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A Review of the Mites of the Family *Pseudocheylidae Oudemans*, 1909 (*Acarina, Prostigmata*)

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ABSTRACT

A Review of the Mites of the Family Pseudocheylidae Oudemans, 1909 (Acarina, Prostigmata)

EDWARD W. BAKER WARREN T. AYEO

Four genera and ten species are included; these are:

Pseudocheylus biscalatus Berlese, 1888, *P. americanus* (Ewing), 1909, *Stigmocheylus brevisetus* Berlese, 1910, *Anoplocheylus europaeus* (Berlese), 1910, *A. clavatus,* n. sp., *A. aegypticus,* n. sp., *A. protea* (Womersley), 1935, *Neocheylus natalensis* Trägårdh, 1906, *N. nidcolus* Lawrence, 1954, and *N. collis,* n. sp.

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A Review of the Mites of the Family Pseudocheylidae Oudemans, 1909 (Acarina, Prostigmata)

INTRODUCTION

Four genera are placed in the family Pseudocheylidae: *Pseudocheylus* Berlese, *Anoplocheylus* Berlese, *Neocheylus* Trägårdh, and *Stigmocheylus* Berlese. Other genera previously included in this family have been assigned to new taxa (Trägårdh, 1950; Baker *et al.,* 1958; Atyeo and Baker, 1964).

Family Pseudocheylidae Oudemans, 1909

Diagnosis: Small rhombiform or elongate prostigmatic mites with chambered peritremes, which may be cervical or free; chelicerae free with small sickleshaped, movable digits. Palpus five-segmented, but the trochanter may be incompletely fused with the coxa and/or the tarsus may be in the form of a small papilla or, more commonly, reduced to an indistinct plate; palpal tibia with

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well-developed apical claw and one or two heavy dorsomedial spurs. Dorsal propodosoma with or without shield, one pair of simple to slightly expanded pseudostigmatic organs, four or more pairs of tactile setae (two in *Stigmocheylus*), and none to two pairs of eyes. Propodosoma separated from hysterosoma by strong suture (except *Stigmocheylus*). Dorsal and ventral hysterosoma each with eight or more pairs of setae (venter of *Stigmocheylus* unknown); without genital discs. Legs with divided femora; pretarsi with annulated stalks terminating in membranous empodia with or without claws (except *Stigmocheylus*). Free-living.

There are three distinct modifications of the peritremes within the family. In the first type, the peritremes are free at their distal terminations or are small anterolateral projections of the idiosoma (figs. 2, 5). In the second type (fig. 15), each peritreme is chambered and located in the membrane connecting the gnathosoma and idiosoma, as in the Raphignathidae. In the last type, there is a basal, transversely striated band immediately posterior to the cheliceral bases and the chambered terminations are in the connecting membrane (fig. 26). This type is also found in the Teneriffidae, but the chambered terminations are multibranched, whereas in the pseudocheylids the terminations are single.

Basically the palpus is five-segmented, although certain of the segments may be reduced in size. The trochanter may be partially fused with the gnathosomal base (coxa), and the tarsus may be reduced to an indistinct plate, as in the Teneriffidae, or be in the form of a small papilla (*Stigmocheylus*). Trägårdh (1950) stated that the palpus of the Pseudocheylidae has a "large, sharply pointed, dentate terminal tooth and varying numbers of comb-shaped or sickle-shaped hairs." Presumably Trägårdh considered the subterminal spines as being parts of the palpal claw. As for the palpal chaetotaxy, only falcate or simple setae are known in the Pseudocheylidae.

The affinities of the monotypic genus *Stigmocheylus* are uncertain. As described by Berlese (1910), the genus and/or species is characterized as having: peritremes in the form of cornicles, palpus five-segmented, palpal tarsus papilliform, chelicerae free, sessile claws lacking empodia, claws on legs I simple, claws on legs II–IV pectinate, legs I at least twice as long as legs II–IV (legs possibly lacking femoral division), 1 pair of sensilla and two pairs of setae on propodosoma, and eight pairs of dorsal hysterosomal setae. The structures of the palpi, chelicerae and peritremes are similar to those in other pseudocheylid genera. However, important differences from these same genera are: body shape, pretarsal structure, and reduced

idiosomal chaetotaxy. This genus and species is based on a single, incomplete specimen; therefore, until additional material is examined, the genus *Stigmocheylus* is retained provisionally in the family Pseudocheylidae.

Key to the genera of Pseudocheylidae

1. Peritremes free at distal ends or as anterolateral projections ... 2
   Peritremes in cervical membrane, ends not free 3
2. Palpal tarsus reduced to a plate; claws and/or empodia on annulated stalks ..... *Pseudocheylus*
   Palpal tarsus papilliform; claws sessile, empodia absent ..... *Stigmocheylus*
3. Peritremes chambered throughout..... *Anoplocheylus*
   Peritremes chambered distally, as a transversely striated band basally ..... *Neocheylus*

Genus *Pseudocheylus* Berlese

Pseudocheylus Berlese, 1888, Bull. Soc. Ent. Ital., 20:189.

