STUDIES ON THE TAXONOMY OF THE SOUTH AFRICAN TECTOCEPHEIDAE GRANDJEAN 1953 (ORIBATEI, ACARI)

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The family Tectocepheidae was instituted by Grandjean (1953) for the reception of the single genus *Tectocepheus* Berlese, 1895, in the family Tegeocranidae; which family is considered invalid nowadays.

In his admittedly provisional classification, Grandjean (1953) classified the Tectocepheidae with oribatids having immatures of the "plicate" type. He ascribed the following characteristics to the family: Nymphal and larval stages with large folds on the hysterosoma, ten pairs of notogastral setae or traces of them in the nymphal and adult stages, genital setae with an ontogenetic formula of 1-3-5-6, nymphal, proto- and deutonymphal stages with hairless paraprocts, lower seta of the adult pedipalpal femur always present from the nymphal stages onward, free anteroculminal seta on the adult pedipalpal tarsus i.e. not combined with the solenidion, genual and tibial dorsal setae of the legs connected with the solenidia σ or φ only during the tritonymphal stages, fourth protonymphal leg with a setal formula which is considered as normal namely 0-0-0-0-7, no tracheal organs on the legs, and with parthenogenetic reproductive powers.

In spite of Grandjean's new classification, which is accepted by most modern acarologists, authors such as Strenzke (1955), Karppinen (1956, 1958), Sengbush (1957) and Seyd (1962) regard *Tectocepheus* Berlese, 1895 as a genus of the family Carabodidae Koch, 1842. In the present research Grandjean is followed.

Balogh (1961b) recognizes five genera in the family: *Tectocepheus* Berlese, 1895, *Tegeocranellus* Berlese, 1913, *Tegeozetes* Berlese, 1913, *Nodocepheus* Hammer, 1958 and *Lamellocepheus* Balogh, 1961. As will be indicated below, it is doubtful whether all these genera are valid, and whether they all belong to the family Tectocepheidae.

In the Republic of South Africa representatives of only *Tectocepheus* Berlese, 1895 and *Tegeocranellus* Berlese, 1913 were found. Known species will be discussed briefly, but the new species will be described in detail. The types of the new species are kept in the collection of the Zoology Department, University of the Orange Free State, Republic of South Africa.

GENUS TECTOCEPHEUS BERLESE, 1895

Type: *Tegeocranus velatus* Michael, 1880.

Berlese established the genus *Tectocepheus* in 1895, and ascribed the following characteristics to it: no distinct dorsosejugal suture but a gradual transition between the prodorsum and the notogaster, lamellae well developed with dartlike lammellar cusps, "skin" granular or rough, pedotecta II and III distinct, and the legs each with one claw of medium size. Knülle (1954) supplemented Berlese's diagnosis by adding a few other features. These are the rectangular bent seta on the tibia of the pedipalp, the short interlamellar setae, the distinct median lyrifissures near the dorsolateral border in the middle of the notogaster, the laterally directed

adanal lyrifissures, the four pairs of genital setae, and the two thick, dentate primiventral setae on the tibia of leg II.

For each of the following taxa only the most striking features will be discussed briefly.

1. *Tectocepheus velatus* Berlese, 1895 = *Tegeocranus velatus* Michael, 1880.
2. *Tectocepheus velatus angulatus* Michelčič, 1957.
3. *Tectocepheus velatus granulatus* Michelčič, 1957.
4. *Tectocepheus velatus ibericus* Michelčič, 1957.
5. *Tectocepheus velatus inflexus* Michelčič, 1957.

Berlese (1895) instituted the genus *Tectocepheus*, and based his generic diagnosis on *Tegeocranus velatus* Michael, 1880. Michael (1880b) described the species with the proviso that "It is not a typical *Tegeocranus*. . .", in which he has proved to be correct. On account of the joined prodorsum and notogaster, the shape of the lamellae, and its habitat, Oudemans (1900), supported by Trägardh (1904) and Henriksen and Lundbeck (1917), regarded this species as belonging to the genus *Scutovertex* Michael, 1879. As the most important characteristics of *Tectocepheus velatus* Berlese, 1895 (=*Tegeocranus velatus* Michael, 1880) Michael (1880b, 1884-1888, 1898) mentioned the irregularly raised dots on the cerotegument, which can easily be detached; hence the name *velatus*, which means "clothed, as with a skin or veil". Michael (1884) also drew attention to the fact that the rostrum is blunt, with an inclination to be trifid. Although Michael (1884-1888, 1898) could not find any interlamellar setae, Haarløv (1952), studying the specimens used by Michael, showed them to be present.

In 1957 Michelčič instituted four varieties of *Tectocepheus velatus* Berlese, 1895, *angulatus*, *granulatus*, *ibericus* and *inflexus*. *Tectocepheus velatus inflexus* Michelčič, 1957, can be distinguished from *Tectocepheus velatus* Berlese, 1895 by the narrow lamellae and the two concave lines, which extend backwards from the rostral peak. Whereas *Tectocepheus velatus ibericus* Michelčič, 1957 has a faint translamella and two short, toothlike projections on either side of the rostrum, *Tectocepheus velatus angulatus* Michelčič, 1957 has a distinct translamella and a rostrum with a depression in the middle. In the case of *Tectocepheus velatus granulatus* Michelčič, 1957, a v-shaped figure is present in the basal part of the intercuspidal space.

6. *Tectocepheus minor* Berlese, 1903 =*Tectocepheus velatus* Jacot, 1937.
7. *Tectocepheus minor expansus* Berlese, 1915 = *Tectocepheus velatus expansus* Jacot, 1937.

Berlese (1903) described *Tectocepheus minor* as differing from *Tectocepheus velatus* Berlese 1895 in size, in having fine, more crowded granules, and a less clavate sensilla. Jacot (1937) considered these characteristics to be of no important systematic value. He also showed that Berlese's figures show *Tectocepheus minor* to have the same lamellar shape as *Tectocepheus velatus*, and thus regarded *Tectocepheus velatus* Berlese, 1895 and *Tectocepheus minor* Berlese, 1903 as conspecific. Upon examining the partly damaged holotype of *Tectocepheus minor*, Knülle (1954) apparently came to the conclusion that *Tectocepheus minor* Berlese, 1903 is a valid species. He remarked that the distal, lateral edges of the lamellar cusps curve inwards while the medial edges are straight, and that the single incision at the apex of the lamellar cusp is indistinct.

When Berlese (1915) established *Tectocepheus minor expansus*, he described this variety as broader and shorter than the nominate species. In addition, he mentioned that the granules of the notogaster are less dense, and that the sensilla is nearly twice as long as that of *Tecto-*

cepheus velatus Berlese, 1895. According to the presence or absence of depressions on the dorsal side of the hysterosoma, Jacot (1937) divided this variety, which he considered to be *Tectocepheus velatus expansus* comb. nov. into an "impressed" and a "smooth" form, thus regarding his *Tectocepheus velatus expansus* as a "dimorphic subspecies".

8. *Tectocepheus sarekensis* (Trägardh, 1910) Balogh, 1943.

=*Tectocepheus velatus sarekensis* Trägardh, 1910.

Trägardh (1910) remarked that *Tectocepheus velatus* Berlese, 1895 ". . . scheint ziemlich variabel zu sein", and established the variety *Tectocepheus velatus sarekensis* Trägardh, 1910. Specific features assigned to it are the medial and lateral borders of the lamellae which run parallel towards the tips, the rounded rostrum and the longitudinal furrows behind the translamella in the interlamellar space. Both Balogh (1943) and Knülle (1954) are of the opinion that this variety differs to such an extent from the typical *Tectocepheus velatus* Berlese, 1895, that it is justifiable to regard it as a true species, *Tectocepheus sarekensis* (Trägardh, 1910) Balogh, 1943. Haarløv (1957), however, still considered this taxon as *Tectocepheus velatus sarekensis* Trägardh, 1910 on account of the similarity of several characteristics present in the two taxa, such as the orientation of lyrifissure *iad* and the shape of the sensillae.

9. (*Tectocepheus personatus* Berlese, 1910).

=*Tegeocranellus personatus* Berlese, 1913.

=*Lamellocepheus personatus* Balogh, 1961.

=*Tessacarus personatus* Grandjean, 1962.

Haarløv (1942, but not in 1952) and van der Hammen (1952) regarded *Tectocepheus personatus* Berlese, 1910 as a true *Tectocepheus*. However, as will be indicated in the discussion of the genus *Lamellocepheus* Balogh, 1961, it does not belong to the genus *Tectocepheus* Berlese, 1895, from which it can easily be distinguished by the distinct dorsosejugal suture, the two long, parallel lamellae situated in the middle of the prodorsum, the shape of the sensilla and the excavated dorsum. The taxonomic validity of *Tessacarus personatus* Grandjean, 1962 is discussed on p. 181.

10. *Tectocepheus alatus* Berlese, 1913.

Berlese (1913) mentioned the transversal lines in the posterior part of the interlamellar space, as well as the heavily granulated notogaster in his original description of the species. As a whole his description is markedly insufficient. Haarløv (1952) redescribed the species, and added amongst other features that the lamellar cusps are narrow with their inner edges slightly concave, that the translamella is incomplete and that a chitinous line is present between the "pteromorph" (=protruding tubercle) and the median line. The individuals on which the redescription is based, can be regarded as neotypes (Haarløv, 1952, 1957), the specimens of Berlese being badly damaged.

11. (*Tectocepheus grandis* Franke, 1950), nom. nud.

In a list of species given by Franz (1950), *Tectocepheus grandis* Franke, 1950 is mentioned. As all the specimens were destroyed during the war (Knülle, 1954), and since no description of them has been published, *Tectocepheus grandis* must be considered as a nomen nudum.

12. (*Tectocepheus obtusus* Knülle, 1954), nom. nud.

As with *Tectocepheus grandis*, no description of this species has been published, hence in accordance with the rules of the International Code of Zoological Nomenclature, *Tectocepheus*

obtusus Knülle, 1954 must be considered a nomen nudum.

13. *Tectocepheus concurvatus* Knülle, 1954.

Knülle (1954) in his description of *Tectocepheus concurvatus*, draws attention to the fact that it superficially resembles *Tectocepheus sarekensis* (Trägårdh, 1910) Balogh, 1943. Upon closer examination, however, *Tectocepheus concurvatus* can be distinguished from *Tectocepheus sarekensis* by the lamellar cusps, which diverge to such an extent medially, that their apices are separated from each other by a distance less than the breadth of the lamellar cusp, by the absence of longitudinal striae in the interlamellar space, by the slightly three-arched anterior border of the rostrum, by the indistinct translamella and by a more spindle-shaped sensilla.

14. *Tectocepheus coniunctus* Knülle, 1954.

One of the outstanding characteristics of *Tectocepheus coniunctus* Knülle, 1954 is the shape of the lamellar cusps, which widen anteriorly to form a large, fused, trapezoid-shaped plate. Dorsally the rounded rostrum is covered by this plate. In contrast with the finely barbed, medially curved lamellar setae of the other species of the genus, the lamellar setae of *Tectocepheus coniunctus* are smooth and directed straight forwards. Antero-dorsally the interlamellar space is finely punctated, but on its posterior end longitudinal striae are present.

