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THREE NEW SPECIES OF *HETEROMURUS*
(*ALLOSCOPUS*) AND DESCRIPTIVE NOTES FOR
SPECIES OF THE SUBGENUS (*COLLEMBOLA*:
ENTOMOBRYIDAE)

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ABSTRACT

Three new species of *Heteromurus* (*Alloscopus*) are described: *H. (A.) thailandensis* from Thailand, *H. (A.) yosiius* from Indonesia, and *H. (A.) deharvengi* from Papua New Guinea. Details are added to the descriptions of *Heteromurus* (*Alloscopus*) *multispinatus* Mari Mutt, *H. (A.) tetracanthus* Börner and *H. (A.) tenuicornis* Börner based on specimens from Papua New Guinea and the Philippines. A key to the species of the subgenus is included.

RESUMEN

Se describen tres especies nuevas de *Heteromurus* (*Alloscopus*): *H. (A.) thailandensis* de Tailandia, *H. (A.) yosiius* de Indonesia y *H. (A.) deharvengi* de Papua Nueva Guinea. Se amplian las descripciones de *Heteromurus* (*Alloscopus*) *multispinatus* Mari Mutt, *H. (A.) tetracanthus* Börner y *H. (A.) tenuicornis* Börner en base a ejemplares de Papua Nueva Guinea y las Islas Filipinas. Se incluye una clave para las especies del subgénero.

During a recent visit to the laboratory of Dr. Louis Deharveng, Université Paul Sabatier, Toulouse, France, I gathered a large number of *Heteromurus* (*Alloscopus*) collected by Dr. Deharveng and his colleagues during expeditions to Thailand, the Philippines, Indonesia, and Papua New Guinea. The material includes three new species described below and specimens of the other three species described previously in *Alloscopus*.

The number given in parentheses after the collection data of each species corresponds to a locality number assigned by Dr. Deharveng. The holotype

of *Heteromurus (Alloscopus) deharvengi*, n. sp., will be deposited in the Australian National Insect Collection, Canberra. Specimens of *H. (A.) multispinatus*, n. sp., listed without a locality number are on loan from the Bishop Museum, Hawaii, and will be returned to that institution. All the other specimens remain in my collection.

Morphological abbreviations used in this paper are as follows: Ant. 2, Th. 2, Abd. 2, etc. = 2nd antennal segment, 2nd thoracic segment, 2nd abdominal segment, etc.

The characters listed in the following paragraph are shared by all the species of the subgenus and will be deleted from the descriptions.

Heteromurus (Alloscopus)

DIAGNOSIS. Antennae 5-segmented. Pigment absent or restricted to a small eyepatch. Head with 13 S macrochaetae, a bothriotrix, and no macrochaetae posterior to macrochaeta Po. Inner pair of labral papillae large, conelike. Setae of maxillary palp similar in length and shape. Behind postlabial quadrangle (PLQ), near posterior margin of head, 2 + 2 ciliated setae (Fig. 26). Macrochaetotaxy of Abd. 1 to Abd. 4 as in Fig. 13. Abd. 4 dorsally about 1.5x length of Abd. 3. Unguiculus with large outer tooth. One smooth seta opposite tenent hair of metathoracic legs. Anterior margin of colophore without scales, corpus of tenaculum with a median seta. Dental spines present, mucronal spine absent.

Heteromurus (Alloscopus) thailandensis Mari Mutt, new species

Length to 1.7 mm. Head with small dark-red eyepatch but no eyes visible in cleared specimens. Apex of Ant. 5 with slender pin seta (Fig. 6). Arrangement of A and M macrochaetae as in Fig. 1; M3 present, \bar{x} M1-A3/A3-A0 = 1.5 (1.2 — 2.0, n = 13). Length of postantennal organ about 2.4x socket diameter of macrochaeta An2 (Fig. 4, 5). Outer labral papillae rounded, with lateral conelike projections (Fig. 7, 8). Posterior portion of labium internal to seta e with 1 ciliated seta, 1 smooth seta and 1-2 scales; setae e, 1, and 1₂ smooth. Differentiated seta of outer labial papilla mounted on a small protuberance (Fig. 10), its apex close to or slightly surpassing apex of its papilla. Setae of PLQ smooth. Trochanteral organ with about 15 setae. Tibiotarsi without smooth setae. Inner margin of unguis with 1-2 unpaired teeth (Fig. 9), tenent hair accidentally missing in all specimens. Macrochaetotaxy of Th. 2 and Th. 3 as in Fig. 2, 3. Lateral anal valves without smooth setae. Dorsum of manubrium with 2 parallel rows of 4 + 4 smooth setae. Dens with 3-6 spines.

DIAGNOSIS: This species can be distinguished from all other members of the subgenus by the shape of the outer labral papillae (cf. Fig. 7, 8, 27; Mari Mutt 1978: 246, Fig. 16; Mari Mutt 1982: 90, Fig. 25).