Type species: *Pseudocheylus biscalatus* Berlese, 1888 (monobasic).

Berlese (1888) defined the genus, in part, as having peritremes appearing as little horns, a three-segmented palpus, two pairs of eyes, and each leg ending in a stalked pretarsus bearing two claws and a membrane. The genus must be redefined to include species with distally free peritremes, five-segmented palpus in which the trochanter may be partially fused with the coxa and the tarsus reduced to a plate, one to two pairs of eyes, and pretarsus stalked, annulated, and bearing a membranous empodium with or without two simple claws.

Key to species of *Pseudocheylus*

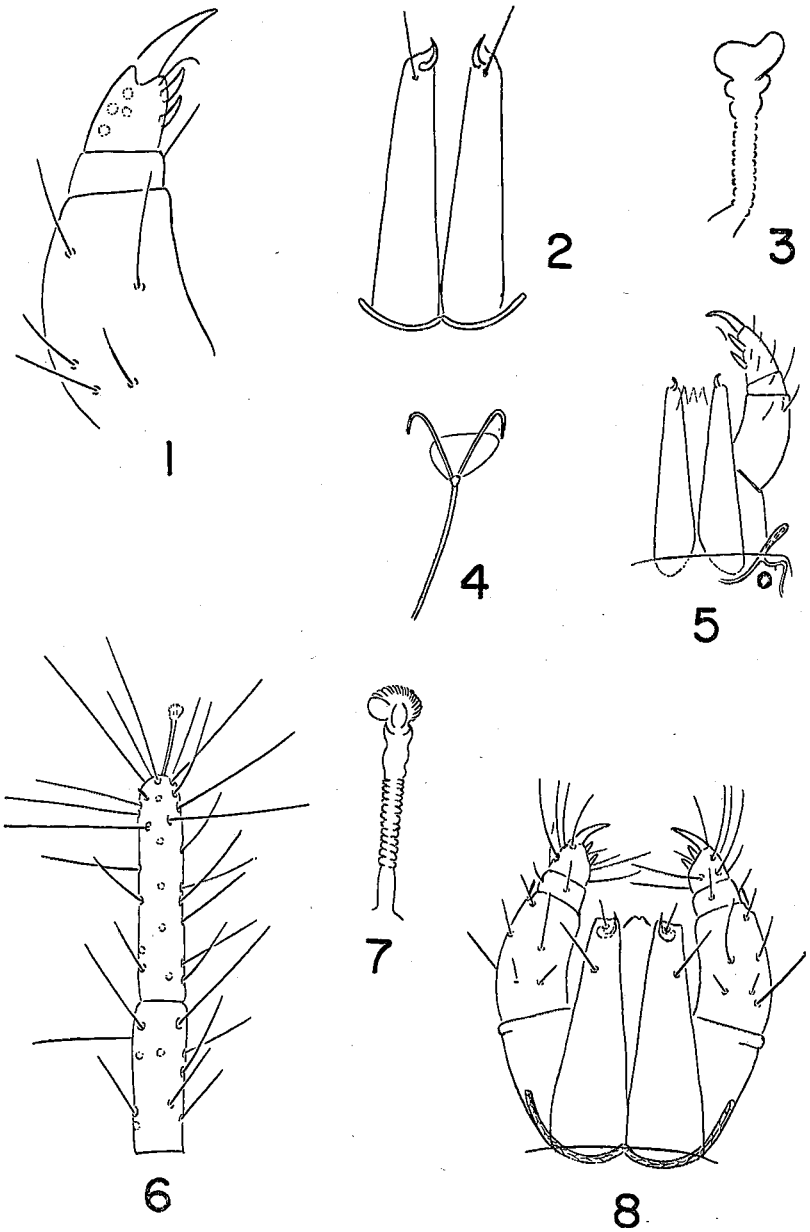
1. Pretarsus I with claws; two pairs of eyes..... *biscalatus* Berlese
   Pretarsus I without claws; one pair of eyes... *americanus* (Ewing)

Pseudocheylus biscalatus Berlese

(Figs. 1–5)

Pseudocheylus biscalatus Berlese, 1888, Bull. Soc. Ent. Ital., 20:189, pl. 7, fig. 3.

Information concerning the chaetotaxy of this species is not available. Characteristics are given in the original definition of the genus, the key, and in figs. 1–5.



FIGS. 1–5. *Pseudocheylus biscalatus* Berlese: drawings of incomplete type, palpus (1), chelicerae and peritremes (2), pretarsus III (claws not present) (3); drawings after Berlese, 1888: pretarsus I (4), gnathosoma and peritremes (5).
FIGS. 6–8. *Pseudocheylus americanus* (Ewing), after Baker, *et al,* 1958; tibia I and tarsus I (6), tip of tarsus I (7), gnathosoma (8).

Type data. Many specimens, some collected under bark of trees at Rio-Apa, Paraguay, others at Mato Grosso, Brazil.

Location of types. The Berlese collection, Florence, Italy.

