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STUDIES ON PHILIPPINE COLLEMBOLA

I. SUBORDER NEOARTHROPLEONA¹

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Seven species of the suborder Nearthropleona are recorded from the Philippines. Two species, *Lobella paraperfusa* and *Lobella reducta*, are described as new to science. Two other species are new records and one is further discussed. A neotype is designated for *Ceratrimeria pulchella* Handschin.

The order Collembola is one of the neglected insect orders in the Philippines. The existing fauna is known only through Handschin (1926a; 1930) who recorded 18 species 7 of which are indigenous, and Yosii (1965) who recorded and redescribed an entomobryid from Philippine examples, one previously reported elsewhere in the Oriental region. Most of the known Philippine species have remained inadequately described, often being cited only with respect to distribution in faunistic studies of the neighboring areas.

This paper is the first in a proposed series reviewing the known fauna of Collembola in the Philippines. Present records show that seven species in two families of Nearthropleona are represented. Four of these are new records, one being described as new to science. All specimens were personally collected from various parts of Luzon. Since none was obtained

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from Mindanao and the Visayas, the present knowledge of the fauna of this suborder is very incomplete.

To a great extent, Salmon's systematic concept of the order (1964) has been adopted. For practical purposes, a key to the existing Philippine suborders is provided.

Key to the Philippine Suborders of Collembola

1. Head prognathous or obliquely prognathous; body segments distinct, the body generally elongate; mouthparts either chewing or sucking 2
- Head hyponathous; body segments indistinct, fused to form a compact subglobose body; mouthparts chewing *Symphyleona* Boerner 1901
2. Mouthparts sucking, the mandibles and maxillae usually styliform and enclosed in a buccal cone; mandibles without molar area; unguiculus and clavate tenent hair absent *Nearthropleona* Salmon 1964
- Mouthparts chewing, not cone-shaped; mandibles and maxillae not styliform, the former always with molar area; unguiculus and clavate tenent hair often present *Arthropleona* Boerner 1901

Suborder NEOARTHROPLEONA Salmon 1964*

Salmon (1964) recognized six families primarily based on the structure of the mandibles and maxillae, i.e., shape, presence or absence of lamellae, and shape and number of teeth. The presence or absence of integumentary tubercles or bosses, as well as paratergal swellings, is similarly diagnostic.

Key to the Philippine Families of Nearthropleona

- Mandible slender, styliform, with one or more distal teeth; maxilla styliform, with two slender shafts or lamellae; body stout, usually having integumentary tubercles or bosses, or paratergal swellings *Neanuridae* Boerner
- Mandible absent; maxilla not styliform, without lamellae, but broadened apically and with apical teeth; body stout but without tubercles or paratergal swellings *Brachystomellidae* Stach

Family NEANURIDAE Boerner 1901, sensu Salmon 1964

The family is a large group which includes about 42 genera. Massoud (1967) revised the concept of the family which differs largely from that of Salmon. Three genera are so far known to occur in the Philippines.

Key to the Philippine Genera of Neanuridae

1. Furcula present; eyes 8 + 8; postantennal organ well developed, with many vesicles arranged in an ellipse; body with distinct paratergal swellings, without tubercles;

* Massoud (1967) presents an entirely different classification, disagreeing with Salmon's concept of this suborder.

- color often bluish or purplish, not decolorized in alcohol; Abd VI reduced, rounded apically *Ceratrimeria* Boerner
- Furcula absent; eyes 2 + 2 or 3 + 3; postantennal organ rudimentary or entirely absent; body without paratergal swellings, but having well-developed dorsal tubercles; body often reddish or reddish orange, becoming whitish in alcohol; Abd VI reduced but bilobed apically. 2
2. Mandible with 2 or 3 teeth (rarely 4); maxilla styliform with joined lamellae *Neanura* MacGillivray
- Mandible with 5 or more teeth; maxilla styliform with free lamellae .. *Lobella* Boerner

Genus **CERATRIMERIA** Boerner

Schoetella Schaeffer, 1896: 175.

Ceratrimeria Boerner, 1906: 167; Handschin, 1942: 280; Massoud, 1967: 179.

Type species: *Schoetella maxima* Schoett, 1901; by Handschin, 1942.

This genus is distinguished from the closely related *Pseudachorutes* Fullberg (1871) in the presence of distinct paratergal swellings on thorax and abdomen, and from *Tasmanura* Womersley (1937b) in having 12-30 vesicles on the postantennal organ and a well-developed furcula, the latter having only 4 vesicles on the postantennal organ and a reduced and stump-like furcula with no mucrones. *Ceratrimeria* has 8 eyes on each side of the head. Abd VI is highly reduced and rounded apically.

The Oriental region contains three species (Handschin 1942) two of which are known to occur in the Philippines. The use (by Womersley 1937a) of the number of vesicles on the postantennal organ and the number of teeth on the unguis for separating the Oriental species must be restudied with respect to individual age or size variation. Consideration of the structure of the mandible and maxilla, body chaetotaxy, and shape and form of mucro of these species might prove useful in future studies. On the other hand, separation of the two Philippine species is easy since one exhibits a distinct body color pattern, a rare phenomenon within the genus.

Key to Philippine Species of *Ceratrimeria*

- Body entirely dark bluish; mucro with 2 dorsolateral lamellae and slightly hooked apically; antennae entirely pigmented *maxima* (Schoett)
- Body dark purplish with 9 large whitish dorsal spots in fixed positions; mucro without dorsolateral lamella, not hooked apically; Ant IV whitish *pulchella* Handschin

(1) *Ceratrimeria maxima* (Schoett)

(Fig. 1)

Schoetella maxima Schoett, 1901: 318, figs. 1 — 5.

Type: New Guinea, paratypes in the Swedish Museum of Natural History, Stockholm, Sweden (not seen).

Ceratrimeria maxima, Boerner, 1906: 167; Schoett, 1917: 5, figs. 4 — 6 Handschin, 1925: 266; Handschin, 1926b: 449, fig. 1; Handschin, 1928: 265; Handschin, 1930: 42, pl. I, figs. 1 — 3; Dennis, 1931: 100; Womersley, 1933: 57; Womersley, 1937: 378; Womersley, 1939: 117, fig. 47 A — C; Handschin, 1942: 279; Stach, 1949: 60.