HOLOTYPE: Thailand: Chiang Dao, base of plateau just north of the cave, route Luang Por Sim, 17-XII-1980, on bark, L. Deharveng and A. Gouze (16).

PARATYPES: Same data as holotype, on bark, soil, roots and leaf litter, 40 in alcohol and 12 on slides (2, 9, 11, 15, 16).

Heteromurus (Alloscopus) yosiius Mari Mutt, new species

Length to 1.8 mm. Eyes 1 + 1 surrounded by dark-red pigment. Apex

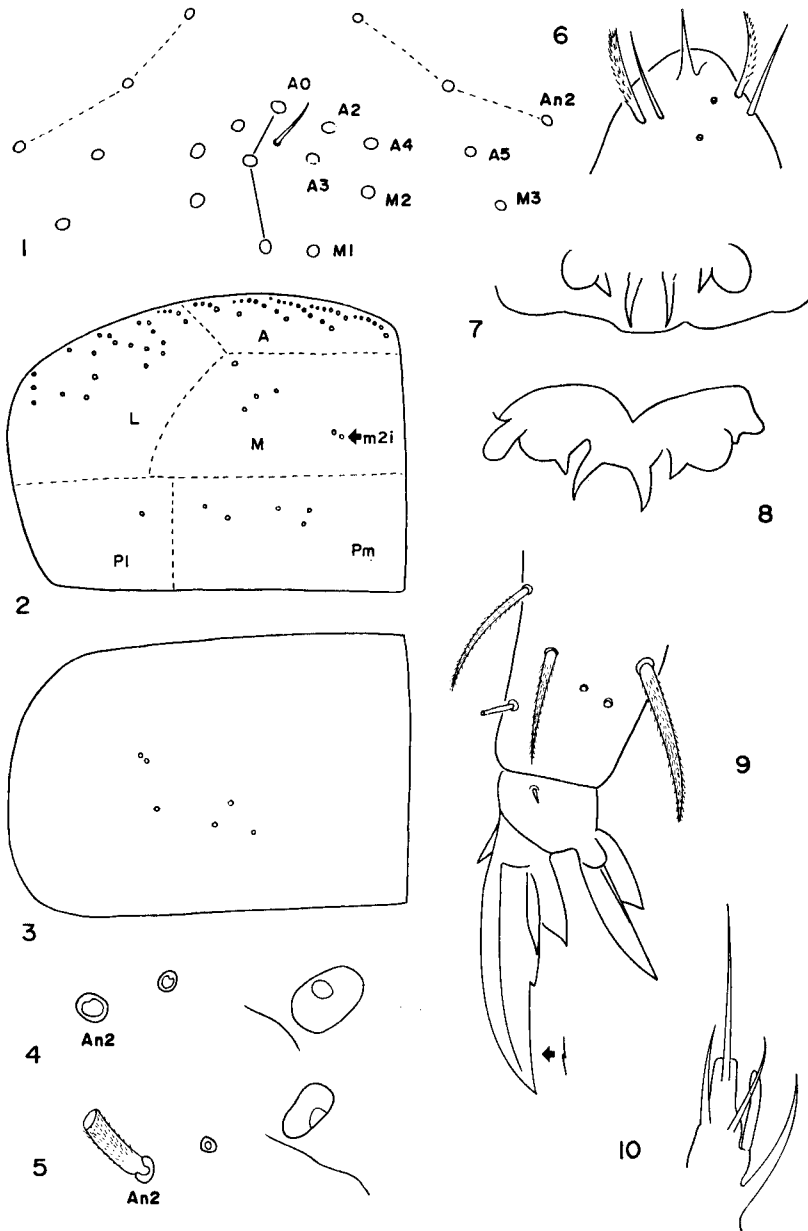


Fig. 1-10. *Heteromurus (Alloscopus) thailandensis*, n. sp. 1. Macrochaetotaxy of anterior portion of head; A = anterior, M = median, An = antennal. 2. Macrochaetotaxy of Th. 2; A = anterior, L = lateral, M = median, Pm = posteromedian, Pl = posterolateral. 3. Macrochaetotaxy of Th. 3. 4-5. Postantennal organ and 2 adjacent An macrochaetae. 6. Apex of Ant. 5. 7-8. Labral papillae. 9. Claws, arrow indicates position of optional unpaired tooth. 10. Outer labial papilla.