Remarks. Figures 1–3 were drawn from a poorly preserved type by the senior author. The palpus (fig. 1) has more setae than figured, but their positions and number were impossible to define. The distal portions of the legs were missing or incomplete, thus the figure of tarsus III lacks claws and only illustrates the annular condition of this structure.

Pseudocheylus americanus (Ewing)
(Figs. 6–8)

Cheyletiella americana Ewing, 1909, Univ. Illinois Bull., 7(14): 429–430, pl. 3, fig. 15.

Pseudocheylus americanus (Ewing), Baker, E. W., and G. W. Wharton, 1952, An introduction to Acarology, Macmillan Co., p. 226.

The absence of claws on pretarsus I is sufficient to distinguish this species from *P. biscalatus.* The gnathosoma and leg I have been figured by Baker *et al* (1958). These drawings are reproduced herein.

Type data. Two specimens, cotypes, collected at Urbana, Illinois, Nov. 16, 1907, by H. Glasgow, under the bark of a hard maple tree.

Location of type. U.S. National Museum.

Remarks. Ewing (1909) stated that "all the legs bear small claws and a small caruncle on the end of a long tarsal pedicle." However, examination of the type specimen indicates that legs I lack claws.

Genus *Stigmocheylus* Berlese

Stigmocheylus Berlese, 1910, Redia, 6: 209.

Type species: *Stigmocheylus brevisetus* Berlese, 1910 (by original designation).

The true affinities of this monotypic genus are not know. Berlese's (1910) description and figures neither mention nor illustrate critical characters, and according to Berlese, the single type specimen was in poor condition. The gnathosoma is typical for the Pseudocheylidae, but other features are unique. The legs, as illustrated, could lack the femoral division; there is no division between the propodosoma and hysterosoma; the propodosoma has only three (?) pairs of setae; the palpal tarsus is papilliform; the idiosoma is elongate; and, most important, the claws are sessile and empodia are wanting. It is possible that this genus will be elevated to familial rank when additional material has been evaluated.

Stigmocheylus brevisetus Berlese

(figs. 9–11)

Stigmocheylus brevisetus Berlese, 1910, Redia, 6: 209, pl. 19, fig. 33.

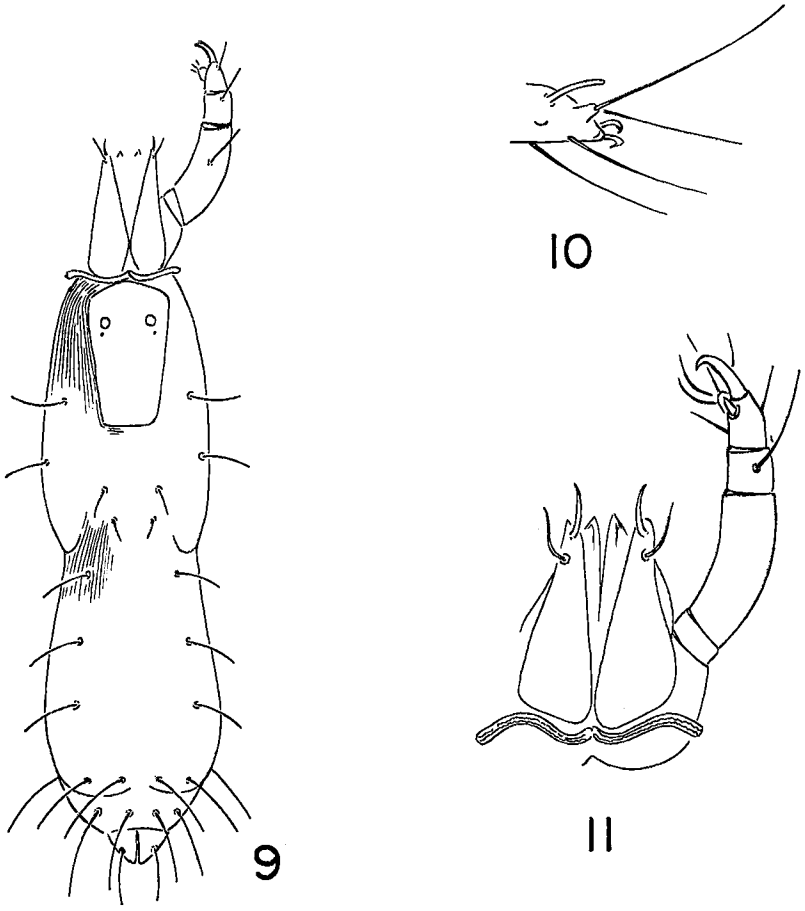
The sessile claws differ on the various legs. On the first pair, the claws are simple and on legs II–IV, the claws are serrate. Other features mentioned in Berlese's description are evident in figures 9–11. The type specimen measures 380μ in length and 100μ in width.

Type data. One specimen in ground at Pisa, Italy.

Location of type. The Berlese collection, Florence, Italy.

Genus *Anoplocheylus* Berlese, new status

Pseudocheylus (*Anoplocheylus*) Berlese, 1910, Redia, 6: 210.