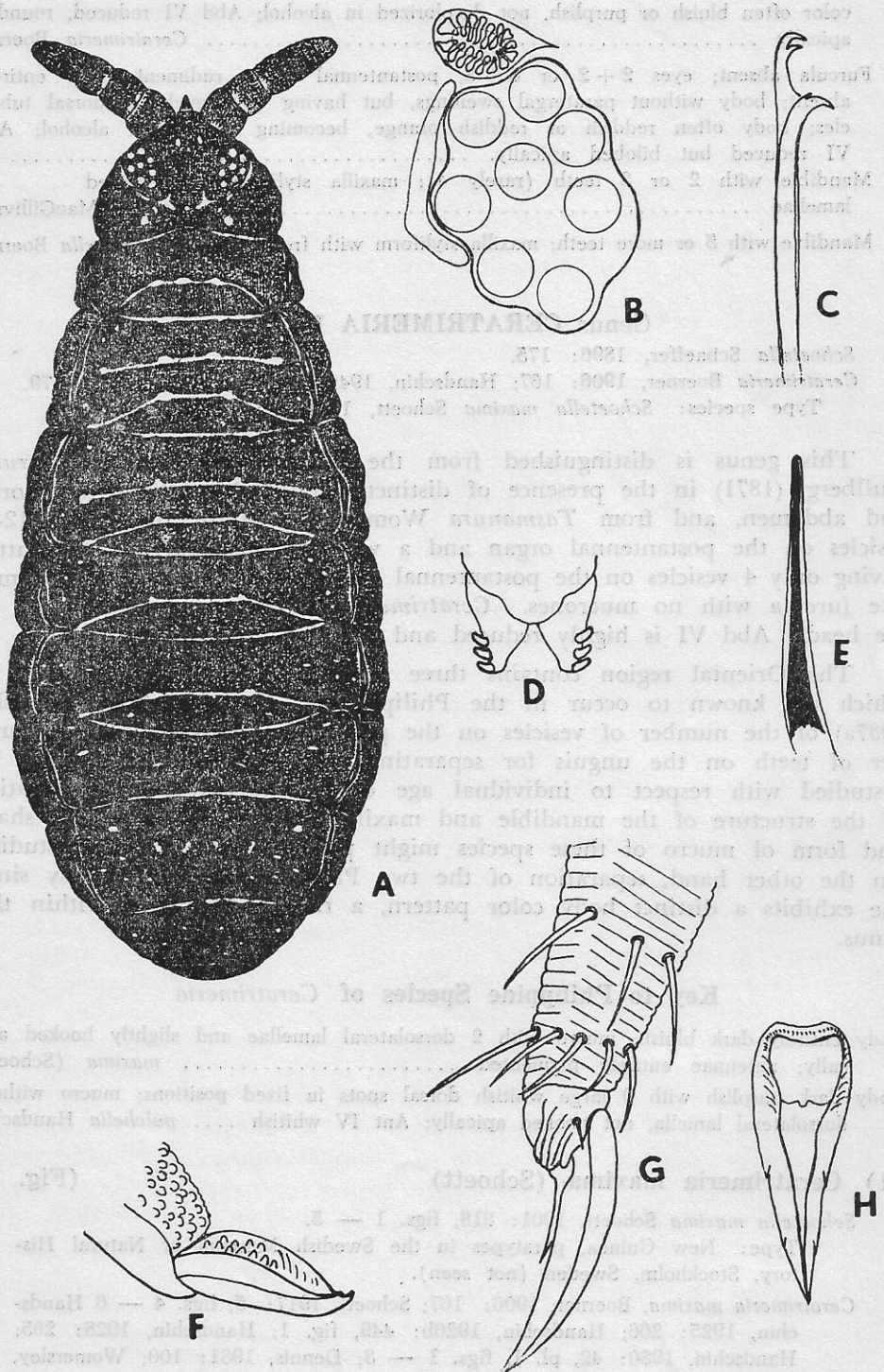


Fig. 1. *Ceratrimeria maxima* (Schoett): A. Habitus, dorsal aspect, 40 x. B. Postantennal organ and eyes, left side. C. Left mandible. D. Tenaculum, anterior aspect. E. Maxilla. F. Mucro and tip of dens, dorsolateral aspect. G. Hind claw, lateral aspect. H. Unguis, posterior aspect showing lateral teeth.

Antennae subequal to head in length, entirely deep bluish; unguis with an inner tooth and 2 pairs of lateral teeth; mucro strongly concave dorsally, having 2 dorsolateral lamellae, its apex slightly hooked.

General Description: Body length 1.2 — 3.4 mm. Color dark bluish, except for whitish borders of segments and intersegments, a median transverse line each on dorsum of Th II and III, integumentary pores, legs, furcula, and body sternum. Body oligochaetotic, the macrochaetae distributed on segments (1 example) as follows: Th II and III, 2 + 2 each; the rest of the segments, 1 + 1 each. Minute, fine setae sparsely distributed on dorsum. Antennae and head subequal in length; Ant III and IV fused, Ant I: II: III + IV = 1:1.5: 3; Ant III sense organ consisting of 2 curving sensory rods in a deep groove guarded posteriorly by 2 plain setae; Ant IV with 3 apical end-bulbs. Buccal cone long, reaching beyond anterior margin of head; mandible with 2 apical and 2 subapical teeth, one subapical tooth being minute; maxilla styliform without teeth. Eyes on dark bluish to bluish-black eye patches. Postantennal organ twice the diameter of an eye, bearing 16 — 17 vesicles arranged in an ellipse (in 3 examples over 3 mm. long). Tibiotarsus annulate on distal half; unguis with an inner tooth at midpoint and 2 pairs of lateral teeth, a pair at distal 2/5, the other at distal 1/5. Lateral flap of ventral tube with 3 + 3 simple setae. Rami of tenaculum tridentate. Furcula stout and dorsally granulate; dens 3 times as long as mucro, dorsally with 8 setae; mucro strongly concave dorsally with 2 dorso-lateral lamellae and a small apical hook.

Material Examined: 3 examples, Australia, determined by Schoett, 1921; PHILIPPINES: 2 examples, College, Laguna, rotten wood from forest area, 24 June 1966 (Coll. 51); 3 examples, same locality and habitat, 8 Sept. 1966 (Coll. 113); 2 examples, Mudspring Area, Mt Maquilung, Luzon, from west decaying leaves on forest floor, 3 Sept. 1966 (Coll. 90).

Distribution: New Guinea; Australia; Java; Sumatra; Philippines.

Remarks: The Philippine examples agree well with *C. maxima* as described by previous workers except in the number of vesicles of the postantennal organ and slightly in the form of the mucro. Existing papers indicate that the number of postantennal organ vesicles varies according to locality, e.g., 18 in the New Guinea type specimen (Schoett 1901), 19 — 24 in Java examples (Handschin 1926b), 12 — 15 in Philippine forms (Handschin 1930), and 25 — 30 in Australian specimens (Womersley 1939). My material bears 16 — 17 vesicles, not exactly corresponding with any of the preceding figures. As Handschin, (1926b, 1942) considered this character variation as subspecific, I suspect the same. On the other hand, whether the mucro of the topotypes has a dorsal lamella or 2 dorsolateral lamellae requires further verification. Additional studies on the structure of the mouthparts and body chaetotaxy of these geographical forms might indicate further whether they are in fact one species, or more than one.

(2) *Ceratrimeria pulchella* Handschin (Fig. 2)

Ceratrimeria pulchella Handschin 1926a: 235, pl. 1, figs. 1-6; Denis, 1931: 100; Womersley, 1937: 378; Handschin, 1942: 280. Type: Philippines, destroyed; *neotype now designated*, in the Natural History Museum of Basel, Switzerland.

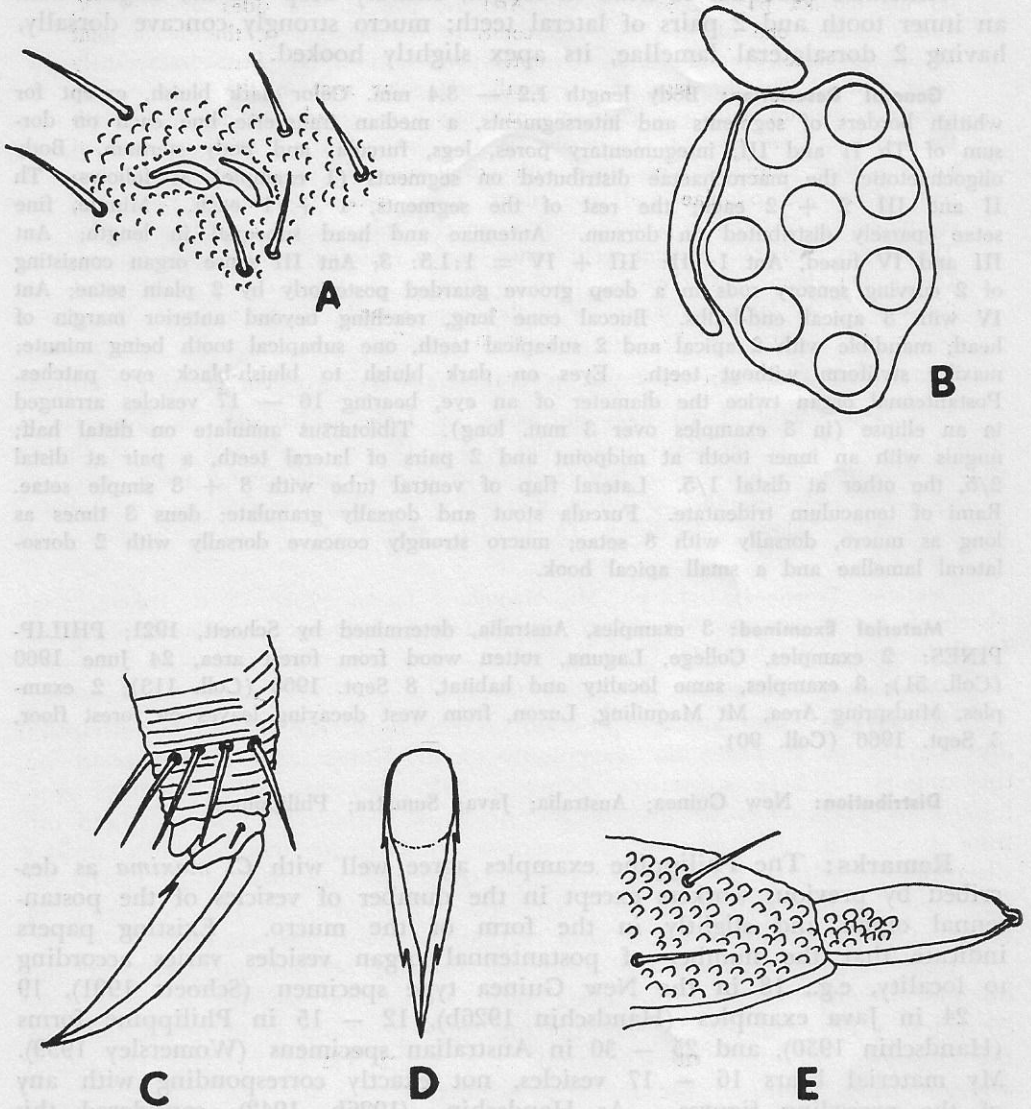


Fig. 2. *Ceratrimeria pulchella* Handschin: A. Ant III sense organ, lateral aspect. B. Eye patch and outline of postantennal organ, left side. C. Hind claw, lateral aspect. D. Unguis, posterior aspect. E. Mucro and tip of dens, dorsolateral aspect.

