between insertions for p_2 and p_3.

Epimeral Region : Apodemata II (*apo.* 2) and *sj* (*apo.sj*) developed; sternal ridge developed as a short ridge only on *ep. 1*; apodemata *apo. 2* and *apo. sj* on left side, those on right side separated from one another, not fused with each other medially; in place of *apo.4* on each side a chain of several (5–6) worm-like ornamentations; epimeral setal formula 3-1-3-3; epimeral region densely punctuated, setae smooth.

Ano-Genital Region : Genital aperture a little longer than wide (length : 122, width : 112), darker in colour compaired to surrounding ventral plate, with 4 pairs of glabrous setae, insertion for g_3 and g_4 closer to outer margins of plates while g_1 and g_2 closer to inner margin; anal aperture little longer than wide (length : 178, width : 160) with 2 pairs of barbed setae; an_2 (58) longer than an_1 (48);



Figs. 1-6. : *Acrotocepheus punctatus* sp. nov.; 1. rostral setae, 2. lamellar setae, 3. interlamellar setae, 4. notogastral setae, 5. sensillus, 6. dorsal view.

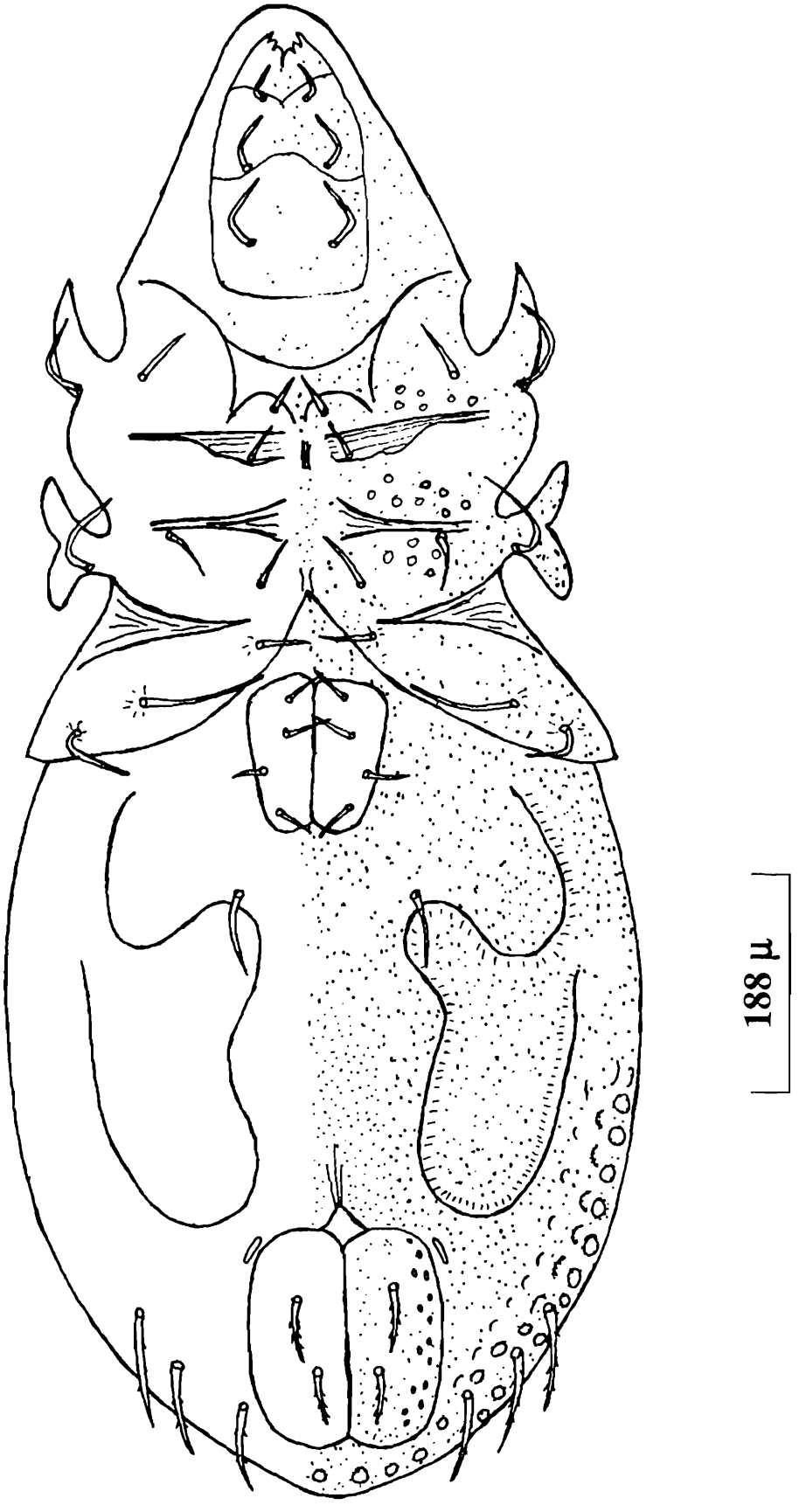


Fig. 7. : *Acrotocepheus punctatus* sp. nov.; ventral view.