FIGS. 9–11. *Stigmocheylus brevisetus* Berlese, after Berlese, 1910: dorsal aspect (9), tip of tarsus I (10), gnathosoma (11).

Type species: *Pseudocheylus* (*Anoplocheylus*) *europaeus* Berlese, 1910 (by original designation).

Rhagina Womersley, 1935, Rec. So. Australian Mus., 5(3): 336 (synonymized by Baker and Wharton, 1952)

Type species: *Rhagina protea* Womersley, 1935 (by original designation).

This genus is characterized as having simple chambered peritremes in the membrane connecting the gnathosoma and the idiosoma. Of the known species, the annulated pretarsal pedicels end in expanded membranous empodia lacking claws on leg I and with claws on legs II–IV. The palpal tarsus is reduced to an indistinguishable plate. One pair of eyes is located at the anterolateral angles of the propodosomal shield.

Key to the species of *Anoplocheylus*

1. Palpal tibia with two dorsomedial spines 2
   Palpal tibia with one dorsomedial spine ..... *europaeus* (Berlese)
2. Anterior sensilla simple 3
   Anterior sensilla expanded ..... *clavatus,* new species
3. Propodosomal shield with subcuticular reticulations ..... *aegypticus,* new species
   Propodosomal shield without subticular reticulations ..... *protea* (Womersley)

Anoplocheylus europaeus (Berlese)

(fig. 12)

Pseudocheylus (*Anoplocheylus*) *europaeus* Berlese, 1910, Redia, 6: 210, pl. 6, fig. 31.

This species has been figured numerous times from Berlese's original illustration (*e.g.,* Baker and Wharton, 1952, p. 225; Baker *et al,* 1958, p. 136). The single spur on the palpal tibia, 5 pairs of propodosomal setae, and approximately 18 pairs of dorsal hysterosomal setae are sufficient to distinguish *Anoplocheylus europaeus* from other known species of this genus. Although not seen by Berlese, this species probably has the pair of small eyes as found in other species.

Type data. One specimen in damp moss from Palermo, Italy.

Location of type. The Berlese collection, Florence, Italy.

Remarks. The type is so poorly preserved that new features cannot be seen.

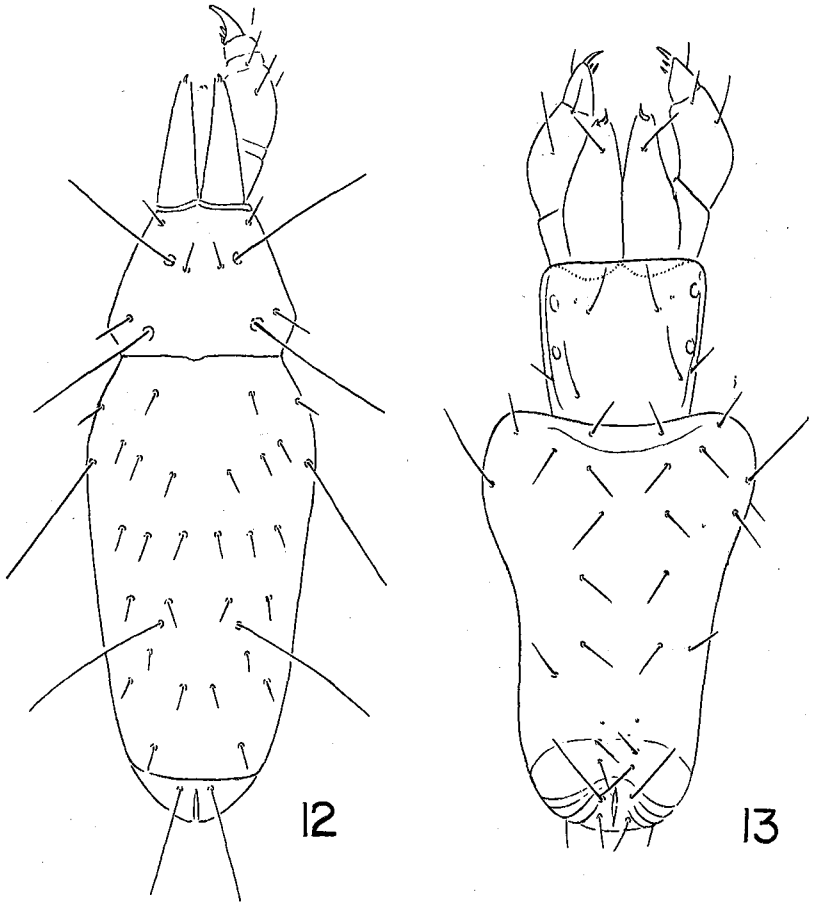
Anoplocheylus protea (Womersley), new combination

(Fig. 13)

Rhagina protea Womersley, 1935, Rec. So. Australian Mus., 5(3): 336–337, fig. 2.

The simple anterior sensillum and nonreticulated propodosomal shield are sufficient to distinguish this species from the other species of the genus *Anoplocheylus*.