Ant IV whitish; body dark purplish, dorsum bearing 9 large white spots in fixed positions namely, 2 each on dorsolateral areas of Th I, III, Abd I, and III, and a central spot on Abd V; mucro without dorsolateral lamellae, not hooked apically.

General Description: The species was originally described as:

"Length 2.5 mm. Body color above dark purple, marked with nine large white spots, two are on the lateral and posterior parts of the head, two lateral

on the median parts of Th II and Abd II, two on the sides of Abd IV, and a median one on Abd V. The conus of the mouthparts, the fourth joint of the antennae, the legs, and all sternal parts of the body beneath...entirely ivory white. On the legs only a small triangular spot at the base of the subcoxae remains purple. The antennae are four-jointed and lie underneath the head at the side of the conus of the mouth parts. Fourth joint of antenna with simple bristles; third with apical antennal organ, composed of a pair of curved papillae and two short guard setae. Postantennal organ composed of 27 lobes in a deep groove; several tubercles in a middle row... The unguis is simple, without teeth either on the inner or on the outer margin. Unguiculus absent. Mucrones a third as long as dentes. The granulation of the skin of the latter continues on to the inner lamella of the mucro. Mucro simple, not hooked apically, subtriangular in form."

From one specimen at hand several characters are corrected or added:

Nine large whitish dorsal spots distributed on body as follows: 2 dorso lateral spots each on Th I and III and on Abd I and III, and a central spot on Abd V; unguis with an inner tooth near base and 2 pairs of minute lateral teeth, one pair at distal 1/3 and the other at about proximal 1/3. Body macrochaetae distributed on segments as follows: Th I, 0; Th II, III, Abd I — IV, 2 + 2 each; Abd V, 1 + 1.

Material Examined: Holotype, Mt. Maquiling, Luzon (Coll., C. F. Baker), completely destroyed; neotype, Mudspring, Mt. Maquiling, Luzon, from decaying leaves on forest floor, 13 March 1966 (Coll. 38).

Distribution: Philippines.

Remarks: The single specimen agrees with the original description and figures of *C. pulchella*, except in having inner and lateral teeth on the unguis. These structures, being actually present, were possibly overlooked by Handschin because of his inadequate material and of their minute size. In his study of *C. maxima* (1926b) he mentioned a similar situation in which the lateral unguis teeth are inconspicuous at lateral view but become visible at an inner (posterior) aspect. The collection of more material of this species will certainly clarify this matter.

Based on Handschin's figure of the dorsum of *pulchella* (1926a) and on the present example, the exact positions of the whitish spots is here corrected. The difficulty of interpreting their positions is mainly caused by the existence of large intersegmental areas from Th II to Abd III which are sometimes confused for the true segments.

C. pulchella was previously known from a single specimen, the holotype, which I have examined and found to be completely destroyed. The specimen in my collection is now designated as neotype. The fact that the species has not otherwise been encountered indicates that it is rare and probably restricted to certain microhabitats which require further exploration.

Genus NEANURA MacGillivray*

Achorutes Templeton, 1835:96.

Blax Koch, 1840:359.

Anoura Gervais, 1842:XLVII.

* For explanation of generic synonymy, see Salmon (1964).

Achoreutes Templeton, 1842:306.

Anura Tullberg, 1869:4.

Neanura MacGillivray, 1893:314; Massoud, 1967: 298

Biclavella Willem, 1902:10.

Biloba Stach, 1951:6.

Propeanura Yosii, 1956:46.

Type species: *Neanura muscorum* (Templeton), by MacGillivray, 1893.

The genus is distinctive in having only 2+2 or 3+3 (rarely 1+1) eyes and often well-developed body tubercles. Ant III and Ant IV are distinctly separate dorsally and ventrally, and Ant IV bears a trilobed apical end-bulb. There are usually 2 or 3 teeth on the mandible, rarely exceeding that number (up to 4 if it does). The maxilla is styliform and has joined or fused lamellae. Abd VI is apically bilobed.

Since the taxonomy of this genus is currently undergoing revision (Yosii 1968), the exact number of Oriental species of this genus is not known. Recently new characters have been used to separate the well-known and newly discovered species, i.e., number and shape of teeth and other structures on the mandible and maxilla, number and arrangement of head and body tubercles, head and body chaetotaxy, types of setae, and at times the structure of the unguis. The body tubercles, for instance, may be variously developed, some fusing to form larger tubercles, while others become reduced or lost, being represented only by their setae. Body setae may be ciliated, serrate, or plain; they may appear blunt or pointed apically, or even strongly broadened and flattened apically (see Coates 1968). The nature of the reticulation on the tubercles is probably the most difficult character to interpret and use for separating species.

Two species of *Neanura* are so far known to occur in the Philippines.

Key to Philippine Species of *Neanura*

- Eyes 2+2, not pigmented; body tubercles well developed; body setae distally broadened and strongly serrate *N. hirtella* (Boerner)
 Eyes 3+3, pigmented; body tubercles weakly developed, prominent only on dorso lateral and lateral areas; body setae smooth, long, sharply pointed
 *N. bakeri* (Handschin)

(3) *Neanura hirtella* (Boerner) sensu Yosii 1959 (Figs. 3, 4)

Achorutes hirtellus Boerner, 1906:170; Handschin, 1925:266; Handschin, 1926b:452, fig. 3; Handschin, 1928:266; Handschin, 1929:236; Womersley, 1933:65, fig. 7a-c; Denis, 1934:120; Handschin, 1938:140; Denis, 1948:207, fig. 8. Type: Java, unknown; hypotype in the Laboratory of Zoology, Faculty of Sciences, Dijon, France (not seen).

Neanura hirtellus, Carpenter, 1935:369.

Lobella (Propeanura) hirtella, Yosii, 1959:11, fig. 7.

Propeanura hirtella, Yosii, 1959:17.

Neanura hirtella, Salmon, 1964:286.

Body setae broadened distally and strongly serrate; body tubercles strongly reticulate without definite pattern; eyes 2 + 2, unpigmented; head with 9 tubercles, the antennal and frontal tubercles being fused; ocular

tubercle with a fine seta as well as 2 serrate setae, one apically pointed, the other apically broadened; Abd IV with 6 tubercles, Abd V with 4; mandible with 2 apical and 2 subapical teeth.

General Description: Body length 1.7 — 2.3 mm. Color entirely reddish in living color, whitish in alcohol. Antennae 4/5 as long as head; Ant III sense organ with 2 sensory rods in a deep groove and 2 posterior guard setae. Eyes 2 + 2, unpigmented; postantennal organ absent. Mandible with 2 apical and 2 subapical teeth; maxilla styliform, untoothed. Head and body tubercles well developed, bearing strongly serrate and distally broadened setae, several smooth setae in fixed positions; all tubercles strongly reticulate but without definite pattern. Head with 9 tubercles, their corresponding setae distributed as follows: fused frontal and antennal tubercles with 3 pairs of setae, the median pair being smooth; ocular tubercles 1 + 1, each with 3 setae, 2 serrate with 1 apically pointed and the other distally broadened, and 1 minute seta; dorsolateral and lateral tubercles fused (1 + 1), each with 6 serrate and 3 minute, plain setae; 2 pairs of postocular tubercles, the inner pair with 1 + 1 setae, the outer with 2 + 2 setae. Body tubercles and setae* arranged and tabulated as follows:

Segment	No. of Tubercles	No. and Arrangement of Setae
Th I	3 + 3	1, 2, 1
II	4 + 4	3, s + 3, 3 + s, 3
III	4 + 4	3, s + 4, 3 + s, 3
Abd I	4 + 4	2, 3 + s, 2, 2
II	4 + 4	2, 3 + s, 2, 2
III	4 + 4	2, 3 + s, 2, 2
IV	4 + 4	2, 2 + s, 3, 5
V	2 + 2	3, s + 4
VI	1 + 1	5

Smooth pointed setae distributed singly on each lateral tubercle from Th I to Abd III, 2 on each lateral tubercle of Abd IV and 3 on Abd VI tubercle. Unguis laterally granulate, with one inner tooth at proximal 1/4. Lateral flap of ventral tube with 3 + 3 plain setae. Male genital field and orifice round, the field bearing 24 + 24 anterolateral and 4 anteromedian setae (3 examples). Female genital field more depressed, ovate, with 11 + 11 anterolateral and 2 antero median setae; genital orifice transverse, slit-like.

Material Examined: 1 example, Guinobatan, Albay, grass compost, 20 August 1966 (Coll. 126); 7 examples, same locality, decaying bracts and roots of banana plants, 20 August 1966 (Coll. 130); 5 examples, same locality and date, decaying leaves (Colls. 134 and 136); 7 examples, Pili, Camarines Sur, grass compost, 19 August 1966 (Colls. 149 and 150).

Distribution: Java; India; Australia; Indo-China; Marquesas and Society Islands; Singapore; Philippines.