of Ant. 5 without pin seta but with 2 long, apically hooked setae. Arrangement of A and M head macrochaetae as in Fig. 11, M3 absent. \bar{x} M1-A3/A3-A0 = 2.4 (n = 2: 1.9, 3.0). Length of postantennal organ about 2.8x socket diameter of macrochaeta An2 (Fig. 15, 16). Outer labral papillae conelike, as in *H. (A.) multispinatus* Mari Mutt (Fig. 27). Posterior portion of labium internal to seta e with 1 ciliated seta, 1 smooth seta and 2-4 scales; setae e and 1_2 smooth, L_1 ciliated. Differentiated seta of outer labial papilla mounted on a large protuberance (Fig. 12), its apex some distance behind apex of its papilla or reaching apex. Setae of PLQ smooth. Trochanteral organ with about 25 setae. Tibiotarsi without smooth setae. Inner margin of unguis (Fig. 14) without unpaired teeth, tenent hair lanceolate. Body macrochaetotaxy as in Fig. 13. Lateral anal valves with 0-1 smooth seta. Male genital plate with about 26 smooth setae arranged in 2 poorly defined concentric rows. Dorsum of manubrium with 2 parallel rows of 4 + 4 (5 + 5?) smooth setae. Dens with 6-10 spines.

DIAGNOSIS: The only other member of the subgenus with 4 macrochaetae on the Pm region of Th. 2 is *H. (A.) tetracanthus* Börner. The key to the species details the differences between these taxa.

HOLOTYPE: Indonesia: Bogor, Java, 1200m, X-1983, native collector (21).

PARATYPES: Same data as the holotype, 1 in alcohol and 1 on slide.

ETYMOLOGY: The species is named after Dr. Ryozo Yosii in recognition of his numerous contributions to the taxonomy of Oriental Collembola.

Heteromurus (Alloscopus) deharvengi Mari Mutt, new species

Length to 1.4 mm. Without eyes and pigment. Apex of Ant. 5 without hooked seta but with pin seta as in *H. (A.) thailandensis* and a short apically rounded sensilla. Arrangement of A and M head macrochaetae as in Fig. 19; M3 present, \bar{x} M1-A3/A3-A0 = 1.3 (n = 3: 1.0, 1.2, 1.8). Postantennal organ small, irregular, seen only on 1 side of 1 specimen. Outer labral papillae as in *H. (A.) multispinatus* but apex sharply pointed. Posterior portion of labium internal to seta e with 1 ciliated seta, 1 smooth seta and 2 scales; setae e and 1_2 smooth, L_1 smooth or ciliated. Differentiated seta of outer labial papilla as in Fig. 21. Setae of PLQ smooth. Trochanteral organ with about 17 setae. Tibiotarsi with 2 rows of smooth setae along inner margin of segment and variable number of similar setae on anterior and exterior margins. Inner margin of unguis without unpaired teeth (Fig. 20), tenent hair lanceolate. Macrochaetotaxy of Th. 2 and Th. 3 as in Fig. 17, 18. Each lateral anal valve with 2 smooth setae. Male genital plate with about 25 smooth setae arranged in 2 concentric rows. Dorsum of manubrium with 2 parallel rows of 4 + 4 smooth setae (Fig. 22). Dens with 3-5 spines.

HOLOTYPE: Papua New Guinea: Wau, route to Mt. Kaindi, 2100 m, 8-XI-1978, humus and mosses, L. Deharveng (72).

PARATYPES: Same data as holotype, 2 in alcohol and 1 on slide (71, 73, 74).

Heteromurus (Alloscopus) multispinatus MARI MUTT, 1982

This species was described from two specimens collected in Muller Plateau, SE Papua New Guinea. The collections under study consists of 100 specimens from 12 localities spread across the main island of Papua