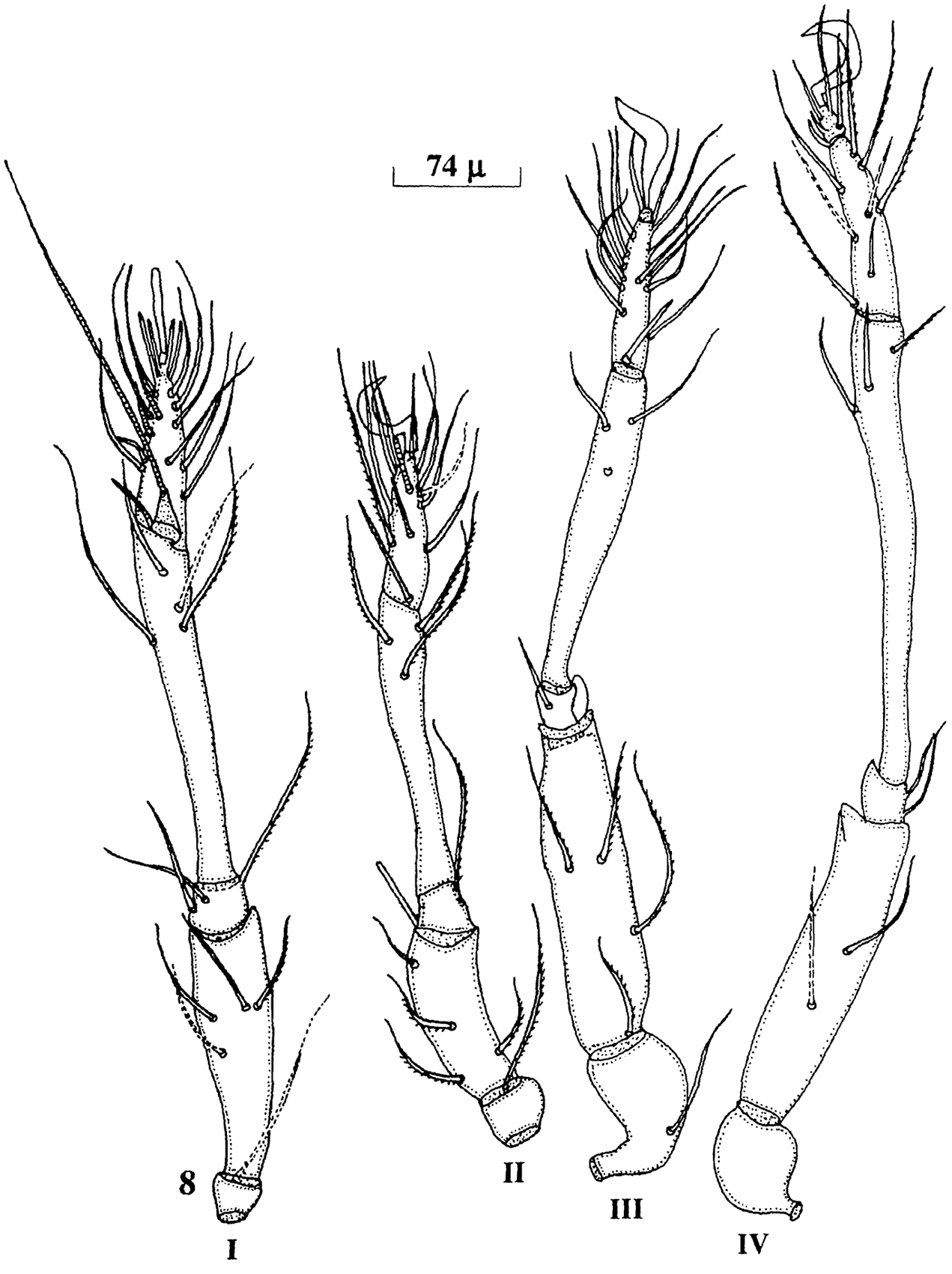


Fig. 8. : *Acrotocepheus punctatus* sp. nov.; legs (I-IV).

3 pairs of adanal setae, barbed with pointed tip, aggenital setae smooth with pointed tip; ventral plate densely punctated with foveoli.

Legs : Monodactylous. Leg chaetotaxy : Leg I: 1-4-3-14+4-I; Leg II: 1-4-2-3-11+2-1; Leg III : 1-4-1-3-15-1; Leg IV : 0-2-2-3-13-1.

Material Examined : HOLOTYPE : Adult female : India : Tripura : Radhanagar (Belonia), 12.x.1993, from loose clay loam soil with decomposed leaves, coll. D. Saha. PARATYPES : 6 adult females, India : Tripura : Radhakisorganj (Belonia), 12.x.1993, from loose soil by the side of root of bamboo tree with cowdung and rotten straw, coll. D. Saha.

Distribution : India : Tripura (South District).

Remarks : The new species is very much similar to *Acrotocepheus duplicornutus* Aoki, 1965 regarding the nature of *co. nl., co. pl.,* and *cp. pm.*, nature of notogastral setae and their RLN. But differs from the latter in the alignment of *iad*, smooth epimeral setae, foveolated nature of notogaster and ventral plate, granulated and foveolated anal plate.

The species from Tripura also agrees to some extent with *A. consimilis* described by J. Balogh 1970 from Sri Lanka in the position of *iad* which is oblique in both the species and nature of *co. nl.* and *co. pl.* But the new species can be clearly differentiated from the Sri Lankan species in the nature of prodorsal and notogastral setae, alignment of adanal and anal setae and structure of sensillus.

Genus ***Archegotocepheus*** Mahunka, 1988

1988. *Archegotocepheus* Mahunka, *Revue Suisse Zool.*, **95**(3) : 839.

Type-species : *Archegotocepheus singularis* Mahunka, 1988.

Mahunka (1988) erected the genus *Archegotocepheus* with *A. singularis* as the type species from Sabah (East Malaysia). Mahunka (1989a) identified another new species *A. brevisetus* from Singapore. The third known species was *A. latus* (Aoki, 1965)

Balogh and Balogh (1992) in their book 'The Oribatid Mites of the World (vols. I & II)' placed the genus *Archegotocepheus* under family Otocepheidae Balogh, 1961 under superfamily Carabodidae Koch, 1837. The genus *Archegotocepheus* was first reported from India as well as from Tripura by Sanyal (2000).

