The genus *Atropacarus* Ewing (Acari: Cryptostigmata)

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Introduction

The genus *Atropacarus* (type, *Hoplophora stricula* C. L. Koch) was proposed by Ewing (1917) for monodactyl 'Hoplodermatinae' (= Euptyctima) with a sculptured integument but without a median aspal carina. Jacot later (1930) submerged the genus in *Steganacarus*, giving it subgeneric ranking with *Tropacarus*, while Grandjean (1934) regarded the presence of an additional pair of setae in the posterolateral region of the notogaster as sufficient reason for retaining *Atropacarus* as a separate genus. Although *Atropacarus* has remained monotypic, Sheals (1969), in the course of a numerical taxonomic study of certain Phthiracaroidea, recognized three further species which he considered might be classified in this genus. These were *Steganacarus diaphanum* Jacot and two undescribed *Steganacarus* species from Italy and Nepal; the latter is here regarded as a 'variant' of *S. striculus* and the former as *Steganacarus clavigerus* (Berlese). Together with *striculus*, these species formed a distinct component within *Steganacarus* in being relatively small (notogastral length 300–475 μm), possessing at least 16 pairs of notogastral setae and having a coupled solenidion on tibia IV (this solenidion is free throughout the rest of the genus). However, while size is usually given in modern descriptions, there is little information available on the chaetotactic pattern of the legs and notogaster, but it would seem that the combination of characters exhibited by the above species may be present in further described species of *Steganacarus*. Accordingly, a search was undertaken of all the available *Steganacarus* material which superficially resembled *striculus*—the results of a preliminary survey indicated that the genus *Atropacarus** should be retained.

Genus *ATROPACARUS* Ewing

Atropacarus Ewing, 1917 : 131; Balogh, 1972 : 43.
Steganacarus: Jacot, 1930 : 210 (in part).

DEFINITION: Moderately sclerotized, rather elongate Phthiracaridae ranging in length from about 300–500 μm (lateral measurement of notogaster taken from the anterodorsal limit of the collar to a point just ventral to seta h_1). The integument of the dorsal and ventral shields is usually strongly ornamented while that of the infracapitulum, chelicerae and appendages is densely punctate. The interlamellar and lamellar setae are short and procumbent and the aspis bears a median keel. Sensillus cranked near the base. The notogaster bears at least 16 pairs of setae. A notogastral cowl may be present or absent. Fissures *ip* and *ips* are absent. Four pairs of anal setae are located on the paraxial margins of the anal plates and a single pair of adanals submarginally. There are at least seven pairs of genital setae along the paraxial margins of the genital plates. On tarsus I the posterior anterolateral seta is reduced and inserted adjacent to, or distally, in relation to the posterior fastigial seta. On leg IV the tibial solenidion is coupled.

*Since this manuscript went to press a paper has been published by Aoki (25 March, 1980. *Bull. Inst. Sci. Technol. Yokohama* **6**(2): 1–88.) in which he separates *Atropacarus* from *Steganacarus* to include the species *A. phyllophorus*, *A. serratus* and *A. striculus*. Therefore, in the present paper *Atropacarus phyllophorus* is not a new combination.

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DIAGNOSIS: *Atropacarus* can be distinguished as a phthiracarid genus with the following combination of characters:

1 Notogaster with 16 or more pairs of setae.
2 Posterior anterolateral seta on tarsus I reduced.
3 Solenidion on tibia IV coupled with a reduced dorsal seta.

Key to species of the genus *Atropacarus*

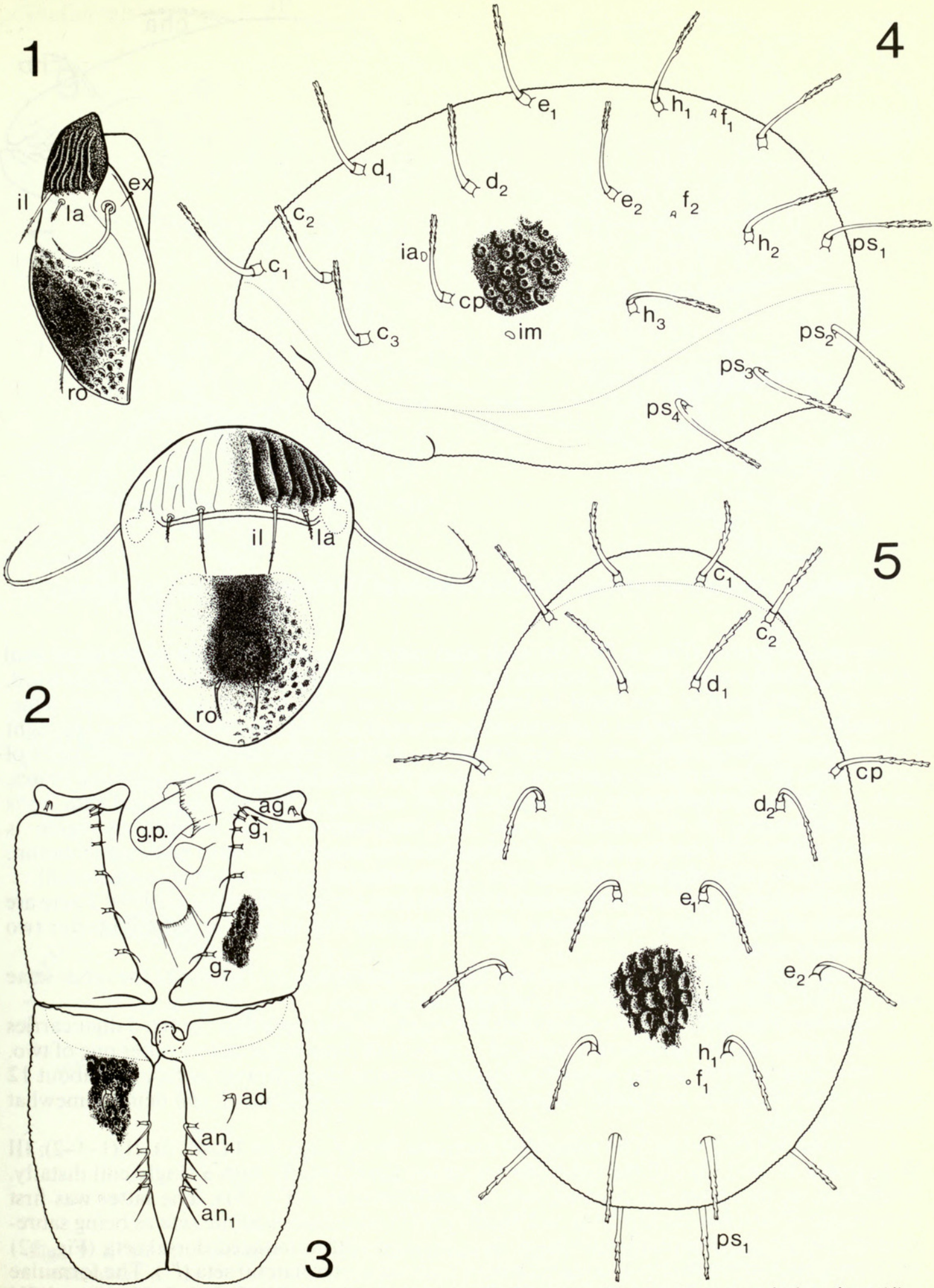
1 Notogaster with 20 pairs of broad, serrated setae (Fig. 13); setae (*il*) and (*1a*) more or less equal in length (Fig. 16); seta *a''* about half as long as famulus and closely associated with seta *fi''* (Fig. 19) . . . . . ***A. clavigerus*** (Berlese) (p. 195)
– Notogaster with 16 pairs of setae (Fig. 4); setae (*il*) at least twice the length of (*la*) (Fig. 2); seta *a''* almost as long as famulus and located on a level with solenidion ω_2 (Fig. 9) . . 2
2 Notogaster without a cowl (Fig. 4); setae stout and serrated distally (Fig. 33) . . ***A. striculus*** (C. L. Koch) (p. 190)
– Notogaster with a well-developed cowl (Fig. 20); setae not of this form 3
3 Notogastral setae spatulate and serrated (Fig. 20); integument reticulate . . . ***A. phyllophorus*** (Berlese) (p. 197)
– Notogastral setae stout and apparently smooth (Fig. 27); integument rugose . . ***A. terrapene*** (Jacot) (p. 200)

Atropacarus striculus (C. L. Koch)
(Figs 1–12; 27–32)

