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INTRODUCTION

THE PRESENT PAPER is a survey of South African Thysanura associated with termites. The specimens studied were made available by Dr. W. G. H. Coaton of the Plant Protection Research Institute, Pretoria, Republic of South Africa. Dr. Coaton and his associates, mainly Mr. J. L. Sheasby, have contributed greatly toward improving our knowledge of the termitophiles of South Africa. I am very grateful to Dr. Coaton for allowing me to study his valuable material.

Holotypes and allotypes of the new species have been deposited in the National Collection of Insects, Division of Entomology, Pretoria; paratypes and specimens belonging to species previously named are in the institution mentioned and in the American Museum of Natural History. All drawings were made by the author.

HOST ASSOCIATIONS

Table 1, compiled from the literature and augmented by new data, shows the associations of South African termites and the Thysanura. All the Atelurinae (Nicoletiidae) mentioned are probably true termitophiles, but most of the Lepismatidae, except the species of *Silvestrella*, are not. The records of associations of normally free-living lepismatids with termites are therefore listed in parentheses.

Among all the species of termites investigated, *Microhodotermes viator* harbors by far the largest number of termitophilous Thysanura, viz., 10 species belonging to six genera of the Atelurinae and one genus of the Lepismatidae. *Hodotermes mossambicus*, also a member of the Hodotermitidae, has the second largest number of termitophilous Thysanura, viz., four species of the Atelurinae belonging to as many genera. According to Coaton (in litt.), transfer of inquilines between *Microhodotermes viator* and *Hodotermes mossambicus* would be possible because both species have similar feeding and nesting habits, and their ranges overlap over a wide belt in the Cape Province. These termites actually do share one species of the Atelurinae (*Pseudatelura trichophila*); one genus, *Gynatelura*, reported only from *Hodotermes mossambicus*, is a component of a group of genera associated mainly with *Microhodotermes viator*.

This group of genera, which I call the *Dinatelura*-group, is of special interest. It is composed of the genera *Rulenatida*, *Natiruleda*, *Pseudatelura*, *Dinatelura*, *Linadureta*, *Eluratinda*, and *Gynatelura*. All are associated with *Microhodotermes viator* except *Gynatelura*. Coaton informed me that the insects of this assemblage, "are found in the hives themselves, and the dorsal surface of their bodies has a golden colouration so similar to that of the termites themselves that, although they are large, they are nearly completely camouflaged and are not easily seen. They are fast moving and hard to catch. . . ." The well-developed mouthparts of these insects indicate that they are predators or general feeders. I have found no trichomes or glandular areas that might produce secretions attractive to the hosts of the thysanurans, and it is probable that speed, combined with a relatively stout and strongly sclerotized body, are sufficient to protect the atelurines from the termites.

The *Dinatelura*-group is clearly monophyletic, viz., all members are derived from a common ancestor not shared with any other atelurine. The fact that these genera are now practically all syntopic (representatives of several genera are frequently found in the same nest) does not necessarily imply that they arose syntopically or even sympatrically. Coaton informed me that, "it would seem as if this termite [*Microhodotermes viator*] has been speciating out in various ecological niches, but the process has not been going on far enough to permit separating the forms on morphological characters into distinct species or subspecies." It is imaginable that the *Dinatelura*-complex has been speciating concomitantly with the *Microhodotermes viator* complex, but that the evolutionary rate in the thysanurans has been very much higher than that of the termites, for reasons not understood. Differentiation in the *Dinatelura*-complex is expressed, among other features, by the evolution of highly complex and diversified genitalic and secondary sexual structures. The existence of definitive reproductive barriers among the taxa is suggested by these striking morphological differences; syntopy of the thysanurans thus becomes possible when secondary contacts between populations of *Microhodotermes viator* is established.

TABLE 1

HOST RELATIONSHIPS OF THYSANURA FOUND WITH TERMITES IN SOUTHERN AFRICA

	Bifiditermes durbanensis (Kalotermitidae)	*Hodotermes mossambicus* (Hodotermitidae)	*Microhodotermes viator* (Hodotermitidae)	*Psammotermes allocerus* (Rhinotermitidae)	*Amitermes hastatus* (Termitidae: Amitermitinae)	*Amitermes* sp. (Termitidae: Amitermitinae)	*Cubitermes* sp. (Termitidae: Termitinae)	*Angulitermes* sp. (Termitidae: Termitinae)	*Promirotermes* sp. (Termitidae: Termitinae)	*Macrotermes natalensis* (Termitidae: Macrotermitinae)	*Macrotermes goliath* (Termitidae: Macrotermitinae)	*Macrotermes vitrialatus* (Termitidae: Macrotermitinae)	*Macrotermes* sp. (Termitidae: Macrotermitinae)	*Odontotermes transvaalensis* (Termitidae: Macrotermitinae)	*Baucaliotermes hainesi* (Termitidae: Nasutitermitinae)	*Trinervitermes trinervoides* (Termitidae: Nasutitermitinae)	*Trinervitermes* sp. (Termitidae: Nasutitermitinae)
Nicoletiidae, Atelurinae																	
Ecnomatelura	—	×	—	—	—	—	—	—	—	×	×	×	—	×	—	×	×
Cryptocephalina minutella	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—	—
Gastrotheus ?aplurus	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
Ateluropsis hodotermitis	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rulenatida apprima	—	—	×	—	×	—	—	×	—	—	—	—	—	—	—	—	×
Rulenatida primitiva	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Natiruleda magnifica	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pseudatelura trichophila	—	×	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dinatelura afra	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Linadureta versicolor	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eluratinda sheasbyi	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Eluratinda coatoni	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gynatelura arcana	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lepismatidae																	
Silvestrella myrmecophila	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Silvestrella termitophila	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ctenolepisma grandipalpis	—	—	—	—	—	—	—	—	(×)	—	—	(×)	—	—	—	—	—
Ctenolepisma intercursa	—	—	(×)	(×)	—	—	—	—	—	—	—	—	—	—	—	—	—
Ctenolepisma terebrans	—	(×)	—	—	—	(×)	—	—	—	—	—	—	—	—	—	—	—
Lepisma globosa	—	—	—	—	—	—	—	—	—	(×)	—	—	—	—	—	—	—
Lepisma braunsi	(×)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Monachina schultzei	—	—	—	—	—	—	(×)	—	—	—	—	—	—	(×)	—	—	—

SYSTEMATICS

NICOLETIIDAE

ATELURINAE

IN ORDER to facilitate further work on the Atelurinae of southern Africa, this portion of the present paper has been conceived as a synopsis of the subfamily as it pertains to this area.

KEY TO THE GENERA OF THE ATELURINAE OF SOUTHERN AFRICA

1. Styli on abdominal segments II–IX . . "*Atelura*"
   Styli less numerous 2
2. Apical segment of maxillary palp much shorter than penultimate (fig. 1C); tibiae with long comb of apically deeply cleft macrochaetae (fig. 1E); eversible vesicles of abdominal sternum VI situated on posterolateral angles of sclerite (fig. 1D) . . . *Ecnomatelura* Wygodzinsky
   Apical segment of maxillary palp not conspicuously shorter than penultimate (figs. 3H, 5F); tibiae only with simple macrochaetae (fig. 4A); vesicles of sixth abdominal sternum when present, in submedian position (fig. 7N) 3
3. Styli present on abdominal segments VI–IX; head with numerous macrochaetae (fig. 2); thoracic and abdominal terga with at least one complete transversal row of macrochaetae . . 4
   Number of styli different; head with only a few scattered short setae (figs. 3J, 10D); terga lacking transversal rows of macrochaetae, although with more or less simple setae 5
4. Head completely hidden from above under pronotum; abdominal sterna lacking vesicles . . . . . *Cryptocephalina* Silvestri
   Head visible from above; some abdominal sterna with vesicles . . . . . *Gastrothæus* Casey
5. Pronotum completely covered by scales; eversible vesicles on abdominal segments II and III, exserted vesicles on VII; mandibles (fig. 3P–R) with a single tooth, molar region overlaid by a large, apically pectinate, lamellar projection; apical article of labial palp internally with conspicuous glandular cells (fig. 3B, F)[1] . . . . . *Ateluropsis*, new genus
   Pronotum either completely lacking scales, or with the latter only on a small area on deflected portion of sclerite; eversible vesicles on abdominal sterna II–VI, exserted vesicles on VII; mandibles (figs. 5D; 14G) with two teeth, molar region simple; apical article of labial palp lacking conspicuous glandular cells . . 6
6. Scales present, normal, with very numerous parallel rays (figs. 5R; 11O, P); mesonotum and metanotum with at least some scales; mid and hind coxae with some scales; abdominal sterna completely covered by scales 7
   Scales either absent, or highly modified, viz., distinctly pigmented, and with rays either completely absent (figs. 14M–O, 19H, 21P), or widely spaced and almost obsolete; thoracic nota and coxae of legs completely lacking scales, abdominal sterna without or with scales, in latter case scales not covering entire surface of sterna 9
7. Scales of dorsal portion of abdominal terga practically covering entire surface of sclerite; setae of terga long (figs. 5S; 7F, H); body of male limuloid (fig. 5A). . *Rulenatida*, new genus
   Scales of dorsal portion of abdominal terga arranged in a band along anterior margin of sclerite (figs. 9A, 11J); setae of terga short (fig. 11C, J); body of male onisciform (figs. 8A, 10A) 8
8. Five pairs of styli; base of caudal filament of male conspicuously widened, at each side with a group of specialized setae (fig. 9C, F); basal process of cerci short, with numerous sensory pegs (fig. 9H, I); outer surface of cerci with spinelike setae (fig. 9I, J) . . . . . *Natiruleda*, new genus
   Three pairs of styli; base of caudal filament of male not conspicuously widened and without specialized setae (fig. 12P); basal process of cerci longer, with one apical sensory spine (fig. 12D, H); outer surface of cerci with simple setae . . . . . *Pseudatelura* Silvestri
9. Scales completely absent; the two teeth of incisive portion of mandibles of unequal size (fig. 23B, C); styli of female only on ninth abdominal segment (fig. 24D, G); genital segments of female highly modified, viz., seventh sternum with deep median incision, eighth coxites reduced to small plates at base of anterior gonapophyses, and ninth coxites fused along middle, with styli inserted subapically (fig. 24D, F, G) . . . . . *Gynatelura*, new genus
   Scales present, mostly situated on abdominal terga; incisive portion of mandibles with two subequal teeth divided by a wide notch (fig. 14G–I); styli of female on segments VII–IX and genital segments of female of normal structure (figs. 16I, 21G) 10
10. The last one, two or three abdominal terga conspicuously darker than the preceding (figs. 14A, 16A, 17A); anterior portion of abdominal sterna generally without scales, only very rarely with a few scattered ones; scales as wide as, or wider than, long (figs. 14N, O; 19H); tenth

[1] This character can only be observed on slide-mounted material.

tergum of female free, rounded posteriorly (figs 16A, 21A); gonapophyses of female with setae and with fossorial spines (figs. 16M, N; 22K, M) 11

Last abdominal segments not darker than the preceding; anterior portion of abdominal sterna with numerous scales; scales longer than wide; tenth tergum of female almost completely covered by ninth, distinctly emarginate at center behind; gonapophyses of female with setae only [data according to original description] . . . . . *Dinatelura* Silvestri

11. Dorsal portion of abdominal tergum IX of male very large, much longer than any of the preceding (fig. 17A, C); caudal filament of male without sensory cones; median sclerite of eighth abdominal sternum of female bisinuate posteriorly (figs. 19K, 21M–O) . . . . . *Eluratinda*, new genus

Dorsal portion of ninth abdominal tergum of male very short, not longer than any of the preceding (figs. 14A, 15A); caudal filament of male with sensory cones (fig. 15J); median sclerite of eighth abdominal sternum of female shortly subtriangular (fig. 16I, J) . . . . . *Linadureta*, new genus

ATELURA VON HEYDEN

"Atelura" natalensis Brown

This species, once collected in Natal and not found since, has been discussed in detail by Wygodzinsky (1955). Its place in the system of the Atelurinae has not been definitely established.

ECNOMATELURA WYGODZINSKY

Ecnomatelura coatoni Wygodzinsky

Figure 1A—N

This species was described from a single female (Wygodzinsky, 1961). A large number of additional specimens of both sexes have since been examined, although males were much scarcer.

The females studied agree in all details with the type. The male agrees with the female in all essential features; some of these characters are figured here again because they were not well illustrated in the original description, or because they are mentioned in the generic key of the present paper.

The pedicellus of the male has no projections, but bears a sensory pit as shown in figure 1B. The mouthparts (fig. 1C, G) are like those of the female; the conspicuous, large spinelike setae of the apical article of the labial palp (fig. 1G) are found even in very early instars. The emargination of the tenth tergum of the male (fig. 1L) is slightly less deep than that of the female; its apical angles bear 1+1 short macrochaetae, and there are a few setae dorsally at the lateral margin of the sclerite. The under surface bears 1+1 groups of sensory cones that extend also to the upper surface as shown in figure 1K–M; the total number of sensory cones of each group is approximately 35. The eighth abdominal sternum of the male (fig. 1H) is emarginated posteriorly; the genital area is shown in figure 1H.

The caudal filament of the male is simple, but the cerci bear numerous large and small sensory cones as those shown in figure 1N.

The spermatolophids of *Ecnomatelura coatoni* (fig. 1J) are completely different from those of any other of the Atelurinae known. They consist of a suboval body, 0.11–0.13 mm. long and 0.06–0.07 mm. wide, penetrated longitudinally by a narrow bundle of spermatozoa, not quite twice as long as the body of the spermatolophid. In all other types of spermatolophid known, the spermatozoa are completely enclosed in the body of the spermatolophid (e.g., figs. 5Q, 8P).

MATERIAL EXAMINED: Transvaal: 35.6 miles ex Pretoria toward Warmbad, February 11, 1963, from shelving and fungus comb in nest of *Odentotermes transvaalensis* (Sjöstedt), (J. L. Sheasby), nine juvenile specimens; 36 miles ex Pretoria toward Warmbad, February 18, 1963, from shelving and fungus comb of *Odontotermes transvaalensis* (J. L. Sheasby), one male; 34 miles ex Pretoria toward Warmbad, March 8, 1963, from shelving and fungus comb, mainly in the vicinity of the royal cell in the nest of *Odontotermes transvaalensis* (J. L. Sheasby), one male allotype, 20 juveniles; Vlakfontein, 10 miles east of Pretoria, June 14, 1963, from shelving and fungus comb in nest of *Macrotermes natalensis* (Haviland), (J. L. Sheasby), one female, two juveniles; 11 miles ex Pretoria toward Babsfontein, July 18, 1963, in mound of *Trinervitermes trinervoides* (Sjöstedt), (J. L. Sheasby), two females; *idem, ibidem*, July 19, 1963, (J. L. Sheasby), 14 females, four juveniles; Voortrekker Monument area, Pretoria, August 15, 1963, in mound of *Trinervitermes trinervoides* (J. L. Sheasby), 24 females; area of Eastwood Location, about 8 miles east of Pretoria, September 6, 1963, in mound of *Trinervitermes tri-*

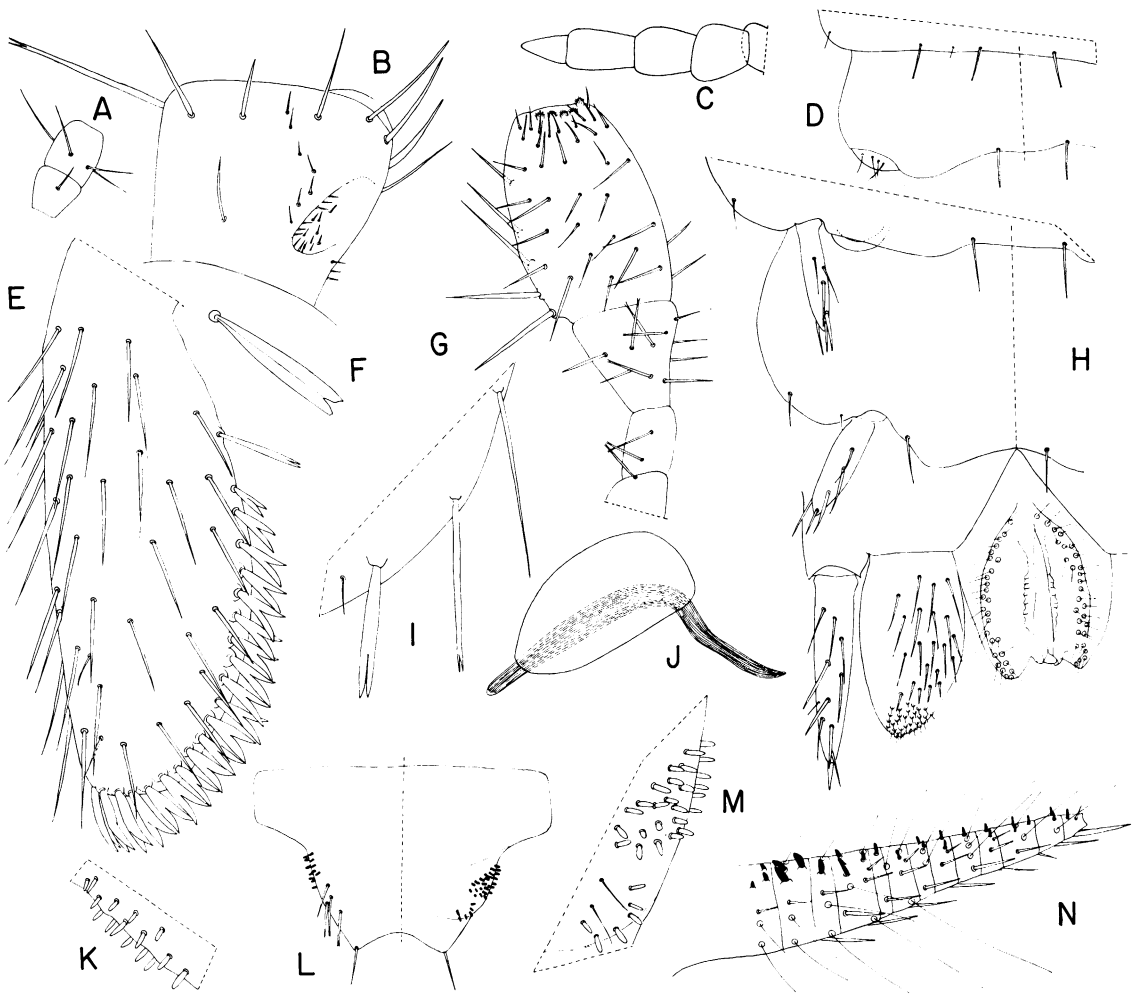

FIG. 1. *Ecnomatelura coatoni*, male. A. Articles of apical portion of flagellum. B. Apical portion of pedicellus. C. Maxillary palp. D. Abdominal sterna V and VI. E. Hind tibia. F. Macrochaeta of hind border of pronotum. G. Labial palp. H. Abdominal sterna VII–IX, with penis and paramere. I. Posterolateral area of abdominal tergum V. J. Spermatolophid. K. Sensory cones of dorsal surface of abdominal tergum X. L. Abdominal tergum X, upper surface on left, under surface at right. M. Sensory cones of under surface of abdominal tergum X. N. Cercus.

nervoides (W. G. H. Coaton), three females; Voortrekker Monument area, Pretoria, December 11, 1963, in mound of *Trinervitermes trinervoides* (J. L. Sheasby), three females; 30 miles ex Pretoria toward Warmbad, January 1, 1964, in nest of *Odontotermes transvaalensis* (J. L. Sheasby), one juvenile; 32 miles ex Pretoria toward Warmbad, January 30, 1964, in nest of *Macrotermes vitrialatus* (Sjöstedt), (J. L. Sheasby), two males, one female, 11 juveniles; 30 miles ex Pretoria toward Warmbad, January 2, 1964, in nest of *Odontotermes transvaalensis* (J. L. Sheasby), one female, one juvenile; 9 miles ex Munnik toward Mokeetsi, February 13, 1964, in nest of *Macrotermes goliath* (Sjöstedt), (J. L. Sheasby), one female; area of Derdepoort, 11 miles northeast of Pretoria, March 6, 1964, in nest of *Macrotermes natalensis* (J. L. Sheasby), one female; Rooikop, Rus de Winter, 65 miles northeast of Pretoria, June 20, 1963, in fungus comb in nest of *Odontotermes transvaalensis* (J. L. Sheasby), one male, one female; 14 miles ex Pretoria toward Vlakfontein, August 15, 1960, in mound of *Trinervitermes* sp., one female; near Punda Milia,

Kruger National Park, July 8, 1960, in foraging pocket of *Hodotermes mossambicus* (Hagen), (W. G. H. Coaton), one juvenile.

CRYPTOCEPHALINA SILVESTRI

Cryptocephalina minutella (Silvestri)

MATERIAL EXAMINED: Transvaal: Komatipoort, at junction of Crocodile and Komati rivers, August 22, 1960, in mound of *Macrotermes* sp. (J. L. Sheasby), one female.

This is the first record of this species from southern Africa.

GASTROTHEUS CASEY

KEY TO THE SPECIES OF *Gastrotheus* OF SOUTHERN AFRICA

1. Pronotum with only one transversal row of macrochaetae, situated at hind margin of sclerite . . 2
   Pronotum with three transversal rows of macrochaetae . . . . . *nanus* (Escherich)
2. Scales of dorsal body surface of two types, one normal, the other with the rays considerably surpassing margin of scale . *dilatatus* (Escherich)
   Scales of dorsal surface uniform, with rays not projecting much beyond margin of scale . . . 3
3. Posterior emargination of tenth abdominal tergum bare . . . . . *aplurus* Silvestri
   Posterior emargination of tenth abdominal tergum with several setae . . . . . *pallens* (Escherich)

Gastrotheus aplurus Silvestri

Figure 2

MATERIAL EXAMINED: Transvaal: Komatipoort, August 23, 1960, below boulder with *Apicotermes*, *Cubitermes*, and *Amitermes*, (W. G. H. Coaton), one female; Komatipoort, April 8, 1960, in mound of *Cubitermes* sp., (H. P. Nieman), one female.

The above specimens agree fairly well with the original description (Silvestri, 1922) based on material from Angola. The main difference is in the number of long macrochaetae along the hind border of abdominal sterna III–VII: 1+1 in the original specimens; 2+2 in our insects.

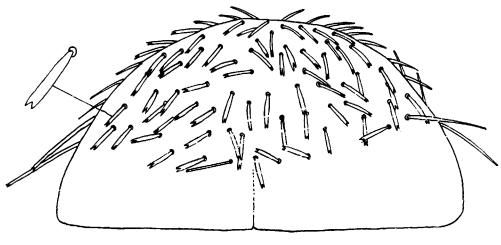

FIG. 2. *Gastrotheus aplurus*. Head, seen from above.

The chaetotaxy of the head, viz., the shape, size, and distribution of its bristles, is an important element in the taxonomy of *Gastrotheus*. It was not figured for *aplurus* by Silvestri (*loc. cit.*) and is therefore illustrated in the present paper from material now examined.

Gastrotheus dilatatus (Escherich)

This is a myrmecophilous species known only from the Cape Province.

Gastrotheus nanus (Escherich)

This species is known from Natal and the Seychelles; it is myrmecophilous.

Gastrotheus pallens (Escherich)

This myrmecophilous species has a wide range in South Africa.

ATELUROPSIS, NEW GENUS

DESCRIPTION: Atelurinae. Female. Body shape limuloid, thorax wider than abdomen, the latter conspicuously narrowed toward behind. Scales longer than wide, with numerous rays; scales present on entire surface of thoracic nota, of abdominal terga and sterna including coxites IX and on coxae of mid and hind legs. Head lacking scales. Most macrochaetae simple, a few bifid apically.