Generic Diagnosis : Lamellae long; lamelliform expansion (*spa.l.*) curved, reaching to the insertion points of rostral setae; tutorium short, not connected with *spa.l.*; pedotecta 2-3 symmetrical, fish-tail-like; two pairs of prodorsal, one pair of (lateral) notogastral condyles; ten pairs of notogastral setae; epimeral setal formula 3-1-3-3; four pairs of genital, one pair of aggenital, three pairs of anal and three pairs of adanal setae, pori *iad* in apoanal position, pori *ips* located between setae r_3 and ps_3.

Distribution : INDIA : Tripura. *Elsewhere* : Malaysia, Singapore.

Archegotocepheus robustus sp. nov.

(Figs. 9-12)

Colour : Dark brown.

Measurements : Length of the body : 996; width of the body : 583.

Prodorsum : Rostrum sparsely punctated; lamellae broad, of same width along their length and reaching rostrum; tutoria distinctly developed; rostral setae long (113), curved inward, thin, attenuating into a fine tip, barbed unilaterally; lamellar setae largest (160) prodorsal setae, whip-like, bending inward, barbed unilaterally; interlamellar setae long (150), blunt at tip, much stronger and weakly roughened,; sensillus short, with curved peduncle (length : 38) and clavate head (diameter : 56); median and lateral condyles on prodorsum; median condyles surrounded with granules and a pair of light area.

Pedotecta : Surface of pedotecta I and II-III foveolated and with granules; pedotecta IV only partly visible in dorsal aspect; pedotecta II-III asymmetrical, fishtail-shaped.

Notogaster : Notogaster elongate, surface densely punctated and with foveoli; *vm* prominent; ten pairs of roughened notogastral setae; relative length to length of notogaster (RLN) varies from 20–23; setae p_2 longest (141), setae *ti* (113) shortest of all; median notogastral condyles absent, lateral pairs prominent; gland opening (*gla*) between insertion of *te* and *ti*; five pairs of relatively long notogastral fissures present; *im* located close to *gla*, *ia* aligned oblique to *ta*, *ih* aligned parallel to *ti*, *ips* in between insertion for r_3 and p_3, *ip* in between insertion for p_2 and p_3.

Epimeral Region : Apodemata II (*apo.2*) and *sj* (*apo.sj.*) developed; sternal ridge developed as a short ridge only on *ep1*; apodemata *apo2* and *apo.sj.* on left side, those on right side separated from one another, not fused with each other medially; in place of *apo.* 4 on each side a chain of worm-like ornamentation; epimeral setal formula 3-1-3-3, smooth; epimeral region densely punctated with foveoli.