15. *Tectocepheus cuspidentatus* Knülle, 1954.

=*Tectocepheus minor* Sellnick, 1928.

In Berlese's descriptions and figure (1903, 1915) of *Tectocepheus minor* Berlese, 1903, no mention is made either of a much incurved lamellar cusp or a median toothlike process. Sellnick (1928) gave a description of *Tectocepheus minor*, different from that of Berlese. Haarløv (1942) concluded that Sellnick's description was based on different material, and consequently regarded Sellnick's description of *Tectocepheus minor* as not typical of Berlese's species. However, he refrained from establishing a new species for Sellnick's material in the belief that it was probably a variety of *Tectocepheus velatus* Berlese, 1895. In 1954, Knülle instituted *Tectocepheus cuspidentatus* with *Tectocepheus minor* Sellnick, 1928 as type. Specific features of this species are the two deep incisions on the anterior border of the rostrum, lyrifissures *iad* which are situated parallel to the lateral margins of the anal plates, and the three toothlike processes at the distal end of each lamellar cusp. As the cusps are subject to much variation, some forms may be confused with *Tectocepheus minor* Berlese, 1903 (cf. fig. 23, Haarløv, 1942; figs. 15 and 22, Knülle, 1954). The characteristics mentioned by Knülle (1954) seem to justify the establishment of a separate species based on Sellnick's *Tectocepheus minor* (1928), and since the name "*Tectocepheus minor*" is preoccupied by the species of Berlese, *Tectocepheus minor* Sellnick, 1928 must be discarded for *Tectocepheus cuspidentatus* Knülle, 1954.

16. *Tectocepheus tenuis* Knülle, 1954.

When Knülle (1954) established *Tectocepheus tenuis*, he mentioned three features by which the species can be distinguished from *Tectocepheus velatus* Berlese, 1895. These are the small size of the specimens, the much longer median lyrifissures (in a relative as well as in an absolute sense) and the shape of the lamellae, especially the medial sides of the lamellar cusps, which slant obliquely towards the front. As Knülle (1954) himself states, these specimens could be regarded as varieties of *Tectocepheus velatus*.

17. *Tectocepheus translamellatus* Knülle, 1954.

Apart from the usual generic characteristics, the lamellae of this species are connected by a very broad, concave translamella, resulting in the lamellar cusps being short and narrow. Behind the translamella the interlamellar space is finely punctated. In most species of the genus lyrifissures *im* are longer than the genu of leg I, but in *Tectocepheus translamellatus* these fissures are much shorter.

18. (*Tectocepheus vicarius* Balogh, 1958), nom. dub.

Without giving an accompanying figure, Balogh (1958) briefly described *Tectocepheus vicarius* with the following features: sensilla long and fusiform, interlamellar seta as well as all the notogastral seate short and thick, lamellar seta acute curving medially, the rostrum obtuse and the hysterosoma granulated. He also drew attention to the fact that *Tectocepheus vicarius* Balogh, 1958 and *Tectocepheus velatus* Berlese, 1895 closely resemble each other. His description is rather vague and gives no definite indications of the morphological features of the species. With the exception of the rounded rostrum, which cannot be considered as a very significant difference, all the characteristics mentioned for *Tectocepheus vicarius* can also be applied to *Tectocepheus velatus*. If the large degree of variability within the genus is taken into consideration, it seems justifiable to regard *Tectocepheus vicarius* Balogh, 1958 as a nomen dubium. Apparently Sellnick (1960) and Johnston (1965) are of the same opinion, for they both exclude *Tectocepheus vicarius* from their respective publications on species belonging to the genus *Tectocepheus* Berlese, 1895.

19. *Tectocepheus knullei* Vanek, 1960.

=*Tectocepheus triangulatus* Knülle, 1954, nom. nud.

In 1954 Knülle named, but did not describe or illustrate the species *Tectocepheus triangulatus*. It consequently became a nomen nudum in accordance with the International Code of Zoological Nomenclature. Vanek (1960) subsequently described the specimens of Knülle as *Tectocepheus knullei*. One of the most striking features of this species is the shape of its lamellae and lamellar cusps. Medially each lamellar cusp forms an almost triangular tooth, the teeth being directed towards each other. Without touching the rostrum, the well developed lamellae bend downwards anteriorly and laterally. Other prominent characteristics are the three arches on the anterior border of the rostrum, the two ledges which divide the dorsal surface of the rostrum into three regions, and the absence of any notogastral setae.

The figures and descriptions of the species and varieties as given by the various authors, suggest that the genus *Tectocepheus* Berlese, 1895 is composed of well-defined taxa. However, in practice it is difficult to distinguish between the different taxa (Trägårdh, 1910; Jacot 1937; Hammer 1958, 1961, 1962a, 1962b). So much so that Hammer (1958) remarked: "I am unable at present to separate the species, neither by outer appearance nor by details of the rostrum with its surroundings, etc. . . .". As the systematic characteristics of most *Tectocepheus* taxa differ only in quantative respects from those of *Tectocepheus velatus* Berlese, 1895, confusion exists concerning the validity of the different species and varieties of the genus *Tectocepheus* Berlese, 1895. Mayr et al. (1953) are of the opinion that the most practical diagnostic characteristics are those "with but slight variability". However, structures such as the lamellae and the sensillae, on which most earlier workers based their descriptions, vary

considerably, even in the same individual. Different species of the same genus are often found together in the same locality (cf. Knülle, 1954). Haarløv (1942, 1952) regarded all the species and varieties of *Tectocepheus* described prior to 1942, with the exception of *Tectocephus alatus* Berlese, 1913, as varieties of *Tectocepheus velatus* Berlese, 1895. In 1957 he remarked that he also considers the more recently described *Tectocephus concurvatus* Knülle, 1954, *Tectocepheus coniunctus* Knülle, 1954 and *Tectocepheus translammelatus* Knülle, 1954 as abnormal or exceptional varieties of *Tectocepheus velatus*.

According to Hammer (1958) "there must be several species, even if we may not yet have found the way to separate them". This problem may perhaps be solved by studying the chaetotaxy of the legs in order to find additional means of distinguishing between the different taxa. For establishing a natural system of classification, a study of the ontogenetic stages should also be undertaken, so that taxa can be cross-checked on immature as well as on adult features. It is obvious in any case that further studies are necessary to elucidate the systematic position of the different taxa of the genus *Tectocepheus* Berlese, 1895. For the present, the taxa discussed above are adhered to by the present author, in spite of views held by Haarløv.

Only one species of this genus *Tectocepheus sarekensis* (Trägardh, 1910) Balogh, 1943, has been collected in large numbers in the Republic of South Africa.

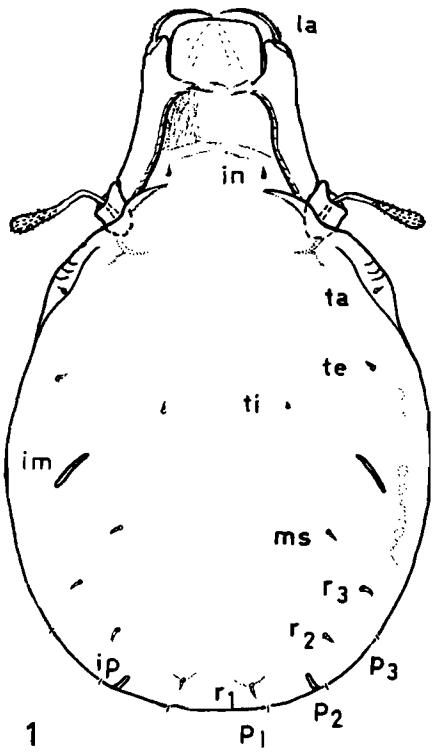
REDESCRIPTION OF TECTOCEPHEUS SAREKENSIS (TRÄGARDH, 1910) BALOGH, 1943.

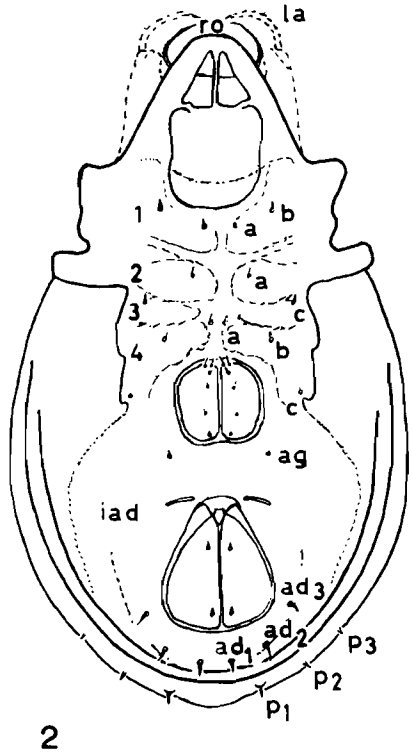
For the advancement of taxonomic study, it is important that hitherto poorly described forms should be redescribed. This will be done in the case of *Tectocepheus sarekensis* (Trägardh, 1910) Balogh, 1943 of which meagre descriptions and inadequate figures exist. With the exception of Grandjean's redescription (1962) of *Tegeocranellus laevis* Berlese, 1913, no attention has yet been given to the chaetotaxy of the legs of any other member of the family Tectocepheidae Grandjean, 1953. With a view to finding additional characteristics to distinguish between closely related taxa special attention will be given in the present study to the chaetotaxy of the legs. As the ontogenetic development of the legs could not be studied, the possibility that some leg setae may be titled wrongly cannot be excluded. Still, the results obtained in this connection must be regarded as an effort to increase the knowledge not only of the Tectocepheidae Grandjean, 1953, but also of the leg chaetotaxy of the Oribatei in general. The terminology of Grandjean is used.

Tectocepheus sarekensis (Trägardh, 1910) Balogh, 1943 is fairly common, and was collected throughout the Republic of South Africa. One thousand two hundred and forty three specimens were found in samples of plant material from one hundred and forty six different sites, especially in the sandy, arid regions of the Orange Free State (cf. Tuxen, 1943; Knülle, 1954; Woolley, 1960).

Measurements in μ:	*Plesiotype*	*Others*
Length	350	254-362
Breadth	208	153-214
Height	165	125-176

As shown by the measurements, the maximum length and breadth of *Tectocepheus sarekensis* (Trägardh, 1910) Balogh, 1943 correspond with those given by Knülle (1954). The minimum measurements, on the other hand, are considerably smaller (cf. Aoki, 1964).





Tectocepheus sarekensis (Trägardh, 1910) Balogh, 1943.

Figure 1. Dorsal view. *im*, median lyrifissure; *in*, interlamellar seta; *ip*, posterior lyrifissure; *la*, lamellar seta; *ms*, median seta; p_1-p_3, posterior setae; r_1-r_3, marginal setae; *ta*, anterior seta; *te*, exterior seta; *ti*, interior seta.