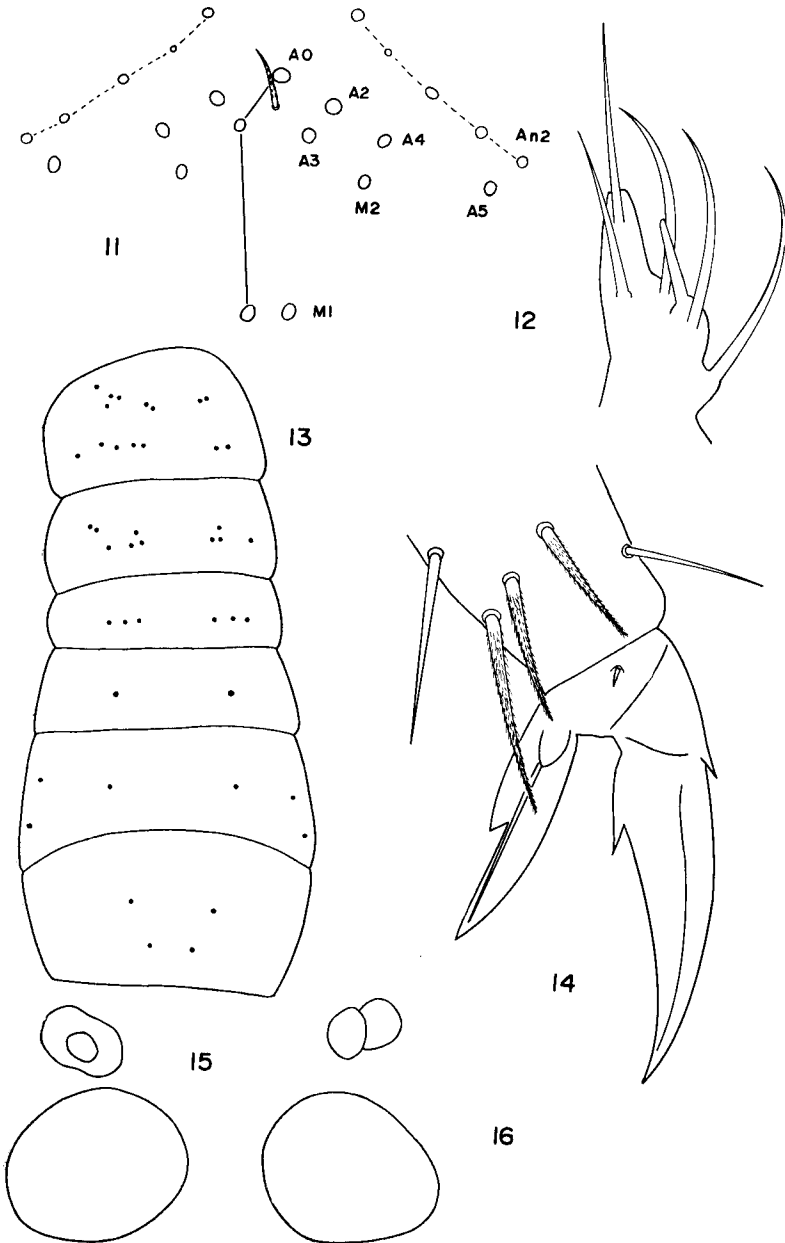


Fig. 11-16. *Heteromurus (Alloscopus) yosiius*, n. sp. 11. Macrochaetotaxy of anterior portion of head, letters as in Fig. 1. 12. Outer labial papilla. 13. Body macrochaetotaxy. 14. Claws. 15-16. Postantennal organ and eye.