Head visible from above. Antennae less than half as long as body. Mandibles with incisive portion well sclerotized but reduced to one pointed, apically bifid tooth. Molar portion reduced, overlaid by conspicuous, wide, translucent, apically pectinate, lamellar projection. Galea and lacinia of maxilla not especially elongate; galea with two apical papillae; apex of lacinia strongly sclerotized and pigmented, with one small subapical projection; pectinate process not surpassing apex of lacinia. Maxillary palp simple, with short setae. Labium transverse, its disc at center with scattered short hairs. Apical segment of labial palp longer than wide, oval, lacking specialized setae, its interior with conspicuous glandular cells. Labrum densely beset with apically deeply cleft setae.

Thoracic nota entirely covered with scales and setae.

Legs with numerous simple macrochaetae. Tarsi four-segmented; praetarsus with two large lateral and one small median claw, all simple.

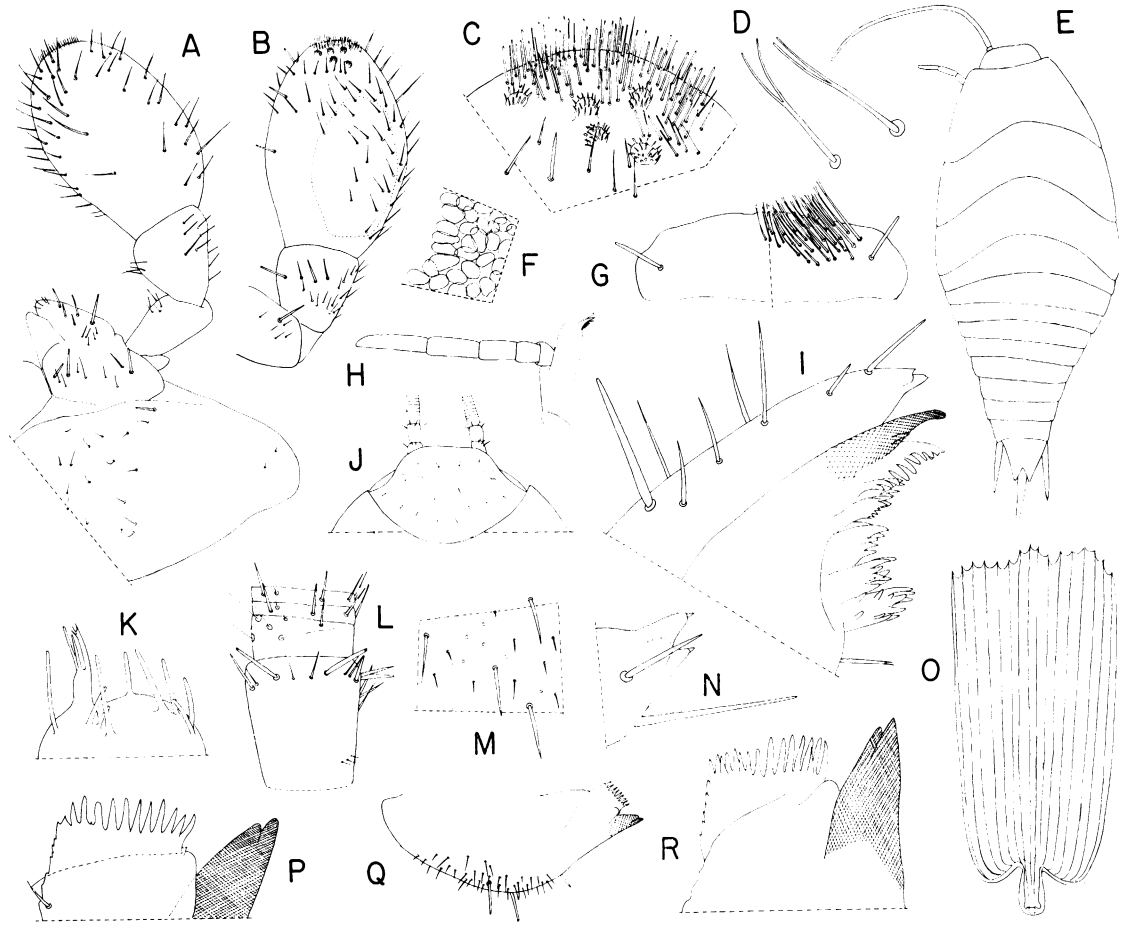

FIG. 3. *Ateluropsis hodotermitis*, female. A. Labium and palp, under surface. B. Labial palp, upper surface; glandular area enclosed in stippled line. C. Apex of labial palp. D. Apically cleft setae of labrum. E. Habitus, dorsal. F. Detail of glandular area of apical segment of labial palp. G. Labrum, specialized setae shown only on right side. H. Maxilla and palp. I. Apex of galea and lacinia. J. Head, seen from above. K. Apex of last antennal article. L. Pedicellus and base of flagellum, dorsal view. M. Setae of head capsule, detail. N. Apex of galea. O. Scale of dorsum. P. Apex of mandible. Q. Mandible. R. Apex of mandible, other view.

Abdominal terga and sterna completely covered with scales. Terga I–IX with setae on posterior, exposed half; posterolateral angles each with one short, spinelike seta. Tenth tergum incised posteriorly, entirely covered with scales and simple setae; posterolateral angles each with one macrochaeta.

Abdominal sterna with setae on posterior third or half; segments III–VII with 1+1 submedian macrochaetae on hind margin. Sterna II and III with eversible vesicles, VII with exserted vesicles. Styli on segments V–IX, all subcylindrical, with distinct apical spine. Exposed portion of median sclerite of eighth sternum broadly subtriangular. Ovipositor short and stout, almost attaining apex of styli IX. Gonapophyses pseudosegmented, with simple and spiniform setae.

TYPE SPECIES: *Ateluropsis hodotermitis*, new species.

OBSERVATIONS: There are three other atelurine genera with styli on abdominal segments V–IX, viz., *Atelurodes* Silvestri (Oriental), *Atelurina* Wygodzinsky (Brazil), and *Natiruleda*, new genus (South Africa). *Ateluropsis* differs from the first two by numerous characters, such as the specialized structure of the mandibles, the apically deeply bifurcate setae of the labrum, the absence of scales from the head, the more complex structure of the lacinia appendages, the extensive

area covered by the setae of the dorsal surface of the body, and the presence of spiniform setae on the ovipositor; the clearly visible glandular cells of the apical segment of the labial palp are also unique. *Ateluropsis* differs from *Atelurodes* further by its simple median claw and the widely spaced exsertile vesicles on abdominal sternite II, and from *Atelurina* by the absence of basal projections on the lateral claws. *Ateluropsis* can be distinguished from *Natiruleda* by numerous features, such as the structure of its mandibles and of the terminal segment of the labial palp, the absence of exsertile vesicles on sterna IV–VI, and the scales which cover the thoracic nota and abdominal terga entirely.

Pseudatelura trichonota Silvestri also belongs in *Ateluropsis;* it agrees with *hodotermitis* in such highly specialized characters as the structure of the mandible and the glandular area of the terminal segment of the labial palp. In the original description, *trichonota* was said to have styli only on the ninth abdominal segment, but Silvestri himself (1922) implied that the only specimen examined may have been imperfect.

KEY TO THE SPECIES OF *Ateluropsis* (FEMALES)

Length 4 mm.; sternum of first abdominal segment posteriorly with 1+1 submedian bifurcate setae, in addition to other bristles; styli of coxites IX approximately three times as long as wide at base; macrochaetae of apical angles of tergum X almost as long as width of apical emargination of tergum . . . . . *trichonota*

Length 6.3 mm.; sternum of first abdominal segment without bifurcate setae; styli of coxite IX approximately four times as long as wide at base (fig. 4I); macrochaetae of apical angles of tergum X not more than half as long as width of apical emargination of tergum (fig. 4K) . . . . . *hodotermitis*

Ateluropsis hodotermitis, new species

Figures 3A–R; 4A–L

FEMALE: Body length 6.3 mm. General shape as shown in figure 1E. General color golden brown; center of head whitish; antennae and maxillary palpi light golden yellow; labial palpi white. Legs ivory-colored, with tibiae and tarsi golden yellow. Ovipositor and styli V–VIII white; styli IX and caudal appendages golden yellow. Structure of scales as shown in figure 3 O.

Head with a few short setae and very small hairs as shown in figure 3J, M. Labrum and its setae as in generic description and in figure 3D, G. Antennae about 3 mm. long, their base as shown in figure 3L; apical articles of flagellum divided into two subarticles. Mandibles, maxillae, and labium as in generic description and shown in figure 3A–C, F, H, I, N, P–R.

Thoracic nota with irregularly arranged small and very small setae interspersed between scales and covering entire sclerite (fig. 4D). Legs as in generic description and shown in figure 4A–C, F. Macrochaetae of coxae, femora, and tibiae well developed. Tibiae with three ventral and one subdorsal macrochaetae on apical half of segment; distally with 10–12 macrochaetae, among which is a row of about six very short ones.

Abdominal terga I–IX (fig. 4L) with setae arranged in two to three irregular rows on posterior half of sclerite; posterolateral angles with 1+1 setae slightly stronger than the remaining. Tergum X (fig. 4K) with setae on its whole surface and along its lateral margin; the 1+1 macrochaetae of posterolateral angles short, not more than half as long as the width of apical incision of tergum.

Abdominal sterna as in generic description and figure 4E, G–I; all setae simple. Styli IX approximately four times as long as wide at base. Genital region as in generic description and figure 4H–J. Gonapophyses with approximately 12 pseudosegments, their chaetotaxy as shown in figure 4H–I.

MATERIAL EXAMINED: South-West Africa: 40 miles ex Kalkrand-Maltahöhe, October 5, 1964, beneath stone, in cells of *Hodotermes mossambicus* (W. G. H. Coaton), one female, holotype.

Ateluropsis trichonota (Silvestri), new combination

Pseudatelura(?) *trichonota* SILVESTRI, 1922, p. 85.

Only one female specimen is known; it was collected in South-West Africa. No host has been reported for this species.

RULENATIDA, NEW GENUS

DESCRIPTION: Atelurinae. Medium-sized insects (length approximately 5 mm.). Body limuloid, moderately convex dorsally, not heavily sclerotized, scales golden colored.

Surface of body with comparatively long and slender setae. Normal scales present on mesonotum and metanotum and on abdominal segments

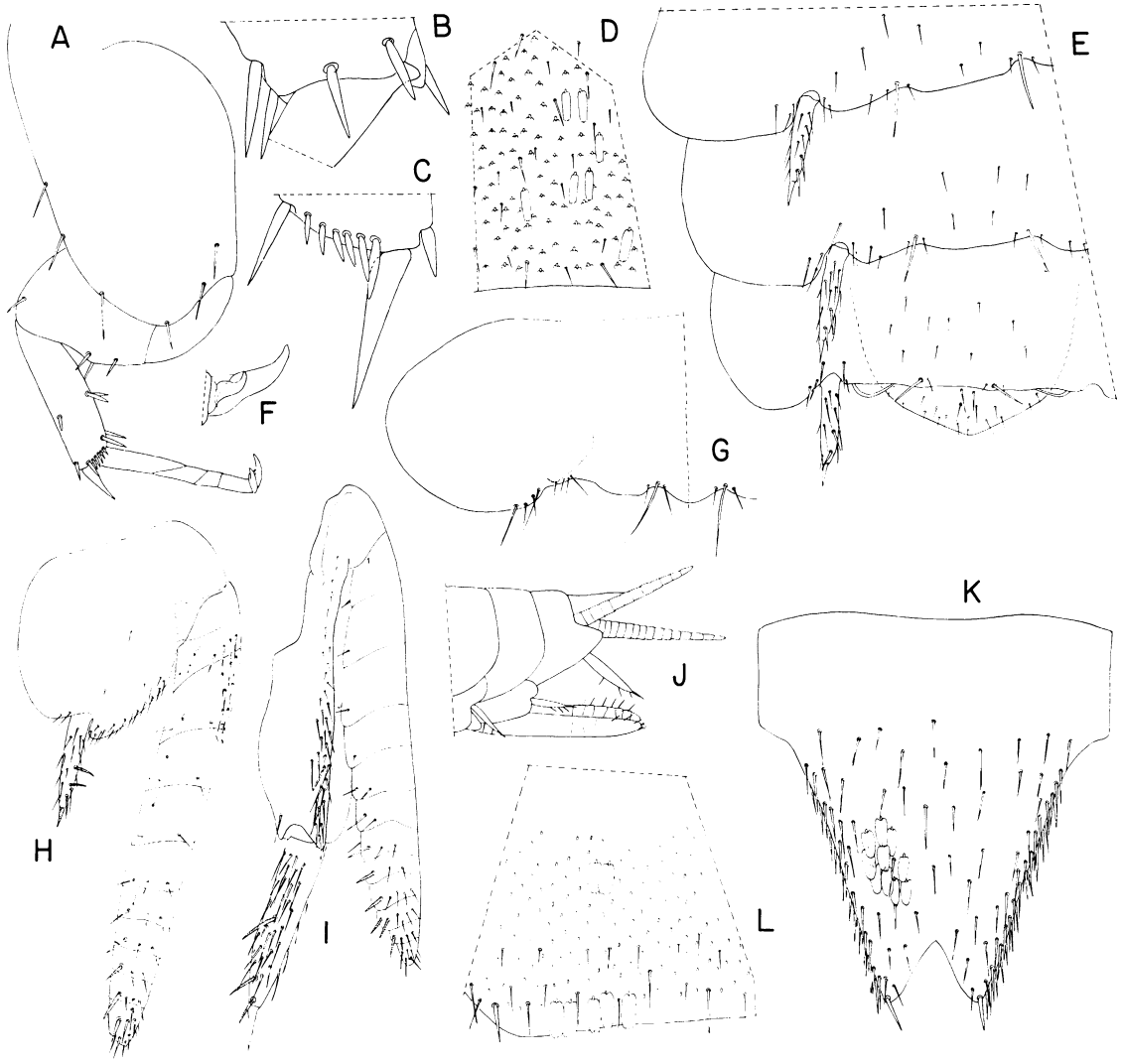

FIG. 4. *Ateluropsis hodotermitis*, female. A. Hind Leg. B. Apex of tibia of hind leg, upper surface. C. Apex of tibia of hind leg, under surface. D. Section of center of pronotum, with setae, scales and empty scale sockets. E. Abdominal sterna V–VII, with central sclerite of eighth sternum. F. Praetarsus with middle and one lateral claw. G. Abdominal sternum III. H. Coxite VIII with anterior gonapophysis. I. Coxite IX with posterior gonapophysis. J. Apex of abdomen, lateral view. K. Abdominal tergum X, only a few scales shown. L. Portion of abdominal tergum IV, with all setae, some scales and empty scale sockets.

dorsally and ventrally; scales covering entire surface of abdominal terga and sterna. Scales also present on apical half of anterior surface of coxae of mid and hind legs; all other areas of body and appendages lacking scales.

Head visible from above, its dorsal and anterior surfaces convex. Antennae less than half as long as body. Pedicellus of male with process of comparatively simple structure, not heavily sclerotized; process with sensory pit and glandular process. Mandibles slender, well-sclerotized apically, incisive portion with two narrow subequal teeth separated by a wide notch; molar portion small. Galea and lacinia of maxilla not elongate. Galea lacking distinct apical sensory papillae. Apex of lacinia heavily sclerotized, narrowly pointed; pectinate process distinctly surpassing apex of lacinia. Maxillary palp stout, its setae short. Labium not specialized; disc of mentum glabrous, its lateral portions with a

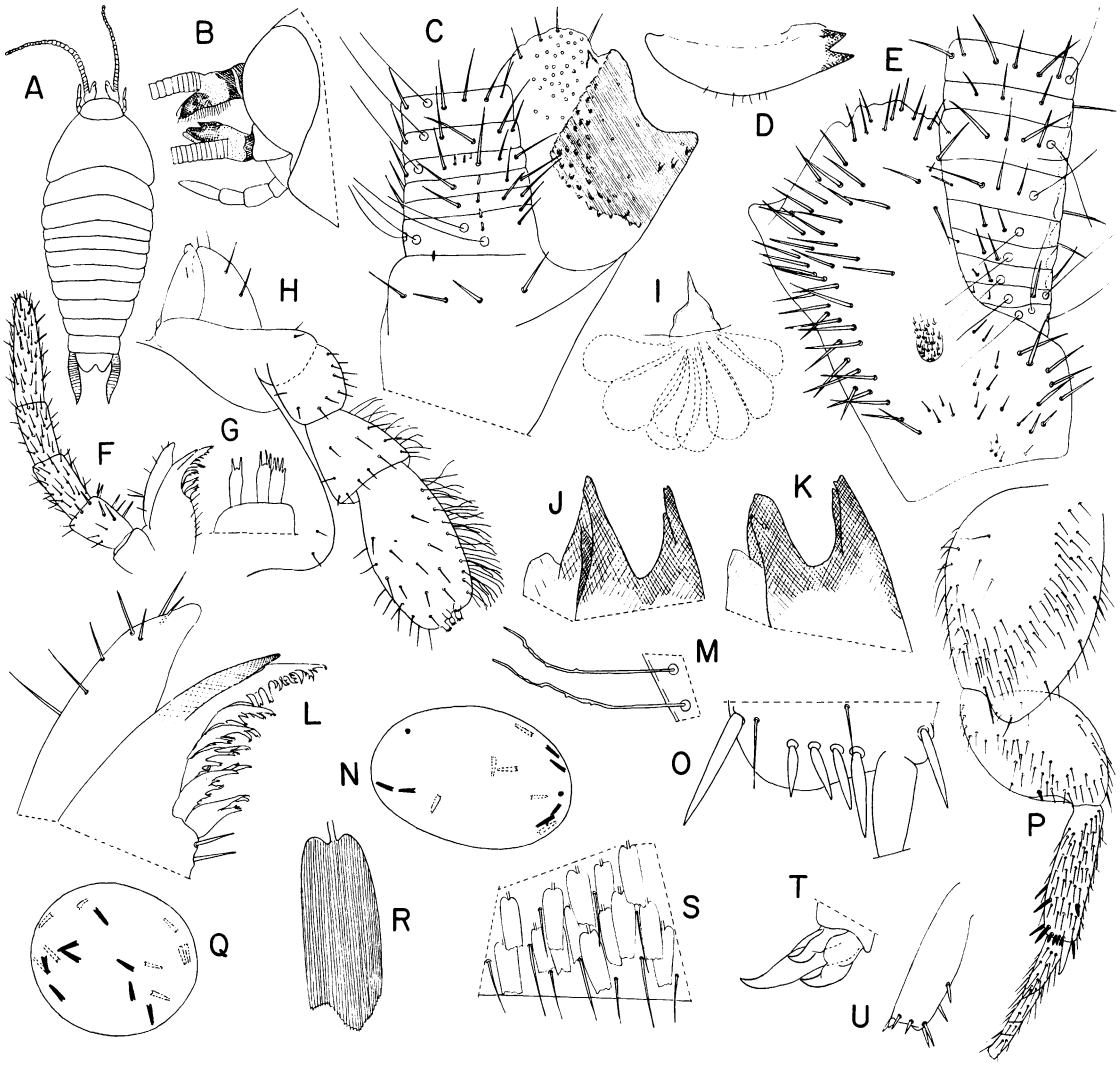

FIG. 5. *Rulenatida apprima*, male. A. Habitus, dorsal. B. Head, dorsal and slightly lateral. C. Pedicellus and base of flagellum, outer aspect. D. Mandible. E. Pedicellus and base of flagellum, inner view. F. Maxilla with palp. G. Apex of maxillary palp. H. Labium and palp. I. Apical glandular projection of pedicellus, with glands. J. Apex of mandible. K. Apex of other mandible. L. Apex of galea and lacinia. M. Long hair of outer surface of apical segment of labial palp. N. Spermatolophid, deformed. O. Apex of posterior tibia, under surface. P. Hind leg, under surface. Q. Spermatolophid. R. Scale of tergum. S. Section of hind margin of abdominal tergum. T. Claws of hind leg, one lateral claw seen in distortion. U. Hind tibia, upper surface.

group of short setae. Apical segment of labial palp elongate oval, about twice as long as wide.

Legs with comparatively long and narrow coxae. Femora with macrochaeta. Tarsi four-segmented; two large lateral and one small median claw, all simple.

Lateral deflexed portions of abdominal terga not separated from central dorsal portion by a carina. Tenth tergum of female normal, notched apically, well visible from above, with setae on disc and along margins. Male with ninth abdominal tergum slightly larger than remaining. Tenth tergum of male small, short, its morphologically dorsal surface horizontal, its morphologically ventral surface obliquely inclined; sclerite not more heavily sclerotized and pigmented than other terga, its under surface membranous longitudinally along middle, close

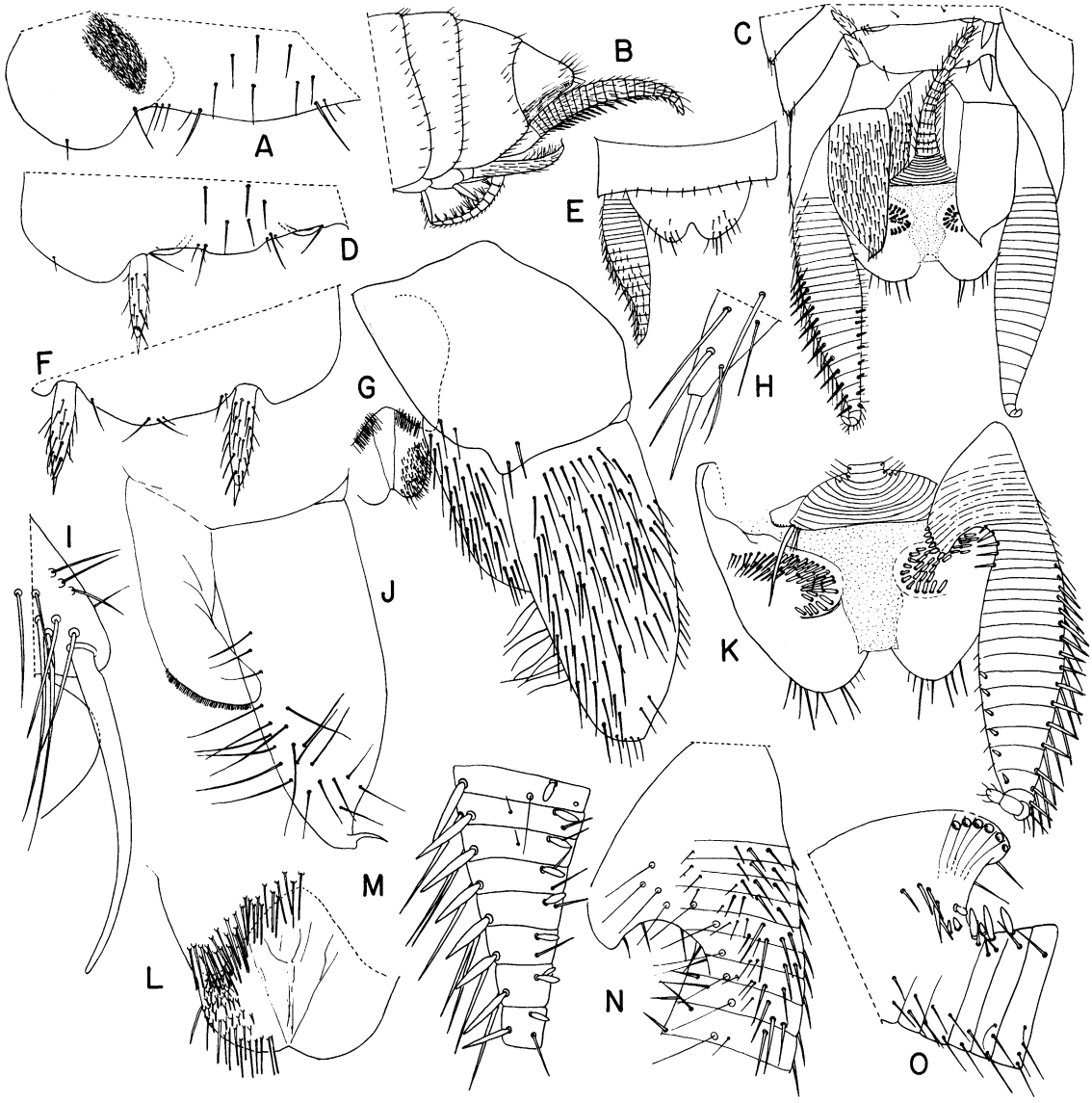

FIG. 6. *Rulenatida apprima*, male. A. Abdominal sternum V. B. Apex of abdomen, side view. C. Terminal abdominal segments, ventral aspect. D. Abdominal sternum VII. E. Abdominal terga IX and X, with cercus. F. Abdominal sternum VIII. G. Coxite IX with appendages and penis. H. Apex of stylus IX, young male. I. Detail of side of base of caudal filament. J. Stylus IX and paramere, dorsal aspect. K. Under surface of abdominal tergum X, with base of caudal filament and one cercus. L. Penis. M. Subapical portion of cercus. N. Base of cercus, upper surface. O. Base of cercus, lower surface.

to its base with 1+1 fields of heavily sclerotized sensory cones.