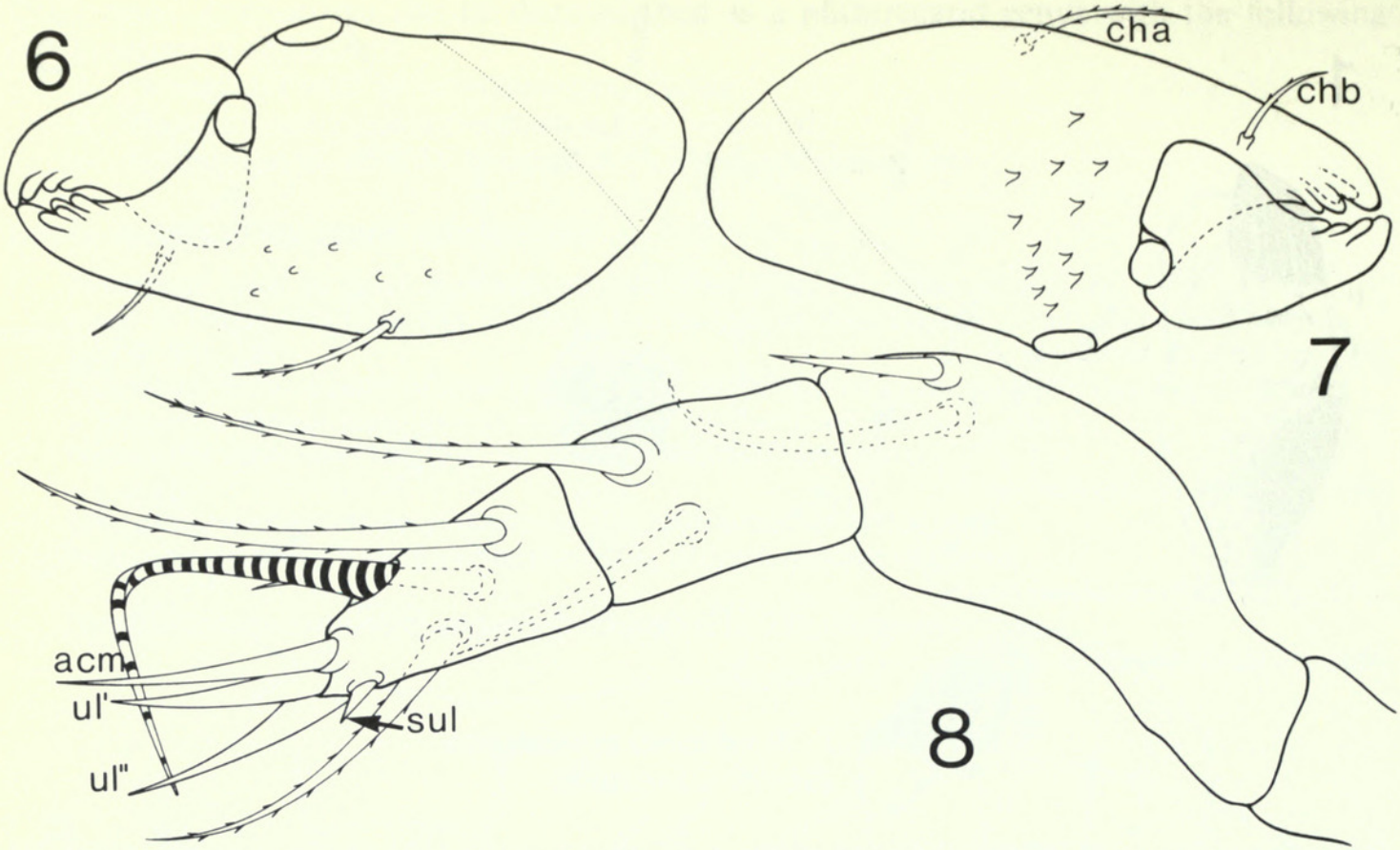
Hoplophora stricula Koch, 1836 : Fasc. 2 t.10. [Type series lost.] NEOTYPE (here designated) (ZM, Hamburg , reg. no. A91/79). [See under 'Material' below.]
Atropacarus striculus: Ewing, 1917 : 131; Balogh, 1972 : 137.
Steganacarus diaphanum Jacot, 1930 : 236. 'Cotypes', Monroe, Connecticut (MCZ, Cambridge, Mass., no. 261hl). [Examined.] **Syn. nov.**
Hoploderma striculum: Willmann, 1931 : 190.
Steganacarus striculum: Grandjean, 1933 : 314.
Steganacarus striculus: Jacot, 1936 : 183; Feider & Suciu, 1957 : 33; Aoki, 1958 : 174; Sellnick, 1960 : 128. [Pérez-Iñigo, 1972 : 190. Misidentification.]
Stegenacarus senex Aoki, 1958 : 172. Holotype, Utsukushigahara (NUY, Tokyo). [Synonymized by Fujikawa, 1972 : 132.]
Steganacarus striculus insularis Weigmann, 1976 : 6. Holotype only, Azores (ITAZ, Berlin). [Examined.] **Syn. nov.** [1976 : 7 (Material from Teneriffe described by Pérez-Iñigo, 1972 : 190). Misidentification.]

Aspis (Figs 1–2; 28): 180–230 µm long and with a greatest width of 141–163 µm. All the dorsal setae are moderately short, procumbent and serrated distally. The lamellar (*la*) and interlamellar setae (*il*) are located at the level of the bothridia. Setae (*il*) are at least twice the length of setae (*la*) and extend about one-third of the distance between the bases of setae (*il*) and (*ro*). The sensillus, 86–114 µm in length (but see *striculus insularis* below), is slender, smooth and cranked near the base (Fig. 28); distally the sensillus is serrated and tapers to a fine point. Three finger-like tracheoles are associated with each bothridium and there is a single pair of short exobothridial setae (*ex*). There is a rather low, broad, median keel in front of the *il-la* setae while posteriorly the integument is raised into a number of longitudinal ridges. The prodorsal integument is opalescent and distinctly pitted.

Notogaster (Figs 4–5; 27; 29–30): 375–475 µm in length and with a greatest depth of 225–300 µm. The notogaster carries 16 pairs of setae, all of which are stout, erect, serrated distally (Fig. 30) and shorter than the distance c_1–d_1. Setae c_1 and c_3 are inserted close to the posterior margin of the collar and seta c_2 submarginally. In comparison with species of the genus *Steganacarus*, *A. striculus* has an additional pair of setae in the posterior region of the notogaster between setae h_1 and ps_1. The vestiges of setae f_1 and f_2 are present, f_1 being located just posterior to seta h_1, and f_2 between e_2 and h_2. The fissures *ip* and *ips* are absent. The integument is opalescent and generally distinctly pitted (Fig. 29).



Figs 1–5 *Atropacarus striculus*: (1) aspis, lateral; (2) aspis, dorsal; (3) ano-genital region; (4) notogaster, lateral; (5) notogaster, dorsal.



Figs 6–8 *Atropacarus striculus*: (6) chelicera, antiaxial; (7) chelicera, paraxial; (8) pedipalp.

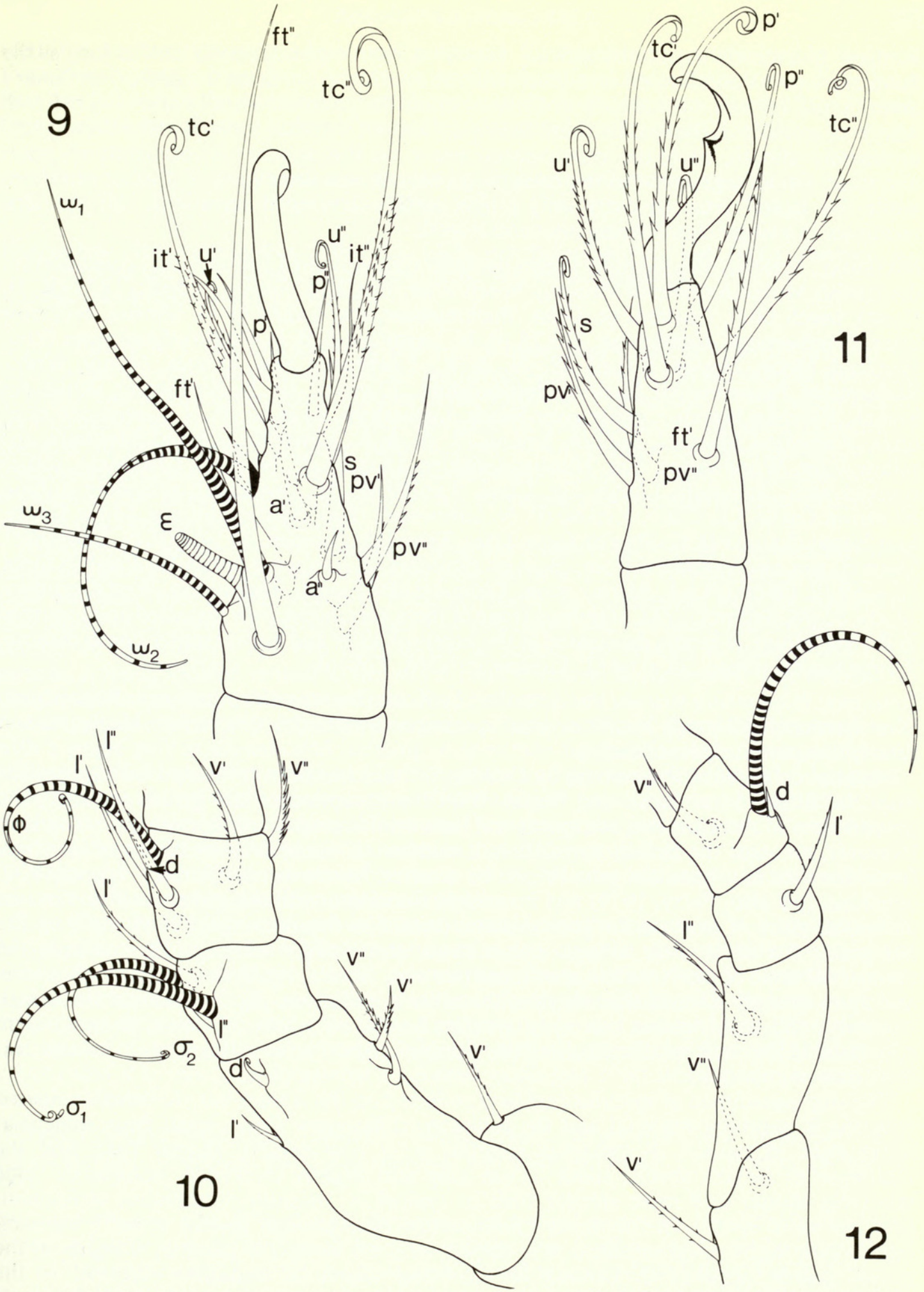
Ano-genital region (Figs 3; 27): On each anal plate there are four pairs of marginal anal setae (an_{1-4}) and a single pair of adanals (*ad*) located submarginally and rather far forward. Setae an_{1-4} are more or less equal in length and about twice as long as the adanal setae. Ventrally, each anal plate has a prominent anteromedian lobe, the left overlying the right ('right-fitting' arrangement, see van der Hammen, 1963). There are usually seven pairs of genital setae (g_{1-7}) arranged in a pattern 4 + 3 along the paraxial margins of the genital plates, setae g_{1-4} being approximately half the length of setae g_{5-7}. A single aggenital seta *ag* is located antiaxially in the genital furrow. The integument of the ano-genital region is distinctly pitted with the exception of the setae-bearing areas which have no ornamentation. There are three pairs of genital papillae ($g.p._{1-3}$), the anterior pair ($g.p._1$) being rather small.