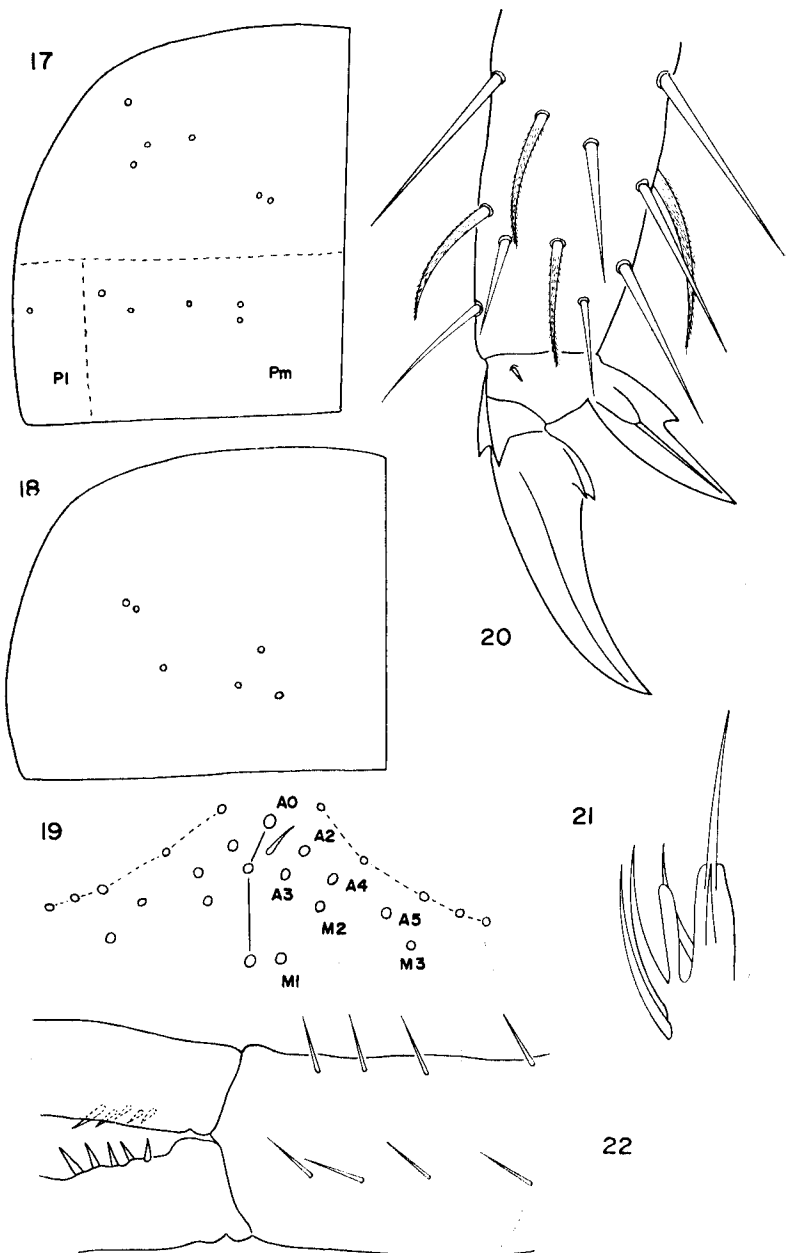


Fig. 17-22. *Heteromurus (Alloscopus) deharvengi*, n. sp. 17. Macrochaetotaxy of Th. 2, letters as in Fig. 2. 18. Macrochaetotaxy of Th. 3. 19. Macrochaetotaxy of anterior portion of head, letters as in Fig. 1. 20. Claws and smooth setae of tibiotarsus. 21. Outer labial papilla. 22. Dorsum of manubrium and proximal portion of dentes.

New Guinea. The following remarks are based on a detailed study of 12 specimens from localities 69, 273 and 277.

Length to 2.3 mm. Eyes 1 + 1, sometimes surrounded by dark-red or black pigment. Apex of Ant. 5 with slender pin seta and an apically rounded sensilla (Fig. 24). Arrangement of A and M macrochaetae as in Fig. 25; A5 and M3 present, \bar{x} M1-A3/A3-A0 = 1.0 (0.9 — 1.2, n = 10). Length of postantennal organ about 2.6x socket diameter of macrochaeta An2. Outer labral papillae conelike but not sharply pointed like inner papillae (Fig. 27). Posterior portion of labium internal to seta e with 1 ciliated seta, 2 smooth setae and 3-4 scales (Fig. 26); setae e and 1₂ smooth, 1₁ smooth or ciliated. Trochanteral organ with 30-41 smooth setae. Inner margin of unguis with pair of large basal teeth and 0-1 unpaired tooth. Lateral anal valves with 0-1 smooth seta. Male genital plate with about 40 smooth setae arranged in 2-3 concentric rows. Dorsum of manubrium with 2 rows of 3 + 3 or 4 + 4 smooth setae (Fig. 28). Dens with 27-55 spines arranged in 2 rows.

The trochanter is absent on 1 metathoracic leg of 1 specimen (Fig. 23). The "femur" bears the setae of the trochanteral organ but their arrangement is not that of a normal trochanter.

DIAGNOSIS: The presence of 2 rows of dental spines with up to 55 spines total separates this species from the other members of the subgenus, which carry no more than 10 spines arranged always in a single row.

SPECIMENS EXAMINED: Papua New Guinea: Musgrave River, south of Port Moresby, 6-XI-1978, L. Deharveng, 6 in alcohol and 2 on slides (23, 25). Wau, route to Mt. Kaindi, summit, 2400 m, 8-XI-1978, mosses, litter and humus, L. Deharveng, 41 in alcohol and 8 on slides (68, 69, 70). Wau, Bulldog Rd., leaf litter, L. Deharveng, 18 in alcohol and 4 on slides (256, 262, 271, 273, 275, 277, 278). Finschaff, 16-20-XII-1978, leaf litter, L. Deharveng, 1 in alcohol and 1 on a slide (314). Tsenga, upper Jimmi Valley, 1200 m, 14-VII-1955, grass straw, J. L. Gressitt, 4 in alcohol and 2 on slides. Swart Valley, Knagami, 19-XI-1958, moss, J. L. Gressitt, 1 on a slide. North side of Mt. Gilure, 2500 m, 25-V-1961, malgi moss, M. and L. Gressitt, 2 on slides. Mt. Otto, 2500 m, 22-VI-1955, humus, J. L. Gressitt, 1 in alcohol and 1 on a slide. Daulo Pass (Asaro-Chimb . . .), 2600 m, 14-VI-1955, moss and humus, J. L. Gressitt, 1 on a slide. Mt. Kaindi, 2350 m, VIII-1977, litter, 3 in alcohol and 1 on a slide. Star Mountains, Sibil Valley, 1250 m, 15-20-X-1961, litter, L. and S. Quate, 2 on slides, Mt. Wilhelm, 4260-4694 m, 24-X-1975, P. Beron, 1 on a slide.

Heteromurus (Alloscopus) tetracanthus BÖRNER, 1906

This species was described originally from Java and has since been recorded from the Philippine island of Luzon, Malaysia, Singapore, India, New Britain, Australia (Queensland), Samoa and Micronesia. Mari Mutt (1978) suggested that the Philippine records of Gapud (1971) belong to *H. (A.) tenuicornis* Börner and this opinion is supported by the present study of numerous specimens from the islands of Luzon and Mindoro.