Abdominal sterna II–VI with eversible vesicles, those on IV and V with heavily pigmented interior saclike portion, the others inconspicuous. Sternum VII with exserted vesicles. Styli present on segments VII–IX. Styli VII and VIII of female normal, styli IX much larger and wider at base than remaining; all with distinct apical spine. Styli VII and VIII of male normal, with distinct apical spine; styli IX very large, wide, flattened dorsoventrally but still with apical spinelike process; styli IX only slightly more pigmented and sclerotized than

the others.

Female genitalia. Median sclerite of eighth segment semicircular. Ovipositor short and stout, not surpassing apex of styli IX. Anterior and posterior gonapophyses distinctly pseudosegmented, with normal and spinelike setae.

Male genitalia. Coxites IX short, their styli as described above. Parameres about as long as coxites but much shorter than styli, membranous, with simple setae. Penis small, membranous; genital opening subtriangular.

Cerci of female slightly longer than width of tergum X at base, backwardly and upwardly directed. Caudal filament of female about twice as long as cerci. Cerci of male not much more strongly sclerotized than rest of body but rigid, stout, backwardly and, at apex, downwardly curved, slightly longer than width of tergum X at base. Cerci with relatively short sub-basal process, its apex adjacent to field of sensory cones of under surface of tenth tergum. Process showing general segmentation of cercus, with one sensory cone at inner margin of each segment. Main body of cercus with sensory cones or spines on inner margin and very strong spinelike setae on outer margin. Caudal filament of male very strongly widened at base, on each side with long sensory spines directed toward field of sensory cones on under surface of tergum X; caudal filament lacking sensory cones.

Spermatolophids globular, their diameter averaging 0.05 mm. Sperm heads cuneiform, not forming aggregations, irregularly distributed close to periphery of spermatolophid. Length of sperm head about equal to one-eighth of diameter of spermatolophid. Estimated basic number of spermatozoa per spermatolophid, 16.

TYPE SPECIES: *Rulenatida apprima*, new species.

OBSERVATIONS: This is in many respects the most plesiomorphic genus of the *Dinatelura*-group. The shape of the insects is limuloid in both sexes; the color is uniformly golden yellow; the setae are comparatively long and the scales, which possess very numerous rays, cover practically the whole surface of the terga where they occur; there are three pairs of styli, all with well-developed apical spine, in both sexes. All the foregoing are plesiomorphic characters; in none of the genera related to *Rulenatida* do all these characters occur together.

Rulenatida also has some apomorphic characters, the most striking of which is the basal widening of the caudal filament in the male with specialized setae on the widened portion; this character is shared with one other genus, *Natiruleda*, which approaches *Rulenatida* also in the general structure of the cerci of the male.

Dinatelura primitiva Silvestri, 1908, must also be included in *Rulenatida*.

KEY TO THE SPECIES OF *Rulenatida* (FEMALES)

Length 4.5 mm.; tenth abdominal tergum with 1+1 spinelike setae on posterior angles (fig. 7O); gonapophyses with conspicuous spinelike setae in addition to normal bristles (fig. 7K, L. R, S) . . . . . *apprima*, new species

Length 6 mm.; tenth abdominal tergum without conspicuous spinelike apical setae; gonapophyses without spinelike setae(?) . *primitiva* (Silvestri)

Rulenatida apprima, new species

Figures 5A–U; 6A–O; 7A–S

Body length of male 4.6 mm., of female 4.5 mm. General shape as shown in figures 5A and 7A; male (fig. 5A) less strongly narrowed toward behind than female (fig. 7A). General color golden; antennae, mouthparts, and legs whitish. Scales longer than wide, with very numerous rays (fig. 5R).

Head with a few scattered setae. Apical articles of antennae divided into two subarticles. Pedicellus of male as illustrated in figure 5A–C, E; sensory pit small, not much longer than wide; subapical glandular projection inconspicuous. Mandibles as shown in figure 5D, J, K. Maxillae as shown in figure 5F, G, L; second segment of palp with a few spinelike setae in addition to normal ones. Labium and palp as shown in figures 5H; 7B, C; apical segment of palp with five sensory papillae. Outer surface of subapical and apical segments of labial palp of male with peculiar irregularly shaped hairs (fig. 5H, M). Inner surface of apical segment of labial palp of female with simple long hairs and a few scattered spinelike setae (fig. 7B).

Pronotum only with a few scattered setae on disc and along lateral and posterior margins. Mesonotum and metanotum with long setae on lateral portions and on posterior half of disc (fig. 7G); posterolateral angles with 1+1 spiniform setae, with others scattered along lateral margin.

Legs stout, their general shape and chaetotaxy as shown in figures 5O, P, U; 7E. Macrochaetae not bifid apically. Femora with one very short macrochaeta on under surface. Tibiae with one

subdorsal and two ventral macrochaetae on apical half of segment; distally with eight or nine macrochaetae, among which is a row of three or four very short ones.

Abdominal terga with setae occupying posterior half of sclerite; posterolateral angles with 1+1 setae slightly stronger than those remaining. Tenth tergum shallowly emarginate in female, more deeply incised in male, apical angles in both sexes with 1+1 distinct spinelike setae (figs. 6E; 7O). Under surface of tenth tergum of male with sensory cones as shown in figure 6C, K.

Abdominal sterna (figs. 6A, D, F; 7N) with scattered setae, especially at center and along hind margin; II–VII in female, II–VIII in male with 1+1 submedian macrochaetae at hind margin: 1+1 conspicuous macrochaetae laterad of vesicles. Center of posterior margin of sterna straight or slightly rounded, of sternum VIII of male conspicuously projecting (fig. 6F). Styli and vesicles as in generic description and figures 6A, D, F; 7L, N, S. Styli of seventh and eighth abdominal segments of female subequal, those of ninth coxites twice as long as foregoing, three times as long as wide. Styli VII and VIII of male subequal, styli IX as in generic description and figure 6C, G, J; their ventral surface with strong backwardly directed setae, their upper surface with less numerous long hairs; apex of styli IX with outwardly bent apical spine (fig. 6J), this spine straight in juvenile specimens (fig. 6H).

Genital region of female as shown in figure 7J, M. Ovipositor as in generic description and figure 7J, K, L, M, R, S, not surpassing level of middle of styli IX. Gonapophyses with approximately 10 pseudosegments, their chaetotaxy as illustrated.

Genital region of male as shown in figure 6C. Parameres and penis as in generic description and in figure 6G, J.

Cerci and caudal filament of female and male as in generic description and figures 6B, C, I, K, M–O; 7J, M, P.

Spermatolophids as in generic description and in figure 5N, Q. Sperm heads 0.006–0.008 mm. long. Number of sperms per spermatolophid about 16.

MATERIAL EXAMINED: Cape Province: 26 miles west of Willowmore toward Beaufort West, September 18, 1961, nest of *Microhodotermes viator* (Latreille), (W. G. H. Coaton), one male, holotype; 30 miles ex Beaufort West toward Willowmore, September 19, 1961, in nest of *Microhodotermes viator* (W. G. H. Coaton), one female, paratype; 12 miles ex Fort Beaufort toward Queenstown, February 5, 1961, below boulder with *Amitermes hastatus* (Haviland), one juvenile specimen; 59 miles ex Zuurbergpass summit toward Somerset East, December 2, 1960, beneath stone with *Microhodotermes viator* and *Angulitermes* sp., one female, paratype; 16 miles ex Klaarstroom toward Prince Albert, October 15, 1963, in hive of *Microhodotermes viator*, beneath small clay mound (J. L. Sheasby), one female allotype, two males, one female, paratypes; 17 miles ex Oudtshoorn toward Mosselbay, February 15, 1961, beneath stone with *Amitermes hastatus*, one male, paratype; 13 miles ex Peddie toward Alice, October 24, 1962, in nest of *Angulitermes* sp. (J. L. Sheasby), one juvenile specimen; 15 miles ex Grahamstown toward Riebeek East, February 7, 1961, in mound of *Amitermes* sp., with *Angulitermes* sp., one juvenile male. Orange Free State: Wesselsbron, December 16, 1960, in mound of *Trinervitermes* sp., on the town commonage, one juvenile specimen; between Dealesville and Petrusburg, February 3, 1961, in derelict mound, with *Amitermes* sp., one juvenile specimen; Nieuwoudtville, May 1, 1968, in nest of *Microhodotermes viator* (J. L. Sheasby), one juvenile female; 32 miles ex Aberdeen toward Willowmore, November 23, 1960, in nest of *Microhodotermes viator* (W. G. H. Coaton), one female, paratype.

Rulenatida primitiva (Silvestri, 1908), new combination

Dinatelura primitiva SILVESTRI, 1908, p. 13.

This species has been reported from the northwestern Cape Province, with *Microhodotermes viator* as its host.

NATIRULEDA, NEW GENUS

DESCRIPTION: Atelurinae. Male. Large insects (approximately 8 mm.). Body strongly convex dorsally, stout, slightly tapering toward behind in dorsal view, widened posteriorly in lateral aspect; rather uniformly darkly pigmented throughout.

Surface of head and body polished, with scattered short setae on entire surface of head and pronotum, on hind border of mesonotum and metanotum and of abdominal terga. Scales

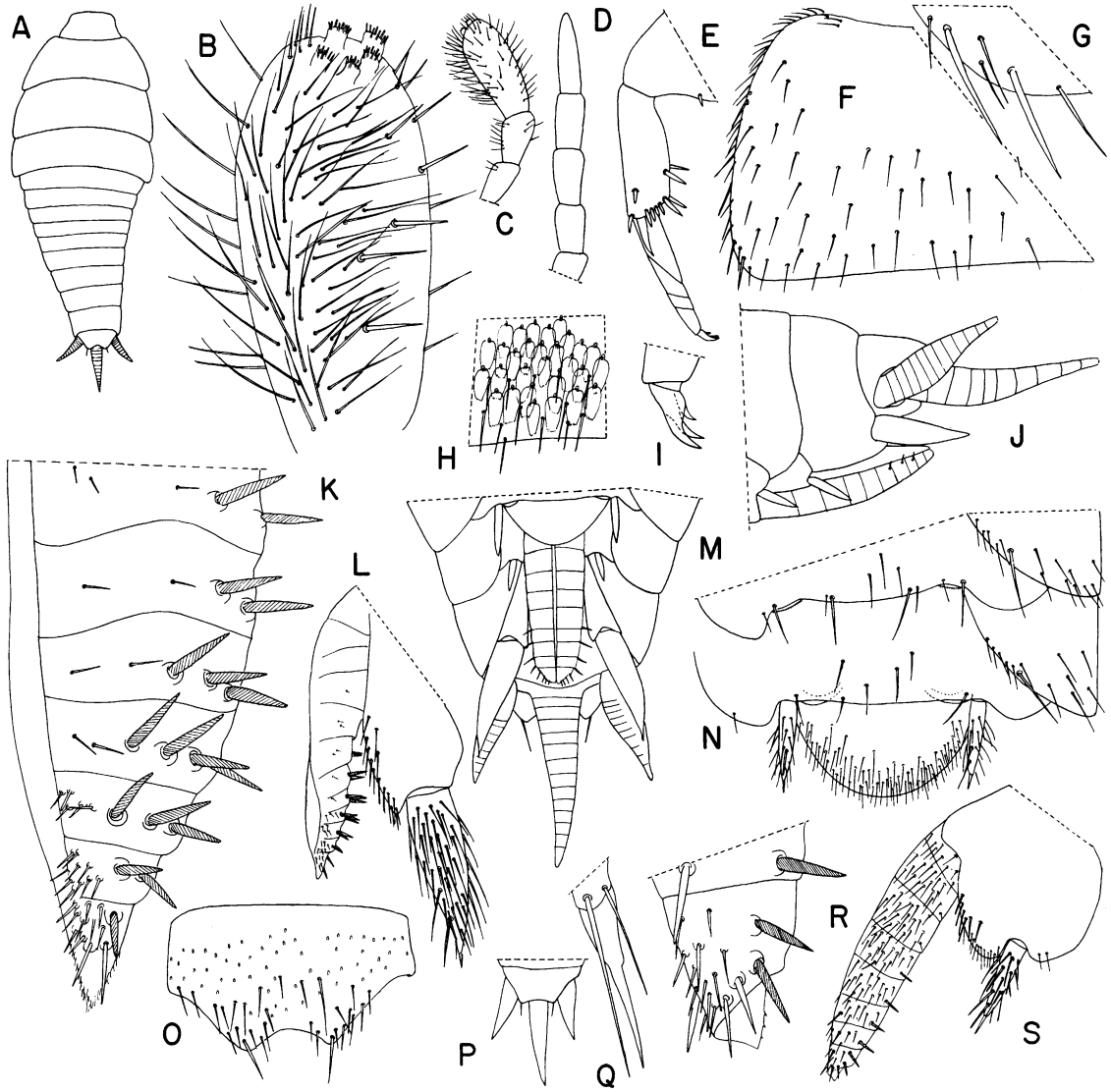

FIG. 7. *Rulenatida apprima*, female. A. Habitus, dorsal. B. Apical segment of labial palp, under surface. C. Labial palp, upper surface. D. Maxillary palp. E. Hind leg. F. Portion of mesonotum, scales not shown. G. Posterolateral angle of mesonotum. H. Portion of hind border of abdominal tergum VI. I. Praetarsus of hind leg. J. Apex of abdomen, side view. K. Apical portion of posterior gonapophysis. L. Coxite IX, with anterior gonapophysis. M. Apex of abdomen, seen from below. N. Abdominal sterna VI and VII, with median sclerite of eighth sternum. O. Abdominal tergum X. P. Apex of abdomen, dorsal. Q. Apex of stylus IX. R. Apex of anterior gonapophysis. S. Coxite VIII, with anterior gonapophysis.

longer than wide, with very numerous but somewhat obsolescent rays. Scales present on reflexed lateral portions of thoracic terga, on anterolateral areas of mesonotum and metanotum, on anterior margin and entire deflexed lateral portions of abdominal terga I–IX; as well as on all abdominal sterna including coxites IX; scales also present on apical half of anterior surface of mid and hind coxae. All other areas of body and appendages without scales.

Head visible from above, its anterior surface flattened, its dorsal surface anteriorly with a conspicuous bulge. Antennae less than half as long as body; scapus and pedicellus each with a

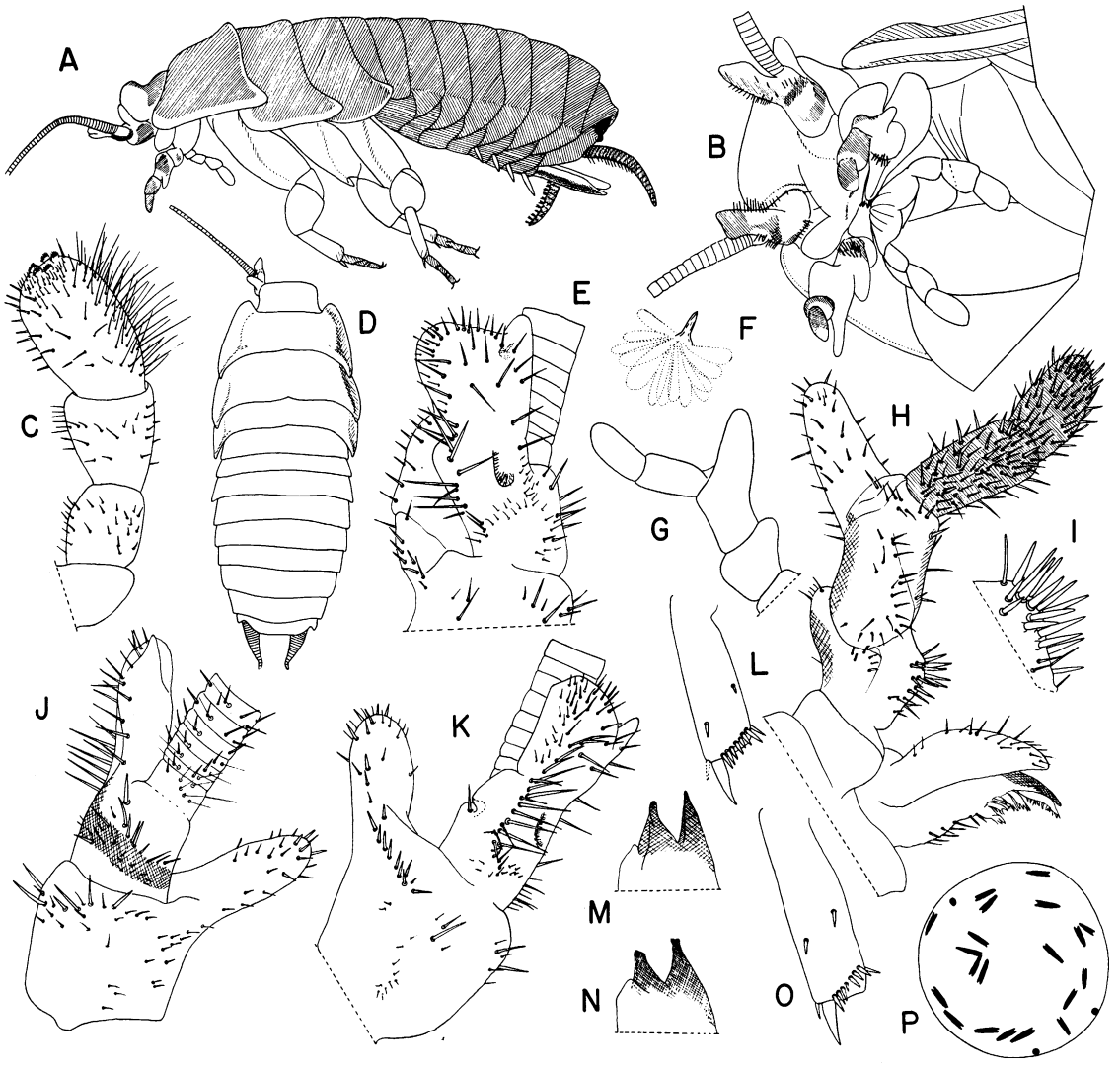

FIG. 8. *Natiruleda magnifica*, male. A. Habitus, lateral. B. Head, ventrolateral view. C. Labial palp. D. Habitus, dorsal. E. Base of antenna, inner view. F. Glandular projection of pedicellus with glands. G. Maxillary palp, outline. H. Maxilla with palp, different view. I. Group of spines of second segment of maxillary palp. J. Base of antenna, seen from below. K. Base of antenna, dorsal aspect. L. Chaetotaxy of fore tibia. M. Apex of mandible. N. Apex of other mandible. O. Chaetotaxy of hind tibia. P. Spermatolophid.

conspicuous projection, the latter with sensory pit and glandular process. Mandibles slender, well sclerotized apically; incisive portion with two narrow subequal teeth separated by a wide notch; molar portion small. Galea and lacinia of maxillae not especially elongate. Galea lacking distinct apical sensory papillae. Apex of lacinia heavily sclerotized, narrowly pointed; pectinate process distinctly surpassing apex of lacinia. Maxillary palp stout, second and third article each with a projection. Labium not specialized; mentum glabrous, its lateral portions with 1+1 groups of very small setae. Apical segment of labial palp elongate oval, distinctly longer than wide, with five sensory papillae.

Sides of all thoracic nota and hind border of pronotum distinctly carinate.

Legs with large coxae. Femora with macrochaeta. Tarsi four-segmented; two large lateral and one small median claw, all simple.

Abdominal terga large, with lateral deflexed portions separated from dorsal portions by a distinct carina. Ninth tergum as large as the preceding, not expanded laterally. Tenth tergum very small, very heavily sclerotized and pigmented, vertical, covered from above by posterior portion of tergum IX. Lower portion of tergum X membranous at sides, with 1+1 fields of heavily sclerotized sensory cones.

Abdominal sterna II–VI with inconspicuous eversible vesicles; VII with exserted vesicles. Styli present on abdominal segments V–IX; those on V–VIII normally developed, with distinct apical spine, those of segment IX much larger than the remaining, more heavily sclerotized, flattened dorsoventrally, with inconspicuous apical spine.

Genitalia. Coxites IX small, much shorter than modified styli. Parameres very large, longer than coxites or styli, elongate tongue-shaped, with numerous setae on basal half, glabrous apically. Penis small, membranous; genital opening narrowly elongate.

Cerci backwardly and downwardly curved, rigid, heavily sclerotized and pigmented. Base of cerci with extremely short sub-basal process adjacent to sensory cones of tenth tergum. Apex of process of cerci and inner border of cerci basad of process with serially arranged sensory cones; outer surface of central portion of cerci with conspicuous spiniform setae. Caudal filament downwardly directed, emerging between parameres, its base conspicuously widened and at each side with a group of specialized spinelike setae. Caudal filament lacking sensory cones.

Spermatolophids globular, their diameter averaging 0.045–0.05 mm. Sperm heads cuneiform, not forming aggregations, irregularly distributed close to periphery of spermatolophid. Length of sperm head equivalent to about one seventh of diameter of spermatolophid. Estimated basic number of spermatozoa per spermatolophid, 32.

TYPE SPECIES: *Natiruleda magnifica*, new species.

OBSERVATIONS: Phenetically, *Natiruleda* is closest to *Rulenatida* with which it agrees in having the base of the caudal filament of the male widened and beset with specialized setae. Certain characters, which are apomorphic within the framework of the *Dinatelura*-group, make their appearance here, viz., the onisciform body shape of the male, the shortened setae, and the restriction of the scales to the anterior border of the abdominal terga. The peculiar processes on the scapus and the maxillary palp of the male, the striking modification of the tenth abdominal tergum, and the elongate paramere are autapomorphic characters.

Natiruleda magnifica, new species

Figures 8A–P; 9A–K

MALE: Body length, 7.8 mm.

General shape as shown in figure 8A, D. Dorsal surface of thorax, and dorsal and ventral surfaces of abdomen, golden brown, polished; head, antennae, mouthparts and legs whitish, but head brown dorsally, maxillary palpi and antennae with darker areas, tibiae slightly and tarsi distinctly darkened; thoracic nota margined with white. Styli golden brown; genitalia, cerci and caudal filament dark brown; abdominal tergum X piceous.

Shape of head as in generic description and figure 8A, D. Scapus and pedicellus of antennae as shown in figure 8A, B, D, E, J, K; processes of left and right antennae slightly different (teratological?). Sensory pit of pedicellus small, about twice as long as wide; subapical glandular projection inconspicuous (fig. 8E, F). Apical portions of mandibles as shown in figure 8M, N. Maxillae as shown in figure 8H; palp as shown in figure 8G, H, I; second segment with a conspicuous cluster of spinelike setae; apical two segments more heavily pigmented than remaining. Labium as in generic description; labial palp as shown in figure 8C, outer surface of apical segment with numerous long hairs.

Macrochaetae of legs not bifid apically. Femora with one short macrochaetae on under surface. Tibiae with one subdorsal and one ventral macrochaetae on apical half of segment; distally with 11–12 macrochaetae (fig. 8L, O).