Infracapitulum: Typically phthiracaroid in form (see, for example, Parry, 1979). There are three pairs of adoral setae, the anterior pair being brush-like distally and the posterior two pairs weakly serrated.

Pedipalps (Fig. 8): Three-segmented with the setal formula (2–2–7). Four of the tarsal setae (*acm*, *ul'*, *ul''* and *sul*) are eupathidial, *sul* being the shortest.

Chelicerae (Figs 6–7): The movable digit has three distinct teeth and the fixed digit carries five. The latter are arranged in two rows, an inner one of three teeth and an outer one of two. The principal segment carries about six conical spines on the antiaxial surface and about 12 sharply pointed spines paraxially. Setae *cha* and *chb* are both serrated, *cha* being somewhat longer than *chb*.

Legs (Figs 9–12; 31–32): The solenidial formulae for the legs are I (2–1–3); II (1–1–2); III (0–1–1) and IV (0–1–0). All the solenidia are rather long, usually with a single coil distally. Solenidion ω_2 on tarsus I is coupled with a small distal seta (Fig. 31). The latter was first observed in *S. striculus* by Griffiths and Sheals (1971) who described the seta as being sabre-shaped. On all legs the tibial solenidion Φ is coupled with a reduced dorsal seta (Fig. 32) while on genu I solenidion σ_1 is coupled with a reduced posterolateral seta (*l''*). The formulae for the leg setae are I (1–4–2–5–16–1); II (1–3–2–3–12–1); III (2–2–1–2–10–1) and IV (2–1–1–2–10–1). On tarsus I six of the setae (*s*, (*it*), (*p*) and *a'*) are eupathidial. The famulus ε



Figs 9 & 10 *Atropacarus striculus*, posterolateral aspect of leg I: (9) tarsus; (10) tibia to trochanter.

Figs 11 & 12 *Atropacarus striculus*, anterolateral aspect of leg IV: (11) tarsus; (12) tibia to trochanter.

(Figs 9 and 11 are drawn at the same magnification.)

is rugose and closely associated with ω_1. Seta *a''* is short (approximately half as long as the famulus), smooth and located on a level with the solenidion ω_1. Setae (*tc*) and (*u*) on tarsus I and (*tc*), (*u*), (*p*) and *s* on tarsi II to IV are ribbon-like, hooked distally and covered with whorls of spicules in the middle third. Seta *d* on femur I is rather short, hooked distally and apparently smooth, while the anteroventral seta *v'* on this segment is comparatively short and stout. On all segments the ventral setae (*v*) bear two or three rows of distinct serrations while the lateral setae (*l*) carry only a few weakly-developed serrations. All the tarsi terminate in a single claw bearing two ventral teeth.

MATERIAL: Material was examined from the following unnamed and unsorted collections of the British Museum (Natural History): beech litter, Box Hill, Surrey, August, 1973 (K. H. Hyatt); beech litter, Chalfont St. Giles, Buckinghamshire, 8.xi.64 (J. G. Sheals); hedgerow litter, Peterborough, Cambridge, 23.i.78 (P. N. Lawrence & B. R. Pitkin); *Sphagnum* litter, Hartland Moor, Dorset, 8.xi.63 (P. N. & K. Lawrence); yew humus, Manor Wood, Rothamsted Experimental Station, Hertfordshire, 22.viii.61 (P. N. Lawrence); deciduous humus, Roudsea Woods, Grange-over-Sands, Lancashire, 24.ix.62 (P. N. Lawrence); alder litter, Westwood Marshes, Suffolk, 8.iii.64 (P. N. & K. Lawrence); mixed hawthorn and sallow litter, Woodwalton Fen, Huntingdonshire, 18.ix.63 (P. N. & K. Lawrence); soil in cracked rock, Inchiquin Lough, Co. Clare, 9.vii.60 (P. N. Lawrence); sycamore humus, Newtown Castle, Co. Clare, 5.vii.60 (P. N. Lawrence); rhododendron humus, Milke Danre, East Nepal, 2.xii.61 (J. G. Sheals); forest litter, Kronåsen, Sweden, 23.v.64 (P. N. Lawrence). Material was also examined from: moss on branches of *Juniperus brevifolia*, Faial, Azores, 19.vi.69 (P. Ohm) (ITAZ, Berlin); moss, Donaustaufer Forest, Regensburg, West Germany, 14.viii.59 (M. Sellnick) (ZM, Hamburg) (one of these specimens, now dissected and mounted in Berlese's fluid, is hereby designated as the *neotype*); litter and humus under *Fagus crenata*, Kuromatsunai, Japan, 25.xi.68 (T. Fujikawa) (NSM, Tokyo).

REMARKS: *Hoplophora stricula* was described by Koch from marshy places near Regensburg, West Germany. Although Koch's original specimens are presumed to be lost, his figures and description permit reidentification.

Material collected at Regensburg by Dr Max Sellnick has been compared with specimens from the British Isles, Japan and Nepal. With the exception of the British material, the general form of the aspis and notogaster and their setal arrangements appear to be identical. However, amongst the British population, a number of 'variants' were observed in which femur I carried four setae and genu IV carried no setae. Moreover, the 'femur I–4, genu IV–0' condition (see also, Parry, 1979) was invariably associated with the presence of one or two additional pairs of setae on the genital plates (total 8 or 9 pairs respectively) while on the notogaster the setae were always rather short and weakly serrated. By contrast, the notogastral setae of the Nepalese specimens (see also, Sheals, 1965) were very much stouter and more strongly serrated than those of the other populations. Again, amongst the British 'variants', the aspal carina was only weakly developed while the lamellar setae were considerably less than half the length of the interlamellars. The sensilli appear to be identical in all four populations.

The single specimen of *striculus insularis* collected on the Azores has also been compared with the Regensburg material and the following differences noted: aspal crest somewhat lower than in typical *A. striculus*; lamellar setae considerably shorter than half the interlamellar length; sensilli about 65 μm long and slightly thickened; notogastral setae relatively shorter and more slender than in typical *A. striculus*; notogastral integument punctate as in species of the genus *Phthiracarus*; nine pairs of genital setae (Weigmann figures only eight pairs) arranged in a pattern of 5 + 4 along the paraxial margins of the genital plates; genu IV–0. Bearing in mind the degree of variation observed in the populations studied above, it seems inadvisable at the present time to warrant the single specimen from the Azores with subspecific ranking.

Steganacarus spinosus, recorded by Sellnick (1920) from humus in the woods around Lötzen, West Germany, closely resembles *A. striculus*, and it seems likely that in the past the

identities of these two species have been confused. Two specimens, determined by Sellnick from Patscherkofel, Nordtirol, Austria have been examined and although they have been found to fall within the size range given above for *striculus* (notogastral length 375–475 μm), the notogaster bears only 15 pairs of setae while the solenidion on tibia IV is free.