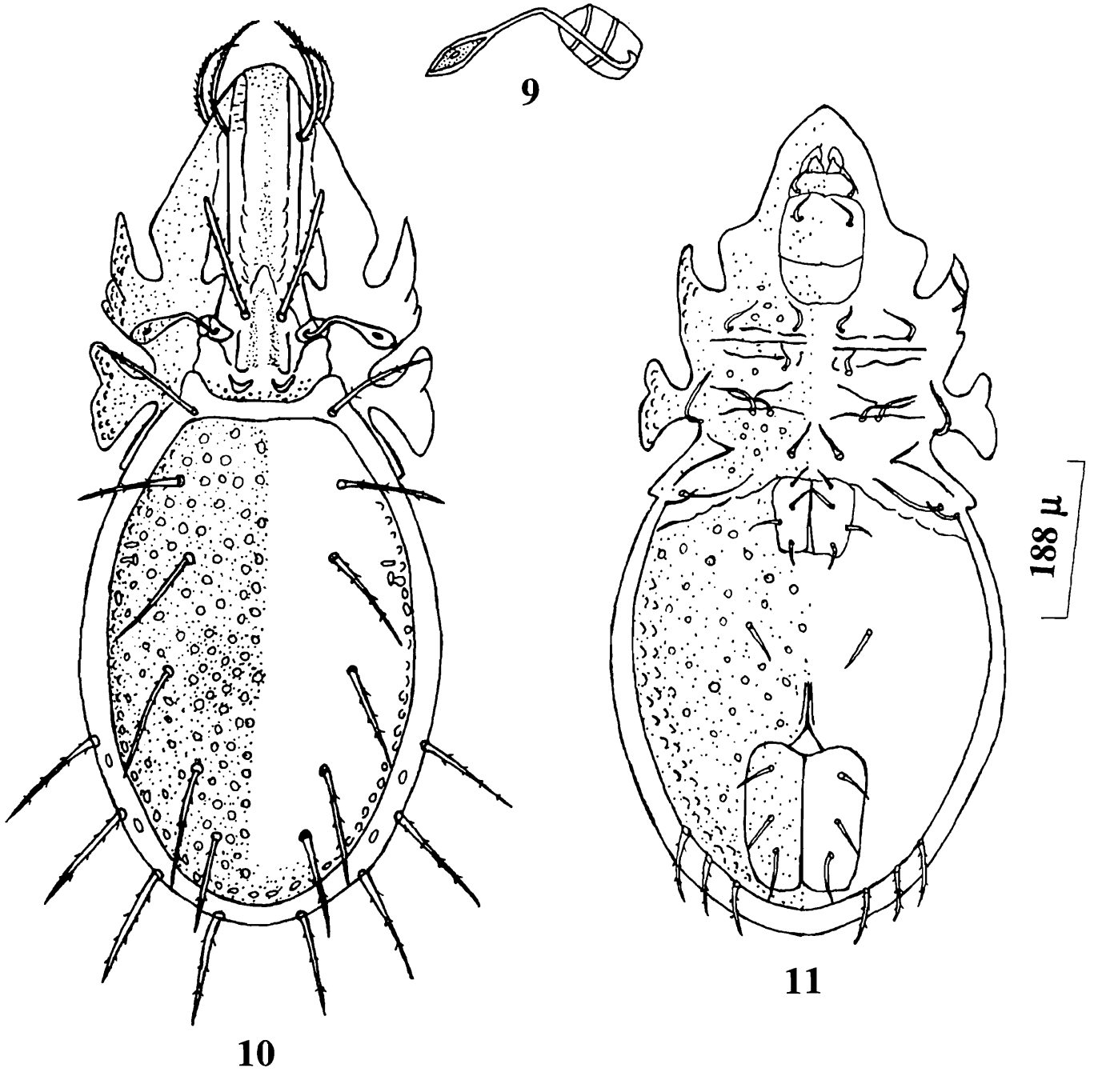
Ano-Genital Region : Sparsely foveolated with granules; genital aperture squarish (length : 94, width : 94) with 4 pairs of smooth setae; interspace between anal and genital aperture (235) about 2.5 X as long as length of genital aperture; anal aperture a little longer than wide (length : 170, width : 141), granulated, 3 pairs of smooth anal setae; an_1 (47) shorter than an_2 and an_3 (56); adanal setae 3 pairs, barbed with pointed tip, ad_1 (75) longer than ad_2 and ad_3 (66).

Legs : Monodactylous. Leg chaetotaxy : Leg I : 1-4-1+2-4-14+1-1, Leg II : 1-4-1+2-3-16-1; Leg III : 0-2+1-1-3-15-1; Leg IV : 0-1-2+1-11-1.

Material Examined : HOLOTYPE : Adult female, India : Tripura : Jarimura (Amarpur), 12.x.1993, from humus with decomposed plant material, coll. D. Saha. PARATYPES : 4 adult females, India : Tripura : Birchandranagar (Amarpur), 12.x.1993, from loose humus with decaying leaves, stem and roots, coll D. Saha.

Distriubution : INDIA : Tripura (South District).

Remarks : This species resembles *A. singularis* Mahunka, 1988 regarding body shape, position of prodorsal and notogastral setae and shape of sensillus. But it can be separated from *A. singularis* by its granulated anal aperture, smooth anal setae, foveolated and granulated notogaster. In this new species notogastral setae are roughened only, but in *A. singularis* they are well ciliated. Among the prodorsal setae, lamellar setae are the longest prodorsal setae, but in *A. singularis* interlamellar setae are the longest setae. In the new species the chitinous lath that is not much prominent as in the Mahunka's species.