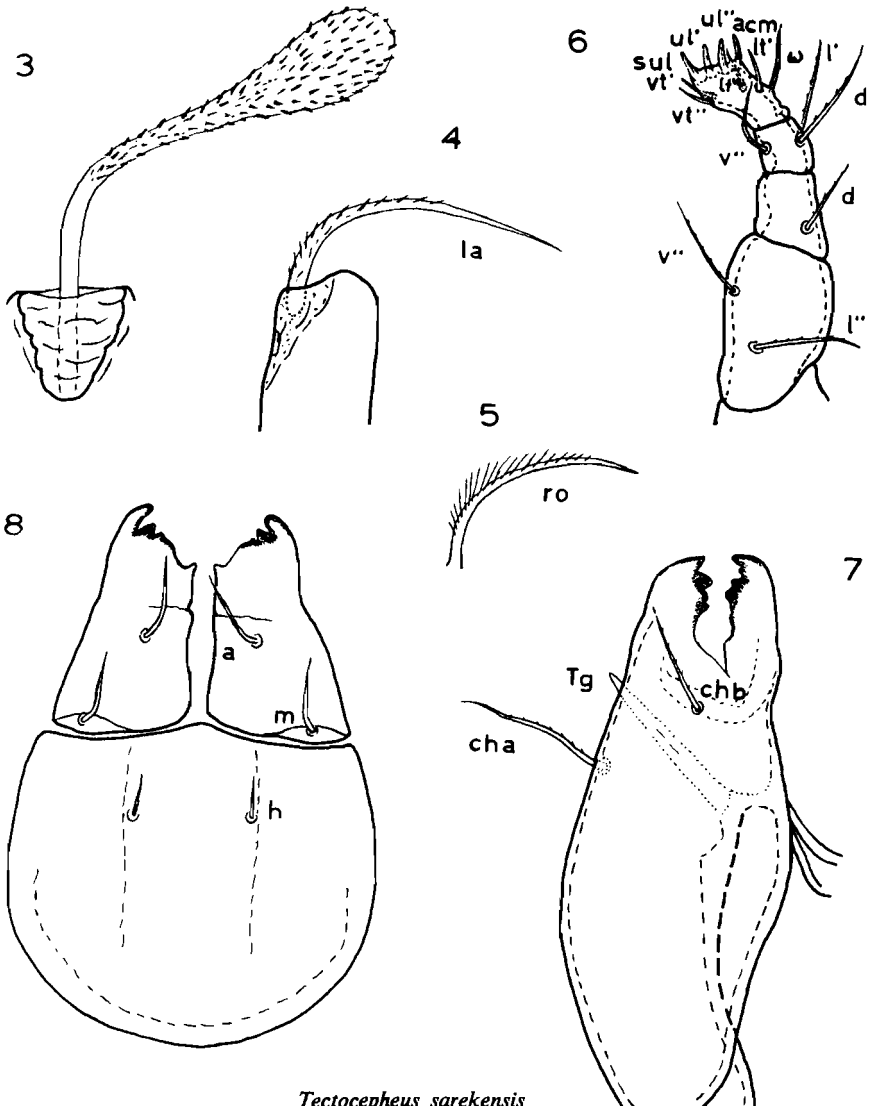
Figure 2. Ventral view. $a-c$, epimeral setae; ad_1-ad_3, adanal setae; *ag*, aggenital seta; *iad*, adanal lyrifissure; *la*, lamellar seta; p_1-p_3, posterior setae; *ro*, rostral seta; 1–4, epimeres.

Differential diagnosis

Medial and lateral edges of the lamellar cusps parallel; interlamellar space decorated with longitudinal striae.

Prodorsum (Figs. 1, 2 and 3-5)

Anteriorly the rostrum is round without any incisions. Seta *ro* is unilaterally barbed (Fig. 5), while *la*, inserted laterally on a chitinous thickening at the apex of the lamellar cusp, is unilaterally setose (Fig. 4). Both setae are curved medially. The lamellar cusps, to which particles of dirt usually adhere, are rounded apically. Their medial and lateral edges are parallel to each other. Behind the medially interrupted translamella, irregular, longitudinal striae occur in the interlamellar space. Two minute interlamellar setae *in* are situated near the bases of the well developed, marginal lamellae. Each spatula-shaped sensilla is 62 μ long, and is distally



Tectocepheus sarekensis

Figure 3. Sensilla and bothrydium.

Figure 4. Lamellar seta on the apex of the left lamellar cusp.

Figure 5. Left rostral seta.

Figure 6. Antiaxial view of the left pedipalp.

Figure 7. Lateral view of the right chelicera.

Figure 8. Ventral view of the infracapitulum. *a*, anterodorsal seta; *acm*, anteroculminal seta; *cha* and *chb*, cheliceral setae; *d*, dorsal seta; *h*, hypostomal seta; *l* and *lt*, lateral setae; *la*, lamellar seta; *m*, median seta; *ro*, rostral seta; *sul*, subultimal seta; *Tg*, Trägårdh's organ; *ul*, ultimal seta; *v* and *vt*, ventral setae; *w*, solenidion of the tarsus; ', paraxial; '', antiaxial.

covered with fine bristles (Fig. 3). Whereas the sensillae are directed postero-laterally, the cup-shaped bothrydia are directed anterolaterally. The notogaster overlaps the posterior parts of the bothrydia. The dorsosejugal suture is partly absent on the border between the prodorsum and notogaster.

Notogaster (Figs. 1 and 2)

The notogaster is longer than broad. On each shoulder a conspicuous humeral process is found. Its dorsal surface is slightly wrinkled. As shown in Fig. 1, ten pairs of small notogastral setae are present. As p_1-p_3 are inserted ventrally, they are hardly discernible from the dorsal side. Lyrifissure *im*, 25 μ long, is situated dorso-laterally in the middle of the notogaster. It slants obliquely towards the front. Lyrifissures *ip* and *ips* are each about half the length of *im*. Dorso-laterally the notogaster is microsculptured by muscular impressions.

Ventral plate (Fig. 2)

Three pairs of adanal ad_1-ad_3 and one pair of aggenital setae *ag* are present on the ventral plate. The latter setae are usually very small, and sometimes only their alveoli may be seen. Lyrifissure *iad*, directed almost laterally, is situated near the anterior border of the anal plate. A small preanal organ can be seen immediately in front of the anal plates. As usual two pairs of anal setae occur on the anal plates. Each genital plate, on the other hand, bears six minute genital setae. Of these the two anterior ones are inserted next to each other, while the four posterior setae are spaced evenly along the inner edge of the genital plate. The number of setae on the genital plates corresponds to Grandjean's diagnosis (1953) of the family Tectocepheidae. According to Knülle's diagnosis (1954) of the genus *Tectocepheus* Berlese, 1895, however, there should be only four pairs of setae.

Podosoma (Fig. 2)

The setal formula of the four epimeres is 2-1-1-3. All these setae are minute. Between the second and third acetabula a chitinised, v-shaped pedotectum is present. In the region above the insertions of legs III and IV, a granulous or nodulous area is present.

Gnathosoma (Figs. 6-8)

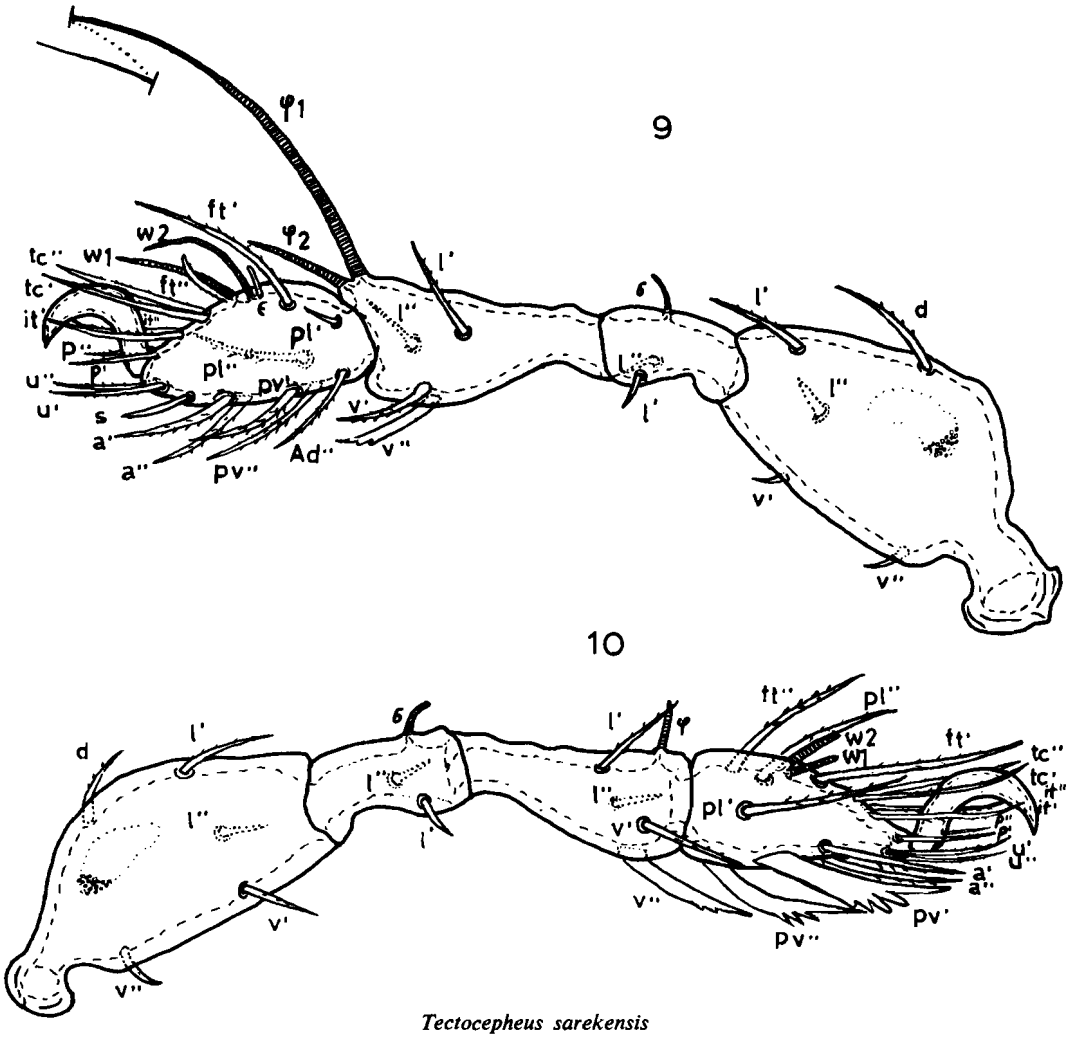
Two thin, rather short hypostomal setae *h* are present on the upper third of the hypostome. On the broad anterior part of each maxilla, three darkly coloured, chitinised teeth are situated. Whereas *m* is situated posterolaterally, *a* is inserted anteriorly, near the inner edge of the maxilla. They are both glabrous, and bend sharply forwards near their bases.

Both *cha* and *chb* are barbed (Fig. 7). Seta *cha* is spiral-shaped. As usual Trägårdh's organ *Tg*, which is weakly chitinised and cone-shaped, is situated on the medial side of the chelicera.