Atropacarus clavigerus (Berlese) comb. nov.
(Figs 13–19)

Hoploderma clavigerum Berlese, 1904 : 275; 1913 : 104. Holotype, Pisa, Italy (ISZA, Florence, no. 141/9). [Photographs examined.] [Schweizer, 1956 : 363. Misidentification.]
Hoploderma clavigera: Sellnick, 1929 : 40.

Aspis (Figs 16–17): 188–246 μm long and with a maximum width of 127–165 μm. All the dorsal setae are short, stout and distinctly feathered. Setae (*il*) and (*la*) are more or less equal in length and extend to the anterior limits of the bothridia. The sensilli, 77–96 μm in length, are expanded and serrated distally, while the basal portion is smooth, slender and distinctly cranked. In front of the *il-la* setae there is a prominent median keel and posteriorly the integument is raised into a number of longitudinal and transverse ridges. The ornamentation of the prodorsal integument (apparently always encrusted with detritus) is rather striking and may be described as raised reticulate.

Notogaster (Figs 13–14): The notogaster ranges in length from 354–467 μm with a greatest depth of 188–283 μm. There are 20 pairs of setae, all of which are very short (less than c_1-d_1), stout and bear three or four whorls of blunt serrations. In comparison with the notogastral chaetotaxy of *striculus*, *A. clavigerus* has four additional pairs of setae, one in the *c* series, another in the *h* series, and two pairs in the *ps* series. The vestiges of setae f_1 and f_2 are present, f_1 being located ventral to the seta h_1, and f_2 ventral to the seta e_2. The notogastral integument is ornamented in a raised reticulate pattern.

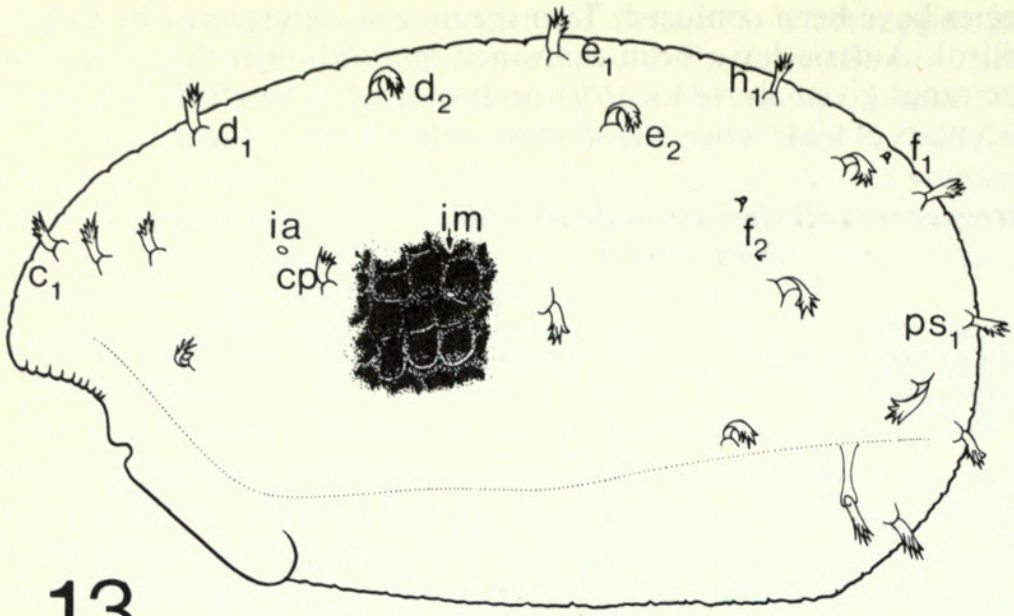
Ano-genital region (Fig. 15): The four pairs of anal setae (an_{1-4}) are located marginally with a single pair of adanals (*ad*) (missing in specimen figured) located submarginally and rather close to (an_4). All the anal setae are short, the anterior two pairs (an_{3-4}) being approximately twice as long as the posterior two. There are nine pairs of minute genital setae (g_{1-9}) arranged in a pattern of 6 + 3 along the paraxial margins of the genital plates. The ornamentation of the genital and anal plates is similar to that of the notogaster.

Chelicerae: The chelicerae resemble those of *A. striculus* although the antiaxial and paraxial surfaces carry a smaller number of spines.

Legs (Figs 18–19): The setal and solenidial formulae for the legs are as in *A. striculus*. All the solenidia are long and straight. On tarsus I the seta coupled with solenidion ω_2 is short with only a weakly developed distal process (see Parry, 1979). Seta *a''* is rather short (approximately half as long as the famulus) and closely associated with the long posterior fastigial seta *ft''*. Setae (*tc*) and (*u*) on tarsus I and (*tc*), (*u*), (*p*) and *s* on tarsi II to IV are ribbon-like, hooked distally and bear whorls of sharply pointed spicules in the middle third. On femur I seta *d* is short and somewhat thickened while seta *v'* on this segment is stout and strongly serrated.

MATERIAL: Eight specimens, BMNH 1979.6.21.6–13, from oak litter (*Quercus ilex*), Boboli Gardens, Florence, Italy. The material was collected by Dr J. G. Sheals, 18 March 1971.

REMARKS: Berlese (1904) recorded *clavigerus* from dead leaves in the Boboli Gardens, Florence, but described the type of the species from Pisa. Unfortunately, we have not been able to examine the holotype but we have studied photographs of the latter taken by Dr J. G. Sheals (BMNH). The specimen appears to be in good condition and although undissected the integumental ornamentation and chaetotactic characters can be discerned. Material collected from the Boboli Gardens has been compared with photographs of the holotype—no morphological differences could be detected.



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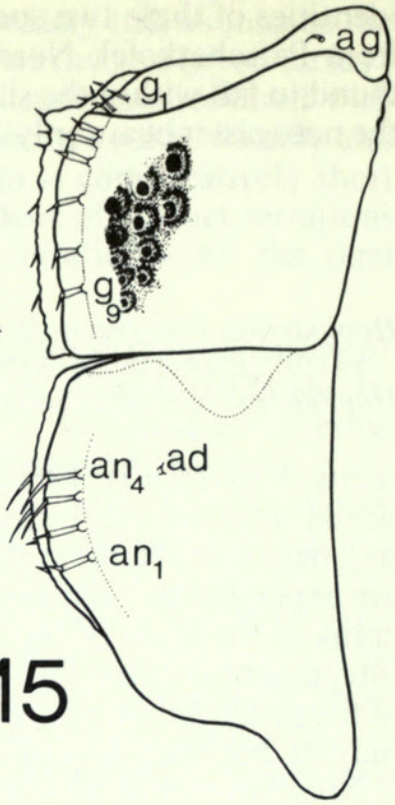

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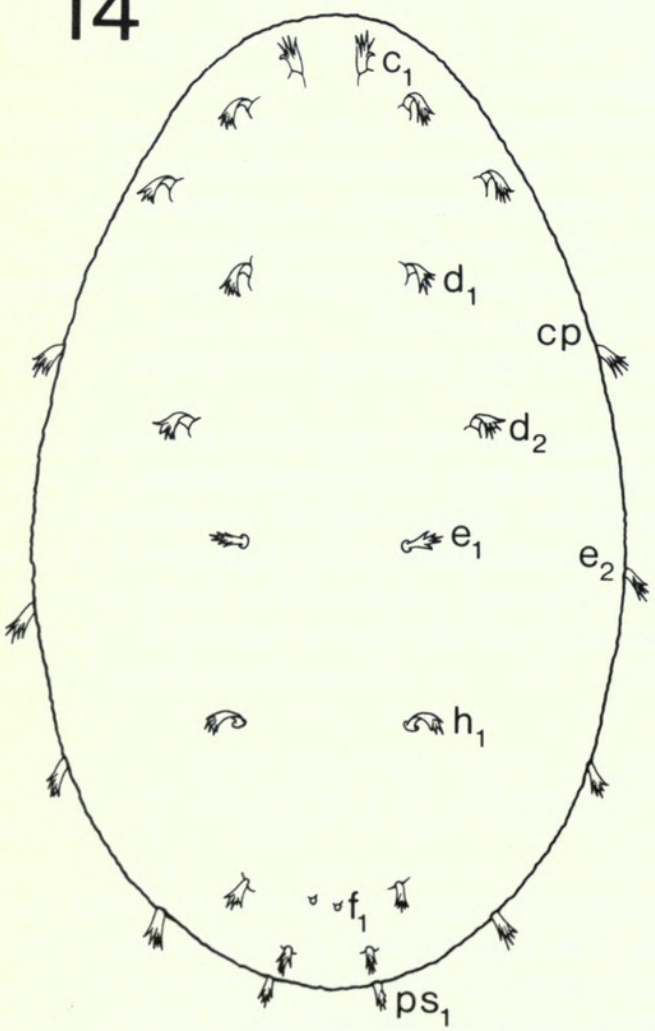