Remarks: The material comes closest to *Neanura hirtella* as primarily conceived by Yosii (1959) who redescribed the species from Singapore examples. However, the Philippine specimens vary slightly from those of Yosii in that the seventh median seta on the fused antennal and frontal tubercles is absent. Also in exception to Yosii's count of 3+3 tubercles on Abd IV, the Philippine material possesses 4+4 tubercles. This difference might be accounted for by the fact that the fourth pair of tuber-

* A seta sensuality is abbreviated as s.

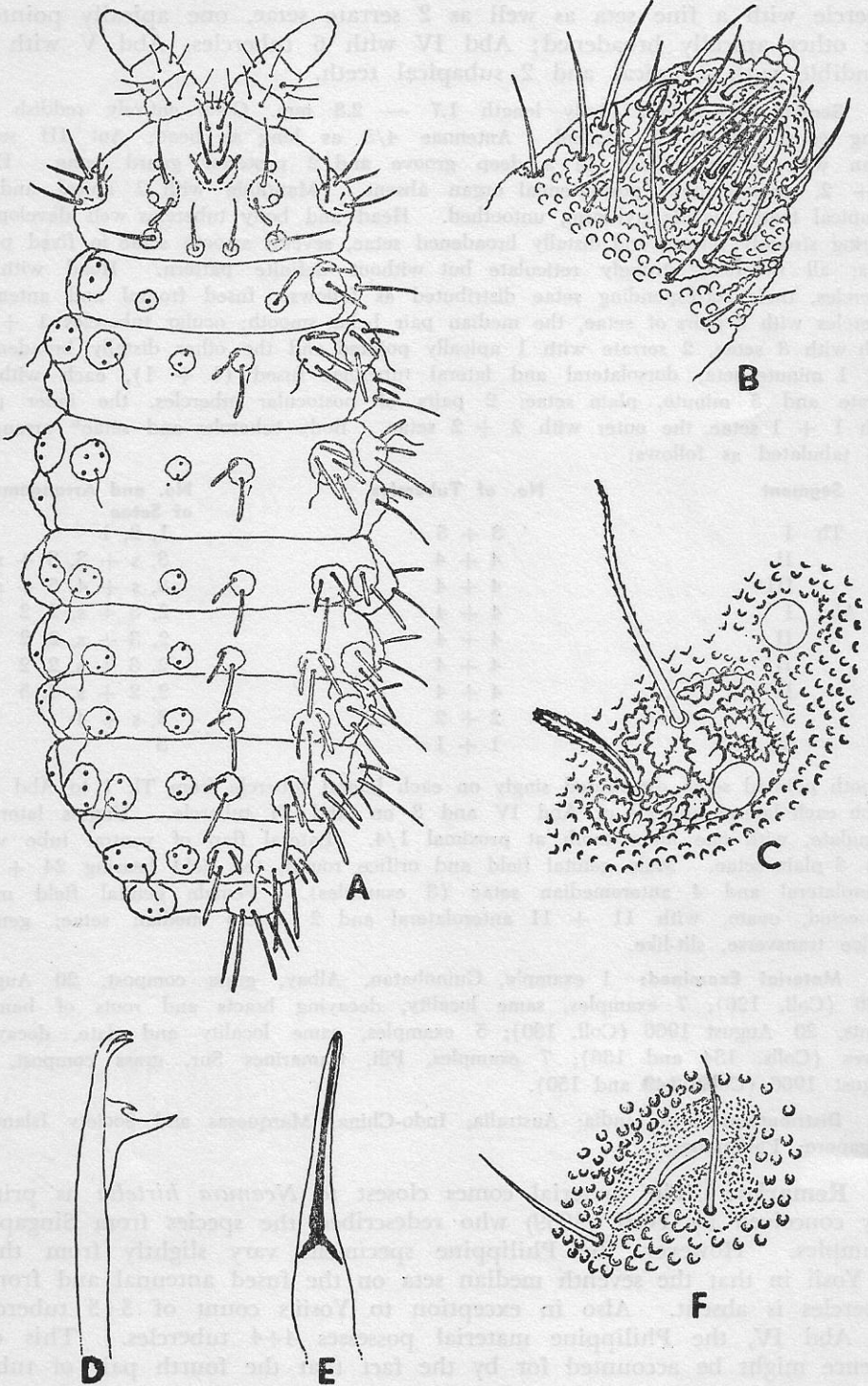


Fig. 3. *Neanura hirtella* (Boerner): A. Habitus, female, 56x. B. Tip of right antenna, dorsal aspect. C. Right ocular tubercle. D. Left mandible. E. Maxilla. F. Ant III sense organ, lateral aspect.

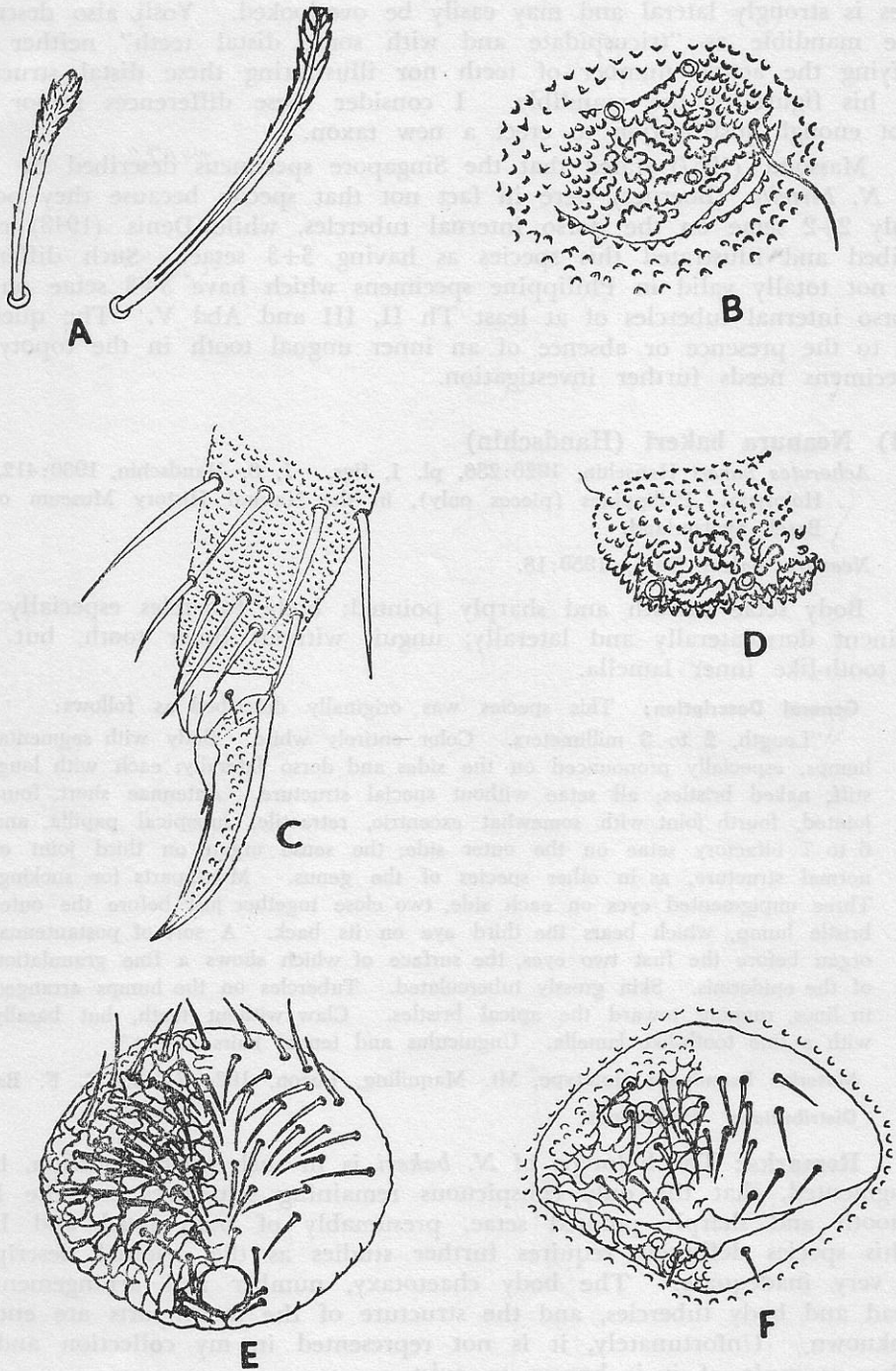


Fig. 4. *Neanura hirtella* (Boerner): A. Typical body setae showing prominent serrations and blunt tip. B. Right Abd III dorsoexternal tubercle showing reticulation. C. Claw, lateral aspect. D. Left Abd VI tubercle. E. Male genital field, ventral aspect. F. Female genital field, ventral aspect.

cles is strongly lateral and may easily be overlooked. Yosii also described the mandible as "tricuspidate and with some distal teeth" neither specifying the actual number of teeth nor illustrating these distal structures in his figure of the mandible. I consider these differences minor and not enough justification to erect a new taxon.