The setal formula of the pedipalp is 0-2-1-3-9 (Fig. 6). With the exception of the setal pairs *vt* and *lt*, four eupathidial setae *acm*, *ul'*, *ul"* and *sul*, and a free solenidion ω occur on the rather narrow tarsus. All the setae of the other podomeres are finely barbed, and are inserted in their normal positions.

Legs (Figs. 9-12)

A single well developed claw is present on each tarsus. An antero-dorsal process of tibia I



Tectocepheus sarekensis

Figure 9. Paraxial view of the first right leg.

Figure 10. Paraxial view of the second left leg. *a*, anterolateral seta; *Ad*, additional seta; *d*, dorsal seta; *ft*, fastigial seta; *it*, iteral seta; *l*, lateral seta; *p*, proral seta; *pl*, primilateral seta; *pv*, primiventral seta; *s*, subunguinal seta; *tc*, tectal seta; *u*, unguinal seta; *v*, ventral seta; ε, famulus; $\omega_1-\omega_2$, solenidia of the tarsus; $\varphi_1-\varphi_2$, solenidia of the tibia; σ, solenidion of the genu; ', paraxial; '', antiaxial.

extends over the posterior part of the adjoining tarsus. All the genua are of similar shape and size. Paraxial porous areas with large, accentuated pores are present on both trochanters of legs III and IV and on all the femora. Whereas the porous areas of femora I and II are long and kidneyshaped, those of femora III and IV are much smaller and almost circular. A progressive reduction of the number of setae is present from the first to the fourth legs.

The solenidion formulae are:

I: 0-1-2-2; II: 0-1-1-2; III: 0-0-1-1-0; IV: 0-0-1-1-0.

Solenidia ω_1 and ω_2 of tarsus I, each having a length of 12μ, are about three times longer than those of tarsus II. Both solenidia φ_1 and φ_2 are inserted on the antero-dorsal process of tibia I. Whereas solenidion φ_2 is short (12μ) and straight, φ_1 is extremely long (87μ), and curves towards the front. Tibiae II, III and IV each bears a single, short (7μ), erect solenidion φ on the anterior third of the podomere. Each genu, on the other hand, possesses a short, slightly curved solenidion σ on the anterior half of the podomere.

Leg I (Fig. 9)

Setal formula: 1-5-2-4-19-1. With the exception of the short and smooth *pl'* all the setal pairs of the tarsus are finely barbed and inserted in their normal positions. Seta *ft"* is much shorter than the corresponding seta on the paraxial side. A famulus and an eupathidial subunguinal seta, situated dorsally and ventrally respectively, are always present. A single, barbed additional seta is inserted on the antiaxial side behind the primiventral pair. The tibia bears four setae. These are setae *l'* and *v'* which are barbed, *l"* which is smooth, and *v"* which is rather thick and has two short, blunt spines at its distal end. As usual the genu possesses only two short lateral setae. The femur bears a sturdy, barbed dorsal seta, two thin ventral setae and two lateral setae. Of the latter *l"* is smooth, short and thorny, while *l'* is barbed and about twice as long as *l"*.

Leg II (Fig. 10)

Setal formula: 1-5-2-4-16-1. Although they are both very thick and dentated, *pv"* is slightly less developed than *pv'*. In contrast to the short and smooth *pl'* of leg I, *pl'* of this leg is long and barbed. Seta *v"* of the tibia is about twice as thick as the corresponding seta on the tibia of leg I. All the other setae of leg II, with the exception of *Ad*, ε and *s*, which are lacking, are exactly similar to those of leg I.

Leg III (Fig. 11)

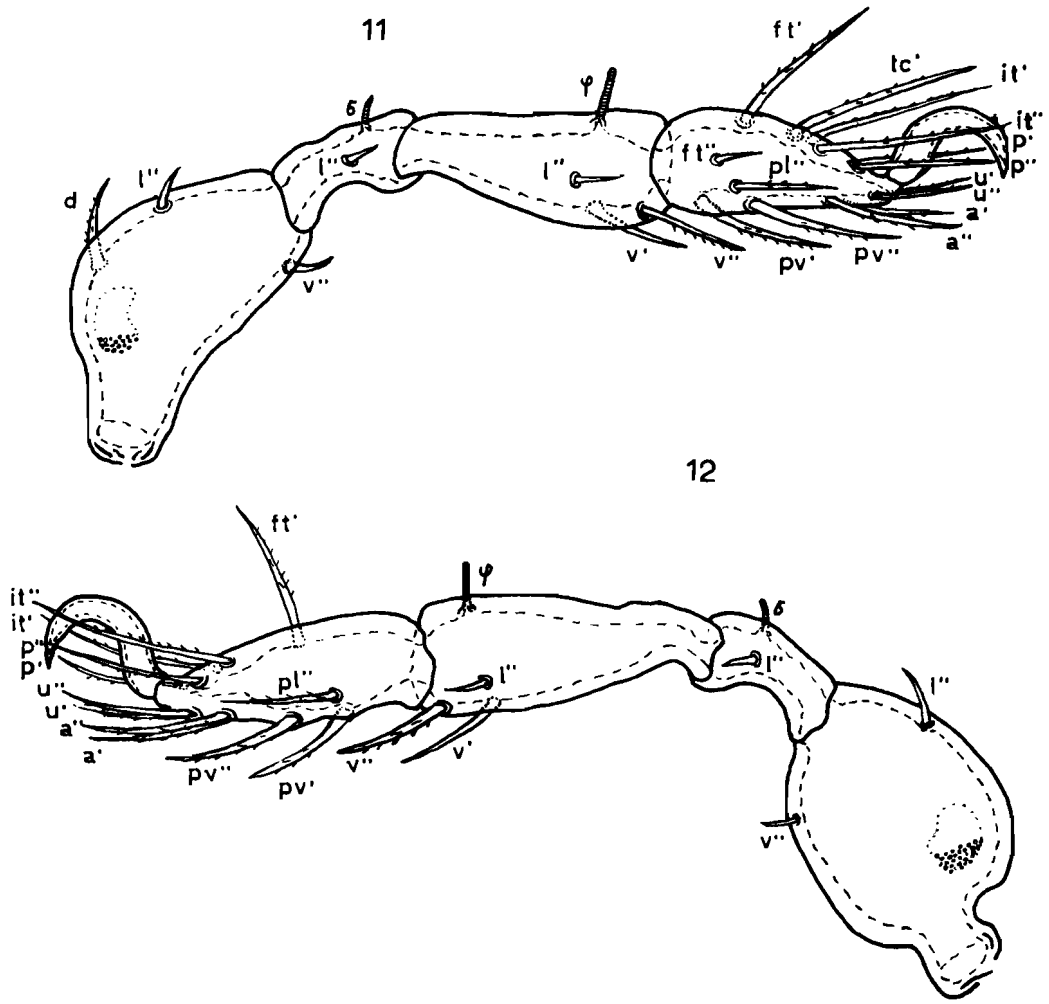
Setal formula: 2-3-1-3-14-1. Instead of its usual dorsal position, *ft"* is inserted rather low down on the lateral side. It is the only seta on the tarsus which is short and smooth. Apart from *tc"* which is absent, all the other paired setae are barbed and situated in their normal positions. Seta *v'* is smooth, while *v"* is barbed. Because this leg (as well as leg IV) is directed backwards, it follows that *v'* of the tibia and *pv'* of the tarsus are both inserted posteriorly to their corresponding setae on the antiaxial side. Both the tibia and the genu lack *l'*. On the femur *d* is barbed, while *l"* and *v"* are thin and glabrous.

Leg IV (Fig. 12)

Setal formula: 1-2-1-3-12-1. As the setal formula indicates, a further reduction of setae occurs. The tarsus lacks *ft"*, *tc'* and *tc"*, while the femur and the trochanter lack one seta each. In other respects, the chaetotaxy of this leg is similar to that of leg III.

GENUS **TEGEOCRANELLUS** BERLESE, 1913

Type: *Tegeocranus laevis* Berlese, 1905.



Tectocepheus sarekensis

Figure 11. Antiaxial view of the third left leg. (Trochanter excluded.)

Figure 12. Antiaxial view of the fourth right leg. (Trochanter excluded.) *a*, anterolateral seta; *d*, dorsal seta; *ft*, fastigial seta; *it*, iteral seta; *l*, lateral seta; *p*, proral seta; *pl*, primilateral seta; *pv*, primiventral seta; *tc*, tectal seta; *u*, unguinal seta; *v*, ventral seta; φ, solenidion of the tibia; σ, solenidion of the genu; ', paraxial; '', antiaxial.

Berlese instituted the genus *Tegeocranellus* in 1913, and assigned *Tegeocranus laevis* Berlese, 1905 to it as type. In giving the generic diagnosis, he mentioned the distinct dorso-sejugal suture, the large lamellae and the claviform femora.

As is usually the case with Berlese, his description of 1905 is markedly insufficient, but a figure of his *Tegeocranus laevis* was later published (Berlese 1910). Although the figure is

rather small, it is concise. The shape leaves no doubt that *Tegeocranus laevis* Berlese, 1905 is actually a *Tegeocranellus* Berlese, 1913.

Due to the inadequate description of *Tegeocranellus laevis* Berlese, 1913 by Berlese in 1905, Grandjean redescribed the species in 1962. However, he did not use the original specimen of Berlese, and the possibility therefore exists that Grandjean did not redescribe *Tegeocranellus laevis* at all. Whatever the case may be, Grandjean (1962) gave a complete description of the supposed *Tegeocranellus laevis* Berlese, 1913. The downwards bending lateral edges of the lamellae, the characteristic shape of the sensillae, the lenticular area, the lamellar canal, and the close proximity of the anal and genital plates can be considered as the most striking features of this species.

Although Berlese (1913) included the presence of claviform femora in his description of *Tegeocranellus*, Grandjean (1962) showed that this is not the case with *Tegeocranellus laevis*. There is a further difference between the two descriptions. In contrast to Berlese's figure of his *Tegeocranus laevis* (1910) in which no setae are indicated, Grandjean (1962) stated that ten pairs of notogastral setae are present.

Tegeocranellus Berlese, 1913 cannot be considered as a representative of the family Tectocepheidae Grandjean, 1953. The broad lamellae, absence of a translamella, shape of the sensillae, presence of a lenticular area and the circular shape, form an exceptional combination of characteristics atypical of the Tectocepheidae Grandjean, 1953 and peculiar to *Tegeocranellus* alone. According to Grandjean (1962) it also shows possible affinities to genera such as *Carabodes* Koch, 1836, *Cepheus* Koch, 1836, *Xenillus* Robineau-Desvoidy, 1839, *Charassobates* Grandjean, 1929 and *Fortuynia* van der Hammen, 1960. Balogh's statements (1961b): "In allocating the genera to their respective families, I had to rely sometimes on intuition only . . .", and ". . . later investigators will surely reallocate some of the genera to other families", indicate that it is advisable that the position of the genus *Tegeocranellus* Berlese, 1913, in the Tectocepheidae should be reconsidered.

DESCRIPTION OF TEGEOCRANELLUS KNYSNAENSIS N. SP.

Four hundred and eight specimens were found in samples of plant debris from twenty different sites. Apparently the species occurs only in evergreen forests, such as are found in the coastal regions of the Cape Province near Knysna and in Magoebaskloof in the Northern Transvaal.