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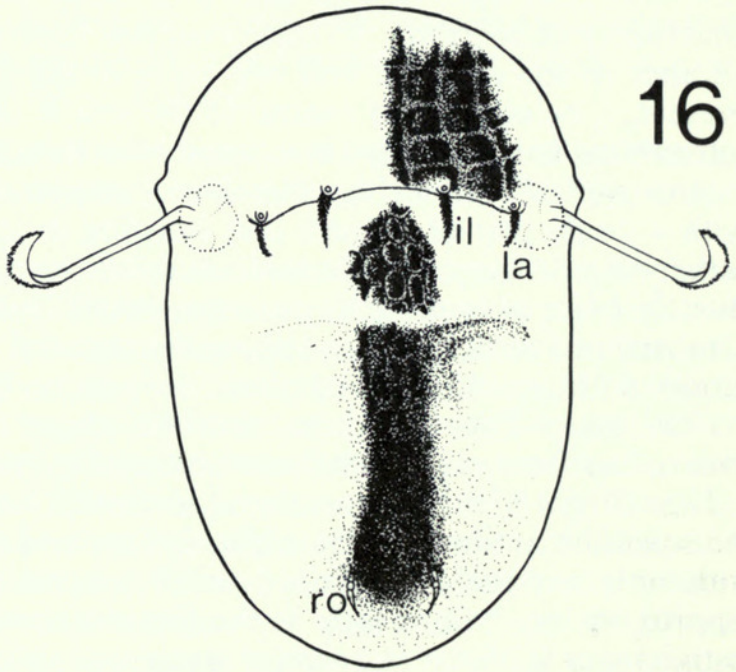

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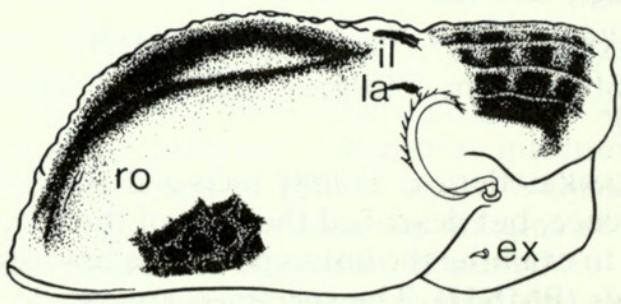

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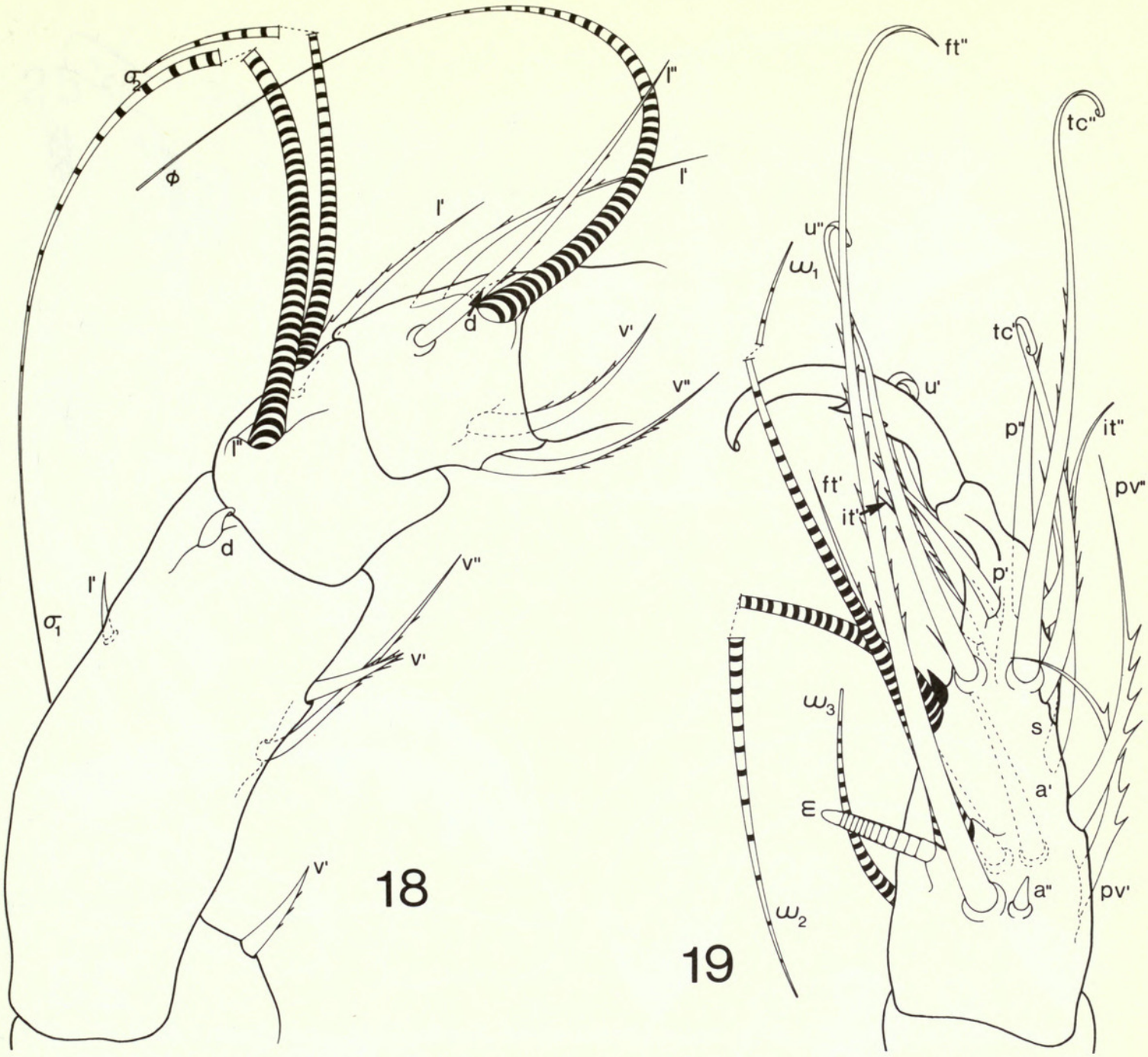
Figs 13–17 *Atropacarus clavigerus*: (13) notogaster, lateral; (14) notogaster, dorsal; (15) ano-genital region; (16) aspis, dorsal; (17) aspis, lateral.



Figs 18 & 19 *Atropacarus clavigerus*, posterolateral aspect of leg I: (18) tibia to trochanter; (19) tarsus.

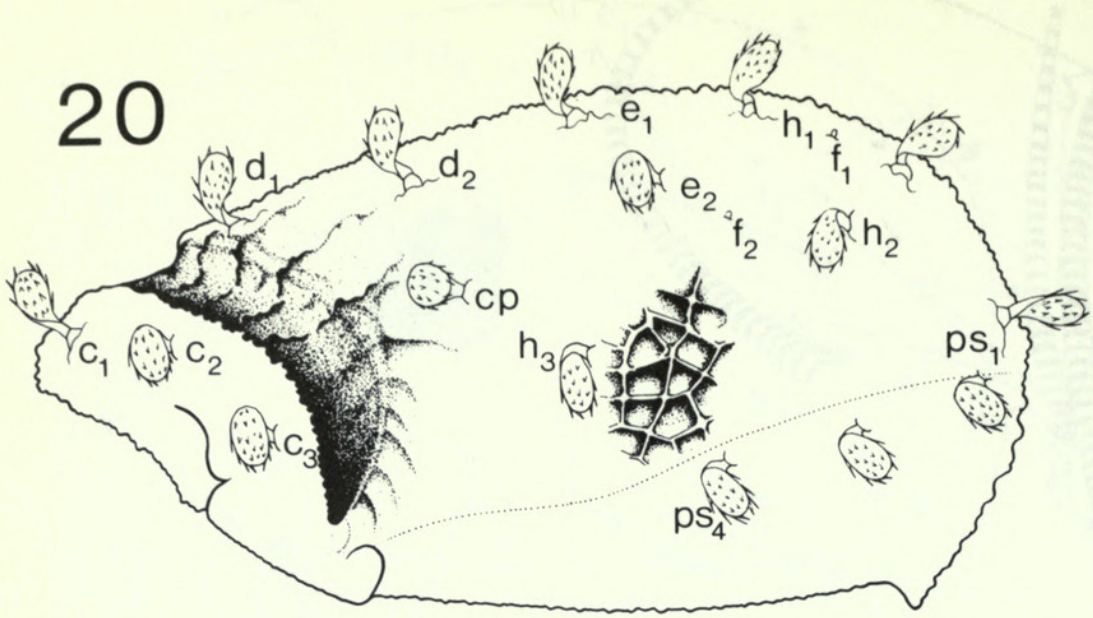
A. clavigerus differs from the other members of the genus by having four additional pairs of setae on the notogaster. Moreover, the very striking ornamentation of the prodorsal and notogastral integument serves to characterize this species.