Massoud (1967) stated that the Singapore specimens described by Yosii as *N. hirtella* (Boerner) were in fact not that species because they possess only 2+2 setae on the dorso internal tubercles, while Denis (1948) redescribed and illustrated this species as having 3+3 setae. Such difference is not totally valid in Philippine specimens which have 3+3 setae on the dorso internal tubercles of at least Th II, III and Abd V. The question as to the presence or absence of an inner unguis tooth in the topotypical specimens needs further investigation.

(4) *Neanura bakeri* (Handschin)

Achorutes bakeri Handschin, 1926:236, pl. I, figs. 7, 8; Handschin, 1930:412.

Holotype: Philippines (pieces only), in the Natural History Museum of Basel, Switzerland.

Neanura bakeri, Yosii, 1959:18.

Body setae smooth and sharply pointed; body tubercles especially prominent dorsolaterally and laterally; unguis without inner tooth, but with a tooth-like inner lamella.

General Description: This species was originally described as follows:

"Length, 2 to 3 millimeters. — Color entirely white. Body with segmental humps, especially pronounced on the sides and dorso laterally; each with long, stiff, naked bristles; all setae without special structure. Antennae short, four-jointed, fourth joint with somewhat excentric, retractile, subapical papilla, and 6 to 7 olfactory setae on the outer side; the sense organ on third joint of normal structure, as in other species of the genus. Mouthparts for sucking. Three unpigmented eyes on each side, two close together just before the outer bristle hump, which bears the third eye on its back. A sort of postantennal organ before the first two eyes, the surface of which shows a fine granulation of the epidermis. Skin grossly tuberculated. Tubercles on the humps arranged in lines, running toward the apical bristles. Claw without teeth, but basally with a fine tooth-like lamella. Unguiculus and tenent hairs absent."

Material Examined: Holotype, Mt. Maquiling, Luzon, 1924 (Coll., C. F. Baker).

Distribution: Philippines.

Remarks: The holotype of *N. bakeri* is in such poor condition, being fragmented, that the only conspicuous remaining structures are the long, smooth and sharply pointed setae, presumably of both head and body. This species definitely requires further studies as the original description is very inadequate. The body chaetotaxy, number and arrangement of head and body tubercles, and the structure of the mouthparts are entirely unknown. Unfortunately, it is not represented in my collection and no other example of it is known to exist.

Although *N. bakeri* was originally described as possessing unpigmented eyes, there is good reason to believe that the eye were indeed pigmented. In many of my specimens of *Neanura* with 3 + 3 eyes, the pigments on

the eyes have faded or dissolved entirely during the clearing process, a phenomenon which is probably not uncommon within the genus. The stated whitish body color is likewise very doubtful for the same reason.

Genus LOBELLA Boerner

Lobella Boerner, 1906:168.

Womersleya Denis, 1948:198.

Type species: *L. sauteri* Boerner, 1906.

The genus is closely allied to *Neanura* and differs only from the latter in having 5 or more teeth on the mandible and free lamellae of the maxilla. As in *Neanura*, the maxillae never possess any fringes on the lamellae. In certain cases, however, the tip of one lamella may contain 2 minute crochet-like hooks.

Two new species are represented in the Philippines.

Key to Philippine Species of *Lobella*

Head with 11 prominent tubercles; frontal tubercle bearing 3 strong setae, the antennal tubercles each with 2 strong setae; mandible with 6 distal teeth; all body tubercles well developed *L. paraperfusa* n. sp.

Head with 10 tubercles; frontal tubercle absent, represented only by 2 fine setae; antennal tubercles reduced, each with 1 seta; mandible with 6 distal teeth and a basal lobe adjacent to one of the apical teeth; dorso internal tubercles on Th II — Abd IV reduced, each with only 1 strong seta; dorso external tubercles of Th I absent, each represented by a seta *L. reducta* n. sp.

(5) *Lobella paraperfusa*, new species

(Figs. 5, 6)

Head with 11 tubercles, the frontal and antennal tubercles well developed and not fused; mandible with 4 apical and 2 subapical teeth; maxilla crochet-like, apex with 2 minute hooks; body setae blunt and weakly serrate, uniquely arranged on well-developed body tubercles eyes 3 + 3, pigmented.

General Description: Body length 1.95 — 3.1 mm. Color entirely reddish orange when living, turning whitish in alcohol. Antennae 3/5 as long as head; Ant III sense organ consisting of 2 sensory rods, posterior guard setae not observed; Ant IV with 9 blunt curving sensory setae (8 examples). Eyes blackish, 3 on each side, 2 of which lie anterior to ocular tubercle, the other at posterior edge of tubercle; postantennal organ rudimentary, appearing as a simple oval smooth area just anterior to the outer anterior eye. Mandible with 4 apical and 2 subapical teeth; maxilla crochet-like with 2 minute apical hooks. Head and body tubercles well developed with strong setae appearing almost smooth but actually faintly serrate; tubercles weakly reticulate, the granules forming rows which radiate from bases of major setae in almost straight lines. Head with 11 tubercles, their corresponding setae distributed as follows: 2 prominent antennal tubercles, each with 2 setae; frontal tubercle, 3 setae; 2 ocular tubercles each with 1 strong and 2 minute setae (varying in length according to size); 2 dorsolateral tubercles, each with 1 minute and 3 strong setae; 2 lateral

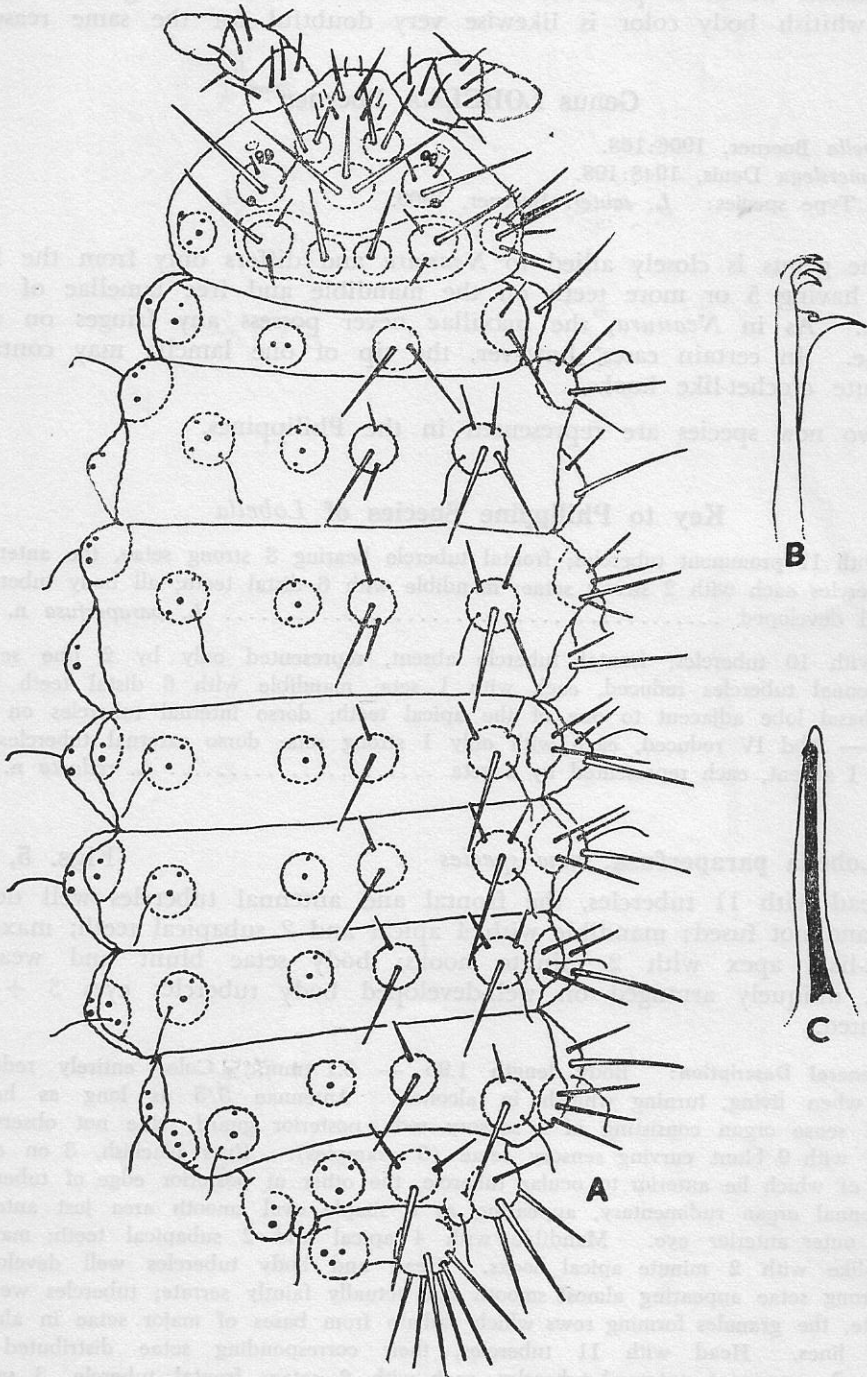


Fig. 5. *Lobella paraperfusa* n. sp.: A. Habitus, female, 64 x. B. Left mandible. C. Right maxilla