Setae of abdominal terga very sparse and short (fig. 9A), of subequal size, restricted to area close to posterior border of sclerite. Tenth tergum as in generic descriptions and figures 8A; 9C, K.

Abdominal sterna largely covered with scales, except for a narrow band along hind margin. Setae very sparse; sterna II–VIII (fig. 9B) with 1+1 submedian macrochaetae along hind border, posterior sterna also with 1+1 smaller macrochaetae mesad of insertion of styli. Styli V–VIII slightly flattened dorsoventrally,

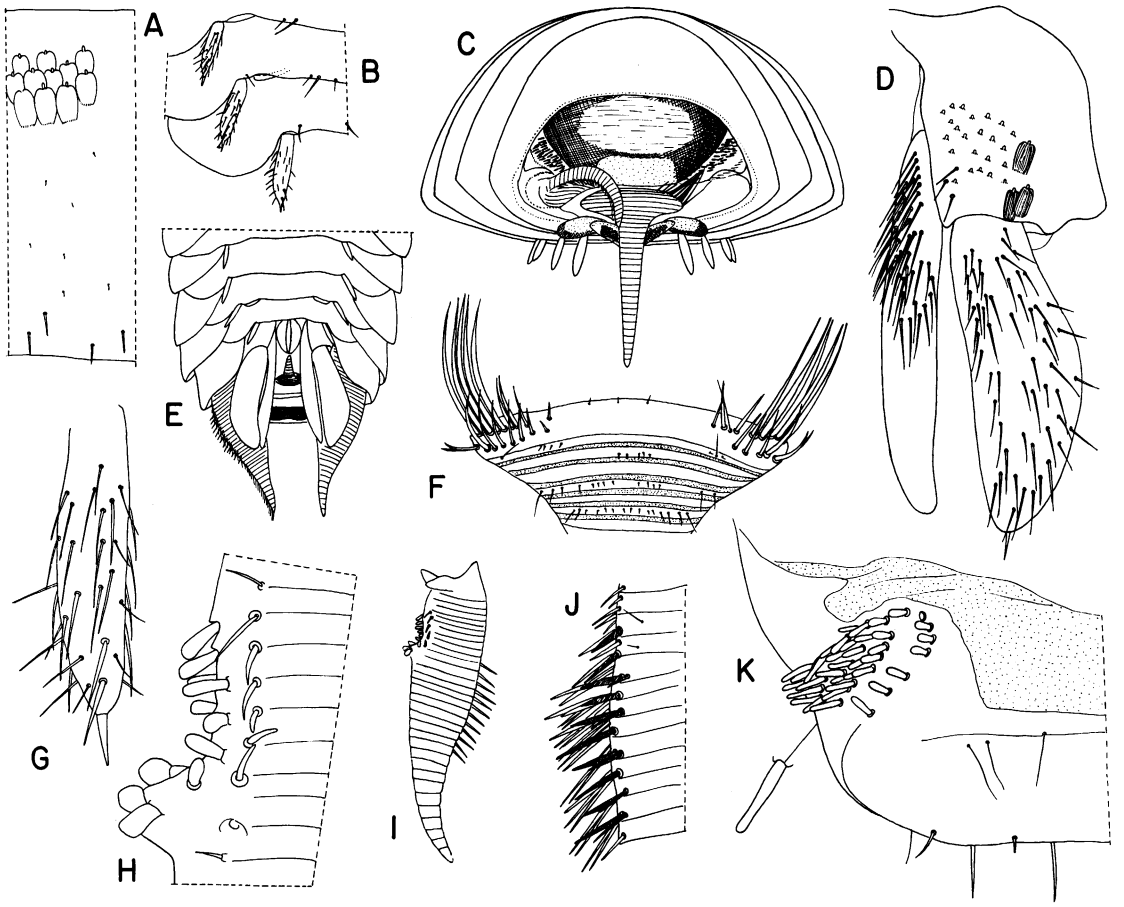

FIG. 9. *Natiruleda magnifica*, male. A. Portion of abdominal tergum V. B. Abdominal sterna VI–VIII. C. Apex of abdomen, seen from behind; only one cercus shown. D. Coxite IX with stylus and paramere; only a few scales shown. E. Apex of abdomen, seen from below. F. Base of caudal filament. G. Stylus VII. H. Area of projection of cercus, common setae not shown. I. Cercus with its spines. J. Setae and spines of center of outer surface of cercus. K. Part of under surface of tenth abdominal tergum.

progressively closer to midline toward posterior segments (fig. 9B, E, G). Styli IX elongate scoop-shaped, their ventral surface normally sclerotized and with strong posteriorly directed setae, their dorsal surface somewhat concave, membranous, and glabrous (fig. 9E, D).

Genitalia as in generic description and in figure 9D, E. Structure and chaetotaxy of penis as in *Linadureta versicolor* (see fig. 15B).

Cerci and caudal filament as in generic description and in figure 9C, F, H–J.

Spermatolophids as in generic description and figure 8P. Length of sperm heads 0.006–0.007 mm. Number of sperms per spermatolophid, 25–40.

MATERIAL EXAMINED: Cape Province: Van Rhynsdoorp, May 4, 1968, in nest of *Microhodotermes viator* (J. L. Sheasby), one male, holotype.

PSEUDATELURA SILVESTRI

DESCRIPTION: Atelurinae. Large insects (6–8 mm.). Body strongly convex dorsally, stout, that of male slightly, that of female strongly, tapering toward behind but not limuloid. Abdomen of male widened posteriorly in lateral view and becoming more heavily sclerotized and pigmented apically.

Surface of head and body polished, with scattered short setae. Scales normal, with numerous rays, present on anterior portion of mesonotum and metanotum, on apical half of anterior

surface of coxae of mid and hind legs, along anterior margin and on lateral deflexed portions of abdominal terga, and on entire surface of abdominal sterna including coxites of genital segments. All other areas of body and appendages lacking scales.

Head visible from above, its anterior surface slightly convex. Antennae less than half as long as body. Pedicellus of male with large but structurally simple appendage bearing a small hook-shaped apical process; appendage not heavily pigmented, with sensory pit and glandular process. Mandibles slender, well sclerotized; incisive portion with two slender subequal teeth separated by wide notch; molar portion small. Galea and lacinia of maxilla not especially elongate. Galea lacking distinct apical sensory papillae. Apex of lacinia heavily sclerotized, narrowly pointed; pectinate process distinctly surpassing apex of lacinia. Maxillary palp stout; setae short, some on second article spinelike. Labium not specialized; disc of mentum glabrous, its lateral portion with a group of very short setae. Apical segment of labial palp about twice as long as wide.

Legs with large narrow coxae. Femora with macrochaetae. Tarsi four-segmented; two large lateral and one small median claw, all simple.

Abdominal terga large, their lateral deflexed portions separated from dorsal portion by faint carina. Setae of terga short. Tergum X of female trapezoidal, notched apically, much of its base covered by ninth tergum. Ninth tergum of male much larger than any of the preceding, very well developed dorsally and laterally. Tenth tergum of male relatively short, not flattened dorsoventrally, its morphologically dorsal surface obliquely downwardly inclined, its ventral surface horizontal; sclerite very heavily sclerotized and pigmented on all surfaces except ventrally at base; under surface on disc with 1+1 groups of heavily sclerotized sensory cones.

Abdominal sterna II–VI with eversible vesicles, those on IV with pigmented interior sac-like portion, the others inconspicuous. Sternum VII with exserted vesicles. Styli present on segments VII–IX; those of female normally developed, subcylindrical, those of segment IX much larger than the preceding but not subtriangular. Styli on segments VII and VIII of male normally developed, with distinct apical spine; styli of segment IX very large, elongate scoop-shaped, heavily sclerotized and pigmented, upper surface membranous distally, not pigmented.

Female genitalia: Median sclerite of eighth segment short, transverse, its central portion somewhat projecting. Ovipositor short and stout, not extending beyond apex of styli IX. Anterior and posterior gonapophyses distinctly pseudosegmented, with fine and strong setae but lacking spines. Coxites IX very narrow, completely covered by sides of abdominal tergum IX.

Male genitalia: Coxites IX very heavily sclerotized and pigmented, their styli as described above. Parameres not much longer than half the length of coxites, narrowed apically, slightly pigmented, with simple and apically few specialized setae. Penis small, membranous; genital opening narrowly elongate.

Cerci of female longer than width of visible portion of tergum X, backwardly directed, horizontal. Caudal filament of female about twice as long as cerci. Cerci of male short and stout, forceps-like, heavily sclerotized, rigid, backwardly directed and downwardly curved. Base of cerci with very short inwardly and backwardly directed process the point of which is adjacent to field of sensory cones on under surface of tenth tergum. Process of cerci at apex with one large sensory cone, main body of cercus on inner surface basad of insertion of process with one row of small sensory cones. Caudal filament of male short and stout, emerging between styli IX, ventrally directed, lacking sensory cones.

Spermatolophids globular, their diameter 0.04–0.05 mm. Sperm heads cuneiform, not forming aggregations, irregularly distributed close to periphery of spermatolophid. Length of sperm head about equal to one ninth of diameter of spermatolophid. Estimated basic number of spermatozoa per spermatolophid, 32.

TYPE SPECIES: *Pseudatelura trichophila* Silvestri, 1908.

OBSERVATIONS: In many respects, *Pseudatelura* resembles *Natiruleda*, but lacks the autapomorphic characters of the male of the latter. The structure of the male genitalia and cerci serves to distinguish *Pseudatelura* from all related genera.

The type species of *Pseudatelura* was described from a juvenile male; immature males associated with adult males as described above, agree well with Silvestri's description.

The second species formerly included in

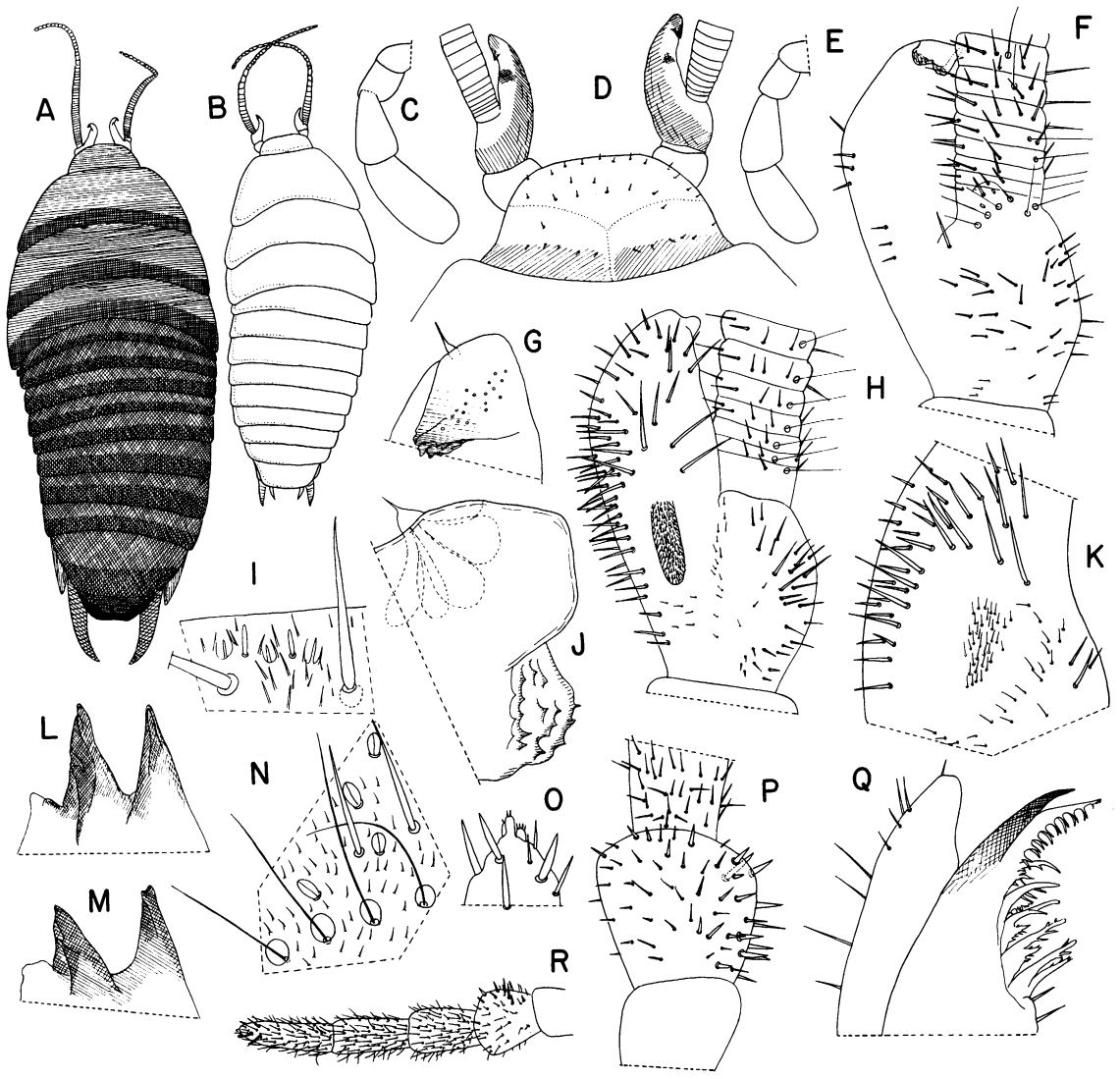

FIG. 10. *Pseudatelura trichophila*, male. A. Habitus, dorsal view. B. Habitus, dorsal, immature male. C. Labial palp, immature male. D. Head and base of antennae, dorsal, immature male. E. Labial palp. F. Pedicellus and base of flagellum, outer aspect. G. Pedicellus, apex with glandular projection, immature male. H. Pedicellus and base of flagellum, inner view. I. Detail of apical margin of article of center of antenna. J. Pedicellus, area of glandular projection. K. Area of sensory pit of pedicellus, immature male. L. Apex of mandible. M. Apex of other mandible. N. Detail of article of base of flagellum. O. Apex of maxillary palp. P. Apex of first, second, and base of third segment of maxillary palp. Q. Apex of galea and lacinia. R. Maxillary palp. (Unless specified, drawings pertain to mature male.)

Pseudatelura, trichonota Silvestri, 1922, is removed from this genus in the present paper and included in the new genus *Ateluropsis*.

Pseudatelura trichophila Silvestri

Figures 10A–R; 11A–S; 12A–P; 13A–R

Body length of male 7 mm.; of female 7.3 mm. General shape of male as shown in figure 10A, of female as shown in figure 13A. General color dark golden brown; in male, coxites IX, cerci and tenth tergum very dark brown. Anterior portion of head, antennae, mouthparts and legs whitish, tibiae and tarsi slightly darkened; sides of thoracic nota narrowly bordered with white. Styli VII and

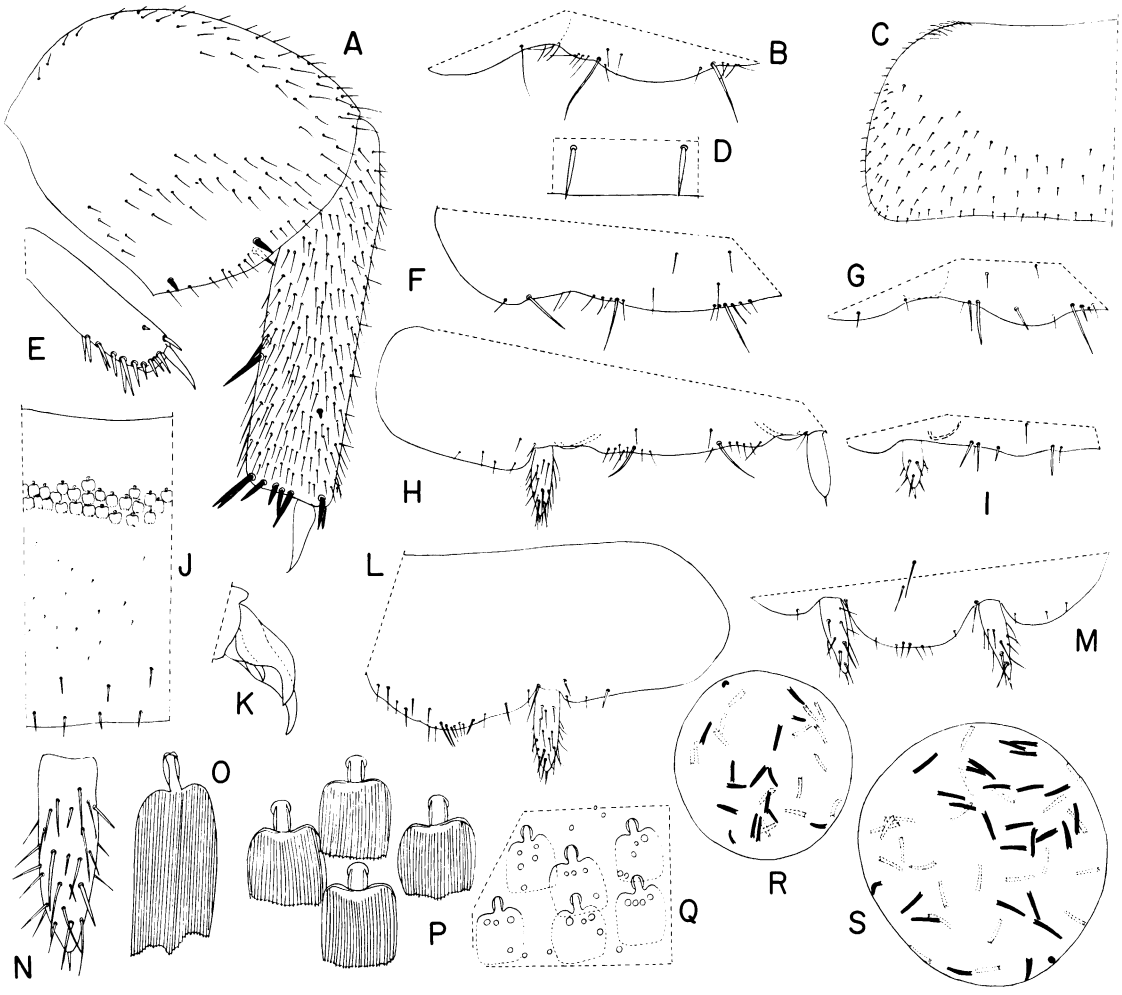

FIG. 11. *Pseudatelura trichophila*, male. A. Femur and tibia of hind leg. B. Portion of abdominal sternum II. C. Portion of metanotum. D. Setae of hind border of metanotum. E. Chaetotaxy of fore tibia. F. Portion of abdominal sternum V. G. Portion of abdominal sternum V of immature male. H. Portion of abdominal sternum VII. I. Portion of abdominal sternum VII of immature male. J. Portion of abdominal tergum II. K. Claws of hind leg. L. Portion of abdominal sternum VIII. M. Portion of abdominal sternum VIII of immature male. N. Stylus VIII. O. Scale of abdominal sternum. P. Scales of anterior portion of abdominal tergum II. Q. Scales of abdominal tergum, with small cuticular structures. R. Spermatolophid, immature male. S. Spermatolophid. (Unless otherwise stated, drawings pertain to a mature male.)

VIII of male, and VIII of female, whitish. Scales of terga as long as wide (fig. 11P, Q), of sterna longer than wide (fig. 11O).

Head with a few scattered setae. Antennae about 3.5 mm. long; apical articles divided into two subarticles. Pedicellus of male as illustrated in figure 10D, F–H, I; sensory pit large, more than three times as long as wide; subapical glandular projection as shown in figure 10G. Maxillae as in generic description and figures 10O–R, 13C–E; second segment of palp with several spinelike setae, in both sexes. Labial palpi as shown in figures 10C, E; 13C; apical segment on upper surface with a few long hairs.

Pronotum with setae on whole surface; mesonotum and metanotum (fig. 11C, D) with setae on sides and posterior half; all setae of approximately uniform size, those of posterolateral angles not longer than any of the others.

Legs stout, their chaetotaxy as shown in figures 11A–E; 13F, G, L. Femora with three short macrochaetae on under surface, one sub-

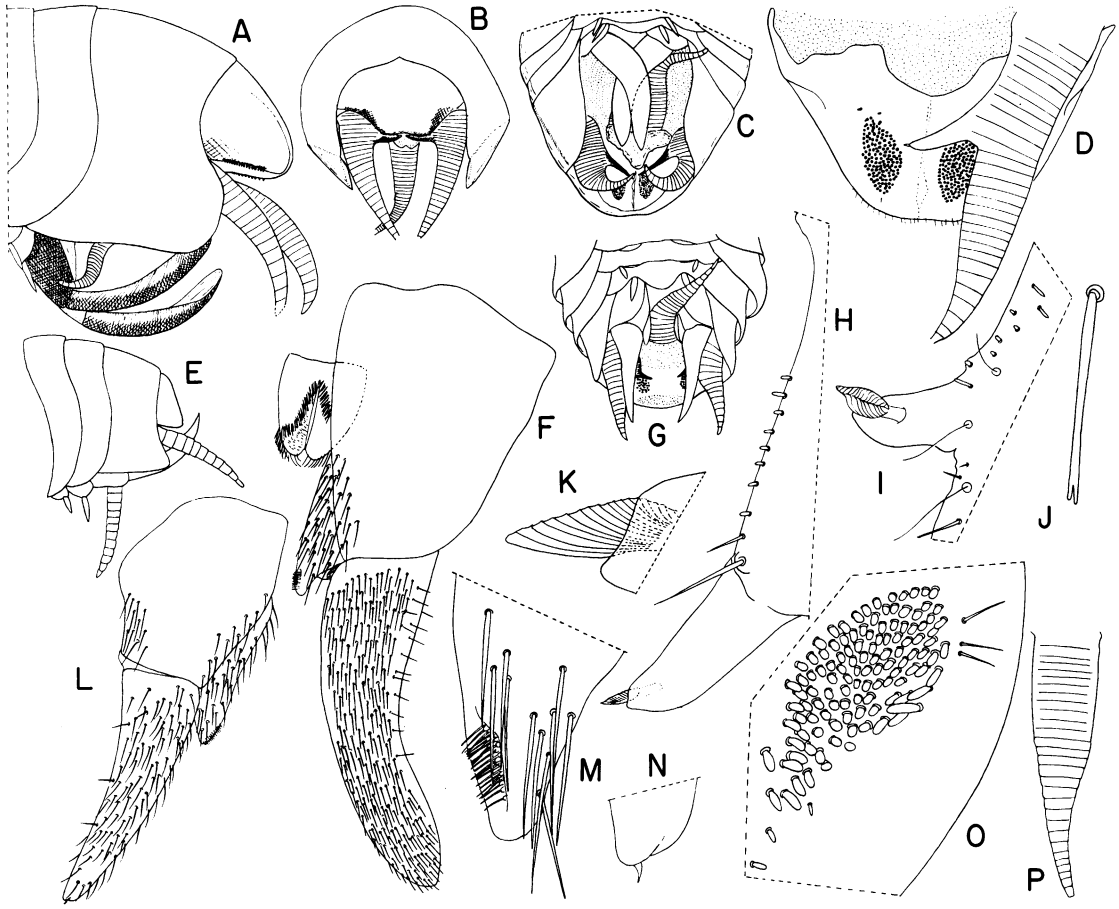

FIG. 12. *Pseudatelura trichophila*, male. A. Apex of abdomen, lateral aspect. B. Apex of abdomen, seen from behind. C. Apex of abdomen, ventral view. D. Abdominal tergum X, with one cercus. E. Apex of abdomen, lateral, immature male. F. Coxite IX, with paramere and penis. G. Apex of abdomen, ventral, immature male. H. Inner margin of basal half of cercus, with spines. I. Portion of inner margin of cercus, immature male. J. Macrochaetae of ventral surface of apical portion of caudal filament. K. Sensory cone of apex of process of cercus. L. Coxite IX with paramere, immature male. M. Apex of paramere. N. Apex of stylus IX, immature male. O. Group of sensory cones of under surface of abdominal tergum X. P. Caudal filament, setae not shown. (Unless otherwise stated, drawings pertain to a mature male.)

basal and two subapical. Tibiae with two relatively long ventral macrochaetae and one very short subdorsal macrochaeta on apical half of article; distally with about 10 macrochaetae.