Measurements in μ:

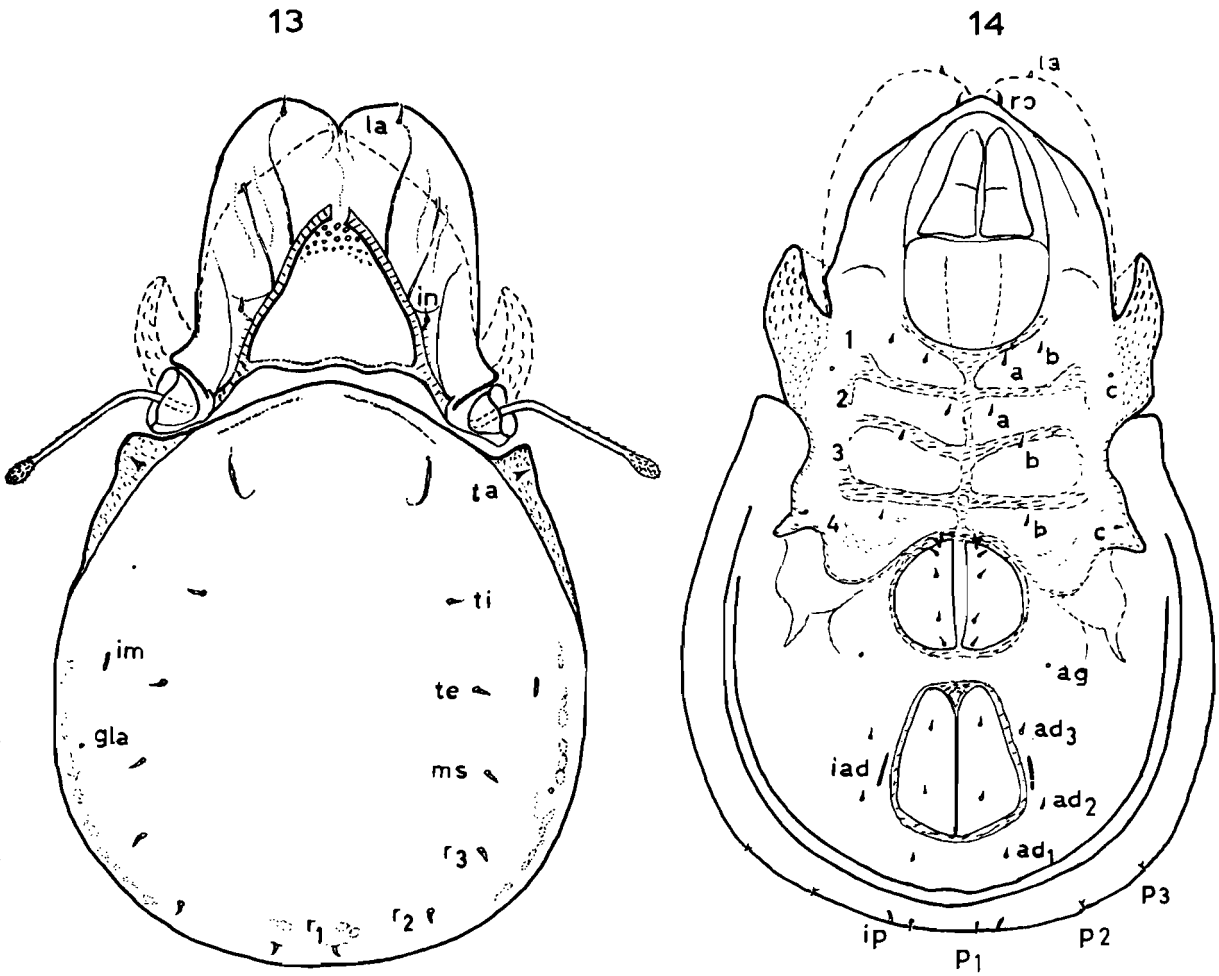
	Holotype	*Others*
Length	274	246-301
Breadth	165	149-184
Height	139	129-157

Differential diagnosis:

Small size; lamellae touching apically; transverse line with three arches; absence of 4*a*; setae *pv'* of tarsi I and II barbed; setae *l'* and *v'* of tibiae I and II glabrous.

Prodorsum (Figs. 13-15)

Very large, anteriorly rounded lamellae extend beyond the tip of the rostrum. They meet apically in the median line. A blunt toothlike process, directed laterally, is situated in front



Tegeocranellus knysnaensis n. sp.

Figure 13. Dorsal view. *gla*, latero-abdominal gland; *im*, median lyrifissure; *in*, interlamellar seta; *la*, lamellar seta; *ms*, median seta; r_1—r_3, marginal setae; *ta*, anterior seta; *te*, exterior seta; *ti*, interior seta.

Figure 14. Ventral view. *a-c*, epimeral setae; ad_1—ad_3, adanal setae; *ag*, aggenital seta; *iad*, adanal lyrifissure; *ip*, posterior lyrifissure; *la*, lamellar seta; p_1—p_3, posterior setae; *ro*, rostral seta; 1-4, epimeres.

of the bothrydium at the base of each lamella. Laterally the free edges of the lamellae bend downwards, becoming thinner at the same time. Very often the front legs are stretched out next to the prodorsum underneath this protective lamellar covering. The upper surfaces of the lamellae are faintly undulating. No trace of a translamella is present.

Whereas the two minute lamellar setae *la* are situated anteriorly on the dorsal surface of the lamellae, the short interlamellar setae *in* are inserted near the inner edge of each lamella.

In the lamellar chitin, the alveolus of *la* is connected with the interior of the body by an s-shaped canal. The corresponding canal of *in* is naturally much shorter. Between the latter two canals a third one runs postero-medially from its slightly distended distal end. According to Grandjean (1962) this canal may be a lyrifissure or an overflow of a gland. It may have a respiratory function or may lead either to a solenidion or to an alveolus of a reduced seta. A small, granulous area occurs apically in the almost triangular interlamellar space. The transverse line has three distinct arches, and is prolonged laterally, rejoining the medial borders of the bothrydia. The two minute rostral setae *ro*, which curve slightly inwards and are situated on the apex of the rostrum, can clearly be seen from the ventral side.

Both cup-shaped bothrydia are directed laterally. The sturdy sensillae curve slightly postero-laterally. The actinochitinous part of the sensillae are setose, while the stalks are very finely barbed (Fig. 15).

Notogaster (Figs. 13-14)

As illustrated in Fig. 13, the notogaster is circular with a distinctly rounded dorsosejugal suture. On each shoulder a conspicuously wrinkled tubercle is present. A large, lightly coloured lenticular area, limited laterally by two grooves, is situated antero-medially on the notogaster. Ten pairs of notogastral setae are present, of which pair *ta* is inserted on the front part of each tubercle. Setae *ti*-r_1 are spaced evenly, with r_1 inserted on a small semilunar ridge. The setal series *p* is inserted ventrally. There are four pairs of lyrifissures, of which *im* is situated halfway between *te* and the dorsal notogastral margin in the middle of the notogaster. Lyrifissure *ip* is present ventrolaterally to p_1. On account of the microsculpture of the lateral muscular impressions, *ih* is difficult to see. Lyrifissure *ips* is situated lower down and further backwards than *ih*.

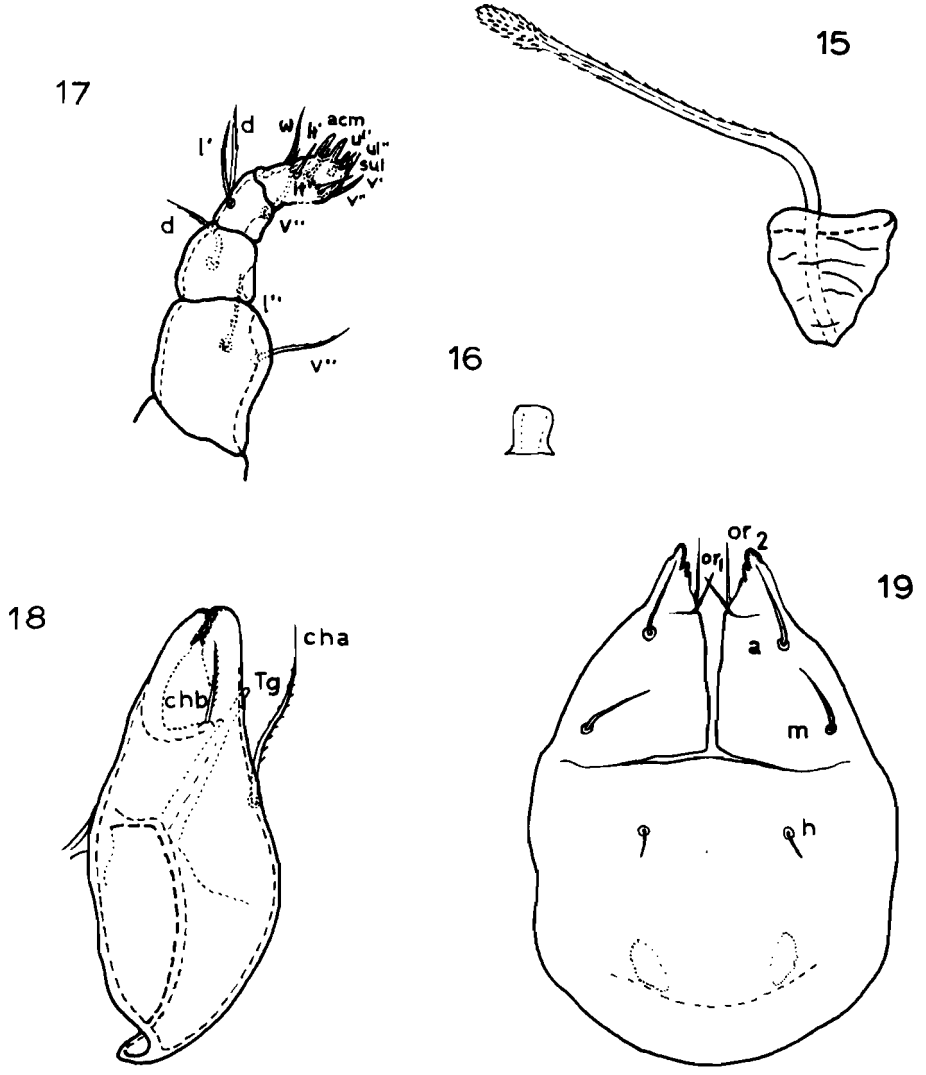
Ventral plate (Fig. 14)

The anal and genital plates are situated near to each other. Both are encircled by dark, chitinous edges. Whereas the anal plates bear two pairs of anal setae each, the genital plates have six pairs of genital setae, situated in a row along the inner edge of each genital plate. In front of the anal plates the small and darkly coloured pre-anal organ (Fig. 16) can be seen clearly. Three pairs of adanal setae ad_1-ad_3 are present on the ventral plate. Seta ad_2 is inserted near the lateral corner of the anal plate. Setal pair *ag* is reduced. Only their alveoli can be seen. Lyrifissures *iad* are twice as long as any dorsal lyrifissure. They slant obliquely forwards, and are situated next to the posterior third of the anal plates.