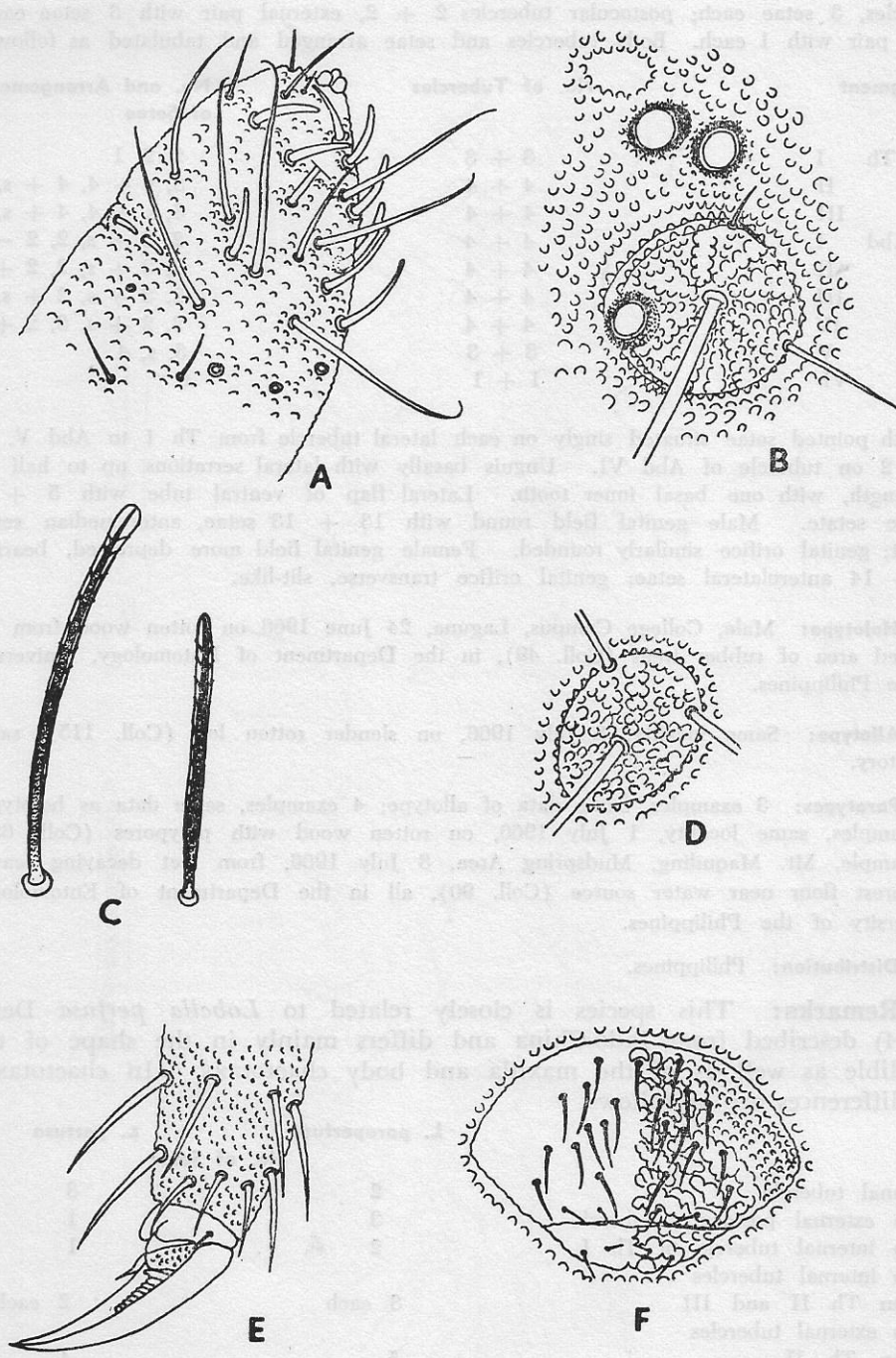


Fig. 6. *Lobella paraperfusa*, n.sp.: A. Tip of left antenna, dorso lateral aspect. B. Left ocular tubercle. C. Typical body setae, the central areas darkened for contrast. D. A body tubercle showing granulation. E. Claw, lateral aspect. F. Female genital field, ventral aspect.

tubercles, 3 setae each; postocular tubercles 2 + 2, external pair with 3 setae each, inner pair with 1 each. Body tubercles and setae arranged and tabulated as follows:

Segment	No. of Tubercles	No. and Arrangement of Setae
Th I	3 + 3	2, 2, 1
II	4 + 4	3, s + 4, 4 + s, 2
III	4 + 4	3, s + 4, 4 + s, 2
Abd I	4 + 4	2, 3 + s, 2, 2 - s
II	4 + 4	2, 3 + s, 2, 2 + s
III	4 + 4	2, 3 + s, 2 + s, 2
IV	4 + 4	2, 2 + s, 3, 2 + s
V	3 + 3	3, s, 4
VI	1 + 1	6

Smooth pointed setae situated singly on each lateral tubercle from Th I to Abd V, at least 2 on tubercle of Abd VI. Unguis basally with lateral serrations up to half of its length, with one basal inner tooth. Lateral flap of ventral tube with 5 + 5 minute setae. Male genital field round with 13 + 13 setae, anteromedian setae absent; genital orifice similarly rounded. Female genital field more depressed, bearing 14 + 14 anterolateral setae; genital orifice transverse, slit-like.

Holotype: Male, College Campus, Laguna, 24 June 1966 on rotten wood from forested area of rubber trees (Coll. 49), in the Department of Entomology, University of the Philippines.

Allotype: Same locality, 8 July 1966, on slender rotten log (Coll. 115), same repository.

Paratypes: 3 examples, Same data of allotype; 4 examples, same data as holotype; 3 examples, same locality, 1 July 1966, on rotten wood with polypores (Coll. 63); 1 example, Mt. Maquiling, Mudspring Area, 3 July 1966, from wet decaying leaves on forest floor near water source (Coll. 90), all in the Department of Entomology, University of the Philippines.

Distribution: Philippines.

Remarks: This species is closely related to *Lobella perfusa* Denis (1934) described from Indo-China and differs mainly in the shape of the mandible as well as of the maxilla and body chaetotaxy. In chaetotaxy, the differences are as follows:

	<i>L. paraperfusa</i>	<i>L. perfusa</i>
	No. of Setae	
Antennal tubercle	2	3
Dorso external postocular tubercle	3	1
Dorso internal tubercle of Th I	2	1
Dorso internal tubercles on Th II and III	3 each	2 each
Dorso external tubercles on Th II	5	4

The observed chaetotaxy in *L. paraperfusa* is constant as far as all specimens examined are concerned, and would seem reasonable to differ actually from that of *L. perfusa*.

Aside from the difference in the shape of the mandible, this structure on *L. paraperfusa* does not have a basal lobe between the apical and subapical teeth as in *L. perfusa*. The lamellar hooks of the maxilla, instead of pointing anteriorly as in *perfusa*, are directed posteriorly and appearing crochet-like.

Since the body chaetotaxy in *Lobella* is considered to be highly specific and constant, as well as the mandible is to some extent, *L. paraperfusa* is thus distinct but strongly allied to *L. perfusa*.

(6) *Lobella reducta*, new species

(Figs. 7, 8)

Frontal tubercle of head absent represented only by 2 fine setae; dorso-external tubercle on Th I obsolete; dorsointernal tubercles on Th II — Abd IV each bearing only 1 well-developed seta; mandible with 6 distal teeth, 4 apical and 2 subapical, and a basal lobe between apical and subapical teeth; maxilla crochet-like as in *L. paraperfusa*; body setae less in number than *L. paraperfusa*; tibio tarsus annulate distally.