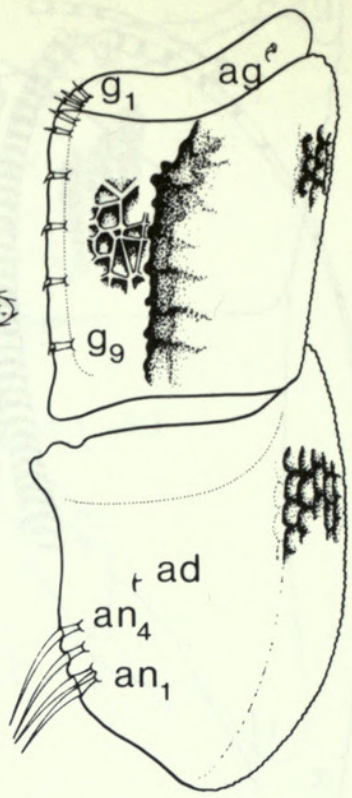
Atropacarus phyllophorus (Berlese) comb. nov.*
(Figs 20–26)

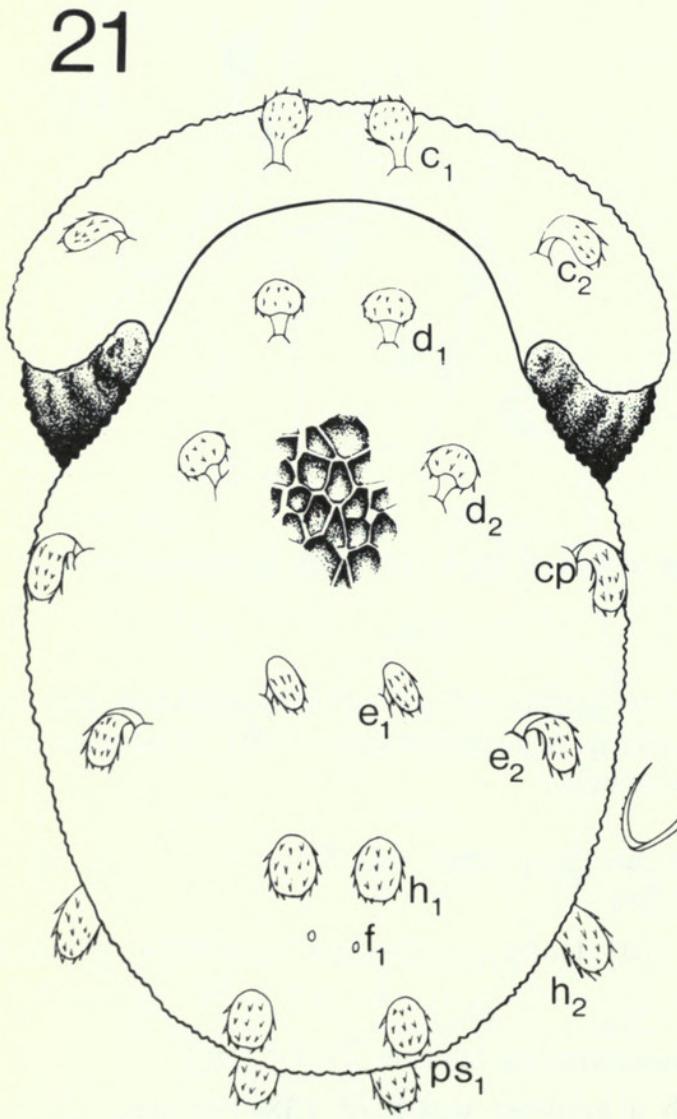
Hoploderma phyllophorum Berlese, 1904 : 275; 1913 : 103. Holotype, Florence, Italy (ISZA, Florence, no. 57/46).
Steganacarus phyllophorus: Schuster, 1957 : 97; 1965 : 218.
Steganacarus ropalus Feider & Suciu, 1957 : 35. [Synonymized by Schuster, 1965 : 218.]

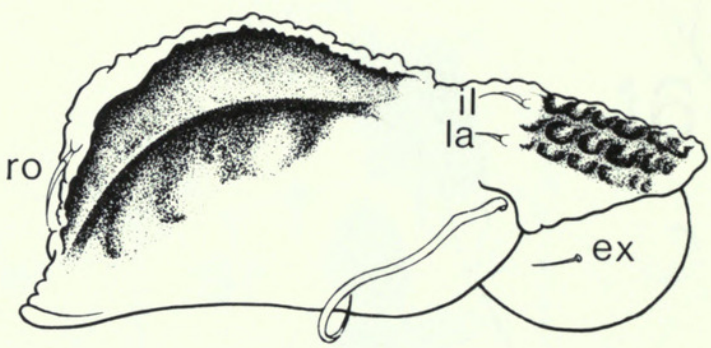
Aspis (Figs 23–24): 196–208 μm long and with a greatest width of 138–145 μm. All the dorsal setae are short, stout and brush-like distally. Setae (*il*) are about twice the length of setae (*la*) and together form a transverse row behind which the prodorsal integument is raised

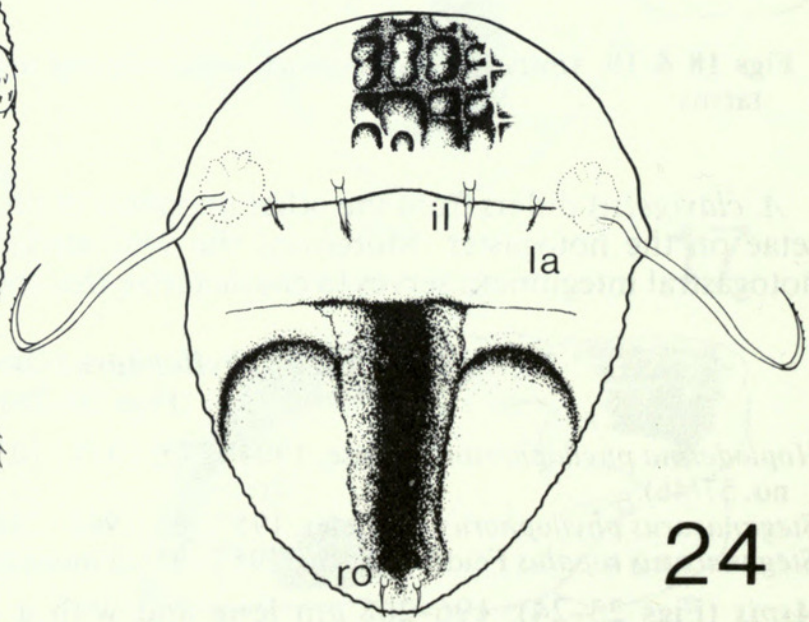
*See footnote at bottom of p. 189.