Abdominal terga with short setae in two or three irregular rows along hind border (figs. 11J; 13K); setae of posterolateral angles not larger than that of those remaining. Most of tenth tergum of female covered by ninth from above, truncate or faintly emarginate apically, the free portion with a few short setae, the posterior angles with 1+1 inconspicuous macrochaetae (fig. 13S). Ninth and tenth tergum of male as in generic description and in figure 12A–E, O; sensory fields of under surface of tenth tergum composed of approximately 120 sensory cones each.

Abdominal sterna as in generic description and figures 11B, F–I, L, M; 13H, M. Setae restricted to posterior region of sterna, most short; hind margin of sterna II–VII in female, and II–VIII in male, with 1+1 submedian macrochaetae. Center of posterior margin of sterna straight or slightly rounded, of sternum VIII of male distinctly projecting. Styli and vesicles as in generic description and in figures

11H, I, L, M; 12A, C, F, L; 13M–R. Styli VIII of female slightly larger than styli VII; styli IX larger still, slender, more than four times as long as wide. Styli VII of male slightly shorter than styli VIII; styli IX as illustrated, their ventral surface covered with straight backwardly directed setae, outer borders with a few hairs perpendicular to longitudinal axis of stylus.

Genital region of female as in generic description and in figure 13N–O. Gonapophyses with approximately 12 pseudosegments, their chaetotoxy as shown in figure 13P–R.

Genital region of male as in generic description and in figure 12A–C, E–G. Parameres less strongly sclerotized than coxite and stylus IX, with long setae and a subapical mediad directed brush of short hairs. Penis very similar to that of *Eluratinda sheasbyi* (see fig. 18F) but sclerotized ring not distinctly pigmented.

Cerci and caudal filament of female and male as in generic description and figures.

Spermatolophid as in generic description and in figure 11R, S. Length of sperm head 0.006–0.007 mm. Number of sperms per spermatolophid, 25–40.

MATERIAL EXAMINED: Cape Province: 20 miles ex Nieuwoudtville towards Clan William, April 10, 1963, in hive of *Microhodotermes viator* (W. G. H. Coaton), one male, one female; 30 miles ex Williston toward Van Wyksvlei, April 19, 1963 (J. L. Sheasby), in soil dump of *Hodotermes mossambicus*, one female; 60 miles ex town Verneukpan toward Williston, April 19, 1963, in soil dump of *Hodotermes mossambicus* (W. G. H. Coaton), one female; 55 miles from Kenhardt to Pofadder, April 4, 1963, in hive of *Microhodotermes viator* beneath stone (W. G. H. Coaton), one female, two males; 10 miles ex Williston toward Van Wyksvlei, April 19, 1963, from hive of *Microhodotermes viator* (J. N. Diederichs), one female; 56 miles ex Williston toward Sutherland, October 19, 1963, in cells of *Microhodotermes viator*, beneath stone (J. L. Sheasby), one female; 20 miles ex Loeriesfontein to Nieuwoudtville, April 28, 1968, from *Microhodotermes viator* (J. L. Sheasby), one female; Nieuwoudtville, May 1, 1968, from *Microhodotermes viator* (J. L. Sheasby), one female, two males; *ibidem*, May 2, 1968, from *Microhodotermes viator* (J. L. Sheasby), one male; 68 miles ex Clan William toward Calvinia, February 20, 1961, nest of *Microhodotermes viator* (W. G. H. Coaton), one female, three males; 61 miles ex Sutherland to Laingsburg, September 15, 1960, in nest of *Microhodotermes viator*, two females; 20 miles ex Loeriesfontein to Nieuwoudtville, April 26, 1968, from *Microhodotermes viator* (J. L. Sheasby), one female, paratype.

A female of 5.7 mm. length contained 10 eggs, 0.5 mm. long and 0.5 mm. wide.

The above description of the male applies to morphologically adult specimens of approximately 7 mm. length. I have examined in detail a physiologically mature (presence of spermatolophids) but morphologically slightly immature specimen of only 4.8 mm. length. The smaller specimen, details of which are illustrated in figures 10B, C, G, K; 11G, I, M, R; 12E, I, L, N, differs from the adult male by its slightly lighter color, the less well-developed sensory pit of the pedicellus (fig. 10K), the presence of only one distinct spine on the femora, the larger subdorsal spine of the tibia, the smaller number of sensory cones on the underside of the tenth tergum (approximately 60 in each field), the smaller number of setae on the abdominal sterna (fig. 11G, I, M), the more slender stylus IX which has a small apical spine (fig. 12L, N), and the smaller process of the cerci with its larger apical spine (fig. 12I).

DINATELURA SILVESTRI

DESCRIPTION: Female. Atelurinae. Large insects (7 mm.). Body strongly convex dorsally, stout. General body color brownish, posterior segments not conspicuously darker than preceding.

Body with short setae. Scales present, slightly longer than wide; rays widely spaced, obsolescent. Scales present on anterior portions of abdominal terga and sterna; all other areas of body and appendages lacking scales.

Head visible from above. Antennae less than half as long as body. Mandibles well sclerotized apically; incisive portion with two slender subequal teeth separated by a wide notch. Galea and lacinia of maxillae not especially elongate; pectinate process slightly surpassing apex of lacinia. Maxillary palp stout, with short setae. Labium not specialized; apical segment of labial palp over twice as long as wide.

Femora with macrochaetae. Tarsi four-segmented; two large lateral, and one median claw, all simple.

Tergum X almost completely covered from above by IX, deeply emarginated apically.

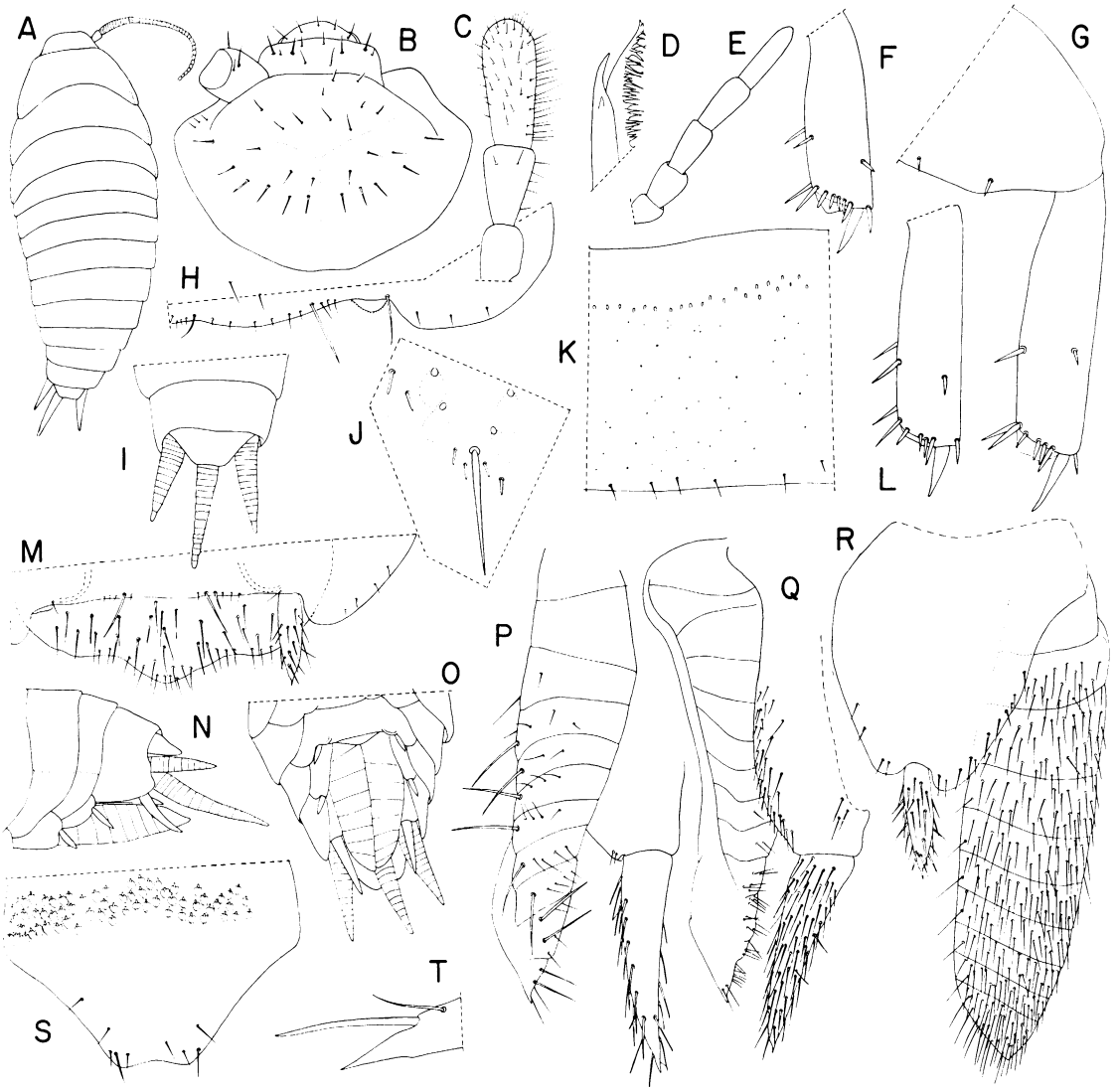

FIG. 13. *Pseudatelura trichophila*, female. A. Habitus, dorsal. B. Head, dorsal. C. Labial palp. D. Apex of lacinia. E. Maxillary palp. F. Chaetotaxy of fore tibia. G. Chaetotaxy of apex of femur and of tibia of hind leg. H. Portion of abdominal sternum V. I. Apex of abdomen, dorsal. J. Detail of surface structure of abdominal tergum near hind border. K. Portion of abdominal tergum, scale sockets near anterior margin. L. Chaetotaxy of mid tibia. M. Portion of seventh abdominal sternum, with median sclerite of eighth. N. Apex of abdomen, lateral view. O. Apex of abdomen, ventral view. P. Coxite IX with posterior gonapophysis, dorsal. Q. Coxite IX with posterior gonapophysis, ventral. R. Coxite VIII with anterior gonapophysis.

Abdominal sterna II–VI with eversible vesicles, VII with exserted vesicles. Styli present on segments VII–IX; VII and VIII normal, subequal in size; IX much larger than preceding, subtriangular, compressed dorsoventrally.

Genitalia. Median portion of eighth sternum shortly subtriangular. Ovipositor short and stout, not surpassing apex of styli IX. Gonapophyses distinctly pseudosegmented, beset with short setae.

Cerci very short, subconical, shorter than width of tergum X at base. Caudal filament about twice as long as cerci.

TYPE SPECIES: *Dinatelura afra* Silvestri, 1908.

OBSERVATIONS: The above description has been drawn up from the original description and

figures of the type species which I have not been able to examine. Some characters could not be clearly established or remain doubtful, such as the absence or presence of apical spines on the styli, and the absence or presence of spinelike setae or fossorial spines on the gonapophyses.

Dinatelura differs from *Rulenatida*, *Natiruleda*, and *Pseudatelura* by the scales which have fewer rays, and the absence of scales on the thorax. Other possibly significant characters cannot be ascertained, as the original description is not detailed enough and the male is not known. In over-all structure, *Dinatelura* comes close to the three genera treated below (*Linadureta*, *Eluratinda*, and *Gynatelura*), but it differs from them by the less contrasting color pattern, the presence of scales on the abdominal sterna, with the scales themselves still having distinct rays, and the apically emarginated tenth abdominal tergum of the female.

The other species originally included in *Dinatelura*, *primitiva* Silvestri, is being transferred, in the present paper, to the new genus *Rulenatida*.

Dinatelura afra Silvestri

This species has not been seen after its original description; the only specimen known was found with *Microhodotermes viator*.

LINADURETA, NEW GENUS

DESCRIPTION: Atelurinae. Large insects (6–8 mm.). Body strongly convex dorsally, stout, that of male approximately parallel-sided in dorsal view, that of female slightly tapering toward behind. Abdomen of male widened posteriorly, in lateral view. General body color whitish, but apical abdominal segments conspicuously darkened.

Surface of head and body polished, with scattered short setae. Scales present, strongly modified, viz. wider than long, with very irregular posterior border, and rays completely absent. Scales only on anterior and lateral portions of from first, second, or third to ninth abdominal tergum in male, and to tenth tergum in female; scaled area close to setae of posterior border of terga. All other areas of body and appendages lacking scales.

Head visible from above, its anterior surface slightly convex. Antennae less than half as long as body. Pedicellus of male with large process of complex structure, heavily sclerotized and pigmented; sensory pit and glandular process absent. Mandibles slender, well-sclerotized apically; incisive portion with two slender subequal teeth separated by a wide notch; molar portion small, poorly sclerotized. Galea and lacinia of maxilla not especially elongate. Galea lacking distinct apical sensory papillae. Apex of lacinia heavily sclerotized, narrowly pointed; pectinate processes not distinctly surpassing apex of lacinia. Maxillary palp stout; setae short, some on second and third segments spinelike. Labium not specialized; disc of mentum glabrous, lateral portions with a few, very short setae. Apical segment of labial palp distinctly longer than wide.

Legs with long, narrow coxae. Femora without macrochaetae. Tarsi four-segmented; two large lateral and one small median claw, all simple.

Abdominal terga large, their lateral deflexed portions well developed, separated from central dorsal portion by a faint carina. Apical terga of female normal; tergum X semicircular, clearly visible from above. Ninth tergum of male very short dorsally, much shorter than preceding terga, but exceedingly well developed laterally and ventrolaterally, covering much of coxites and stylets IX. Tenth tergum of male very large, its base vertical, its disc horizontal, flattened dorsoventrally. Tenth tergum of male heavily sclerotized with complex pigment pattern above, its under surface largely membranous and not pigmented; close to its base on under surface with 1+1 fields of heavily sclerotized sensory cones.

Abdominal sterna II–VI with eversible vesicles, those on IV with heavily pigmented interior saclike portion, the others inconspicuous. Sternum VII with exserted vesicles. Styli present on segments VII–IX. Styli of female normally developed, somewhat depressed dorsoventrally; stylet of segment IX subtriangular; all lacking apical spines. Styli of male highly modified: those on segments VII and VIII strongly reduced, not longer than wide at base, with only a few setae and without apical spine; styli of ninth segment very large, elongate subrectangular, strongly compressed dorsoventrally, heavily sclerotized and pigmented, lacking apical spine.

Female genitalia: Median sclerite of eighth sternum shortly subtriangular. Ovipositor short, not surpassing apex of styli IX. Anterior and posterior gonapophyses distinctly pseudo-

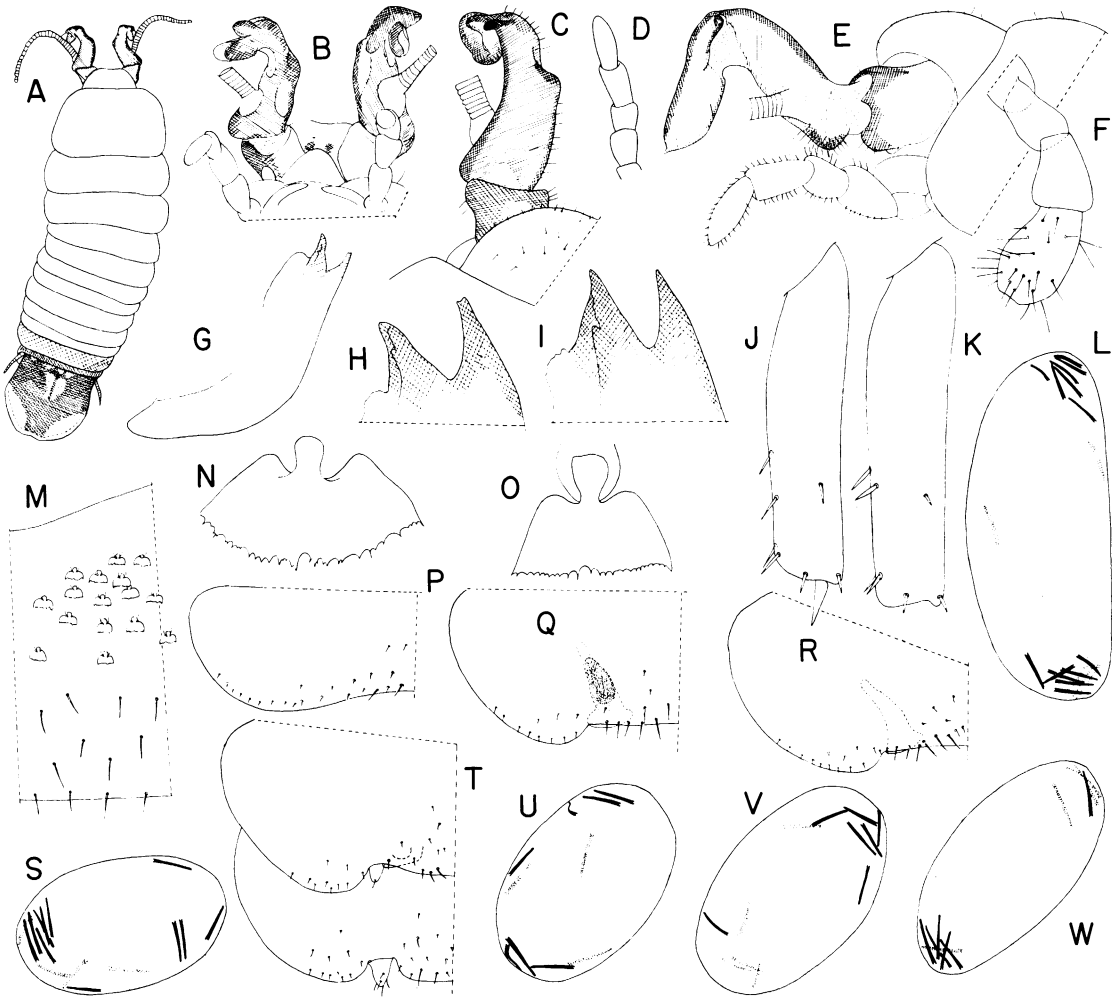

FIG. 14. *Linadureta versicolor*, male. A. Habitus, dorsal. B. Anterior portion of head with appendages, ventral. C. Base of antenna, dorsal. D. Maxillary palp. E. Head, lateral. F. Labial palp, setae shown only on last segment. G. Mandible. H. Apex of mandible. I. Apex of other mandible. J. Chaetotaxy of fore tibia. K. Chaetotaxy of hind tibia. L. Spermatolophid, distorted. M. Portion of abdominal tergum VI. N. Scale of abdominal tergum VI. O. Scale of abdominal tergum VII. P. Portion of abdominal sternum I. Q. Portion of abdominal sternum IV. R. Portion of abdominal sternum V. S. Spermatolophid, distorted. T. Portion of abdominal sterna VII and VIII. U–W. Spermatolophids, distorted.

segmented, beset with setae and fossorial spines.

Male genitalia: Coxites IX large, their styli as described above. Parameres not longer than half the length of coxite, narrow, pointed apically, membranous throughout, with simple and apically few specialized setae. Penis small, membranous; genital opening narrowly elongate.

Cerci of female very short, subconical, upwardly directed, shorter than width of tenth tergum at base. Caudal filament of female about twice as long as cerci. Cerci of male very slender but short, much shorter than tergum X, not heavily sclerotized, obliquely backwardly and upwardly directed, not attaining level of upper surface of tergum X. Base of cerci with a relatively short upwardly and anteriorly directed process, the point of which is adjacent to field of sensory cones of under surface of tergum X on same side. Process of cerci with a few sensory cones arranged in one longitudinal row; base of process and basal portion of main body of cercus

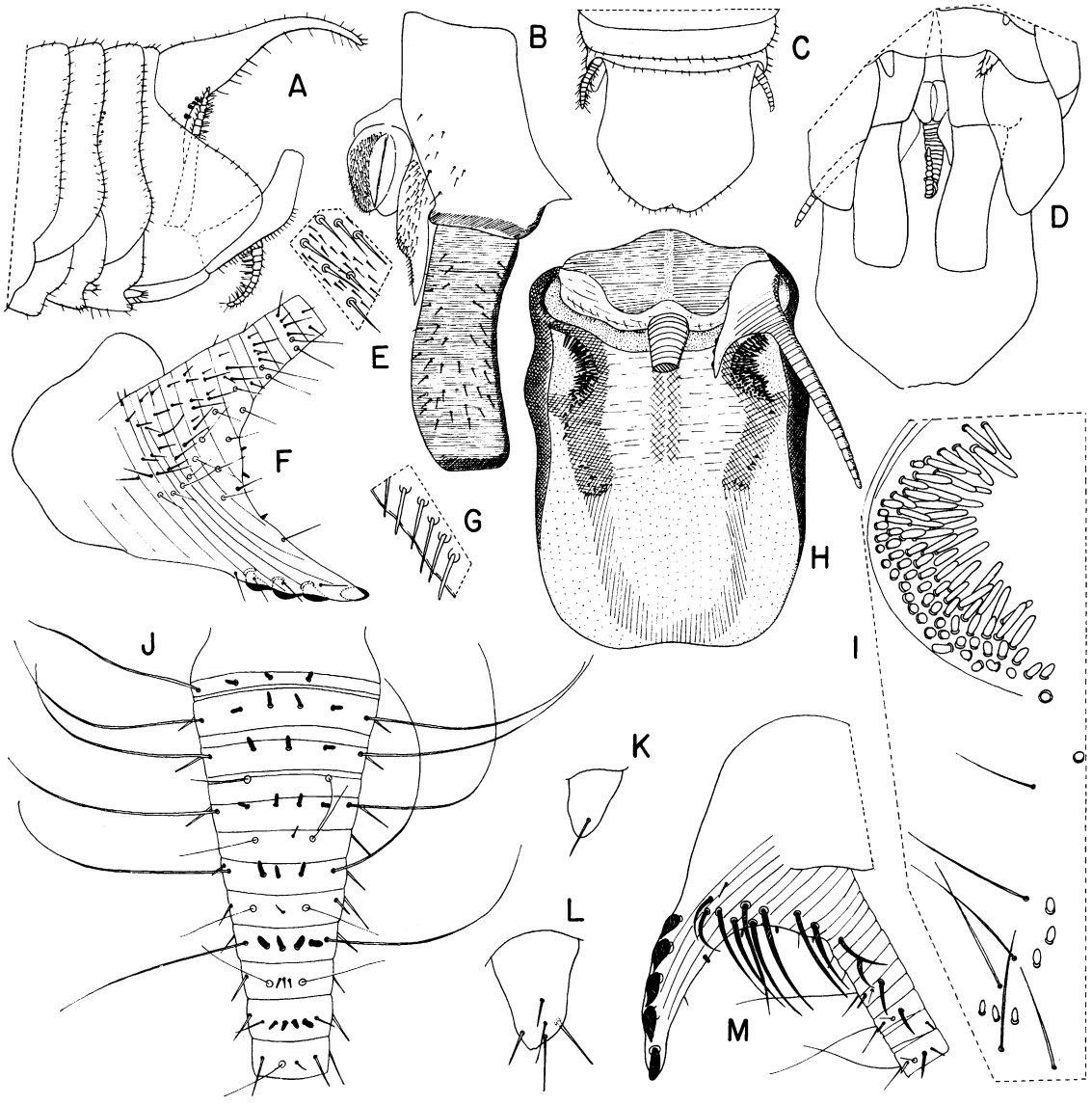

FIG. 15. *Linadureta versicolor*, male. A. Apex of abdomen, lateral. B. Coxite IX, with penis and paramere. C. Apex of abdomen, dorsal. D. Apex of abdomen, ventral. E. Setae of penis. F. Base of cercus, under surface. G. Specialized setae on subapical portion of inner margin of paramere. H. Abdominal tergum X seen from below, with one cercus and base of caudal filament. I. Sensory cones and setae of under surface of abdominal tergum X. J. Basal portion of caudal filament, dorsal surface. K. Stylus VII. L. Stylus VIII. M. Base of cercus, upper surface.

with numerous spinelike setae of varied length. Caudal filament of male short and stout, emerging between styli IX, ventrally directed. Caudal filament with sensory cones on under surface.