Figs. 9-11. : *Archegotocepheus robustus* sp. nov.; 9. sensillus, 10. dorsal view, 11. ventral view.

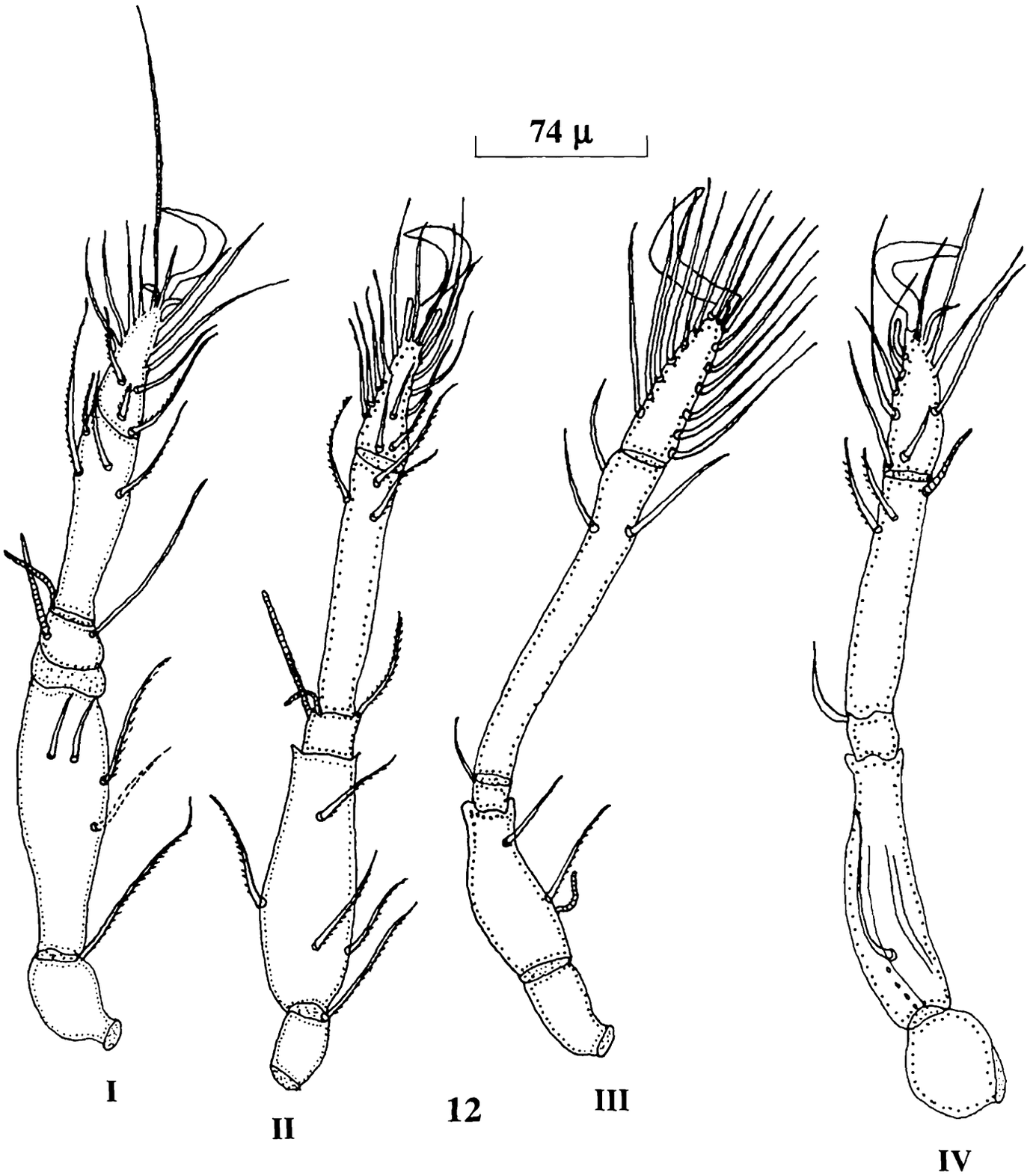


Fig. 12. : *Archegotocepheus robustus* sp. nov.; legs (I-IV).