PROTONYMPH. Length, including gnathosoma, 538μ. Palpus with four visible segments; tibiotarsus with terminal claw, two subterminal spines, one falcate seta, and nine simple setae. Dorsal propodosoma with five pairs of setae. *Legs*. Measurements: leg I: basifemur, 76μ; telofemur, 35μ; genu, 54μ tibia, 70μ; tarsus, 98μ;



FIGS. 12–13. *Anoplocheylus europaeus* Berlese, after Berlese, 1910 (12); *Anoplocheylus protea* (Womersley), after Womersley, 1935 (13).

pretarsus, 27μ; leg II: tibia, 36μ; tarsus, 43μ; pretarsus, 29μ; total lengths of legs (excluding coxae): I, 380μ; III, 307μ; IV, 323μ. Chaetotaxy: coxae I–IV, 4, 3, 3, 1 setae; trochanters I–IV, 1, 1, 2, 1 setae; basifemora I–IV, 6, 1, 1, 0 setae; telofemora I–IV, 6, 3, 3, 3 setae; genua I–IV, 7, 4, 4, 4 setae; tibia I, 18 setae, 2 capitate pegs; tibiae II–IV, 5 setae; tarsus I, 18 setae, distal solenidion; tarsus II, 8 setae, 1 solenidion; tarsi III–IV, 7 setae each.

FEMALE and MALE. Unknown.

Type. Collected at Glen Osmond, South Australia, April, 1935, by R. V. Southcott, from moss.

Location of type. The South Australian Museum.

Remarks. The redescription is based on a protonymph collected at Keith, South Australia, January 28, 1953 (S. J. E.), in soil under *Casuarina.* The propodosoma, as drawn in the original description (fig. 13), shows three pairs of setae, the bases of the anterior sensilla, and two pairs of eyes. These features do not agree with the protonymph examined in that there are four pairs of setae, the bases of the anterior sensilla, and no discernible eyes (however, the specimen is almost transparent).

Anoplocheylus clavatus, new species

(Figs. 14–19)

This new species is closely related to *Anoplocheylus protea* but can be distinguished by having the anterior sensilla claviform rather than simple.

TRITONYMPH (holotype). Length, including gnathosoma, 562μ. Palpus (fig. 15) as in *A. protea.* Idiosoma as in figure 14. *Legs.* Measurements: leg I: basifemur, 45μ; telofemur, 30μ; genu, 46μ; tibia, 57μ; tarsus, 75μ; pretarsus, 23μ; leg II: tibia, 31μ; tarsus, 28μ; pretarsus, 26μ; total lengths of legs (excluding coxae): I, 297μ; II, 178μ; III, 242μ; IV, 294μ. Chaetotaxy: coxae I–IV, 5, 4, 3, 2 setae; trochanters I–IV, 1, 1, 2, 1 setae; basifemora I–IV, 5, 2, 2, 1 setae; telofemora I–IV, 5, 3, 3, 3 setae; tibia I, 8 setae, 2 capitate pegs; tibiae II–IV, 5 setae each; tarsus I, 19 setae, 1 distal solenidion; tarsus II, 8 setae, 1 solenidion; tarsi III–IV, 9 setae each.

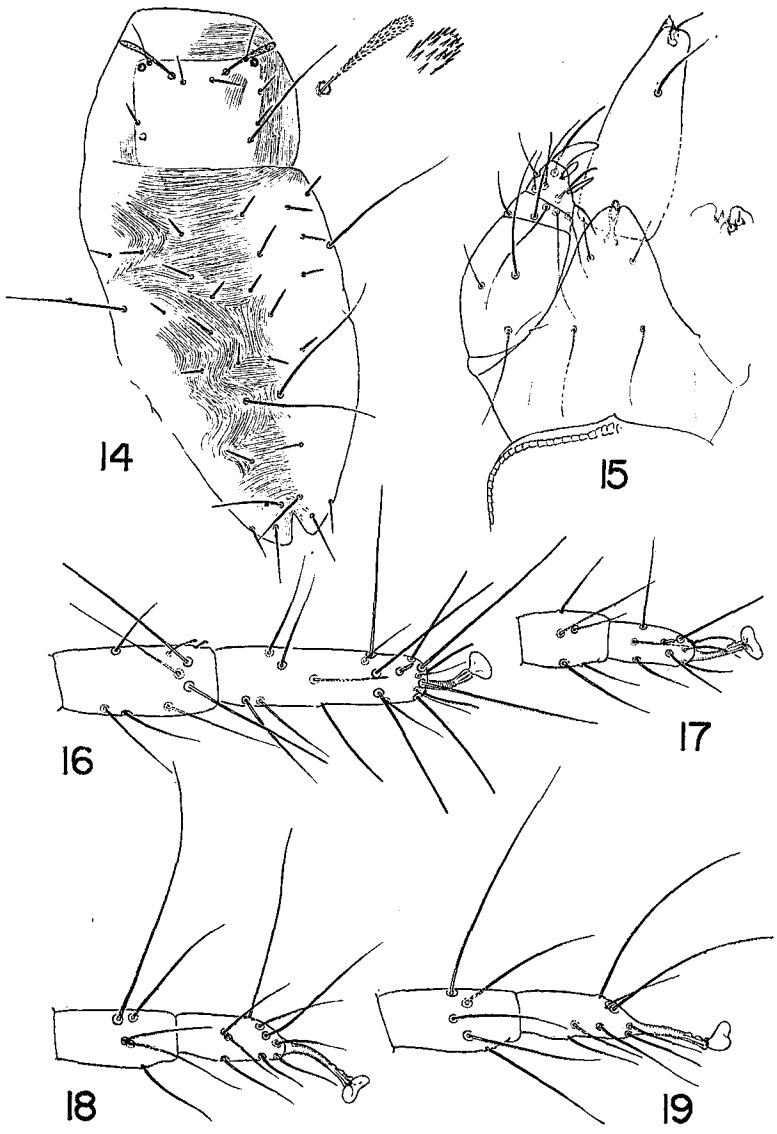
FEMALE and MALE. Unknown.