Yosii's (1959) records from Malaysia (Malaya) and Singapore are doubtful because his specimens have a different chaetotaxy on Th. 2. *Heteromurus (Alloscopus) deharvengi* and *H. (A.) thailandensis* have the chaetotaxy of Yosii's specimens but only the former has smooth setae on the

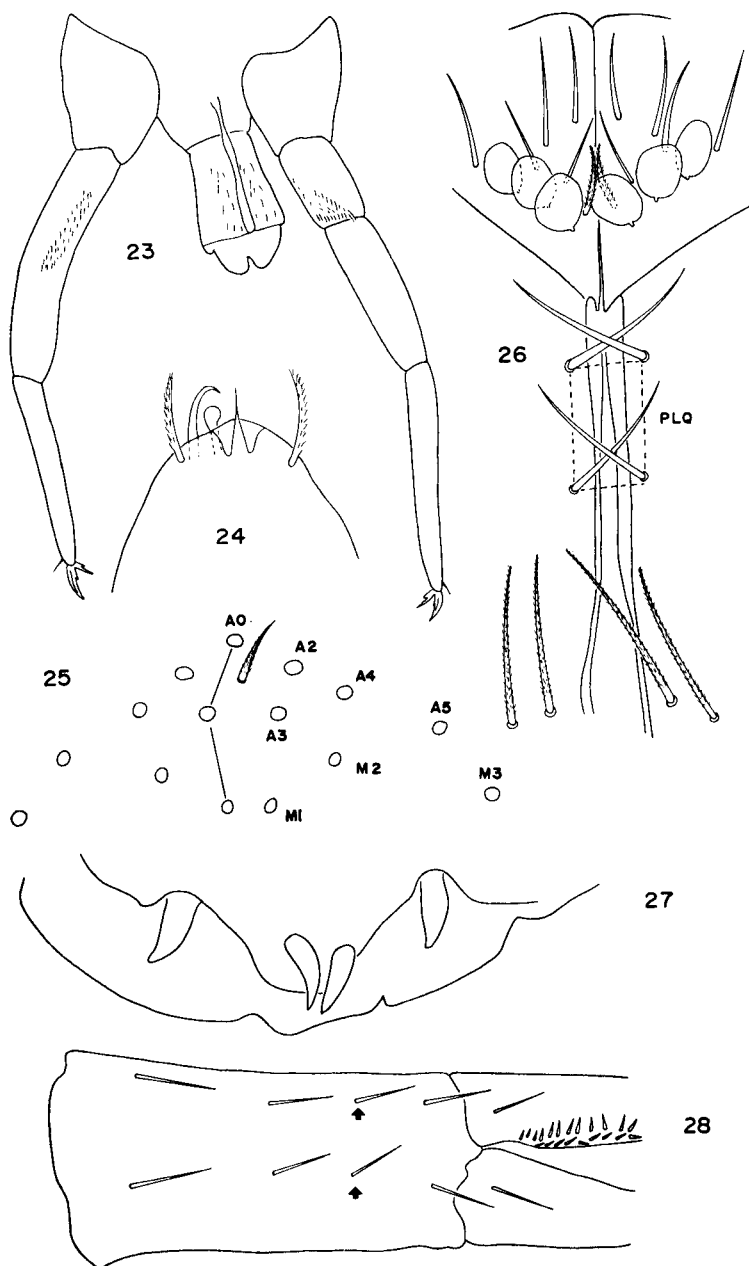


Fig. 23-28. *Heteromurus (Alloscopus) multispinatus* Mari Mutt. 23. Abnormal and normal metathoracic legs, note different arrangement of trochanteral organ setae. 24. Apex of Ant. 5. 25. Macrochaetotaxy of anterior portion of head, letters as in Fig. 1. 26. Labium and setae along cephalic groove, PLQ = postlabial quadrangle. 27. Labral papillae. 28. Dorsum of manubrium and proximal portion of dentes, setae with arrows are absent in some specimens.