SUMMARY

The present paper contains description along with illustrations of two new species *viz.*, *Acrotocepheus punctatus* and *Archegotocepheus robustus* of the family Octocepheidae from Tripura, India.

ACKNOWLEDGEMENTS

The authors are thankful to the Director, Zoological Survey of India, Kolkata and Head of the Department of Zoology, University of Kalyani, Nadia, West Bengal, for laboratory facilities.

REFERENCES

Aoki, J. 1965. A preliminary revision of the family Octopheidae (Acari, Cryptostigmata) I. Subfamily Otocepheinae. *Bull. natn. Sci. Mus., Tokyo*, **8**(3) : 259-341.

Aoki, J. 1973. Oribatid mites from Mt. Poroshiri in Hakkaido, North Japan. *Annotnes zool. Jap.*, **46**(4) : 241-252.

Balogh, J. 1961. Identification keys of world oribatid (Acari) families and genera. *Acta zool. Hung.*, **7**(3-4) : 243-344.

Balogh, J. 1970. New oribatid (Acari) from Ceylon. The scientific results of the Hungarian soil zoological expedition. *Opusc. zool., Bpest.*, **10** : 33-67.

Balogh, J. and Balogh, P. 1992. The oribatid mites genera of the world vol I and II. *Hungarian National History Museum, Budapest*, 1-375.

Balogh, J. and Mahunka, S. 1967. New oribatids (Acari) from Vietnam. *Acta zool. Hung.*, **13**(1-2) : 39-74.

Berlese, A. 1905. Acari nuovi Manipules IV. Acari di Giave. *Redia*, **2** : 154-176.

Corpuz-Raros, L.A. 1979. Philippine Oribatei (Acarina). 1. Preliminary list of species and description of forty new species. *Philipp. Agric.*, **62**(1) : 1-82.

Corpuz-Raros, L.A. 1990. A new genus and five new species of Otocepheidae Acari : Oribatida) from Leyte and Samar, Philippines. *Philipp. Entomol.*, **8**(3) : 973-983.

Koch, C.L. 1837. *Deutschlands Crustaceen, Myriapoden und Arachniden*, vol. 10-16.

Mahunka, S. 1974. Neue und interessante Milben aus dem Genfer Museum : XII. Beitrag Zur Kenntnis der Oribatiden – Fauna Greichenlands (Acari). *Revue Suisse Zool.*, **81**(2) : 568-590.

Mahunka, S. 1987. Neue und interessante Milben aus dem Genfer Museum, 60. Oribatids from Sabah (East Malaysia) II. (Acari : Oribatei). *Revue Suisse Zool.*, **94**(4) : 765-817.

Mahunka, S. 1988. New and interesting mites from the Geneva Museum, 61. Oribatid from Sabah (East Malaysia). 3. (Acari : Oribatida). *Revue Suisse Zool.,* **95**(3) : 817-888.

Mahunka, S. 1989a. New and interesting mites from the Geneva Museum, 64. Oribatids from Singapore (Acari : Oribatida). *Revue Suisse Zool.*, **96**(2) : 381-402.

Mahunka, S. 1989b. New and interesting mites from the Geneva Museum, 64. Oribatids of Sumatra (Indonesia) – I (Acari : Oribatida). *Revue Suisse Zool.*, **96**(3) : 673-696.

Sanyal, A.K. 2000. Oribatid mites (Acari : Oribatei). *Zool.Surv.India, State Fauna Series 7 : Fauna of Tripura,* Part 2 : 33-112.