Holotype. Tritonymph, collected at Gnangara (16 miles north of Perth), Western Australia, October 28, 1953, by G. F. Bornemissza.

Paratype. Nypmh, same data as holotype.

Location of types. The holotype is deposited in the Division of Entomology, C.S.I.R.O., Canberra, A.C.T., Australia; the paratype is deposited in the U.S. National Museum.

Remarks. Although based on nymphs, the structure of the sensilla is unique among the known species of the Pseudocheylidae. The name *clavatus* is chosen for this species because of the claviform sensilla. The drawings are of the holotype.



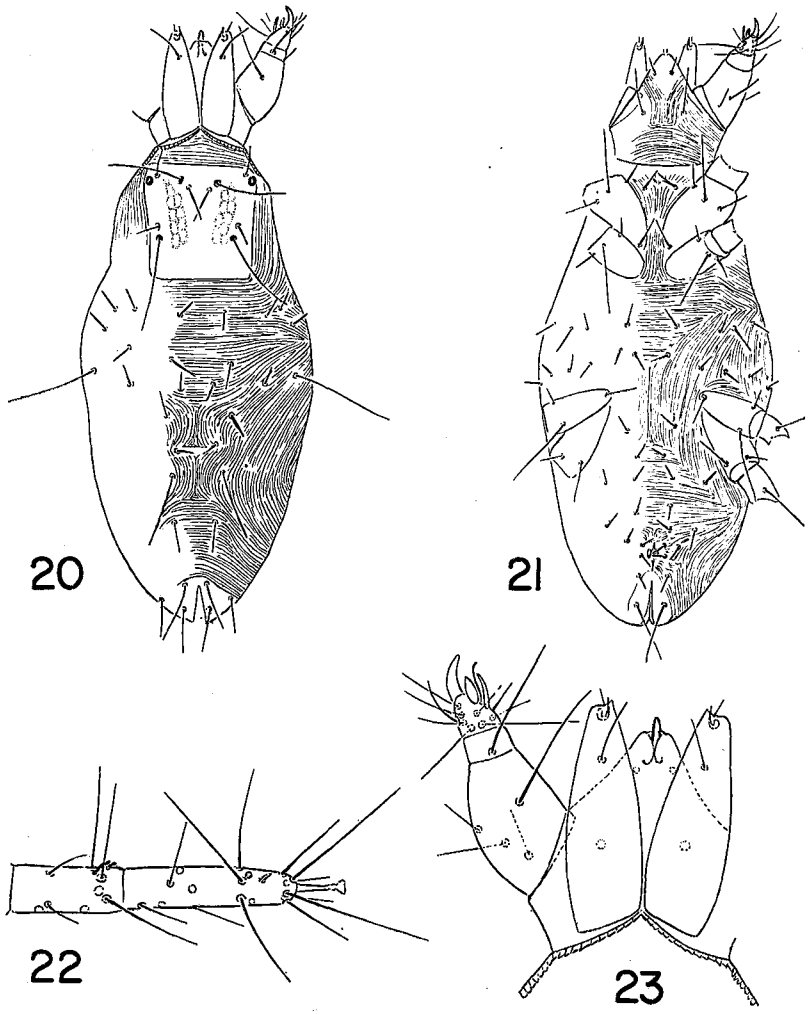
FIGS. 14–19. *Anoplocheylus clavatus,* new species: idiosoma, dorsal aspect (14), gnathosoma, dorsal aspect (15), leg I (16), leg II (17), leg II (18), leg IV (19).

Anoplocheylus aegypticus, new species

(Figs. 20–23)

The two subcuticular bands of reticulations of the dorsal propodosomal shield are unique (fig. 20).

TRITONYMPH (holotype). Length, including gnathosoma, 640μ. Palpus as in fig. 23; idiosoma as in figures 20 and 21. *Legs.*



FIGS. 20–23. *Anoplocheylus aegypticus,* new species: idiosoma, dorsal aspect (20), idiosoma, ventral aspect (21), tibia I and tarsus I (22), gnathosoma, dorsal aspect (23).