Podosoma (Fig. 14)

Five darkly coloured edges marginate the four epimeres of which the fourth one is microsculptured by muscular impressions. A small cavity is present in the sternum between epimeres 3 and 4. The setal formula of the epimeres is 2-2-1-2. All the setae are minute. Only the alveolus of *2c* can be seen at the base of pedotectum I, on the same level as the second epimeral edge. Seta *4c* is found near the base of a toothlike process, the discidium, in front of the fourth leg.

Acetabulum I is covered by a large pedotectum, of which the lower section is rugose. Posteriorly the wrinkles shorten and change to a simple granulous sculpture. The upper part



Tegeocranellus knysnaensis n. sp.

Figure 15. Sensilla and bothrydium.

Figure 16. Pre-anal organ.

Figure 17. Paraxial view of the left pedipalp.

Figure 18. Lateral view of the left chelicera.

Figure 19. Ventral view of the infracapitulum. *a*, anterodorsal seta; *acm*, anteroculminal seta; *cha* and *chb*, cheliceral setae; *d*, dorsal seta; *h*, hypostomal seta; *l* and *lt*, lateral setae; *m*, median seta; or_1-or_3, oral setae; *sul*, subultimal seta; *Tg*, Trägardh's organ; *ul*, ultimal seta; *v* and *vt*, ventral setae; ω, solenidion of the tarsus; ', paraxial; '', antiaxial.

of the pedotectum is smooth and forms a finger-shaped process. An aperture is always present between these two sections. Between the base of the pedotectum and the acetabulum II, an oblong area with a smooth surface can be seen. A similar area occurs between leg III and IV, extending to the top of acetabulum III. Dorsally this area is bordered by a semilunar nodulous or granulous region.

Gnathosoma (Figs. 17-19)

Two rather small hypostomal setae *h* are situated on the upper third of the hypostome. The maxillae are broad at their bases, attenuating rapidly towards the front. Setae *a* and *m* are inserted marginally. Both are smooth, and bend sharply inwards near their bases. Two pairs of thin and pointed oral setae or_1 and or_2 are present. Setae or_1 cross each other apically.

As shown in Fig. 18, Trägårdh's organ *Tg* is cone-shaped. Both *cha* and *chb* are barbed. Seta *cha* is spiral-shaped and twice as long as *chb*.

The setal formula of the pedipalp is 0-2-1-3-9 (Fig. 17). Four eupathidial setae and a free solenidion occur on the rather narrow tarsus. All the other setae are inserted in their normal positions.

Legs: (figs. 20-23).

All the legs are monodactyle. As usual all the genua are of similar shape and size. Narrow porous areas with large, accentuated pores are present on the trochanters. Femora I to IV also possess such areas. Those of femora I and II are situated latero-dorsally on the paraxial, anterior half of each podomere in front of the dorsal setae. The porous areas of femora III and IV, on the other hand, are situated on the posterior half of each podomere. On the anti-axial side ventro-lateral laminae are present on all the femora. A reduction of the number of setae occurs from leg *I* to leg *IV*.

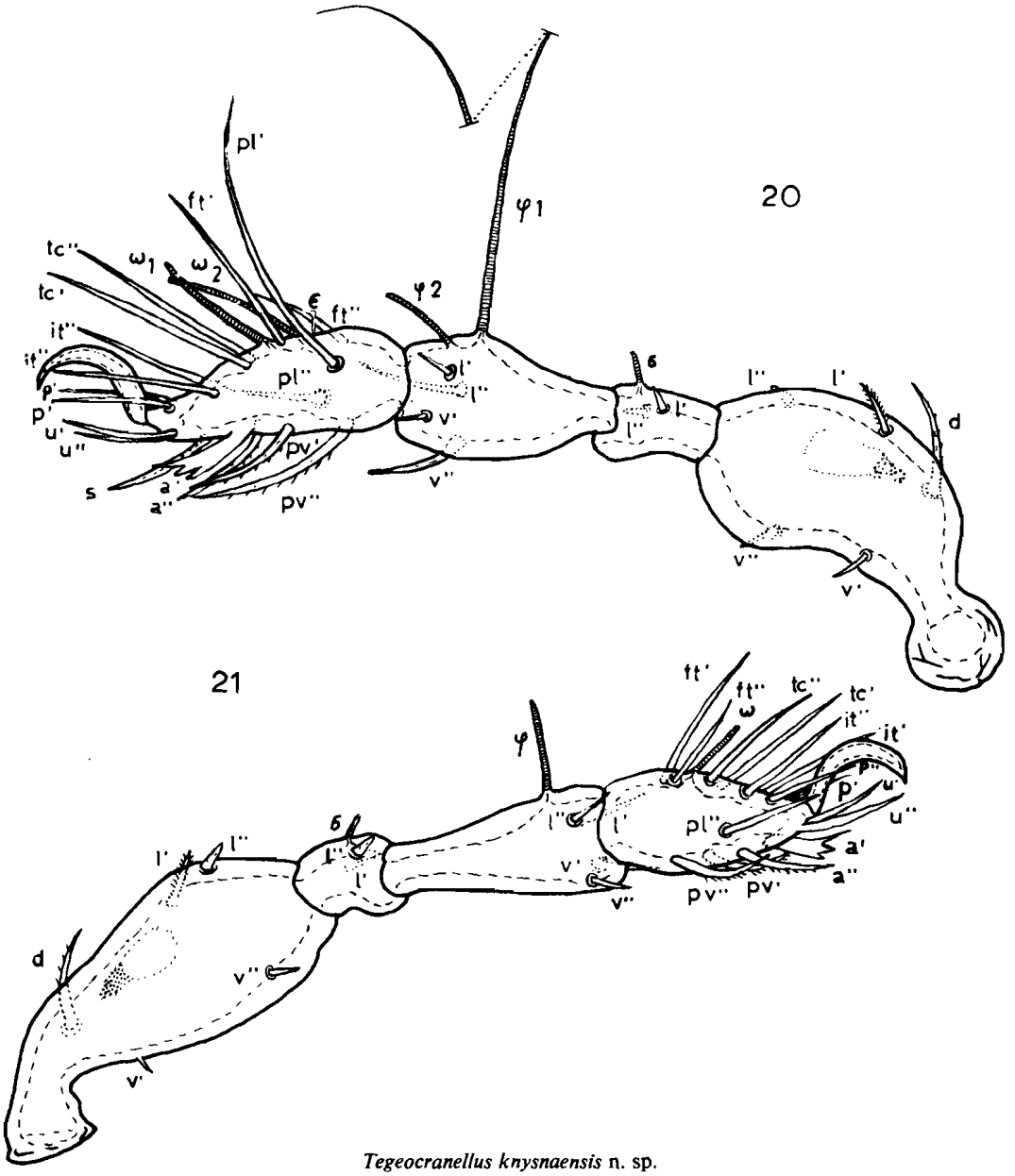
The solenidion formulae are:

I: 0-1-2-2; II: 0-1-1-1;
III: 0-0-1-1-0; IV: 0-0-0-1-0.

Solenidia ω_1 and ω_2 are slightly longer than the single solenidion on tarsus II. Solenidia φ of all the tibiae are inserted on the anterior third of each podomere. With the exception of φ_1 I, which is extremely long (76μ), tactile and acuminated, the other tibial solenidia diminish in length from 17 to 9μ in the first to the fourth tibiae. All the solenidia of genua I-III are short. Solenidion σ IV is entirely absent.

Leg I (Fig. 20)

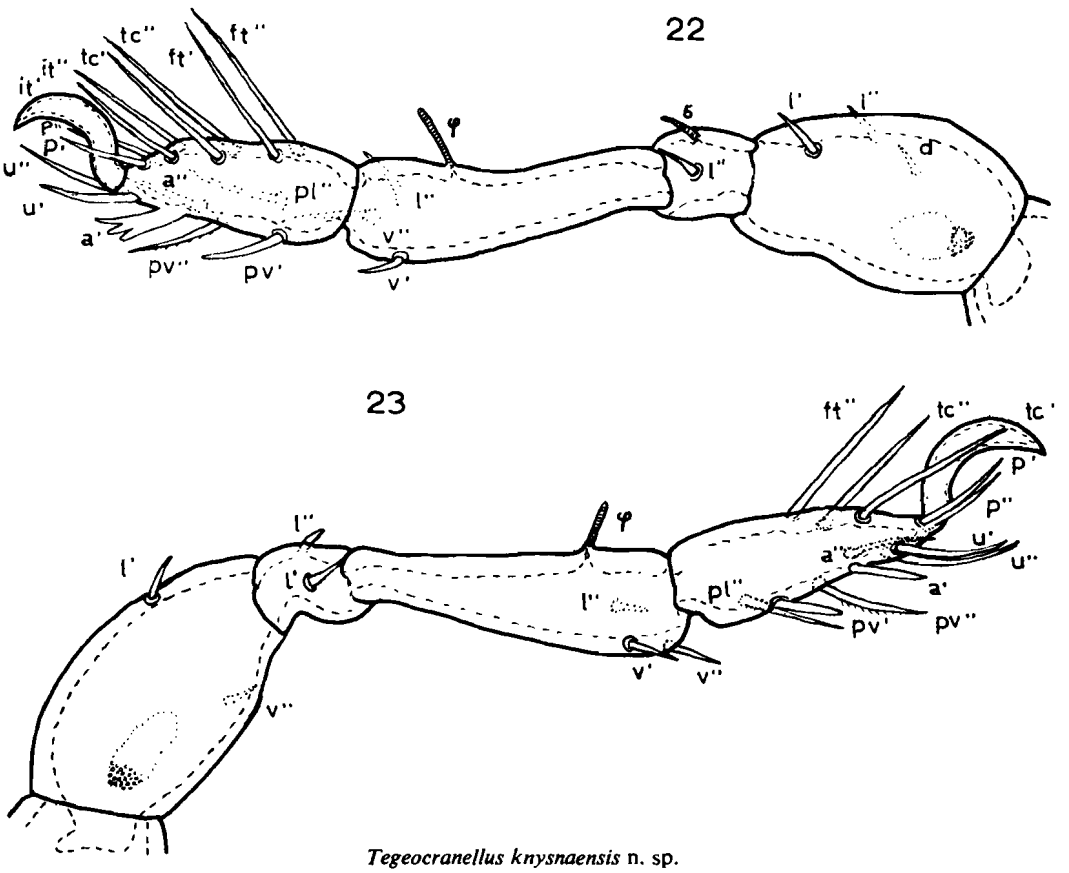
Setal formula: 1-5-2-4-18-1. Apart from *a* and *pv*, all the paired setae of the tarsus are smooth and acute and are inserted in their normal positions. Setae *pv'*, *pv''* and *a''* are barbed. Seta *a'* is very thick and has three spines of which the anterior one is acuminated and the other two obtuse. As is always the case, *s* is eupathidial, because it is implanted anterior to *a'* and *a''*. Dorsally the short famulus is always present and is slightly thickened at its distal end. On the tibia *l''* and *v''* are always longer than the corresponding setae on the paraxial side. The opposite is true of the setae of genu I of which *l''* is short and thorny. On the femur *l''* is similar to *l''* of the genu, while *l'* is plumose. In contrast with the short and smooth ventral setae, the single *d* of the femur is sturdy and barbed.