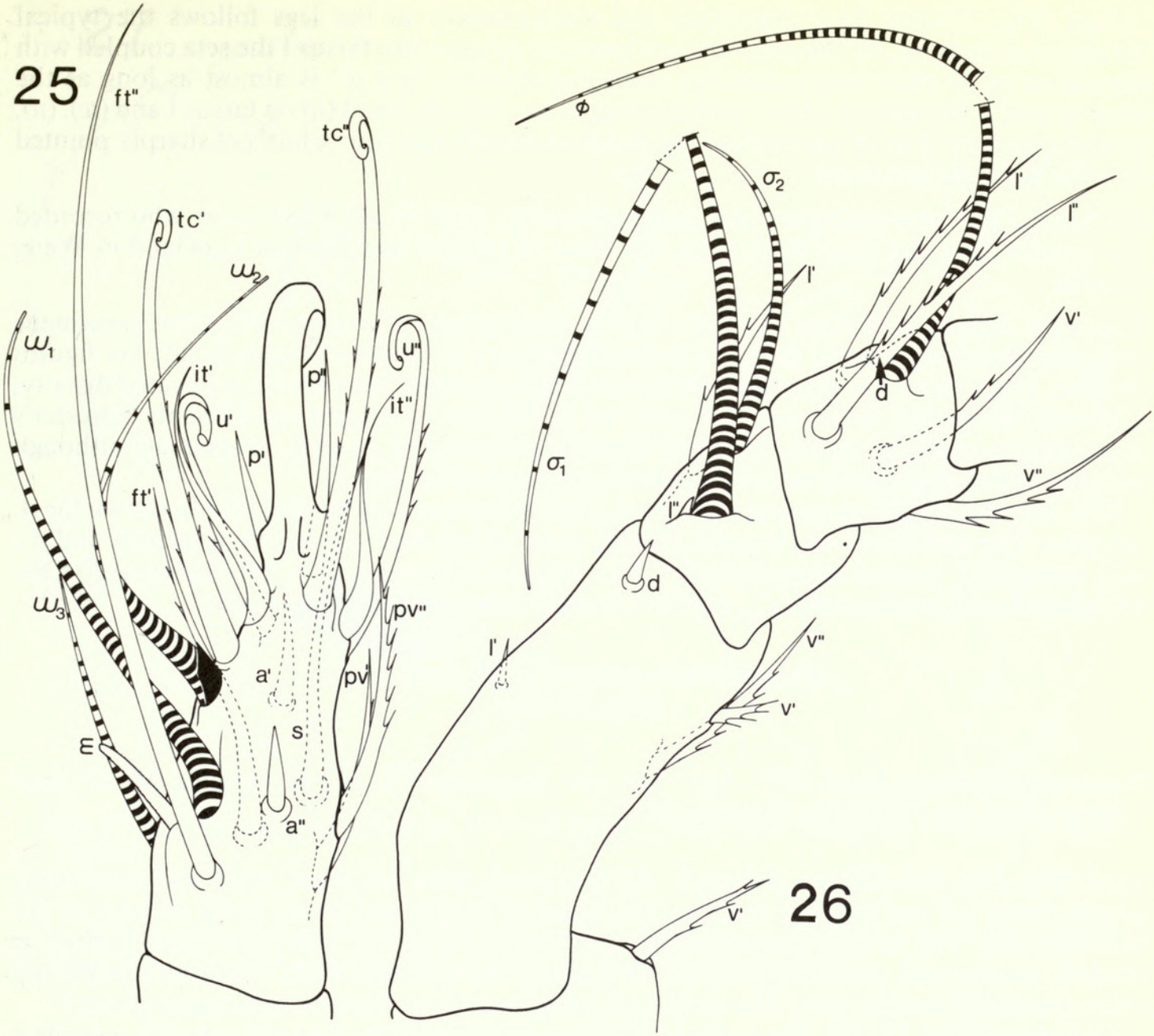








Figs 20–24 *Atropacarus phyllophorus*: (20) notogaster, lateral; (21) notogaster, dorsal; (22) ano-genital region; (23) aspis, lateral; (24) aspis, dorsal.



Figs 25 & 26 *Atropacarus phyllophorus*, posterolateral aspect of leg I: (25) tarsus; (26) tibia to trochanter.

into a number of irregularly arranged longitudinal and transverse ridges. The sensillus is 97–111 μm in length and closely resembles that of *A. striculus*. In front of the *il-la* row there is a broad and rather pronounced median keel. The integument is sculptured in a reticulate pattern.

Notogaster (Figs 20–21): 376–446 μm in length and with a greatest depth of 198–238 μm. The notogastral chaetotaxy closely resembles that of *A. striculus*. There are 16 pairs of setae all of which are rather short (less than c_1-d_1), broadly spatulate, and serrated marginally. Setae c_{1-3} form a row submarginally on the cowl, the latter being separated from the rest of the notogaster by a deep furrow which extends dorsolaterally. The vestiges of setae f_1 and f_2 are present. The integument is sculptured in a reticulate pattern.

Ano-genital region (Fig. 22): The four pairs of anal setae (an_{1-4}) are more or less equal in length and located marginally while a single pair of minute adanals (*ad*) are located submarginally and rather far forward. The integument of the anal plate is rugose. There are nine pairs of minute genital setae (g_{1-9}) arranged in a pattern of 5 + 4 along the paraxial margins of the genital plates. A median longitudinal ridge with irregular thickenings separates a reticulate paraxial region from a rugose antiaxial region.

Legs (Figs 25–26): The chaetotaxy and solenidiotaxy of the legs follows the typical *Atropacarus* pattern. All the solenidia are long and straight. On tarsus I the seta coupled with solenidion ω_2 is short and somewhat elongated distally. Seta *a''* is almost as long as the famulus and is located on a level with solenidion ω_1. Setae (*tc*) and (*u*) on tarsus I and (*tc*), (*u*), (*p*) and *s* on tarsi II to IV are ribbon-like, hooked distally and bear whorls of sharply pointed spicules in the middle third.

MATERIAL: We have examined material collected in 1956 by Dr R. Schuster who recorded this species from oak litter in Vienna, and from heathland and *Sesleria*-grassland in Weiz, Austria.

REMARKS: Although Berlese's (1904) original description of *phyllophorus* from specimens collected in rotting leaves, Boboli Gardens, Florence is extremely superficial, his figures (Berlese, 1913) show the characteristic features of the species: long sensillus serrated distally; spatulate notogastral setae; anterior cowl on notogaster; reticulate integument. Schuster's redescription of *phyllophorus*, based on material collected in Austria, is adequate although no information is available on the chaetotactic pattern of the legs.

The distribution of notogastral setae in *A. phyllophorus* is very similar to that shown for *A. striculus*. The additional seta is again located more or less mid-way between setae h_1 and ps_1 with vestigial f_1 located anterodorsally. The diagnostic features of *A. phyllophorus* are the notogastral cowl bearing setae c_{1-3} and the strongly spatulate notogastral setae.

Atropacarus terrapene (Jacot) comb. nov.
(Figs 27–29)

Steganacarus terrapene Jacot, 1937 : 165. 'Cotypes', Buncombe County, N. Carolina (MCZ, Cambridge, Mass., no. 35F6.2–36). [Examined.]

Aspis (Fig. 29): 164–208 μm in length. All the dorsal setae are short, stout and apparently simple. Setae (*il*) and (*ro*) are more or less equal in length and about twice as long as the lamellars (*la*). The sensilli are expanded and serrated distally, while the basal portion is smooth, slender and distinctly cranked. In front of the *il-la* row there is a pronounced and rather truncated median keel. The prodorsal integument is sculptured in a rugose pattern.

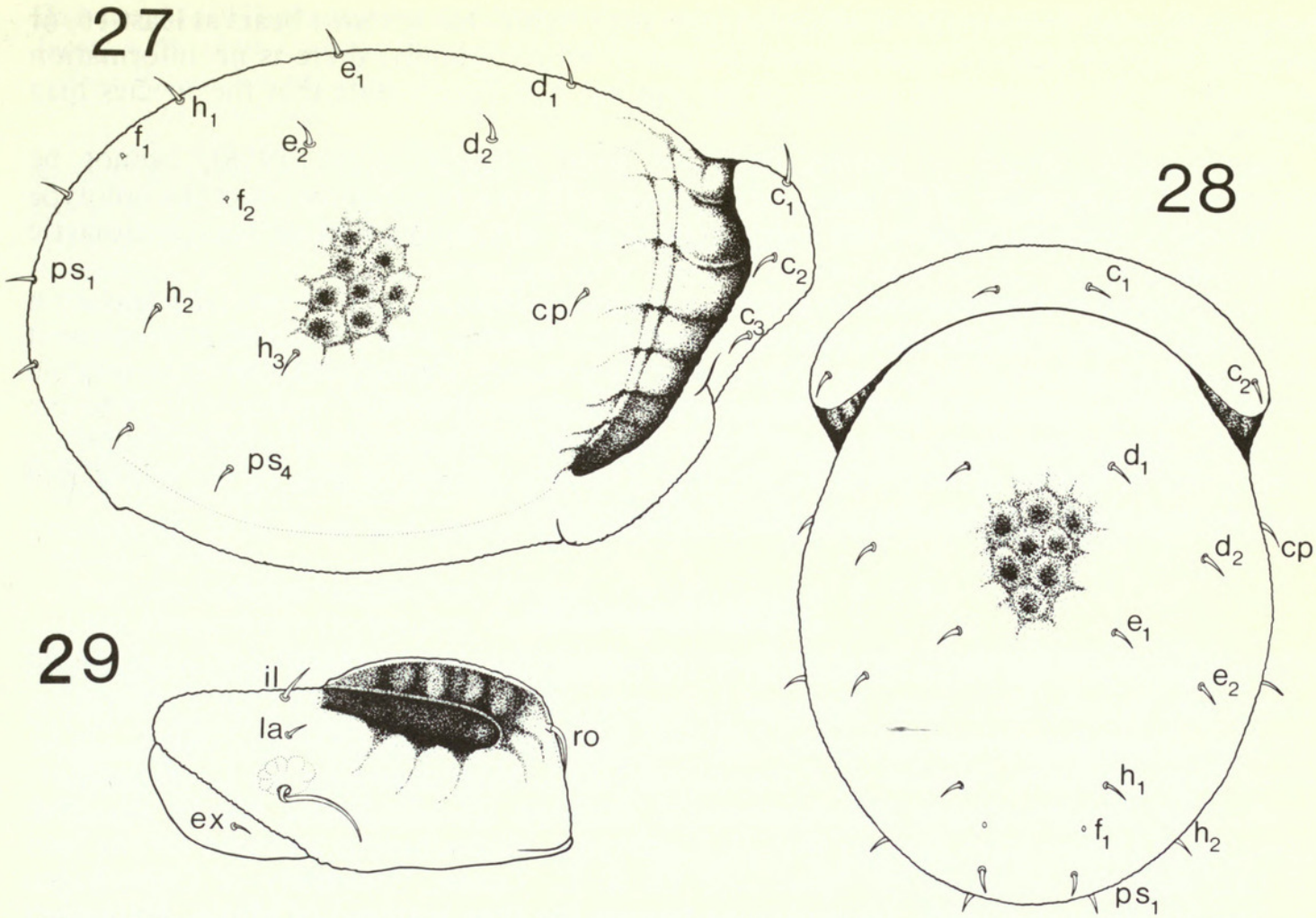
Notogaster (Figs 27–28): The notogaster ranges in length from 276–352 μm with a greatest depth of 184–240 μm. There are 16 pairs of setae all of which are very short (less than c_1-d_1), stout and apparently simple. Anteriorly there is a well defined cowl bearing setae c_{1-3}. The vestiges of setae f_1 and f_2 are present. The integument is rugose.