Measurements: leg I: basifemur, 68μ; telofemur, 31μ; genu, 49μ; tibia, 63μ; tarsus, 54μ; pretarsus, 28μ; leg II: tibia, 34μ; tarsus, 39μ; pretarsus, 29μ; total lengths of legs (excluding coxae): I, 327μ; II, 199μ; III, 298μ; IV, 332μ. Chaetotaxy: coxae I–IV, 5, 4, 3, 2 setae; trochanters I–IV, 1, 1, 2, 1 setae; basifemora I–IV, 11, 3, 3, 2 setae; telofemora I–IV, 7, 3, 3, 2 setae; genua I–IV, 6, 5, 4, 4 setae; tibia I, 8 setae, 1 solenidion, 1 capitate peg; tibiae II–IV, 5 setae each; tarsus I, 19 setae, 1 short solenidion; tarsus II, 7 setae, 1 short solenidion; tarsi III–IV, 9 setae each.

FEMALE and MALE. Unknown.

Holotype. Tritonymph, collected on the Ismaelia-Port Said Road, Egypt, 50 kilometers, on November 15, 1962, from soil, by E. W. Baker.

Paratype. Tritonymph, same data as holotype.

Location of types. U.S. National Museum.

Genus *Neocheylus* Trägådh

Neocheylus Trägådh, 1906, Zool. Anz., 30(20): 870.

Type species: *Neocheylus natalensis* Trägårdh, 1906 (by original designation).

This genus is characterized as having "banded" cervical peritremes, one pair of eyes, an annulated pretarsal pedicel ending in a membranous flap with or without claws, and the palpal tarsus reduced to an indistinct plate.

The critical character for this genus is the form of the basal portions of the peritremes. Unfortunately, Trägårdh (1906) in his short diagnosis of the genus and brief description of *Neocheylus natalensis* stated only that the generic and/or specific characters are: one pair of eyes, two subapical tibial spurs on the palpus, long and threadlike sensilla, no stigmal horns, and long pretarsi ending in a triangular flap without claws. It is possible that *N. natalensis* has peritremes of the chambered cervical type as in *Anoplocheylus.* Lawrence (1954), in his description of *N. nidicolus,* illustrated peritremes with transversely striated bases. Thus, the present authors follow Lawrence and assume that the type species does in fact have the characteristic peritremes.

Key to the species of *Neocheylus*

1. At least legs II–IV with claws 2
   All legs without claws ..... *natalensis* Trägårdh
2. All legs with claws; dorsal hysterosoma with 12 pairs of setae ..... *nidicolus* Lawrence

Legs I lacking claws; dorsal hysterosoma with about 27 pairs of setae.....*collis,* new species

Neocheylus natalensis Trägårdh

Neocheylus natalensis Trägårdh, 1906, Zool. Anz., 30(20): 870.

This species was not figured in the original description. Assuming that the peritremes are as described for the genus, *Neocheylus natalensis* is the only known species lacking claws on all of the legs. This species has 10–12 long setae on the palpal tibiotarsus and measures 1,020μ in length and 330μ in width (Trägårdh, 1950).

Type data. Collected in damp moss, Natal.

Location of type. Unknown; possibly in the Trägårdh collection in the Royal Natural History Museum, Stockholm, Sweden.

Neocheylus nidicolus Lawrence

(Fig. 24)

Neocheylus nidicolus Lawrence, 1954, Ann. Natal Mus., 13(1): 74–76, fig. 6.

As the only species of *Neocheylus* with claws on all the legs, *N. nidicolus* is easily recognized. In addition, the species has 7 pairs of dorsal propodosomal setae, including the simple sensilla, and 12

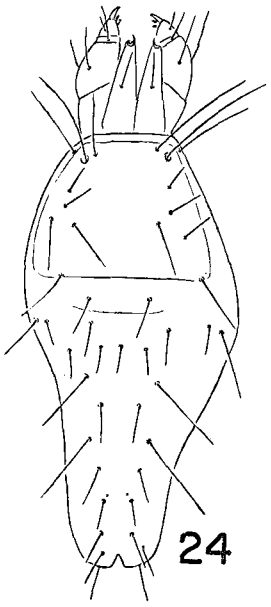


FIG. 24. *Neocheylus nidicolus* Lawrence, after Lawrence, 1954: dorsal aspect.

pairs of dorsal hysterosomal setae. The measurements of the type are: length, including gnathosoma, 670μ; idiosoma, 500μ; width, 270μ.

Type data. One specimen, Karomoja, Uganda, November 18, 1952, collected from a weaver-bird's nest used by *Galago senegalensis.*

Location of type. The South African Institute for Medical Research, Johannesburg.

Neocheylus collis, new species

(Figs. 25–30)

This new species is closely related to *Neocheylus nidicolus,* but can be distinguished by having legs I without claws and approximately 27 pairs of dorsal hysterosomal setae, rather than having legs I with claws and 12 pairs of dorsal hysterosomal setae.