General Description: Body length 1.6 — 2.5 mm. Living color entirely reddish orange, whitish in alcohol. Antennae slightly more than $3/5$ as long as head; Ant III sense organ as in *L. paraperfusa*; Ant IV with 6 blunt curving sensory setae. Eyes 3+3 darkly pigmented (decolorized when cleared in Hoyer's), two anterior to ocular tubercle and 1 just at posterior edge of tubercle. Postantennal organ rudimentary and represented by a simple smooth oval area anterior to anterior eyes. Mandible with 4 apical and 2 subapical teeth, with a basal lobe between apical and subapical teeth; maxilla crochet-like and directed posteriorly as in *L. paraperfusa*. Dorsal tubercles of head with fewer setae than in *L. paraperfusa*; typical body setae finely serrate (visible under oil immersion at phase) and apically blunt; granules of body tubercle radiate from base of major seta, not forming any reticulation. Head with 10 tubercles, the frontal one absent and is represented only by two fine setae, other tubercles with the following setal arrangement: 2 antennal tubercles, 1 each; 2 ocular tubercles, each with 1 strong and 1 minute setae; 2 dorsolateral tubercles each with 1 minute and 2 strong setae, and 3 minute setae lying adjacent to each tubercle; 2 + 2 postocular tubercles each with 1 strong seta. Body tubercles and setae, including setae sensuales (s.) as follows:

Segment		No. of Tubercles	No. and Arrangement of Setae
Th	I	2 + 2	1, 1, 1
	II	4 + 4	2, s + 2, 2 + s, 2
	III	4 + 4	2, s + 2, 2 + s, 2
Abd	I	4 + 4	2, 2 + s, 2, 2
	II	4 + 4	2, 2 + s, 2, 2
	III	4 + 4	2, 2 + s, 2, 2
	IV	4 + 4	2, 2 + s, 3, 4 + s
	V	3 + 3	3, s, 5
	VI	1 + 1	5

Smooth pointed setae singly distributed on lateral tubercles from Th I to Abd IV, at least one on dorsolateral tubercle of Abd V, and at least 2 on Abd VI tubercle. Tibiotarsus slightly annulated distally; unguis with lateral serrations on proximal half, and a basal inner tooth. Lateral flap of ventral tube with 4 + 4 setae. Male genital field round, bearing 17 + 17 setae; genital orifice irregularly rounded (4

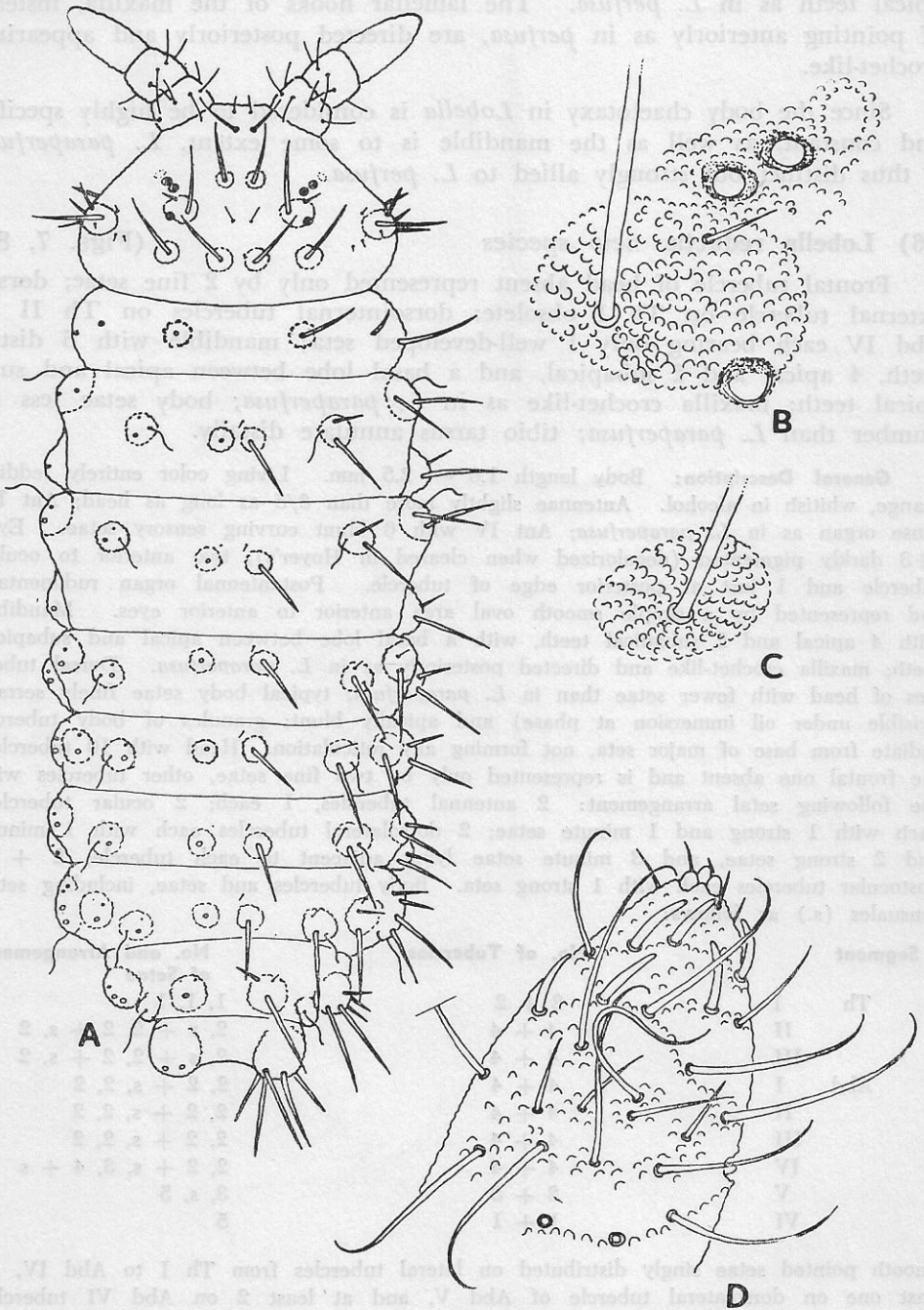


Fig. 7. *Lobella reducta*, new species: A. Habitus, female, 70 x. B. Right ocular tubercle. C. A body tubercle showing granulation. D. Tip of right antenna, dorsal aspect.

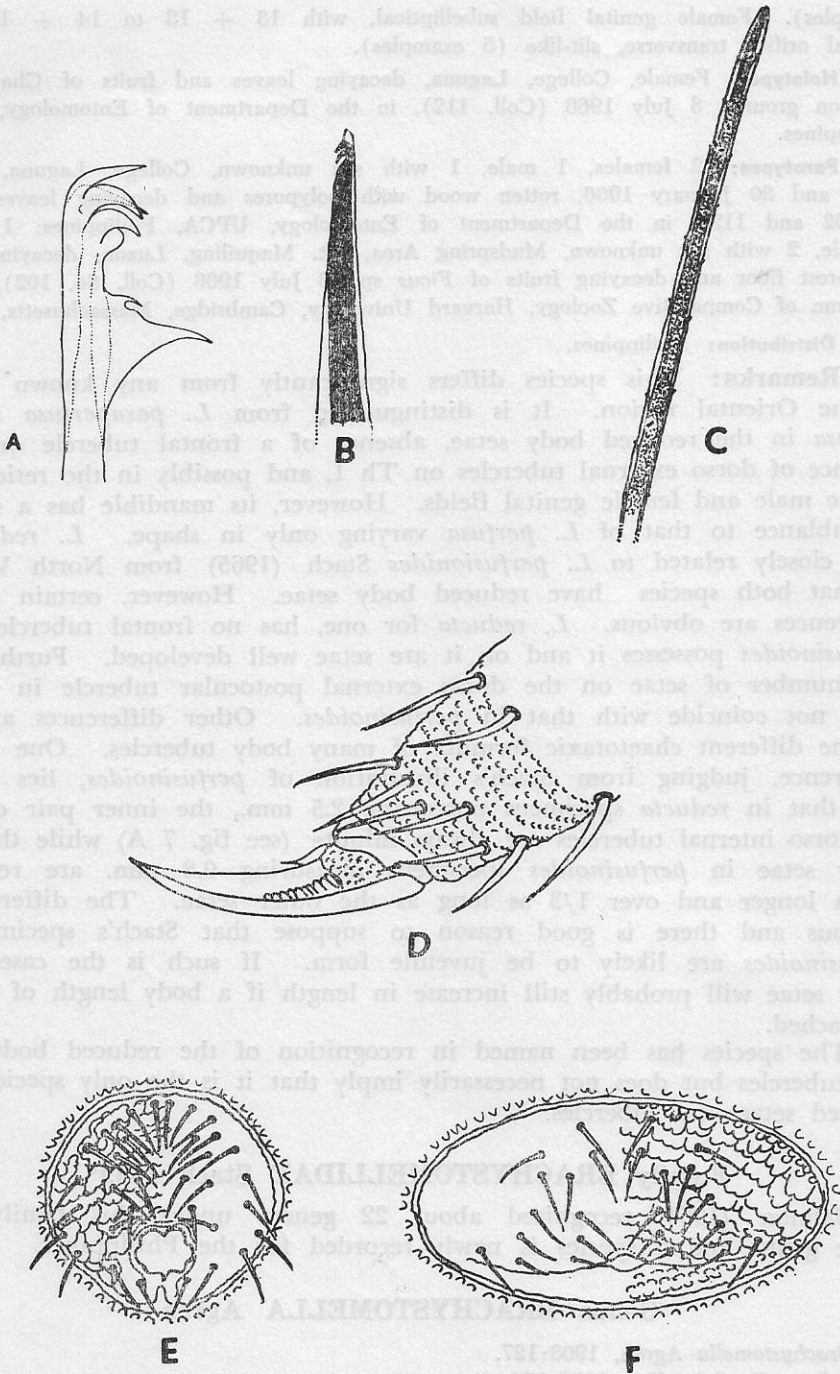


Fig. 8. *Lobelia reducta*, new species: A. Right mandible. B. Right maxilla. C. Typical body setae with central area darkened to show hyaline borders. D. Claw, lateral aspect. E. Male genital field, ventral aspect. F. Female genital field, ventral aspect.

examples). Female genital field subelliptical, with 13 + 13 to 14 + 14 setae; genital orifice transverse, slit-like (5 examples).