Ano-genital region: There are four pairs of marginal anal setae (an_{1-4}) and a single pair of adanals (*ad*) located submarginally and rather far forward. Setae an_{1-4} are more or less equal in length and distinctly longer than the adanals. On the genital plates the setal bases are difficult to discern owing to the rather opaque nature of the integument. However, there appear to be eight pairs of genital setae arranged in a pattern of 4 + 4 along the paraxial borders. The integument is rugose.

Legs: The setal and solenidial formulae for the legs are as in *A. striculus*. All the solenidia are long and straight. On tarsus I the seta coupled with solenidion ω_2 is very short. Seta *a''* is almost as long as the famulus and located on a level with solenidion ω_2. Setae (*tc*) and (*u*) on tarsus I and (*tc*), (*u*), (*p*) and *s* on tarsi II-IV are ribbon-like, hooked distally and bear whorls of sharply pointed spicules in the middle third.

MATERIAL: Eight 'cotypes' from oak litter, Bent Creek Experimental Forest, N. Carolina, U.S.A. The material was collected by Dr A. P. Jacot, 15 July 1935.

REMARKS: The eight 'cotypes' examined are in good condition and mounted in Canada Balsam. They are undissected and although only partially cleared, most of the chaetotactic characters can be discerned.



Figs 27–29 *Atropacarus terrapene*: (27) notogaster, lateral; (28) notogaster, dorsal; (29) aspis, lateral.

A. terrapene shows an overall similarity to *A. phyllophorus*. In both species the aspal keel is markedly truncated and the notogaster bears a well-developed cowl.

Survey

In addition to the species referred to above, a number of other taxa, possibly referable to *Atropacarus*, have been considered but unfortunately type material has not been available in the case of the following six species, all of which fall within the size range given for *Atropacarus*: *illinoisensis* (Ewing, 1909), *vitrinum*, *remigerus* and *somalicus* (Berlese, 1913, 1923 & 1923), *serratus* Feider and Suciu (1957), and *collaris* Balogh (1958).

In his original description of *Atropacarus*, Ewing (1917) noted that *illinoisensis*, of which the type specimen is apparently lost, was 'known to be included in the genus *Atropacarus*.' Although from the description and illustration the species does appear to have certain affinities with *Atropacarus* (sickle-shaped sensillus, stout pectinate notogastral setae, overall length 450 μm), the number and arrangement of setae on the anal plates (two marginal and three submarginal) are reminiscent of *Phthiracarus*. Moreover, the general shape of the aspis and the form of the integumental ornamentation are characteristic of a *Phthiracarus* species.

The true identities of the three species described by Berlese are doubtful, although it seems probable that they have been correctly assigned to the genus *Steganacarus*. Van der Hammen (1959) has examined each of the species which are entire, uncleared and mounted in Canada Balsam, and is of the opinion that they belong to a '*striculus*-group'. However, it seems unlikely that they can be reidentified in their present condition.

In their original description of *Steganacarus serratus*, a species recorded from mosses and leaves, Odorhei, Rumania, Feider and Suciu (1957) described the presence of 14 pairs of

notogastral setae. However, it is apparent from their figure that *serratus* bears at least 16, or possibly even 19 pairs of setae on the notogaster. Unfortunately, there is no information available on the chaetotactic pattern of the legs but it is conceivable that the species may belong to the genus *Atropacarus*.

Steganacarus collaris, a species described from Angola(Balogh, 1958), cannot be determined as a member of the genus *Atropacarus* without a re-examination of the holotype for Balogh's description does not include details of any notogastral or leg chaetotactic characters.

The holotype of *Steganacarus craterifer*, collected by Hammer (1971) from dry leaves on Viti Levu, the Fiji Islands, has been examined. This species is of particular interest for it shares with all species of the genus *Atropacarus* the presence of a coupled solenidion on tibia IV while only possessing 15 pairs of setae on the notogaster (Hammer figures only 14 pairs). However, the general shape of the aspis and the form of the integumental ornamentation are reminiscent of species of the genus *Tropacarus*. The arrangement of setae on the genital and anal plates are nevertheless characteristic of *Steganacarus*.

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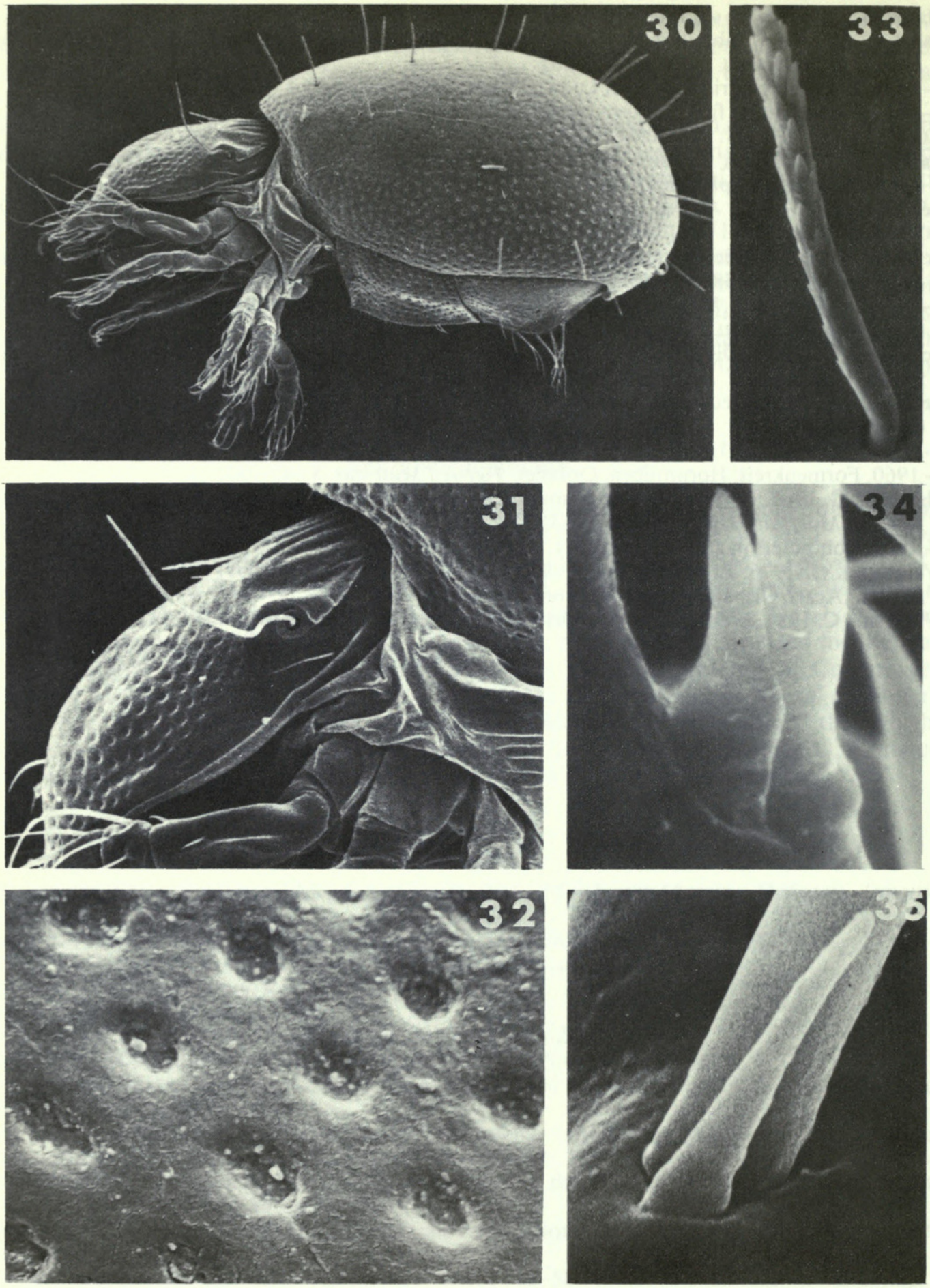

Figs 30–35 *Atropacarus striculus*: (30) lateral aspect, ×130; (31) aspis, lateral aspect, ×310; (32) detail of notogastral integument, ×4960; (33) detail of notogastral seta, ×1200; (34) distal solenidion and associated seta on tarsus I, anterolateral aspect, ×8440; (35) solenidion and associated seta on tibia IV, dorsal aspect, × 9110.