Spermatolophids globular, their diameter averaging 0.04–0.06 mm. Sperm heads elongate cuneiform, often forming loose polar aggregations. Length of sperm head one-fourth of diameter of spermatolophid. Estimated basic number of spermatozoa per spermatolophid, 32.

TYPE SPECIES: *Linadureta versicolor*, new species.

OBSERVATIONS: *Linadureta* is distinguished from the related genera described above by such apomorphic characters as the highly modified pedicellus of the male with the concomitant loss of the sensory pit and glandular process, the

highly modified scales and their total absence from the abdominal sterna, the loss of the macrochaetae of the femora, and the loss of apical spines on the styli. The size reduction of styli VII and VIII of the male is an autapomorphic character within the group. *Linadureta* is the only genus in the *Dinatelura*-group in which the caudal filament of the male bears sensory cones, but they are frequently found in other genera of the Nicoletiinae.

Linadureta versicolor, new species

Figures 14A–W; 15A–M; 16A–Q

Maximum length of body of male 7 mm., of female 5.7 mm.

General shape of male as shown in figure 14A, of female as shown in figure 16A. General color ivory white; thoracic nota and abdominal segments dorsally and ventrally suffused with light brown, margined with white; genital region in both sexes slightly darker. Parameres of male and dorsal surface of tergum X in both sexes very dark brown, uniform in female, with light spots in male as shown in figure 14A. Under surface of tergum X of male white, with 1+1 longitudinal darker bands (fig. 15H); occasionally also terga IX and VIII distinctly darker than preceding ones. Scapus and pedicellus of male and its process with heavily pigmented areas as shown in figure 14A–C, E.

Head with a few scattered short setae. Maximum length of antennae 2.5 mm.; apical articles subdivided into two segments. Pedicellus of male and its appendage very large, longer than head, approximately L-shaped; details of its structure as shown in figure 14A–C, E. Mandibles as shown in figure 14G–I. Maxillae as in *Eluratinda sheasbyi* (see fig. 17J–L); palps as shown in figures 14D, 16C. Labium as in *Eluratinda sheasbyi* (see fig. 17I); palp of male as shown in figure 14F.

Thoracic nota with short setae, occupying whole disc of pronotum but only posterior half of mesonotum and metanotum.

Legs as shown in figures 14J, K; 16B, E, F; their macrochaetae not bifid apically. Femora without macrochaetae. Tibiae with one subdorsal and one or two ventral macrochaetae on apical half of segment; distally with about six macrochaetae.

Abdominal terga with short setae in two or three irregular rows along hind margin (figs. 14M, 16H); no macrochaetae developed. Scales on terga II–IX in male, II–X in female, becoming more numerous on posterior segments. Shape of scales as shown in figure 14N, O. Tenth tergum of female (fig. 16A, P) almost entirely exposed, subsemicircular, setae only on area close to hind border. Tenth tergum of male as in generic description and in figures 14A; 15A, C, H, I; its apical margin slightly emarginated at center. Sensory cones arranged in two halfmoon-shaped groups of about 80 elements each; a few scattered sensory cones accompanied by a few long hairs situated caudad of each group.

Abdominal sterna with several irregular rows of setae along hind margin, those on central portion larger than those on lateral areas (figs. 14P–R, T; 16G, J); macrochaetae absent. Sterna III and V of female posteriorly with wide, membranous, apparently pouchlike projection of unknown function (fig. 16G). Styli and vesicles as in generic description and as illustrated. Styli IX of female (fig. 19I, K) not longer than styli VIII, but more heavily pigmented and conspicuously widened, only twice as long as wide at base, their over-all shape slightly curved (fig. 19L). Styli VII and VIII of male as shown in figures 14T; 15K, L. Styli IX slightly longer than coxite, about three times as long as wide, with short setae on their under surface (fig. 15B).

Genital region of female as shown in figure 16D, I, J. Median sclerite of eighth sternum with setae along posterior border only. Gonapophyses with 12 pseudosegments, their setae and fossorial spines as illustrated (fig. 16J, K, M, N).

Genital region of male as in generic description and in figure 15A, B, D; penis and parameres as in figure 15B, E, G.

Cerci and caudal filament of female as in generic description and in figure 16A, D, H, Q; cerci very short, distinctly curved.

Cerci and caudal filament of male as in generic description and figure 15A, C, F, H, J, M.

Spermatolophids as in generic description and figure 14L, S, U–W. Length of sperm heads 0.012 mm. Number of sperms per spermatolophid from 10–20, in most cases 12–14.

MATERIAL EXAMINED: Cape Province: 50 miles ex Die Bos toward Tulpfontein, April 13, 1963, in hive of *Microhodotermes viator* (W. G. H. Coaton), one male, holotype, one female, allotype; 20 miles ex Mertonhof toward Die Bos, April 12, 1963, from hive of *Microhodotermes*

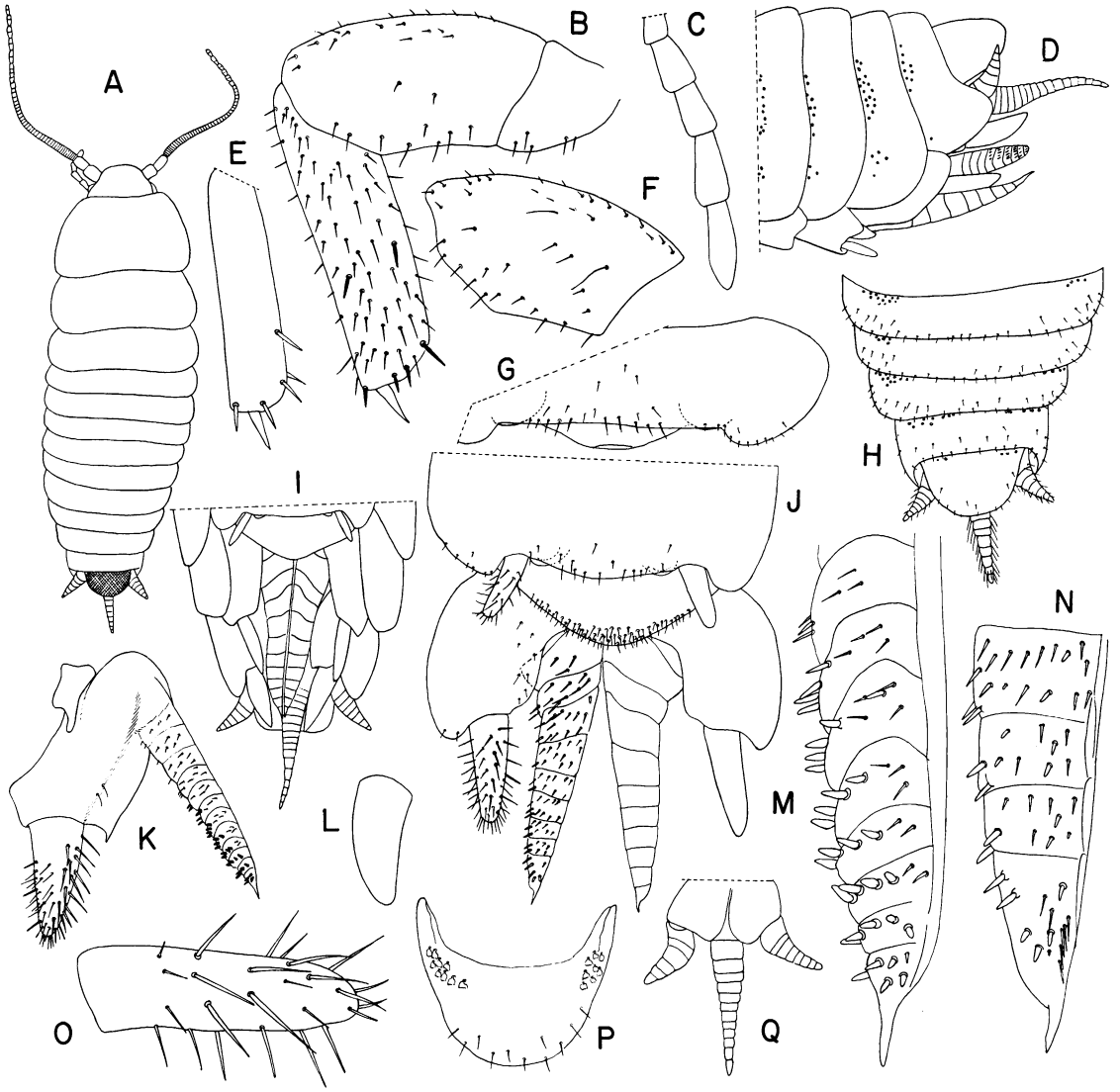

FIG. 16. *Linadureta versicolor*, female. A. Habitus, dorsal. B. Part of hind leg, under surface. C. Maxillary palp. D. Apex of abdomen, lateral view. E. Chaetotaxy of fore tibia. F. Posterior femur, upper surface. G. Portion of abdominal sternum III. H. Distal segments of abdomen, dorsal. I. Apical segments of abdomen, from below. J. Abdominal sterna VII and VIII, with anterior gonapophyses. K. Coxite IX, with posterior gonapophysis. L. Outlines of stylus IX, flattened. M. Apical portion of posterior gonapophysis. N. Apical portion of anterior gonapophysis. O. Stylus VII. P. Abdominal tergum X. Q. Subanal lamellae and caudal appendages, simplified.

viator (W. G. H. Coaton), three males, paratypes, one juvenile; 68 miles ex Clan William toward Calvinia, February 20, 1961, nest of *Microhodotermes viator* (W. G. H. Coaton), one female, paratype.

ELURATINDA, NEW GENUS

DESCRIPTION: Atelurinae. Large insects (6–8 mm.). Body strongly convex dorsally, stout, that of male approximately parallel-sided in dorsal view, that of female distinctly tapered toward behind. Abdomen of male widened posteriorly in lateral view, more or less bulbous apically, and becoming more heavily sclerotized and pigmented distally.

Surface of head and body polished, with scattered short setae. Scales strongly modified, as wide as, or wider than, long; rays numerous

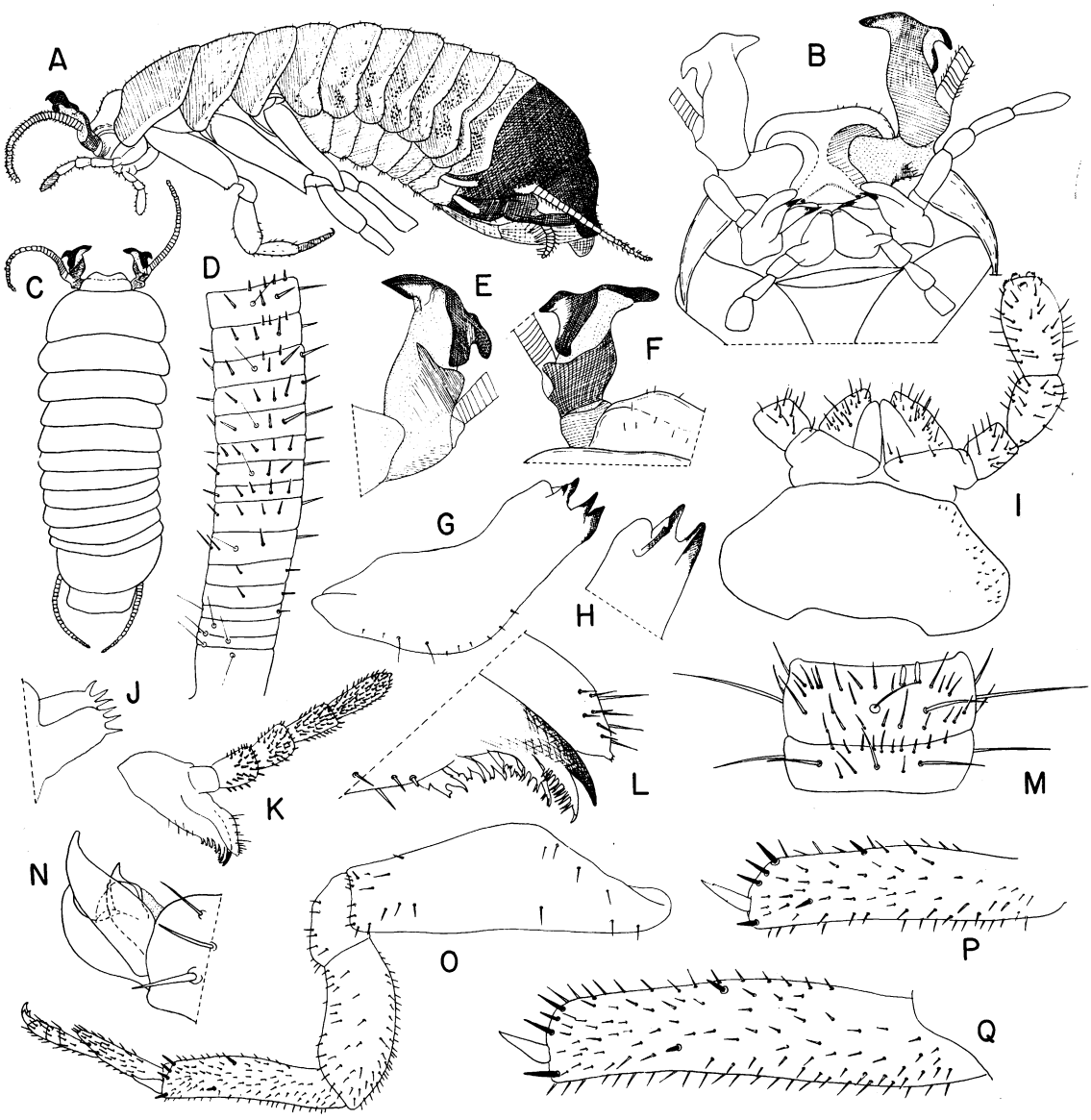

FIG. 17. *Eluratinda sheasbyi*, male. A. Habitus, lateral. B. Head with appendages, under surface. C. Habitus dorsal. D. Base of flagellum. E. Pedicellus, from below. F. Pedicellus, from above. G. Mandible. H. Apex of other mandible. I. Labium with palp. J. Apex of maxillary palp. K. Maxilla with palp. L. Apex of galea and lacinia. M. Articles of apical third of antenna. N. Praetarsus of hind leg. O. Hind leg. P. Tibia of fore leg. Q. Tibia of hind leg.

but obsolete, very difficult to observe; apical border of setae very irregular; scales distinctly pigmented. Scales present on lateral and anterior portions of from first, second, or third to eighth, ninth, or tenth abdominal tergum, very rarely a few isolated scales also on some abdominal sterna. All other areas of body and appendages lacking scales. Scales of terga remote from each other; scaled area separated from setae at posterior border of terga by a wide space.

Head visible from above, its anterior surface with a conspicuous concavity. Antennae less than half as long as body. Pedicellus of male with large process of complex structure, portions heavily sclerotized and pigmented; sensory pit and glandular process absent. Mandibles slen-

der, well-sclerotized apically; incisive portion with two subequal slender teeth separated by a wide notch; molar portion small, poorly sclerotized. Galea and lacinia of maxilla not especially elongate. Galea lacking distinct apical sensory papillae. Apex of lacinia heavily sclerotized, narrowly pointed; pectinate processes not distinctly surpassing apex of lacinia. Maxillary palp short and stout; setae short, some on second and third segments spinelike. Labium not specialized; disc of mentum glabrous, its lateral portions with 1 + 1 groups of very short setae. Apical segment of labial palp elongate oval, about twice as long as wide.

Legs with large narrow coxae. Femora without macrochaetae. Tarsi four-segmented; two large lateral and one small median claw, all simple.

Abdominal terga large, their lateral deflexed portions well developed, separated from dorsal portion by a carina. Apical terga of female normal; tenth tergum relatively small, subsemicircular, clearly visible from above. Male with ninth tergum much larger than that of any others, bulbous, very heavily sclerotized and pigmented. Tenth tergum of male also comparatively large, inverted cup-shaped, flattened dorsoventrally, its morphologically dorsal surface subvertical or subhorizontal. Tenth tergum heavily sclerotized and pigmented dorsally, membranous and not pigmented ventrally, its base on under surface with 1 + 1 fields of heavily sclerotized, sensory cones.

Abdominal sterna II–VI with inconspicuous eversible vesicles, VII with exserted pseudovesicles. Styli present on segments VII–IX; those on VII and VIII subcylindrical, although somewhat flattened dorsoventrally, conspicuously sclerotized and pigmented, with or without minute apical process. Styli of ninth segment of female subtriangular, viz., wide at base and progressively and uniformly narrowed to pointed apex. Styli of ninth segment of male highly specialized, enlarged, of complex shape, strongly sclerotized, and pigmented.

Female genitalia: Median sclerite of eighth segment bisinuate posteriorly. Ovipositor short and stout, not, or only slightly, surpassing apex of styli IX. Anterior and posterior gonapophyses distinctly pseudosegmented, with setae and fossorial spines.

Male genitalia: Coxites IX large, their stylets as described above. Parameres of complex shape, not larger than half the length of coxite, and shorter than modified stylus, partially sclerotized, with a few simple setae. Penis small, with a conspicuous ring-shaped sclerotization; genital opening narrowly elongate.

Cerci of female obliquely upwardly and backwardly directed, stout at base, short, their length approximately equal to width of tenth tergum at base. Caudal filament of female not much longer than cerci. Cerci of male relatively slender and elongate, not heavily sclerotized, as long as terga IX and X combined, subhorizontal, curved, with points almost meeting. Base of cerci with a long and slender mediad-directed process bearing a few sensory spines; apical portions of processes overlapping; apices of processes of cerci adjacent to fields of cones on opposite side of under surface of tenth tergum. Caudal filament of male short and stout, emerging between parameres, ventrally directed. Main body of cerci and caudal filament lacking sensory cones.

Spermatolophids globular, their diameter averaging 0.07–0.08 mm. Sperm heads cuneiform, not forming aggregations, numerous, irregularly distributed close to periphery of spermatolophid. Length of sperm head about equal to from one-sixth to one-seventh of diameter of spermatolophid. Estimated basic number of spermatozoa per spermatolophid, 64.

TYPE SPECIES: *Eluratinda sheasbyi*, new species.

OBSERVATIONS: *Eluratinda* agrees closely with *Linadureta* described above. *Eluratinda* differs mainly by such autapomorphic characters as the bisinuate median sclerite of the eighth abdominal sternum of the female, and, in the male, by the conspicuously enlarged ninth abdominal tergum and the complex shape of the modified styli IX.

KEY TO THE SPECIES OF *Eluratinda*

Female: Inner posterior angle of coxite IX conspicuously projecting (fig. 19N); posterolateral angles of median sclerite of eighth sternum much smaller than median projection (fig. 19K). Male: Tenth tergum slightly emarginate apically (fig. 18B); styli IX widest at base (fig. 18E, F) . . . . . *sheasbyi*, new species

Female: Inner posterior angle of coxite IX not projecting (fig. 22I); posterolateral angles of median sclerite of eighth sternum comparatively well developed (fig. 21M–O). Male: Tenth tergum rounded apically (fig. 20N); styli IX widest at middle (fig. 20M) . . . . *coatoni*, new species

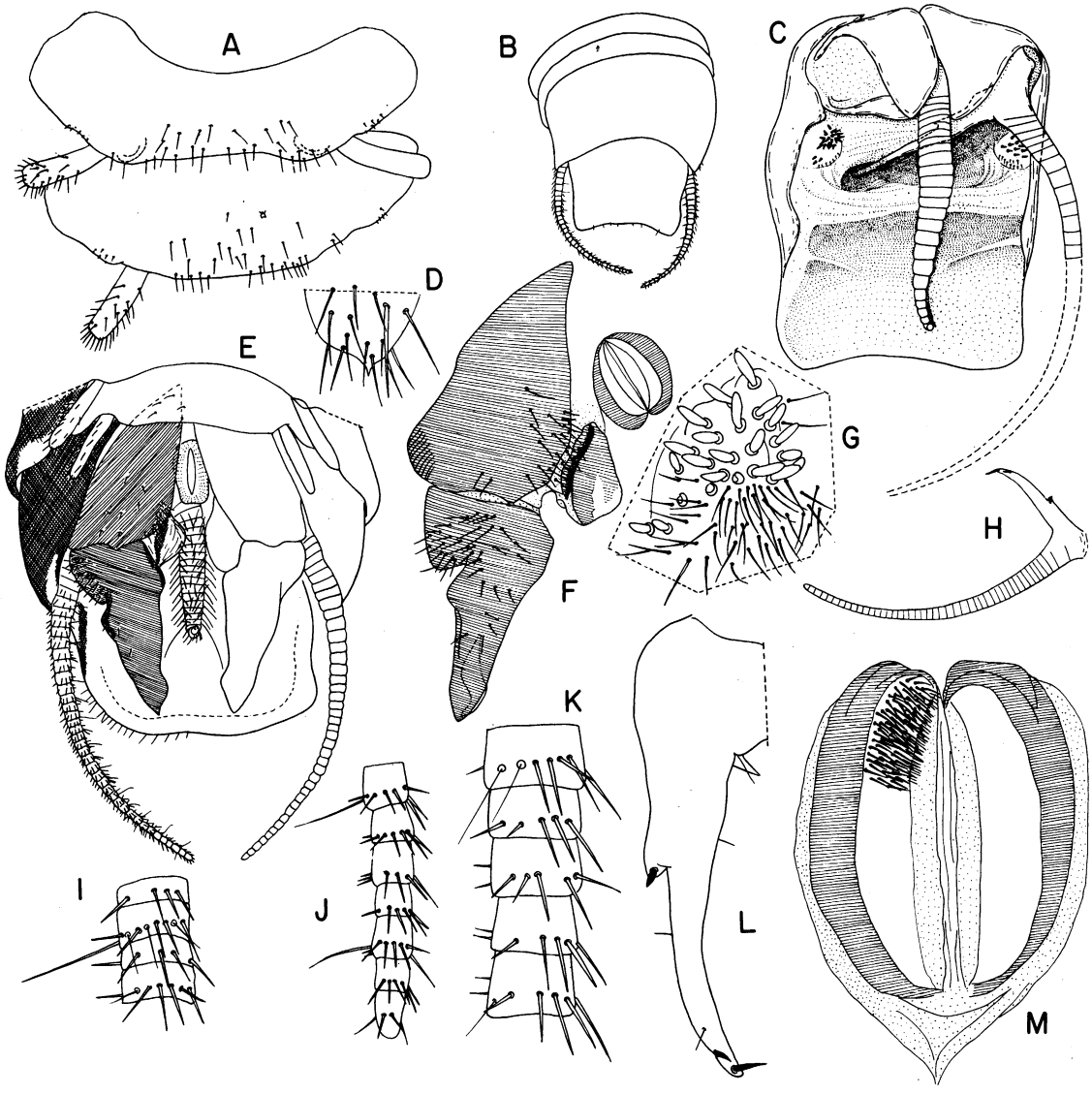

FIG. 18. *Eluratinda sheasbyi*, male. A. Abdominal sterna VII and VIII. B. Apex of abdomen, dorsal. C. Under surface of abdominal tergum X, with caudal filament and one cercus. D. Apex of stylus VIII. E. Apex of abdomen, ventral. F. Coxite IX with paramere and penis. G. Group of sensory cones and setae of undersurface of abdominal tergum X. H. Cercus, schematic. I. Articles of sub-basal portion of cercus. J. Articles of apical portion of cercus. K. Articles of central portion of cercus. L. Process of cercus. M. Penis, with setae only shown on portion of surface.