Holotype: Female, College, Laguna, decaying leaves and fruits of *Chaulmoogra* tree on ground, 8 July 1966 (Coll. 112), in the Department of Entomology, UPCA, Philippines.

Paratypes: 2 females, 1 male, 1 with sex unknown, College, Laguna, 1 July 1966 and 30 January 1966, rotten wood with polypores and decaying leaves (Colls. 17, 62 and 112), in the Department of Entomology, UPCA, Philippines; 1 female, 1 male, 2 with sex unknown, Mudspring Area, Mt. Maquiling, Luzon, decaying leaves on forest floor and decaying fruits of *Ficus* sp., 3 July 1966 (Coll. 84, 102), in the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U. S. A.

Distribution: Philippines.

Remarks: This species differs significantly from any known species in the Oriental region. It is distinguished from *L. paraperfusa* and *L. perfusa* in the reduced body setae, absence of a frontal tubercle on head, absence of dorso external tubercles on Th I, and possibly in the reticulation of the male and female genital fields. However, its mandible has a striking resemblance to that of *L. perfusa* varying only in shape. *L. reducta* is very closely related to *L. perfusionides* Stach (1965) from North Vietnam in that both species have reduced body setae. However, certain distinct differences are obvious. *L. reducta* for one, has no frontal tubercle while *perfusionoides* possesses it and on it are setae well developed. Furthermore, the number of setae on the dorso external postocular tubercle in *reducta* does not coincide with that in *perfusionoides*. Other differences are seen in the different chaetotaxic formula of many body tubercles. One striking difference, judging from Stach's illustration of *perfusionoides*, lies in the fact that in *reducta* specimens measuring 2.5 mm., the inner pair of setae on dorso internal tubercles are always minute (see fig. 7 A) while the same inner setae in *perfusionoides* specimens measuring 0.8 mm. are relatively much longer and over 1/3 as long as the outer setae. The difference is obvious and there is good reason to suppose that Stach's specimens of *perfusionoides* are likely to be juvenile form. If such is the case, these inner setae will probably still increase in length if a body length of 2 mm. is reached.

The species has been named in recognition of the reduced body setae and tubercles but does not necessarily imply that it is the only species with reduced setae and tubercles.

Family BRACHYSTOMELLIDAE Stach 1949*

Salmon (1964) recognized about 22 genera under this family. A single genus and a species is newly recorded for the Philippines.

Genus BRACHYSTOMELLA Agren

Brachystomella Agren, 1903:127.

Schoettella Schaeffer, 1896:176 (in part)

Chondratorutes Wahlgren, 1906:5.

Type species: *Schoettella parvula* Schaeffer, 1896; by Stach, 1949.

* Massoud (1967) considered this family as a subfamily under Neanuridae.

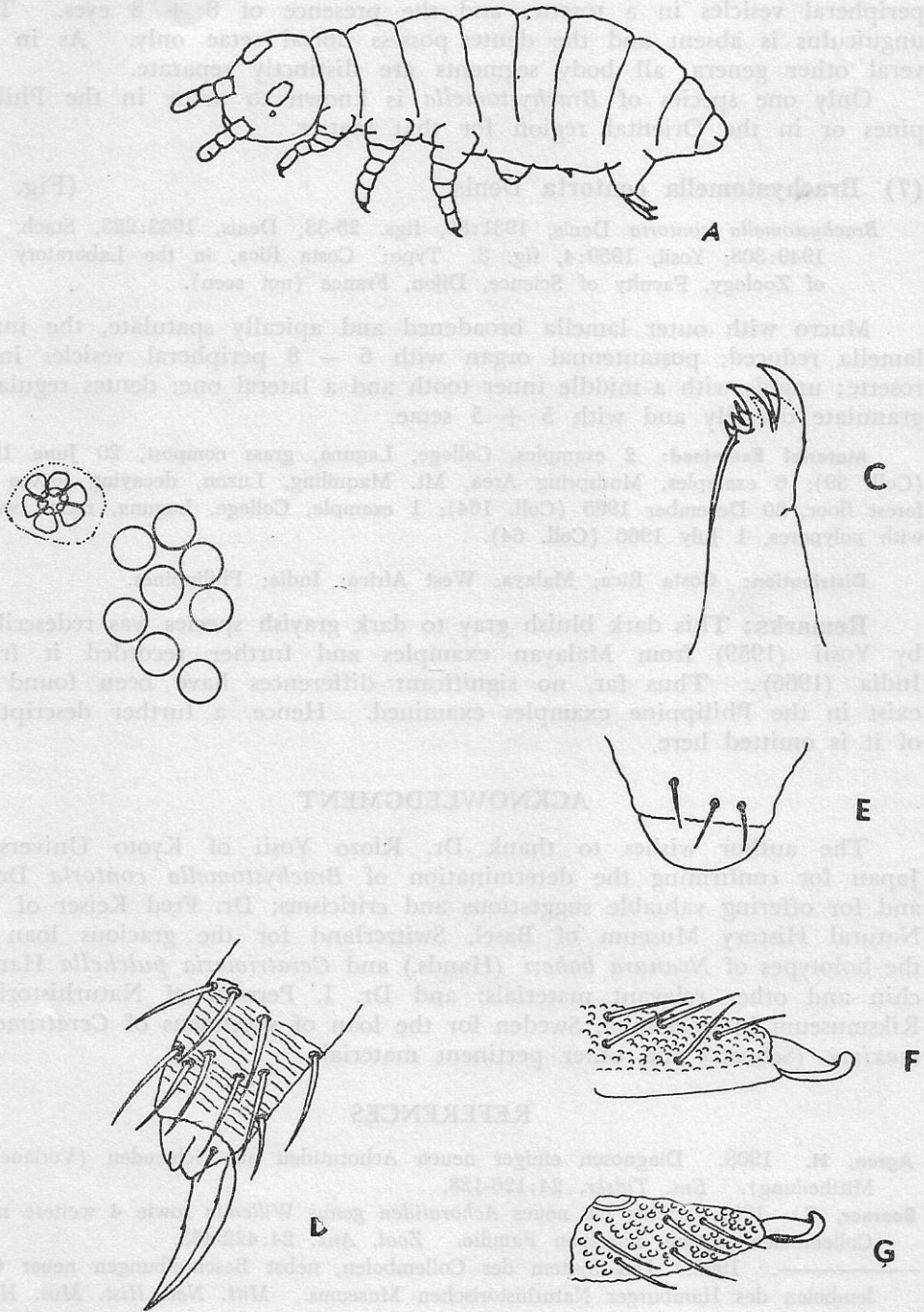


Fig. 9. *Brachystomella contorta* Denis: A. Habitus, lateral aspect, head dorso lateral, 82 x, body color omitted. B. Eyes and postantennal organ. C. Maxilla

The genus is readily recognized by the well-developed furcula, short maxilla head bearing apical teeth, the postantennal organ having up to 7 peripheral vesicles in a rosette, and the presence of 8 + 8 eyes. The unguiculus is absent and the dentes possess dorsal setae only. As in several other genera, all body segments are distinctly separate.

Only one species of *Brachystomella* is known to occur in the Philippines or in the Oriental region for that matter.

(7) *Brachystomella contorta* Denis

(Fig. 9)

Brachystomella contorta Denis, 1931:80, figs. 25-33; Denis, 1933:223, Stach, 1949:308; Yosii, 1959:4, fig. 3. Type: Costa Rica, in the Laboratory of Zoology, Faculty of Science, Dijon, France (not seen).

Mucro with outer lamella broadened and apically spatulate, the inner lamella reduced; postantennal organ with 6 — 8 peripheral vesicles in a rosette; unguis with a middle inner tooth and a lateral one; dentes regularly granulate dorsally and with 5 + 5 setae.

Material Examined: 2 examples, College, Laguna, grass compost, 20 June 1966 (Coll. 39); 6 examples, Mudspring Area, Mt. Maquiling, Luzon, decaying leaves on forest floor, 20 December 1965 (Coll. 164); 1 example, College, Laguna, rotten wood with polypores, 1 July 1966 (Coll. 64).

Distribution: Costa Rica; Malaya; West Africa; India; Philippines.

Remarks: This dark bluish gray to dark grayish species was redescribed by Yosii (1959) from Malayan examples and further recorded it from India (1966). Thus far, no significant differences have been found to exist in the Philippine examples examined. Hence, a further description of it is omitted here.

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