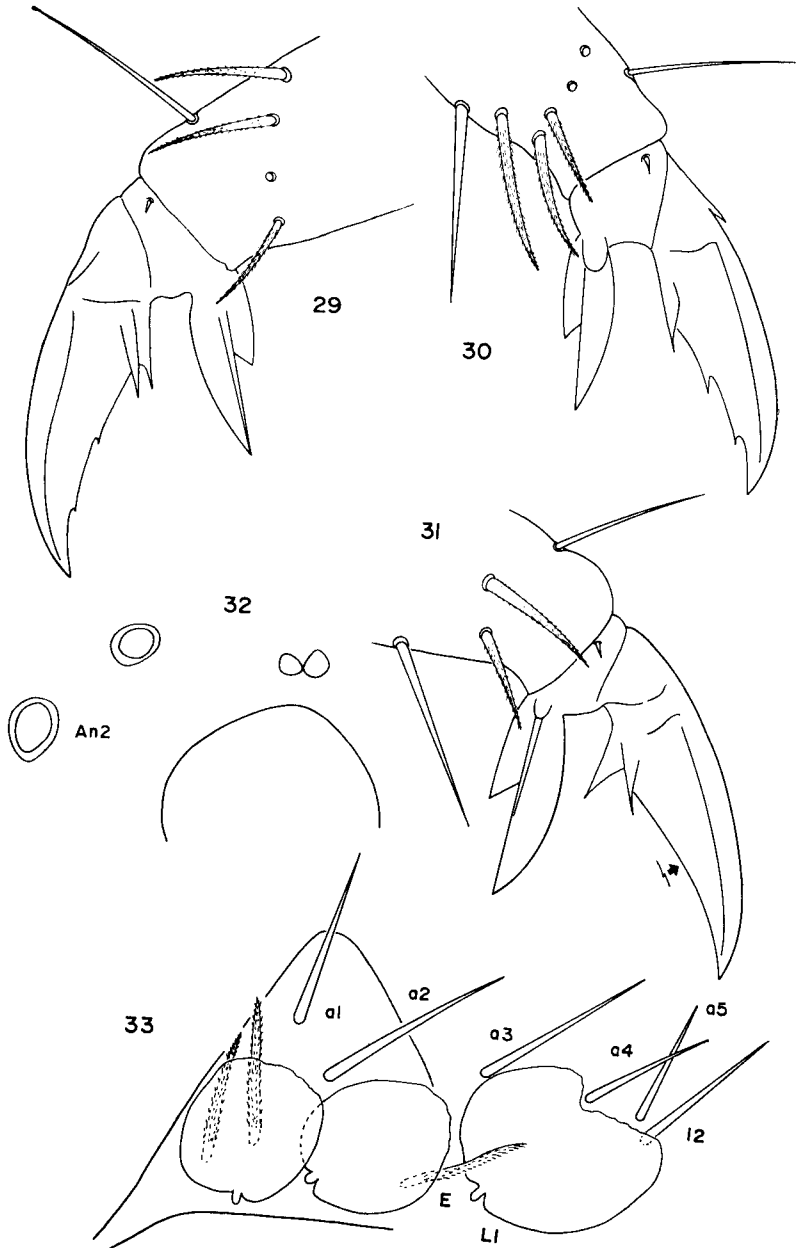


Fig. 29-33. *Heteromurus (Alloscopus) tenuicornis* Börner. 29-31. Claws, arrow in Fig. 31 indicates position of occasional unpaired tooth. 32. Post-antennal organ, eye, and 2 adjacent An macrochaetae. 33. Labial chaetotaxy; a = anterior, E = external, L = lateral, smallcase for smooth setae, capitals for ciliated setae. Note presence of a scale in position of L₁.

tibiotarsi. It is very likely that Yosii's specimens belong to *H. deharvengi* or to a new species closely related to this one. The record from New Britain (Yosii 1960) demands verification because the specimens are from Rabaul, and 1 individual from Rabaul in the present collection belongs to *H. (A.) tenuicornis*.

Postantennal organ (unrecorded previously for this species) bean-shaped, small, its length about 1.1x socket diameter of macrochaeta An2. Head macrochaeta A5 present, \bar{x} M1-A3/A3-A0 = 1.7 (n = 3: 1.60, 1.69, 1.74). Posterior portion of labium internal to seta e with 1 ciliated seta, 2-3 smooth setae and sometimes a small scale; setae e, 1₁ and 1₂ smooth. Inner margin of unguis with 0-2 unpaired teeth.

DIAGNOSIS: The only other species of the subgenus with smooth setae on the tibiotarsi is *H. (A.) deharvengi*, and its diagnosis separates it from *tetracanthus*.

SPECIMENS EXAMINED: Papua New Guinea: Lae, 10m, P. Beron, 1 in alcohol and 6 on slides.

Heteromurus (Alloscopus) tenuicornis BÖRNER, 1906

This species was described originally from Java and has since been recorded from Sumatra, the Philippine island of Luzon, Micronesia and Hawaii. The following observations are based on specimens from the Philippine Islands (Luzon and Mindoro) and Papua New Guinea (New Britain and New Ireland).

Apex of Ant. 5 without pin seta, sometimes with a hooked seta and an apically rounded papilla. Postantennal organ (unrecorded previously for this species) bilobed, small, subequal in length to socket diameter of macrochaeta An2 (Fig. 32). Eyes 1 + 1 or absent. Head macrochaeta A5 present, M3 absent. Mean of distance M1-A3/A3-A0 = 3.0 (2.5 — 3.9, n = 11). Posterior portion of labium internal to seta e with 1-2 ciliated setae, 0-1 smooth seta and 2 scales; seta e ciliated or smooth, L₁ substituted by a scale (Fig. 33), 1₂ smooth. Setae of PLQ smooth or ciliated. Second thoracic segment with a posterolateral (Pl) macrochaeta. Inner margin of unguis with 0-2 unpaired teeth. Manubrium with variable number of smooth setae.