Eluratinda sheasbyi, new species
Figures 17A–Q; 18A–M; 19A–N

Maximum length of body of male, 8 mm., of female, 6 mm.

General shape of male as shown in figure 17A, C, of female as in *Eluratinda coatoni* (see fig. 21A). General body color white. Thoracic nota and abdomen dorsally and ventrally suffused with brown; pigment more intense on lateral portions of sclerites and toward posterior segments; terga IX and X of male conspicuously darker than those of the preceding segments. Pedicellus of male and its appendages with conspicuous pigmented areas; also pigmented: apical segment of maxillary palp, tarsi, styli IX, genital appendages, cerci, and caudal filament. Lateral

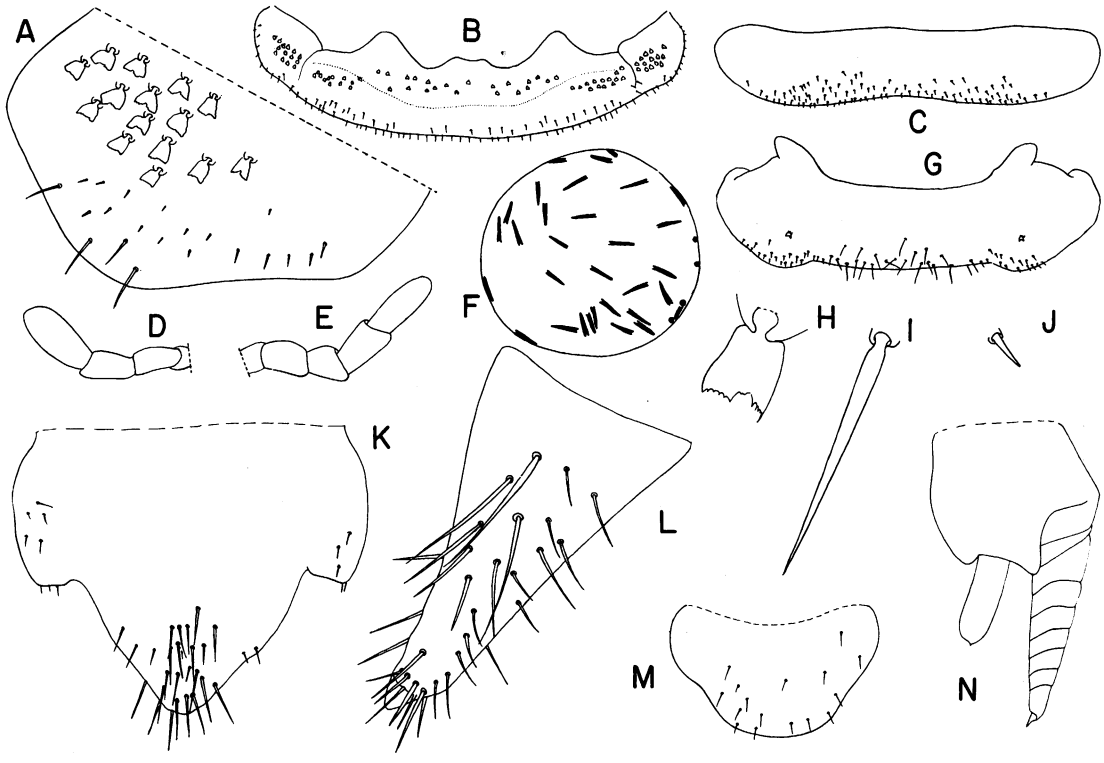

FIG. 19. *Eluratinda sheasbyi*. A–C. Male. A. Posterolateral portion of abdominal tergum V. B. Abdominal tergum V. C. Abdominal tergum I. D, E. Female. D. Labial palp. E. Maxillary palp. F–J. Male. F. Spermatolophid. G. Abdominal sternum V. H. Scale of lateral portion of abdominal sternum V. I. Seta of hind border of central portion of abdominal sternum V. J. Setae of hind border of lateral portion of abdominal sternum V. K–N. Female. K. Central sclerite of abdominal sternum VIII. L. Stylus IX. M. Abdominal tergum X. N. Coxite VIII with anterior gonapophysis.

and posterior borders of thoracic nota and abdominal terga bordered with white.

Head with a few scattered setae. Maximum length of antennae 3 mm.; apical articles subdivided into two subarticles. Pedicellus of male (fig. 17A–C, E, F) roughly T-shaped in dorsal and ventral view, with a weaker sub-basal and stronger apical sclerotization. Mandibles as shown in figure 17G, H. Maxillae as shown in figures 17J–L, 19E. Labium and palp as shown in figures 17I, 19D, the latter without long hairs in either sex.

Thoracic nota with short setae, occupying whole disc of pronotum, but only on posterior two-thirds on mesonotum and metanotum.

Legs as shown in figure 17N–Q, their macrochaetae not bifid apically. Femora without macrochaetae. Tibiae with one subdorsal and one or two ventral macrochaetae on apical half of segment; distally with about six macrochaetae.

Abdominal terga (fig. 19A–C) with short setae in two or three irregular rows along hind margin, those on sides somewhat longer than those at center. Tenth tergum of female (fig. 19M) subsemicircular, almost entirely exposed, setae scattered over most of surface. Tenth tergum of male (figs. 17A; 18B, C, G) heavily sclerotized dorsally, about as long as ninth; posterior border straight or slightly emarginate. Under surface of tenth tergum membranous, with a transversal fold at about middle; base of under surface at sides with 1+1 groups of approximately 25 sensory cones, as shown in figure 18G.

Abdominal sterna with several irregular rows of setae along hind margin, very short on first segment, becoming progressively longer toward posterior segments (figs. 18A, 19G); no macrochaetae developed. Styli and vesicles as in generic description and figures 18A, E; 19L, N.

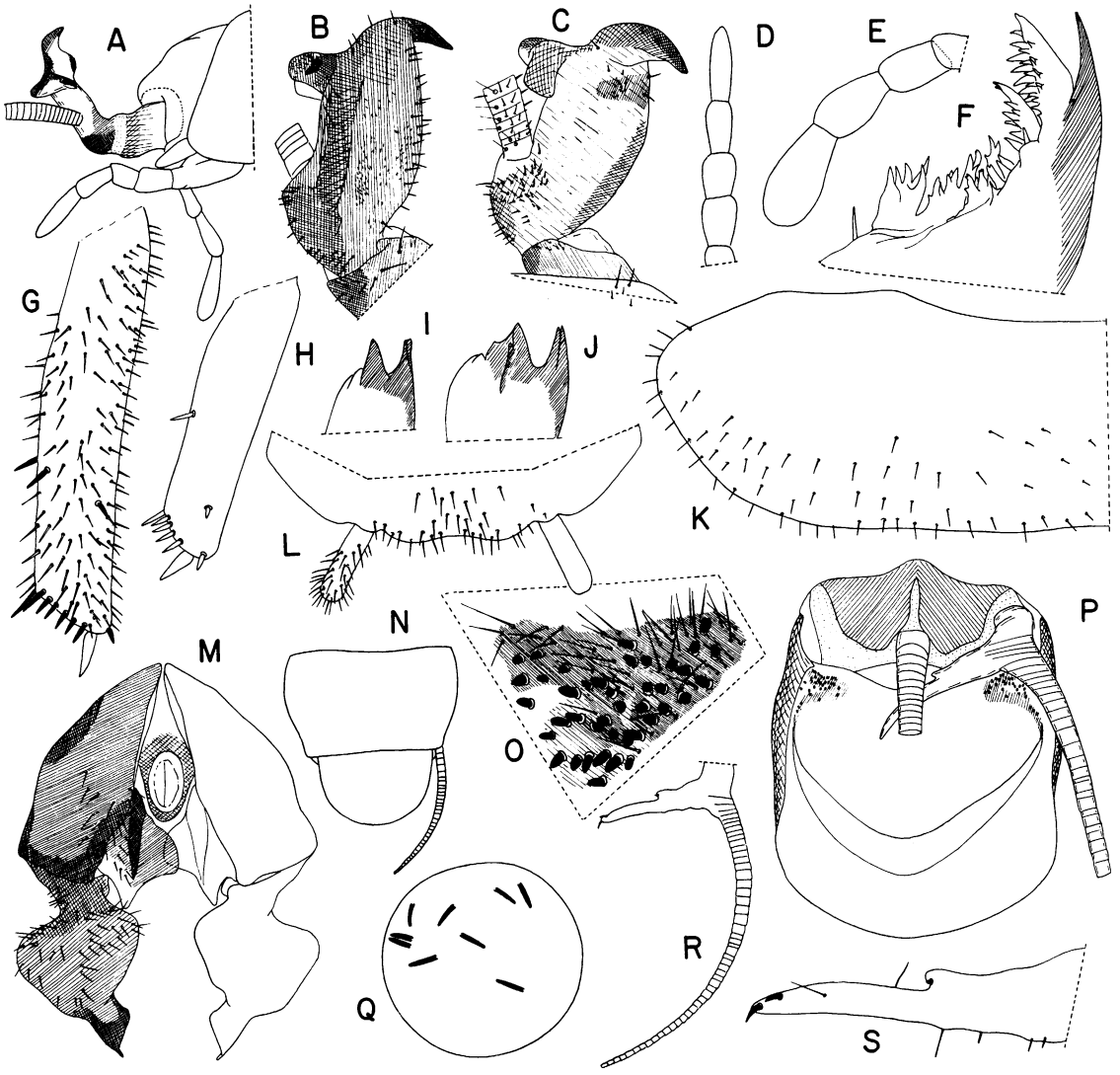

FIG. 20. *Eluratinda coatoni*, male. A. Head, lateral. B. Pedicellus, ventral. C. Pedicellus, dorsal. D. Maxillary palp. E. Labial palp. F. Apex of lacinia. G. Hind tibia. H. Chaetotaxy of fore tibia. I. Apex of mandible. J. Apex of other mandible. K. Part of metanotum. L. Posterior portion of abdominal sternum VIII. M. Coxites IX, with parameres and penis. N. Apex of abdomen, dorsal. O. Sensory cones and setae of under surface of abdominal tergum X. P. Under surface of abdominal tergum X, with cercus and base of caudal filament. Q. Spermatolophid. R. Cercus, simplified. S. Process of cercus.

Styli VII and VIII of female of identical size, subcylindrical, subtruncate dorsally, apex with minuscule pointed process (fig. 19N). Styli IX of female not longer than those preceding, but triangular, almost twice as long as wide at base, somewhat depressed dorsoventrally, narrowed distally but lacking apical spine. Styli VII and VIII of male subequal, cylindrical, truncate apically and completely lacking distal spines. Styli IX heavily pigmented and sclerotized on all surfaces, many times longer than those preceding, about as long as coxite; shape of styli IX as shown in figure 18E, F; setae only on ventral surface.

Genital region of female as in *Eluratinda coatoni* (see fig. 22H, L).

Median sclerite of eighth sternum (fig. 19K) with posterolateral angles much smaller than

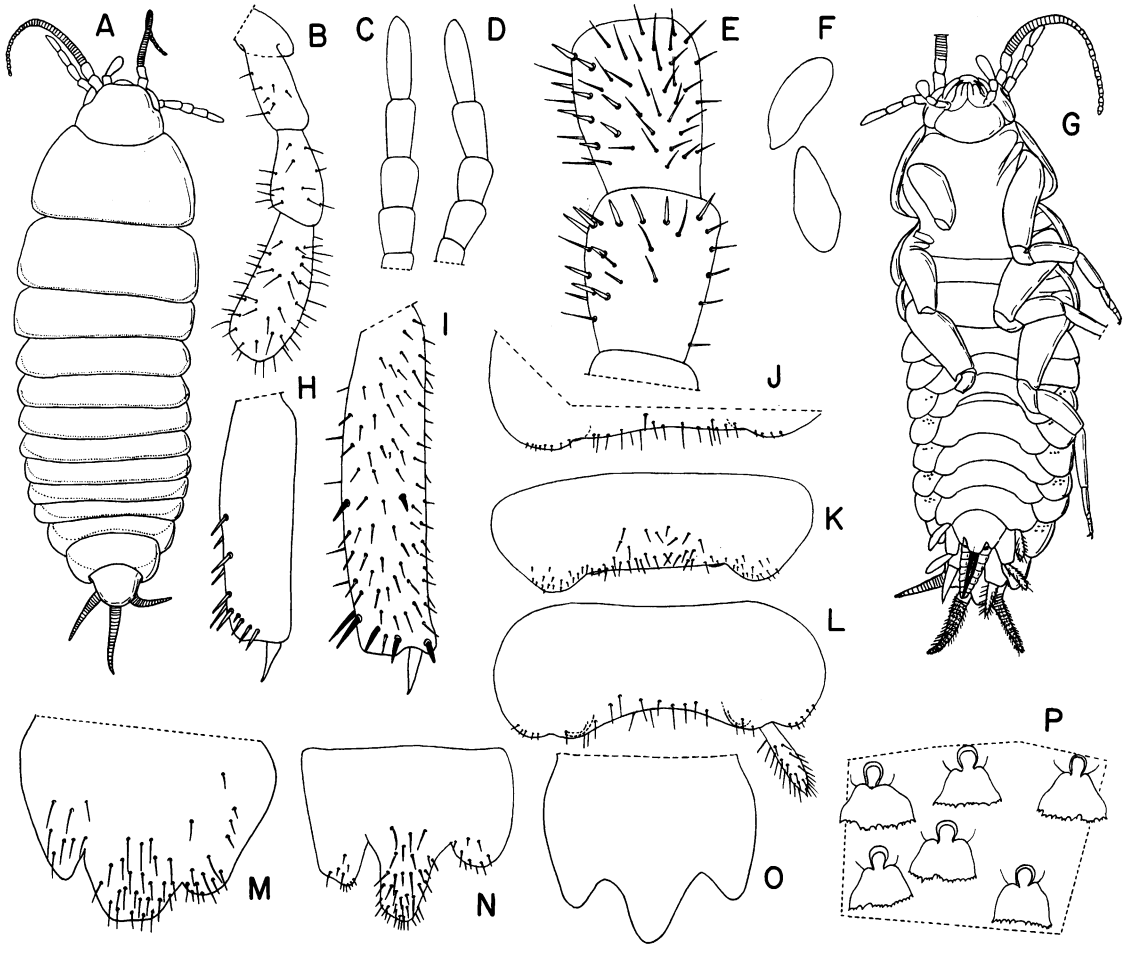

FIG. 21. *Eluratinda coatoni*, female. A. Habitus, dorsal. B. Labial palp. C. Maxillary palp. D. Maxillary palp of different specimen. E. Second and third segments of maxillary palp. F. Outline of ovarian eggs. G. Habitus, ventral. H. Chaetotaxy of fore tibia. I. Chaetotaxy of hind tibia. J. Portion of abdominal sternum VI. K. Portion of abdominal sternum VI of different specimen. L. Abdominal sternum VII. M–O. Median sclerite of abdominal sternum VIII of different specimens. P. Scales of abdominal terga.

central projection, the latter approximately the shape of a right-angle triangle. Inner posterior angle of coxite VIII somewhat pointed, distinctly projecting (fig. 19N). Ovipositor slightly projecting beyond level of styli IX; its structure and chaetotaxy as in *Eluratinda coatoni* (see fig. 22H–M).

Genital region of male as in generic description and figure 18I, E. Parameres and penis as in generic description and figure 18I, E, M.

Cerci and caudal filament of female as in generic description. Cerci and caudal filament of male as in generic description and figure 18B, E, H–L.

Spermatolophids as in generic description and as illustrated (fig. 19F). Length of sperm heads 0.006–0.008 mm. Number of sperms per spermatolophid, 50–75.

MATERIAL EXAMINED: Cape Province: Nieuwoudtville, May 1, 1968, nest of *Microhodotermes viator* (J. L. Sheasby), one male, holotype, one female, allotype, 20 males and eight females, paratypes; *idem*, May 2, 1968, nest of *Microhodotermes viator* (J. L. Sheasby), 18 males, 19 females, paratypes, three juvenile specimens, *ibidem*, May 1, 1968, in nest of *Microhodotermes viator* (J. L. Sheasby), seven males, four females, paratypes, one juvenile female; *ibidem*, May 2,

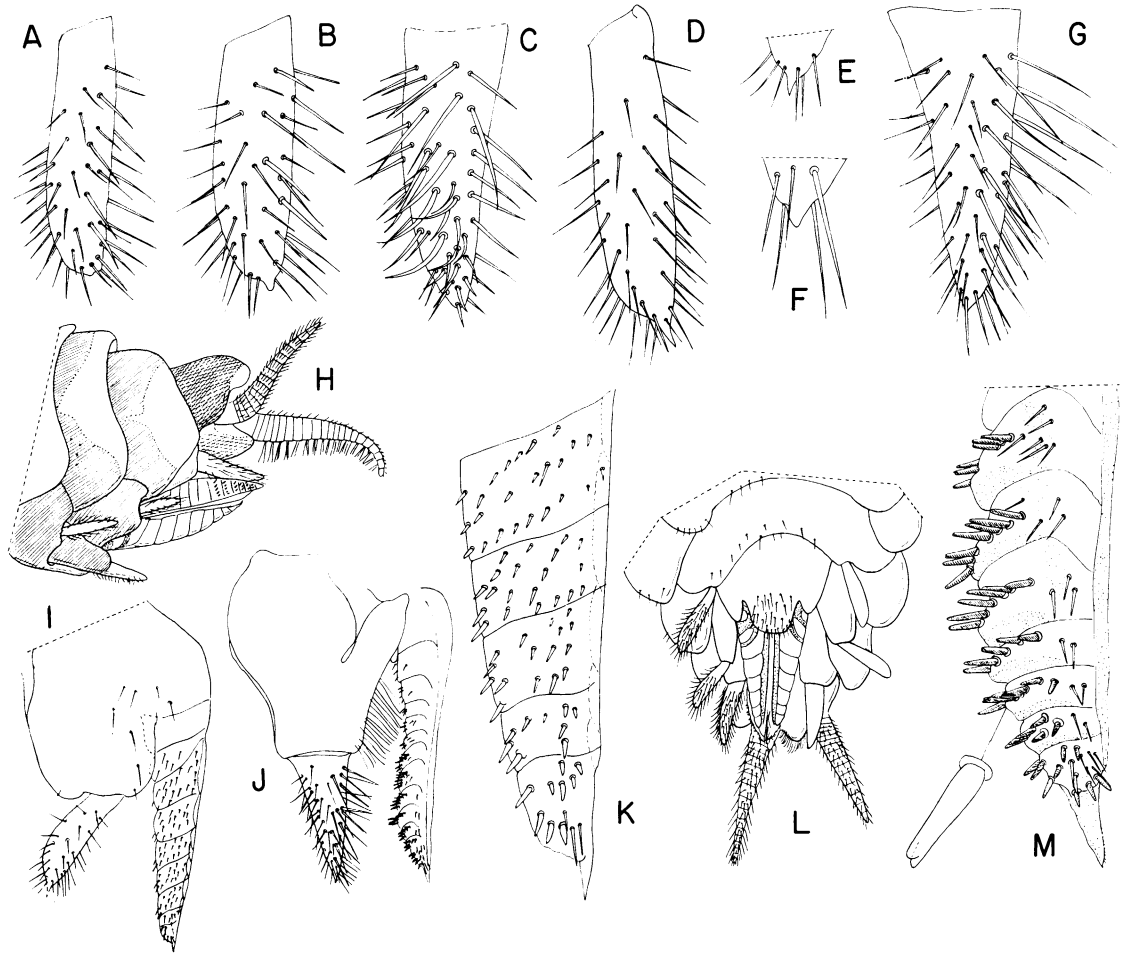

FIG. 22. *Eluratinda coatoni*, female. A. Stylus VII. B. Stylus VIII. C. Stylus IX. D–G. Different specimen: D. Stylus VII. E. Apex of stylus VIII. F. Apex of stylus IX. G. Stylus IX. H. Apex of abdomen, lateral. I. Coxite VIII, with anterior gonapophysis. J. Coxite IX, with posterior gonapophysis. K. Apex of anterior gonapophysis. L. Apex of abdomen, ventral view. M. Apex of posterior gonapophysis.

1968, in nest of *Microhodotermes viator* (J. L. Sheasby), 10 males, five females, paratypes, three juvenile females, one juvenile male; Van Rhynsdorp, May 4, 1968, in nest of *Microhodotermes viator* (J. L. Sheasby), one male, paratype; 30 miles ex Loeriesfontein toward Nieuwoudtville, April 10, 1963, in hive of *Microhodotermes viator* (J. L. Sheasby), two males, paratypes; 10 miles ex Calvinia to Ceres, April 30, 1968, nest of *Microhodotermes viator* (J. L. Sheasby), two females, paratypes.

Eluratinda coatoni, new species

Figures 20A–S; 21A–P; 22A–M

Maximum length (not counting appendages) of body of male 8 mm., of female 7 mm. General shape and color of male as in *Eluratinda sheasbyi*, of female as shown in figure 21A.

General structure of head and appendages very similar to *E. sheasbyi*, and as shown in figures 20A–F, I, J; 21A–G. Pedicellus of male T-shaped (fig. 20A–C), but somewhat different from that of *E. sheasbyi*.

Thorax and legs as in *E. sheasbyi*, but macrochaetae of apex of tibia slightly more numerous (figs. 20G, H; 21H, I).

Abdominal terga as in *E. sheasbyi*, but tergum X of male rounded posteriorly (fig. 20N, P), and sensory cones (fig. 20O) more numerous (approximately 40+40).

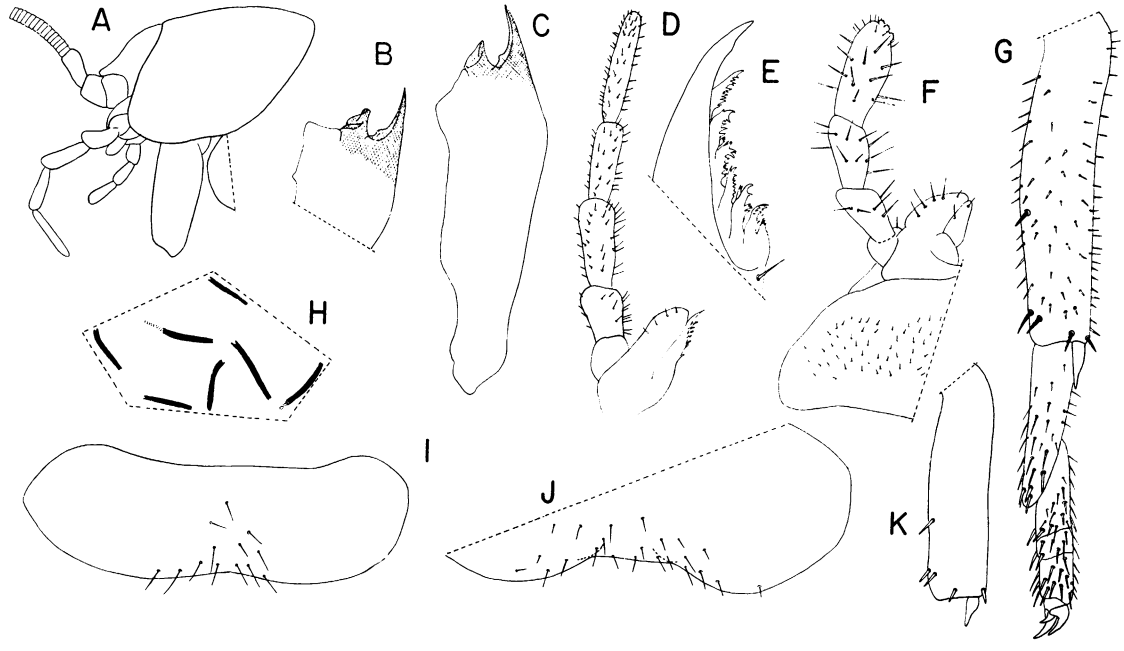

FIG. 23. *Gynatelura arcana*, female. A. Head and prothorax, lateral. B. Apex of mandible. C. Other mandible. D. Maxilla with palp. E. Apex of lacinia. F. Labium with palp. G. Tibia and tarsus of hind leg. H. Heads of spermatozoa as found in receptaculum seminis. I. Abdominal sternum I. J. Portion of abdominal sternum VI. K. Chaetotaxy of fore tibia.