Tegeocranellus knysnaensis n. sp.

Figure 20. Paraxial view of the first right leg.

Figure 21. Antiaxial view of the second right leg. *a*, anterolateral seta; *d*, dorsal seta; *ft*, fastigial seta; *it*, iteral seta; *l*, lateral seta; *p*, proral seta; *pl*, primilateral seta; *pv*, primiventral seta; *s*, subunguinal seta; *tc*, tectal seta; *u*, unguinal seta; *v*, ventral seta; ε, famulus; $\omega_1-\omega_2$, solenidia of the tarsus; $\varphi_1-\varphi_2$, solenidia of the tibia; σ, solenidion of the genu; ', paraxial; '', antiaxial.



Tegeocranellus knysnaensis n. sp.

Figure 22. Paraxial view of the third left leg (Trochanter excluded).

Figure 23. Paraxial view of the fourth right leg (Trochanter excluded). *a*, anterolateral seta; *d*, dorsal seta; *ft*, fastigial seta; *it*, iteral seta; *l*, lateral seta; *p*, proral seta; *pl*, primilateral seta; *pv*, primiventral seta; *tc*, tectal seta; *u*, unguinal seta; *v*, ventral seta; φ, solenidion of the tibia; σ, solenidion of the genu; ', peraxial; '', antiaxial.

Leg II (Fig. 21)

Setal formula: 1-5-2-4-15-1. With the exception of *pl'*, ε and *s*, which are lacking, the chaetotaxy of this leg is similar to that of leg I in every respect.

Leg III (Fig. 22)

Setal formula: 2-3-1-3-15-1. Instead of being barbed as usually is the case, pv' of the tarsus is fusiform and glabrous. It is also inserted posteriorly to pv''. Both the tibia and the genu lack *l'*. Because this leg is directed backwards, *l'* actually corresponds to *l''* of the first two pairs of legs. Both *v'* and *v''* of the femur are absent. Seta *d* is short and smooth.

Leg IV (Fig. 23)

Setal formula: 1-2-2-3-12-1. As the setal formula indicates, a further reduction of setae,

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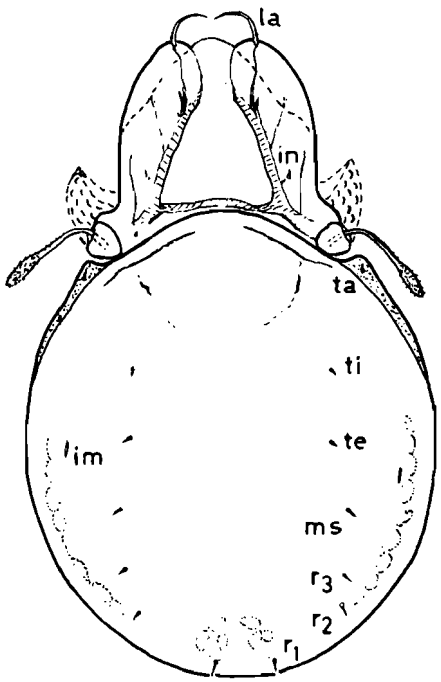

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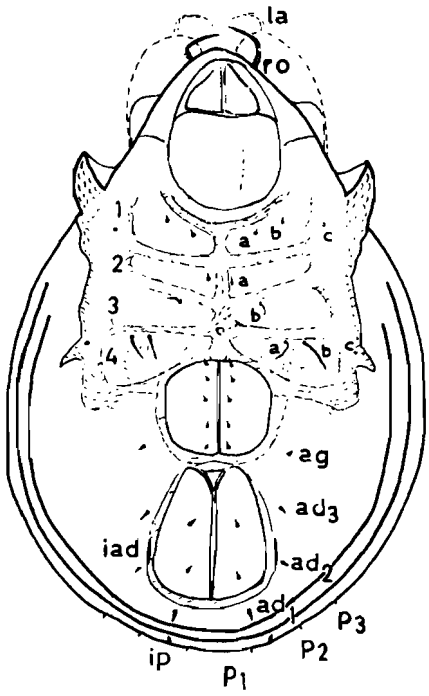


Tegeocranellus sacchareus n. sp.

Figure 24. Dorsal view. *im*, median lyrifissure; *in*, interlamellar seta; *la*, lamellar seta; *ms*, median seta; r_1-r_3, marginal setae; *ta*, anterior seta; *te*, exterior seta; *ti*, interior seta.

Figure 25. Ventral view. *a-c*, epimeral setae; ad_1-ad_2, adanal setae; *ag*, aggenital seta; *iad*, adanal lyrifissure; *ip*, posterior lyrifissure; *la*, lamellar seta; p_1-p_3, posterior setae; *ro*, rostral seta; 1-4, epimeres.

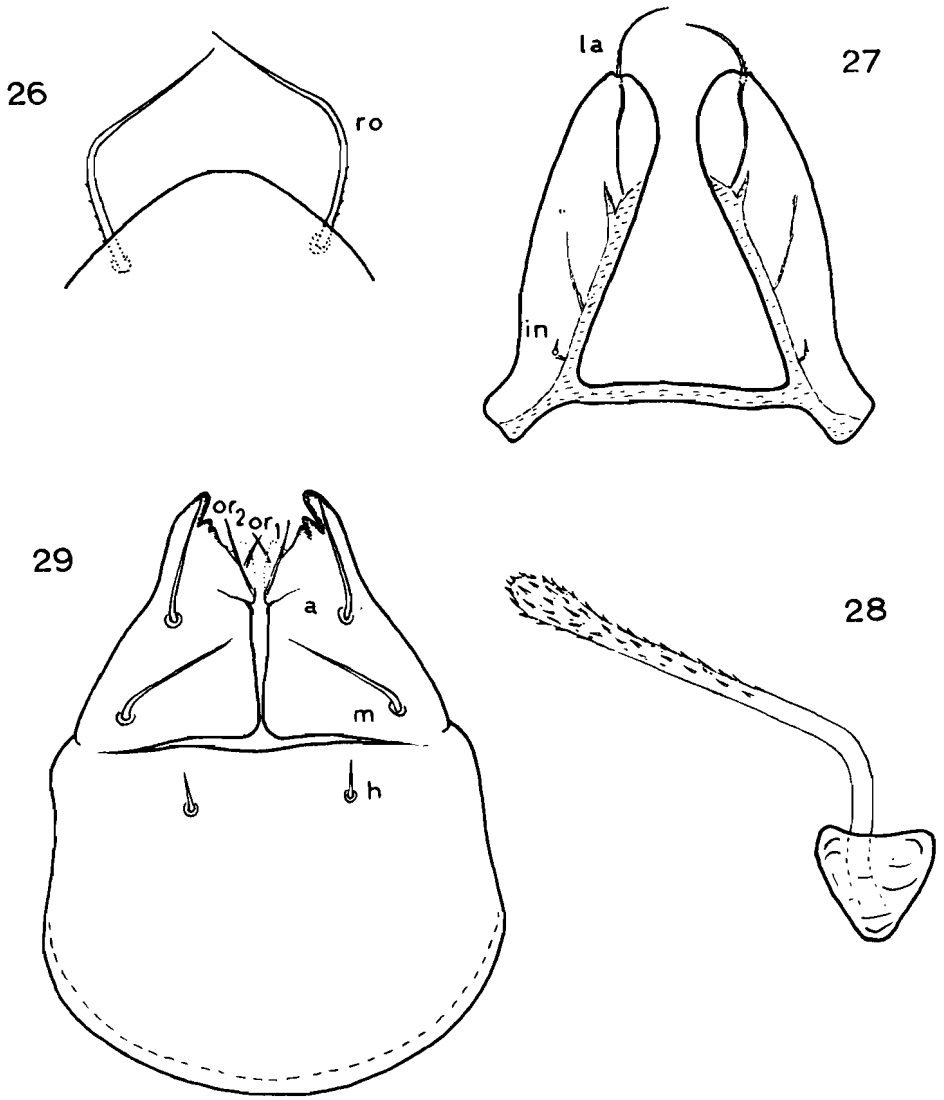
especially on the tarsus occurs. Three setae, *ft'*, *it'* and *it"* are absent on tarsus IV, while the femur and the trochanter lack only one seta each. The genu, on the other hand, possesses an extra *l"*. On the tarsus both *pv'* and *a'* are fusiform and glabrous. Seta *pl"* is inserted rather low down on the lateral side behind *pv'*.

Remarks

Apart from the characteristics given in the differential diagnosis, *Tegeocranellus knysnaensis* can be distinguished from *Tegeocranellus laevis* Berlese, 1913 (but not from *Tegeocranellus sacchareus* (see later)) by several prominent differences such as the small size, the shape of the sensillae, the small notogastral setae, and the plumose *l'* of femora I and II.

DESCRIPTION OF TEGEOCRANELLUS SACCHAREUS N. SP.

Forty four specimens from sixteen samples were collected, exclusively from a cultivated sugar-cane plantation near Kwa-Dlangezwa in Zululand.



Tegeocranellus sacchareus n. sp.

Figure 26. Rostral setae on the apex of the rostrum.

Figure 27. Dorsal view of the lamellae.

Figure 28. Sensilla and bothrydium.

Figure 29. Ventral view of the infracapitulum. *a*, anterodorsal seta; *h*, hypostomal seta; *in*, interlamellar seta; *la*, lamellar seta; *m*, median seta; or_1-or_2, oral setae; *ro*, rostral seta.

Measurements in μ

	Holotype	*Others*
Length	321	313-353
Breadth	208	208-239
Height	168	153-184

Differential diagnosis

Medium size; setae *la*, *ro*, *a* and *m* very long; two long setae, *4a* and *4b*, situated next to one another on epimere 4.

Since *Tegeocranellus sacchareus* resembles *Tegeocranellus knysnaensis* in many respects, only the dissimilarities are mentioned below.

Prodorsum (Figs. 24-28)

Apically the lamellae are well separated from each other (Figs. 24 and 27). Although *la* and *ro* are very long (32μ each) and curved medially, their tips do not meet (Figs. 25 and 26). At their bases they are set with fine setae. The transverse line between the bases of the lamellae is without three distinct arches.

Notogaster (Figs. 24-25)

The notogaster and notogastral setae are similar to those of *Tegeocranellus knysnaensis* in every respect.

Ventral plate (Fig. 25)

Seta *ag* is always present, and never reduced.

Podosoma (Fig. 25)

The setal formula of the epimeres is 2-2-1-3. Seta *3b* is long. Two long, curved setae, probably representing *4a* and *4b*, occupy an unusual position in the middle of the fourth epimere, posterior to the epimeral edge.

Gnathosoma (Fig. 29)

Setal pairs *a* and *m* are long in the present species.