The specimens from the Philippine Islands can be separated into 2 groups. Individuals from localities 17, 18, 20, 26, 28, 30, 42 and 47 possess 2 ciliated setae on the posterior margin of the labium (Fig. 33); seta E, the setae of the PLQ, and all other setae on the venter of the head are ciliated, and there are none or 1 + 1 smooth setae on the dorsum of the manubrium. Specimens from localities 5, 7, 21, 115, 118, 119 and 120 have only 1 ciliated seta on the posterior portion of the labium; seta e, the setae of the PLQ and all other setae on the venter of the head are smooth, and the dorsum of the manubrium carries 2 rows of 4 + 4 smooth setae. Specimens of both groups were found with 0-2 unpaired inner unguis teeth (Fig. 29-31).

DIAGNOSIS: Although different populations of this species exhibit considerable variation in number of teeth on the inner margin of the unguis, and in the chaetotaxy of labium, venter of head, and manubrium (see above), this species can be recognized by the presence of 6 Th. 2 Pm macrochaetae, labial seta L₁ substituted by a scale, \bar{x} M1-A3/A3-A0 = 3.0 (2.5 or less in the other species) and by the long and sharply pointed inner pair of unguis teeth.

SPECIMENS EXAMINED: Philippines, Mindoro, Puerto Galera, nr. San

Theodoro cascade, 2-4-I-1979, leaf litter, L. Deharveng, 15 in alcohol and 2 on slides (5). As preceding but nr. Gulf of Tabinay, 27-29-XII-1979, leaf litter, L. Deharveng and J. Orousset, 3 in alcohol and 2 on slides (115). As preceding but nr. 300 m, litter and humus in primitive forest, 18 in alcohol and 7 on slides (118, 119, 120). Luzon, Mountain Prov., Ambasing, 1440 m, nr. a spring, 16.XII.1979, mosses and leaf litter, L. Deharveng and J. Orousset, 25 in alcohol and 10 on slides (17, 18, 20, 21). As preceding but 1460 m, 10 in alcohol and 3 on slides (26, 28, 30). Luzon, nr. Sagada, by the road nr. Latan cave, 15-19-XII-1979, humus, L. Deharveng and J. Orousset, 8 in alcohol and 3 on slides (42). NE of Sagada, 21-XII-1979, rotten banana plant, L. Deharveng and J. Orousset, 4 in alcohol and 2 on slides (77). Papua New Guinea, New Britain, Rabaul, at sea level, 20-VII-1979, soil under dead trees and coconut palms, J. D. Bourne, 2 on slides (60/79, 61/79). New Ireland, Kavieng, at sea level, 29-VII-1979, soil under Banyan, J. D. Bourne, 2 on slides (104/79).

KEY TO THE SPECIES OF *Heteromurus* (*Alloscopus*)

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|-------|---|--------------------------------|
| 1. | Th. 2 with 6 Pm macrochaetae; labial seta L ₁ substituted by scale (Fig. 33); \bar{x} M1-A3/A3-A0 = 3.0 | <i>tenuicornis</i> Börner |
| 1'. | Th. 2 with 4 or 5 Pm macrochaetae; L ₁ smooth or ciliated but never a scale; \bar{x} M1-A3/A3-A0 < 2.5 | 2 |
| 2(1') | Th. 2 with 4 Pm macrochaetae | 3 |
| 2'. | Th. 2 with 5 Pm macrochaetae | 4 |
| 3(2') | Inner margin of tibiotarsi with 2 longitudinal rows of smooth setae; head macrochaeta M3 present; labium with 0-1 scale; 1 ₁ smooth; each lateral anal valve with 2 smooth setae | <i>tetracanthus</i> Börner |
| 3'. | Tibiotarsi without smooth setae; head macrochaeta M3 absent; labium with 2-4 scales; L ₁ ciliated; lateral anal valves with 0-1 smooth seta | <i>yosiüus</i> n. sp. |
| 4(2') | Dens with 27-55 spines arranged in 2 rows; Th. 3 with 7 macrochaetae | <i>multispinatus</i> Mari Mutt |
| 4'. | Dens with 3-5 spines arranged in 1 row; Th. 3 with 6 macrochaetae | 5 |
| 5(4') | Tibiotarsi with several rows of smooth setae; each lateral anal valve with 2 smooth setae; outer pair of labral papillae strongly conelike | <i>deharvengi</i> n. sp. |
| 5'. | Tibiotarsi and lateral anal valves without smooth setae; outer pair of labral papillae rounded, with small lateral conelike projections (Fig. 7, 8) | <i>thailandensis</i> n. sp. |

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