Abdominal sterna (figs. 20L; 21J–L) as in *E. sheasbyi*. Styli of female much as in *E. sheasbyi*, but in most specimens with more or less developed apical spine (fig. 22B, D–G).

Styli VII and VIII of male (fig. 20L) truncate apically, lacking distinct apical spine; styli IX heavily pigmented and sclerotized on all surfaces, much longer than preceding styli, their shape complex (fig. 20M) proportionally much wider than in *E. sheasbyi*.

Genital region of female as shown in figure 22H, L. Median sclerite of eighth sternum (fig. 21M–O) with posterolateral angles more developed than in *E. sheasbyi*. Inner posterior angle of coxite IX not projecting (fig. 22I).

Genital region of male as shown in figure 20M. Parameres larger and more extensively sclerotized than in *E. sheasbyi*.

Cerci and caudal filaments in female and male (figs. 20N, P, R, S; 22H, L) much as in *E. sheasbyi*.

Spermatolophids (fig. 20Q) as in *E. sheasbyi*.

MATERIAL EXAMINED: Cape Province: 20 miles ex Loeriesfontein to Nieuwoudtville, April 26, 1968, nest of *Microhodotermes viator* (J. L. Sheasby), one male, holotype, one female, allotype, eight males, two females, paratypes; *ibidem*, *idem*, April 28, 1968, five males, four females, paratypes, two juvenile specimens; 30 miles ex Loeriesfontein toward Brandvlei, April 15, 1963, from soil dump of *Microhodotermes viator* (J. N. Diederichs), one female, paratype.

This species is close to *Eluratinda sheasbyi*, from which it can be distinguished as shown in the key.

?Eluratinda sp.

MATERIAL EXAMINED: Cape Province: 20 miles ex Nieuwoudtville toward Clan William, April 10, 1963, in hive of *Microhodotermes viator* (W. G. H. Coaton), two females.

One of the above females is juvenile and cannot be identified to species. The other specimen is probably adult morphologically, as it measures 5.1 mm. and is fully pigmented. The specimen agrees well with *Eluratinda* in most characters here considered as generic, but the styli begin on abdominal segment V, the styli IX are less widened at the base than those of the females of the two described species, and the tenth tergum is almost completely hidden.

This female agrees with *Natiruleda* in the

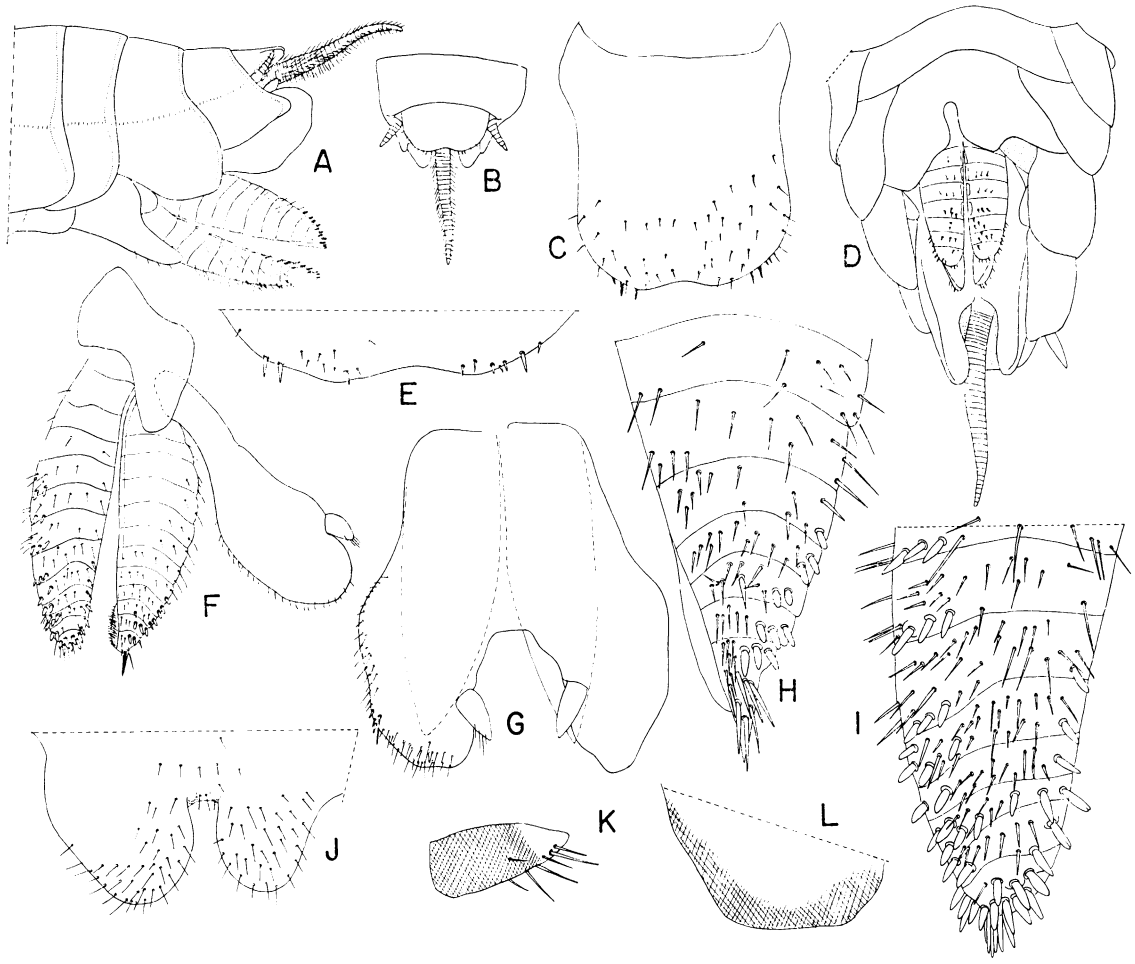

FIG. 24. *Gynatelura arcana*, female. A. Apex of abdomen, lateral. B. Apex of abdomen, dorsal. C. Abdominal tergum X, dorsal. D. Distal portion of abdomen, ventral. E. Apex of abdominal tergum X, ventral. F. Coxites VIII and IX, with anterior and posterior gonapophyses. G. Fused posterior gonapophyses. H. Apex of posterior gonapophysis. I. Apex of anterior gonapophysis. J. Abdominal sternum VII. K. Stylus IX. L. Portion of median sclerite of abdominal sternum VIII.

number of styli, but cannot be included in that genus from which it differs by the absence of scales from the thorax, coxae, and abdominal sterna.

GYNATELURA, NEW GENUS

DESCRIPTION: Female. Very large insects (11 mm.). Body strongly convex dorsally, stout, distinctly tapering toward behind but not limuloid.

Surface of head and body polished, with scattered short setae. Scales absent.

Head visible from above, its anterior surface faintly concave. Antennae less than half as long as body. Mandibles slender, well-sclerotized apically, with two teeth separated by a wide notch; outer tooth long, very slender, and sharply pointed, inner tooth short and blunt; molar portion obsolete. Galea and lacinia of maxilla not especially elongate. Galea lacking apical sensory papillae. Apex of lacinia heavily sclerotized, narrowly pointed; pectinate process falling considerably short of apex of lacinia. Maxillary palp relatively slender, with short setae. Labium not specialized; disc with numerous, very short setae. Apical segment of labial palp much longer than wide.

Legs with long, narrow coxae. Femora without macrochaetae. Tarsi four-segmented; two large lateral and one small median claw, all simple.

Abdominal terga large, their lateral deflexed portions well developed, separated from dorsal portion by a sharp carina. Tergum X relatively small, subrectangular, somewhat emarginated behind, clearly visible from above. Abdominal sterna II–VI normally developed, with rather closely approximated eversible vesicles. Sternum VII modified, deeply incised at middle, vesicles at bottom of narrow incision. Coxites of sternum VIII reduced to 1+1 small sclerites at base of anterior gonapophyses; median sclerite of eighth segment covered from below by seventh sternum. Coxites IX large, fused into a single sclerite, its lateral portions vertically oriented, its central portion horizontal. Styli only on ninth segment, very short, only with a few setae, inserted subapically on coxites. Genital area covered laterally by deflected portions of terga VIII and IX. Ovipositor short and stout, not surpassing apex of coxites IX. Anterior and posterior gonapophyses distinctly pseudosegmented, beset with setae and fossorial spines.

Cerci obliquely upwardly and backwardly directed, slender, short, shorter than width of tergum X. Caudal filament several times as long as cerci, longer than width of tergite X.

TYPE SPECIES: *Gynatelura arcana*, new species.

OBSERVATIONS: This genus is close to *Linadureta* and *Eluratinda*; it differs from all its relatives by the complete absence of scales, the structure of the mandibles, the closely approximated vesicles, the presence of only one pair of styli, and the extraordinary modifications of the genital area of the female. It is to be expected that the male will likewise differ considerably from the males of related genera.

Gynatelura arcana, new species

Figures 23A–K; 24A–L

FEMALE: Body length 11 mm.

General shape similar to that of female of *Eluratinda coatoni* (see fig. 21A). General body color light brown; the following are white: head, antennae, mouth-parts, margins of thoracic nota, under surface of thorax, legs except tarsi, and borders of abdominal terga.

Head with a few scattered setae. Length of antennae not less than 4 mm.; apical articles divided into two subarticles. Mouthparts as in generic description and shown in figure 23A–F.

Thoracic nota with short setae, occupying whole disc of pronotum, but only posterior half of mesonotum and metanotum.

Legs as in generic description and shown in figure 23G, K. Femur without macrochaetae; tibiae without dorsal but with one ventral macrochaetae, distally with four or five macrochaetae.

Abdominal terga with setae arranged in two or three irregular rows along hind margin. Tenth tergum (fig. 24C, E) with apical half exposed, covered with scattered short, slender setae and a few short spines along its hind margin. Abdominal sterna as in generic description and shown in figures 23I, J; 24G, J. Sterna II–VI at center posteriorly with relatively long setae; VII with setae at center and on posterior lobes; coxites VIII and median sclerite of VIII glabrous; IX with numerous setae along lateral borders. Styli and vesicles as in generic description and shown in figure 24G, J, K.

Genital region as in generic description and shown in figure 24A, D, F. Gonapophyses with approximately 12 pseudosegments, their setae and spines as shown in figure 24F, H, I.

MATERIAL EXAMINED: South West Africa: 30 miles from Narubis on road to Aroab, district Keetmans Hoop, May 5, 1965, beneath stone slab in cells of *Hodotermes mossambicus* (G. F. Pretorius), one female, holotype.

This female contained eight apparently mature eggs, oval in shape and measuring 1.0–1.1 × 0.5 mm.

The receptaculum seminis contained many spermatozoa, illustrated in figure 23H; their length ranges from 0.015 to 0.02 mm.

THE *Dinatelura*-GROUP

The *Dinatelura*-group, composed of the seven foregoing termitophilous atelurine genera, can be defined as follows:

Trend to onisciform body shape, especially in male.

Head and dorsal surface of pronotum always without scales, with a tendency to progressive reduction and loss of scales on other body parts.

Mandibles with two well-sclerotized teeth, separated by a deep notch.

Labial palp much longer than wide, often subcylindrical.

Pedicellus of male conspicuously modified.

Legs large: macrochaetae of legs simple; claws simple.

Normally three pairs of styli.

Gonapophyses of females (always?) with

spinelike setae or fossorial spines, in addition to simple setae.

Stylus IX of female elongate subtriangular, very wide at base.

Stylus IX of male conspicuously modified in varied ways.

Parameres of male variously modified.

Cerci of male variously modified, always with spiniferous, sub-basal, medially directed process.

Caudal filament of male downwardly directed.

Spermatolophids globular, with generally scattered elongate fusiform sperm heads.

The Oriental termitophilous genus *Assmuthia* Escherich agrees in many characters with the members of the *Dinatelura*-group, but the complex structure of the claws in *Assmuthia* as opposed to the simple claws in the group under discussion, the differently modified mandibles, and the completely different spermatolophid of *Assmuthia* (unpublished observation) make it doubtful if a phyletic relationship exists.

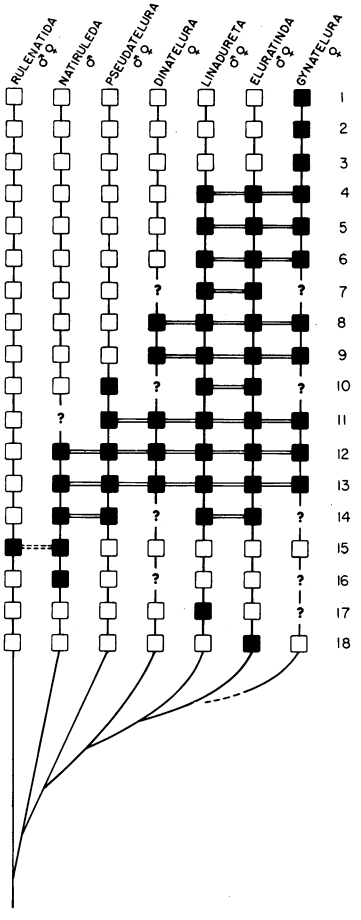

FIG. 25. Tentative cladogram showing the relationships between the genera of the *Dinatelura*-group. Details in the text.

An analysis of the cladistic structure of the group is somewhat hampered by the fact that only one sex is known for three of the seven genera involved (*Natiruleda*, *Dinatelura*, and *Gynatelura*). In the tentative cladogram presented here (fig. 25) question marks had to be substituted for the squares indicating character states, but as the position of the respective genera is backed up by other characters I feel confident that no future changes will be necessary.

The characters used in the tentative cladogram are apomorphic (filled squares) or plesiomorphic (empty squares) within the group. Synapomorphy is considered to indicate recentness of common ancestry not shared with any related group. Apomorphic characters common to all genera, viz., most of those used to define the group as such, are not shown in the cladogram.

The following is a list of the characters used, with the plesiomorphic state mentioned first, the apomorphic second:

1. Female genitalia: simple; highly modified
2. Abdominal vesicles: of normal distance; closely approximated
3. Mandibular teeth: subequal; unequal in size
4. Macrochaetae of femur: present; absent
5. Scales of abdominal sterna: present; absent
6. Apical spine of styli: normally developed; reduced or absent
7. Pedicellus of male: not transformed into clasping organ, with sensory pit and glandular projection present; transformed into clasping organ, with sensory pit and glandular process absent
8. Scales of thorax: present on some nota; completely absent
9. Scales of body: normal in structure, numerous; modified in structure and reduced in number, or completely absent
10. Ninth abdominal tergum of male: about as large as preceding terga; conspicuously enlarged dorsally or laterally or both
11. Median sclerite of abdominal sternum VIII of female: of normal subsemicircular shape; of modified shape
12. Setae of body: long; short

13. Scales of abdominal terga: covering tergum almost completely; restricted to anterior portion of sclerite, or completely absent
14. Body shape of male: limuloid; not limuloid, more or less onisciform
15. Caudal filament of male; not conspicuously widened at base, and there without specialized setae; conspicuously widened at base, and there with specialized setae
16. Scapus and third segment of maxillary palp of male: without projections; with projections
17. Styli VII and VIII of male: normally developed; strongly reduced in size
18. Central sclerite of abdominal sternum VIII of female: not bisinuate posteriorly; bisinuate posteriorly.

This scheme shows that *Rulenatida* is the most plesiomorphic component of the assemblage. It agrees with the fact that it is the only genus of the group the species of which are not restricted to the Hodotermitidae (see table 1). *Rulenatida* is obviously close to the genus that gave rise to the *Dinatelura*-group.

Gynatelura is clearly the most specialized genus of the *Dinatelura*-group and most closely related to *Linadureta* and *Eluratinda*, with which it shares many apomorphic characters (4, 5, 6, and 7) not found in any other genus. There is no apomorphic character that *Gynatelura* shares with only one of the two other genera mentioned, but as long as the male of *Gynatelura* is not known we cannot state if the genus represents the sister-group of *Eluratinda*+*Linadureta*, or if it is more closely related to one of these genera. This uncertainty is expressed in the cladogram by the dashed line connecting *Gynatelura* to the stem of the other two genera mentioned.

The only character set to mar the scheme of continuous evolutionary divergence is number 15. The males of *Rulenatida* and *Natiruleda* both have the caudal filament conspicuously widened at the base, and there beset laterally with specialized spinelike setae (figs. 6I, K; 9C, F). This morphologically specialized condition is not found in the males of other members of the assemblage, but can hardly be interpreted as plesiomorphic. *Natiruleda* agrees in so many apomorphic characters with the remaining genera that I believe the apparent incongruence in this cladistic scheme is due to a wrong interpretation of character set 15 as synapomorphic. Homoiology is the more acceptable hypothesis.

Finally, a curious character correlation, the significance of which escapes me completely, must be mentioned (table 2). The progressive evolutionary divergence from *Rulenatida* toward *Eluratinda* is matched by a rise in the estimated basic number of spermatozoa per spermatolophid. Spermatolophids (Wygodzinsky, 1958) are minute spermatophore-like structures produced by the males of all the Nicoletiidae (figs. 1J, 8P, and others). The average number of spermatozoa per spermatolophid, in addition to their shape, size, and arrangement, is diagnostic for each genus. There is, of course, a somewhat comparable increase in body size and in the diameter of the spermatolophids, as shown in table 2. This may be correlated with the number of spermatozoa per spermatolophid, even though there is also a trend toward larger size of the sperm heads.

LEPISMATIDAE

Ctenolepisma grandipalpis Escherich

MATERIAL EXAMINED: Orange Free State: three miles south of Bothaville, February 2, 1961, (W. G. H. Coaton), two males. Cape

TABLE 2
SPERMATOLOPHIDS OF *Dinatelura*-GROUP
(Measurements in Millimeters)

	Average Estimated Number of Spermatoza per Spermatolophid	Length of Sperm Head	Diameter of Spermatolophid	Body Size
Rulenatida	16	0.006–0.008	0.05	5
Natiruleda	32	0.006–0.007	0.045–0.05	8
Pseudatelura	32	0.006–0.007	0.04–0.05	6–8
Dinatelura	?	?	?	7
Linadureta	32	0.012	0.04–0.06	6–8
Eluratinda	64	0.006–0.008	0.07–0.08	6–8
Gynatelura	?	0.015–0.02	?	11

Province: 47 miles ex Groblershoop to Griekwastad, February 23, 1961, with *Promirotermes* sp., in derelict mound of *Trinervitermes* sp., one female.

Ctenolepisma grandipalpis is normally found under stones.

Ctenolepisma intercursa Silvestri

MATERIAL EXAMINED: Cape Province: 85 miles ex Kenhardt to Pofadder, April 5, 1963, taken from soil dump of *Microhodotermes viator* (W. G. H. Coaton), one female; 55 miles ex Kenhardt to Pofadder, April 4, 1963, in hive, beneath stone, of *Microhodotermes viator* (W. G. H. Coaton), one female; three miles ex Brandvlei toward Kenhardt, February 21, 1962, with *Psammotermes allocerus* Silvestri, in donkey dung (W. G. H. Coaton), one female.

This species is normally free-living.

Ctenolepisma terebrans Silvestri

MATERIAL EXAMINED: Cape Province: Colesberg District, extracted from *Amitermes* sp., one female; 18 miles ex De Aar toward Philipstown, November 21, 1960, in soil dump of *Hodotermes mossambicus*, against a stone (W. G. H. Coaton), one female.

This is also a normally free-living species.

Lepisma braunsi Escherich

MATERIAL EXAMINED: Cape Province: Great Brak River, near Mosselbay, August 5, 1965, associated with *Bifiditermes durbanensis* (Haviland), (A. Boonzaaier), eight males, two females.

This species has been found associated with ants.

Lepisma globosa Escherich

MATERIAL EXAMINED: South-West Africa: Farm Etemba, *ca.* 100 miles east of Okahandja, in mound of *Macrotermes natalensis*, September 6, 1962, (W. G. H. Coaton), one male.

This species has been found once before with ants.

Monachina schultzei Silvestri

MATERIAL EXAMINED: Cape Province: 36 miles ex Griekwastad toward Prieska, November 11, 1960, in old mound of *Trinervitermes* sp., with *Amitermes* and *Lepidotermes* sp. (W. G. H. Coaton), one female, one juvenile; 32 miles ex Upington toward Kenhardt, April 3, 1963, beneath stone with host *Angulitermes* sp. (J. L. Sheasby), one female, two males; 35 miles ex Pofadder toward Springbok, April 6, 1963, with *Baucaliotermes hainesi* (Fuller), (J. L. Sheasby), one juvenile.

There is no evidence to indicate that this species is termitophilous.

Silvestrella myrmecophila Escherich

MATERIAL EXAMINED: Cape Province: Van Rhynsdorp, May 4, 1968, with *Microhodotermes viator* (J. L. Sheasby), two females; Van Rhynsdorp, May 5, 1968, with *Microhodotermes viator* (J. L. Sheasby), two females.

This species was originally described from specimen supposedly collected with ants, but later (Wygodzinsky, 1955) reported from a nest of *Microhodotermes viator*.

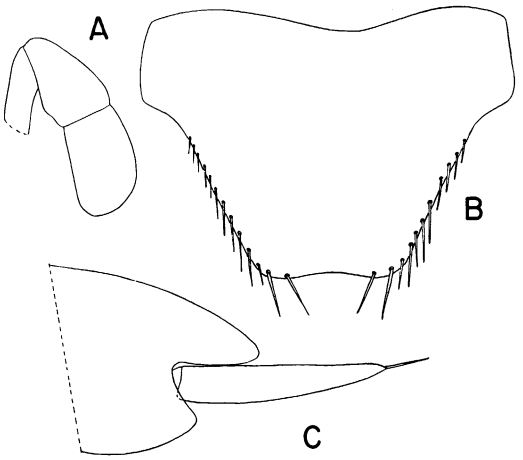

FIG. 26. *Silvestrella myrmecophila*, female. A. Labial palp. B. Abdominal tergum X. C. Coxite IX.

Silvestrella termitophila Escherich

Figure 26A–C

MATERIAL EXAMINED: Cape Province: 68 miles ex Clan William toward Calvinia, nest of *Microhodotermes viator*, February 20, 1961 (W. G. H. Coaton), two females; 42 miles ex Williston toward Fraserburg, November 13, 1960, with *Microhodotermes viator*, in abandoned mound of *Trinervitermes* (W. G. H. Coaton), one female; 30 miles ex Beaufort West toward Willowmore. September 19, 1961, in nest of *Microhodotermes viator* (W. G. H. Coaton), one female; 15 miles ex Kenhardt toward Pofadder, April 4, 1963, in soil dump of *Microhodotermes viator* (W. G. H. Coaton), one juvenile; 10 miles ex Calvinia toward Loeriesfontein, April 15, 1963, in chambers of *Microhodotermes viator* (W. G. H. Coaton), one male; 60 miles ex Kenhardt toward

Williston, April 18, 1963, in soil dump of *Microhodotermes viator* (W. G. H. Coaton), one female; Nieuwoudtville, May 1, 1968, with *Microhodotermes viator* (J. L. Sheasby), one female; Nieuwoudtville, May 2, 1968, with *Microhodotermes viator* (J. L. Sheasby), one female.

The above specimens agree reasonably well with the original description of the species, although the adults are larger, up to 6 mm., as compared with 4.5 mm. for the original specimens. The color of *termitophila* was described as white; this, however, applies only to younger specimens, and larger ones tend to be yellowish.

Silvestrella termitophila differs from *Silvestrella myrmecophila*, as redescribed by Wygodzinsky (1955), by the slightly stouter maxillary and labial palpi (fig. 26A), the wider inner process of coxite IX of the female (fig. 26C) and the absence of macrochaetae from the disc of tergum X (fig. 26B).

This species has only been found with *Microhodotermes viator*.

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