FEMALE (holotype). Length, including gnathosoma, 890μ. Palpus (fig. 26) as in *Anoplocheylus protea* except with 7 femoral setae rather than 3. Idiosoma as in figure 25. *Legs.* Measurements: leg I: basifemur, 90μ; telofemur, 35μ; genu, 97μ; tibia, 83μ; tarsus, 119μ; pretarsus, 26μ; leg II: tibia, 40μ; tarsus, 50μ; pretarsus, 37μ; total lengths of legs (excluding coxae): I, 497μ; II, 277μ; III, 342μ; IV, 381μ. Chaetotaxy: coxae I–IV, 4 (and 1 intercoxal), 3, 3, 2 setae; trochanters I–IV, 1, 1, 2, 1 setae; basifemora I–IV, 8, 3, 4, 3 setae; telofemora I–IV, 6, 5, 3, 3 setae; genua I–IV, 10, 5, 5, 5 setae; tibia I, 11 setae, 1 solenidion, 1 peg; tibiae II–IV, 5, 6, 7 setae; tarsus I, 19 (21) setae, 1 distal solenidion; tarsus II, 10 setae, 1 solenidion; tarsi III–IV, 13 setae each.

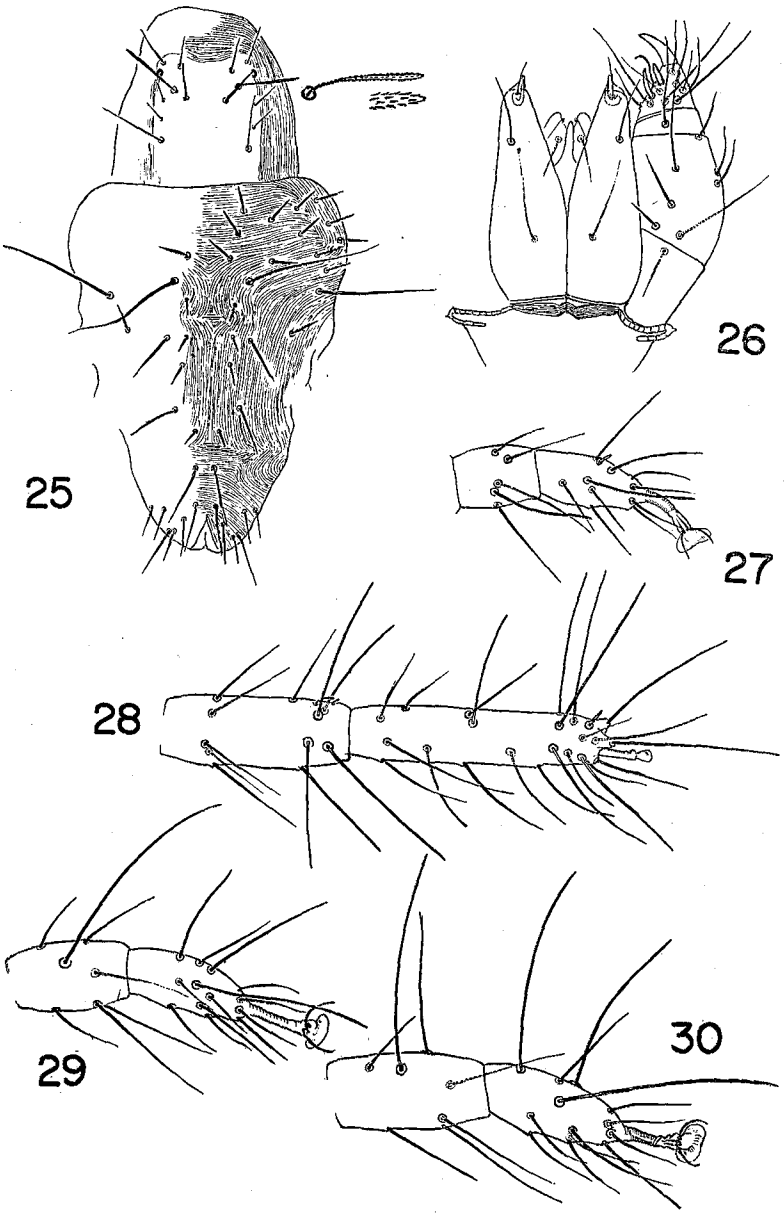
MALE. Unknown.

Holotype. Female, collected from compact moss, Mount Toolbrunup (Stirling Ranges, 300 miles south from Perth), Western Australia on June 12, 1953, by G. F. Bornemissza.

Paratype. Nymph, same data as holotype.

Location of types. The holotype is deposited in the Division of Entomology, C.S.I.R.O., Canberra, A.C.T., Australia; the paratype is deposited in the U.S. National Museum.

Remarks. Since this species has been collected only in the mountains, the name *collis* has been selected. The drawings are of the holotype.



FIGS. 25–30. *Neocheylus collis*, new species: idiosoma, dorsal aspect (25), gnathosoma, dorsal aspect (26), leg II (27), leg I (28), leg III (29), leg IV (30).

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