Legs (Figs. 30-36)

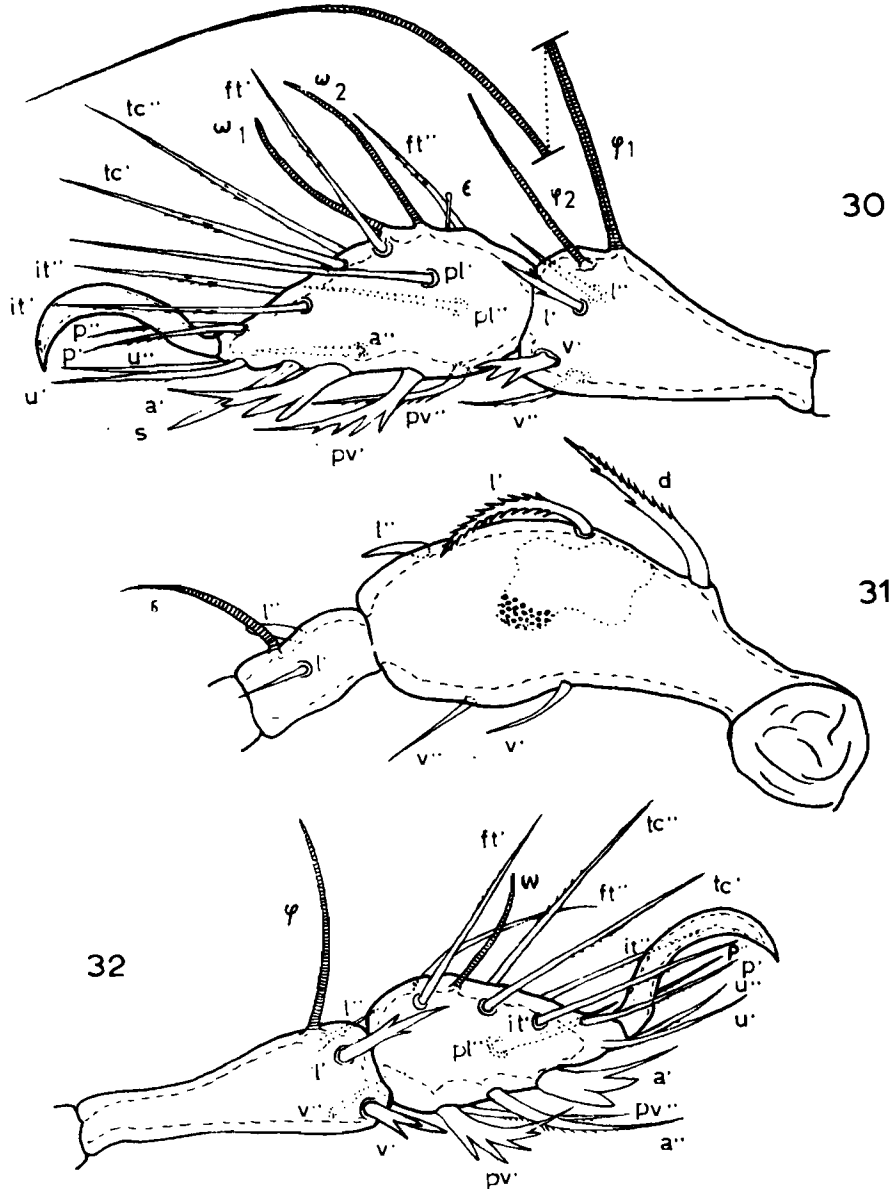
Each leg has a huge single claw. Long, narrow porous areas are present on femora III and IV.

Leg I (Figs. 30-31)

Apart from *a*, *pv* and *pl*, the medial parts of all the paired setae of tarsus I are very finely barbed. In contrast with *pv'*, which is thick and almost serrated, the thick *a'* has three or four blunt spines posteriorly and one acuminated spine anteriorly. Seta *pl'* does not curve upwards. Seta *v'* of the tibia has three sharp spines, while *l'* has two small spikes immediately above its centre. On the femur *d* is barbed unilaterally, and possesses two small spikes on the opposite side.

Leg II (Fig. 32)

Seta *pv'* is thick, *a'* is extremely so.



Tegeocranellus sacchareus n. sp.

Figure 30. Paraxial view of the tarsus and tibia of the first right leg.

Figure 31. Paraxial view of the genu and femur of the first right leg.

Figure 32. Paraxial view of the tarsus and tibia of the second left leg. *a*, anterolateral seta; *d*, dorsal seta; *ft*, fastigial seta; *it*, iteral seta; *l*, lateral seta; *p*, proral seta; *pl*, primilateral seta; *pv*, primiventral seta; *s*, subunguinal seta; *tc*, tectal seta; *u*, unguinal seta; *v*, ventral seta; ε, famulus; $\omega_1-\omega_3$, solenidia of the tarsus; $\varphi_1-\varphi_2$, solenidia of the tibia; σ, solenidion of the genu; ', paraxial; '', antiaxial.

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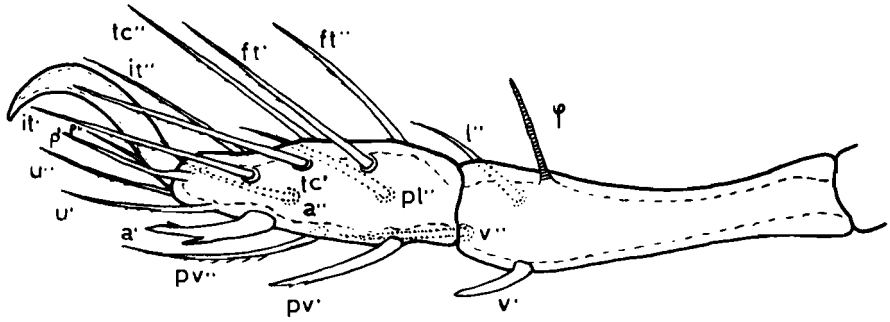

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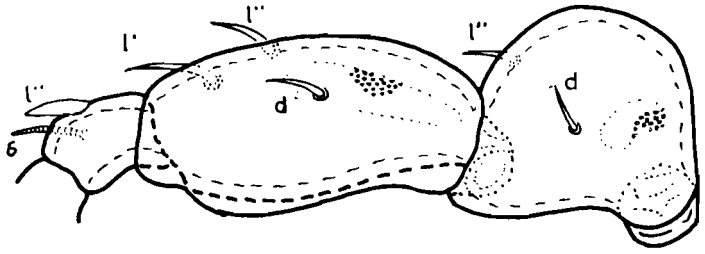


Tegeocranellus sacchareus n. sp.

Figure 33. Paraxial view of the tarsus and tibia of the third left leg.

Figure 34. Antiaxial view of the genu, femur and trochanter of the third right leg. *a*, anterolateral seta; *d*, dorsal seta; *ft*, fastigial seta; *it*, iteral seta; *l*, lateral seta; *p*, proral seta; *pl*, primilateral seta; *pv*, primiventral seta; *tc*, tectal seta; *u*, unguinal seta; *v*, ventral seta; φ, solenidion of the tibia; σ, solenidion of the genu; ', paraxial; '', antiaxial.

Leg III (Figs. 33-34)

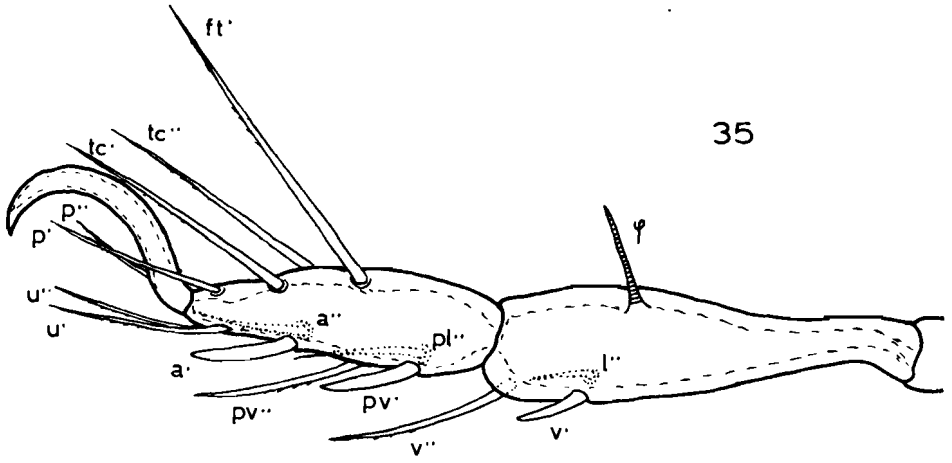
Seta *a'*, set with two acute spines, is quite thick. Distally *pv'* bears two short, blunt spines.

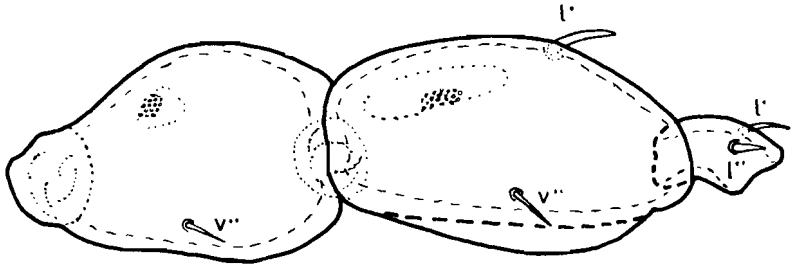
Leg IV (Figs. 35-36)

Seta *v''* is finely barbed.

Remarks

Tegeocranellus sacchareus possesses an unusual combination of characteristics, reminiscent in some respects of *Tegeocranellus laevis* Berlese, 1913 and in others of *Tegeocranellus knysnaensis*. Apart from its own prominent features, the separated lamellae and the chaetotaxy of leg I resemble those of *Tegeocranellus laevis* Berlese, 1913 whereas the setose sensillae and the small notogastral setae are features characteristic of *Tegeocranellus knysnaensis*.





Tegeocranellus sacchareus n. sp.

Figure 35. Paraxial view of the tarsus and tibia of the fourth left leg.

Figure 36. Antiaxial view of the genu, femur and trochanter of the fourth left leg. *a*, anterolateral seta; *ft*, fastigial seta; *it*, iteral seta; *l*, lateral seta; *p*, proral seta; *pl*, primilateral seta; *pv*, primiventral seta; *tc*, tectal seta; *u*, unguinal seta; *v*, ventral seta; φ, solenidion of the tibia; ', paraxial; '', antiaxial.

GENUS TEGEOZETES BERLESE, 1913

Type: *Tegeozetes tunicatus* Berlese, 1913.

When Berlese (1913) established the genus *Tegeozetes*, he twice drew attention to the similarities, particularly in shape, between this genus and the genus *Tectocepheus* Berlese, 1895. As the most important differences, which can also serve as generic diagnostic features of the genus *Tegeozetes* Berlese, 1913, he mentioned the distinct dorsosejugal suture and the well developed, downwards-bending "pteromorphae".

Only the genotype, *Tegeozetes tunicatus* Berlese, 1913, has been described as yet. Diagnostic features of this species are its rather thin, marginal lamellae almost reaching the tip of the rostrum, and the club-shaped, hairy sensillae. As its name "tunicatus" implies, the whole specimen, with the exception of the basal part of the prodorsum, is enveloped in a granulated cerotegument which contains pale, circular areoles.

No representatives of this genus have been collected in the Republic of South Africa.

GENUS **NODOCEPHEUS** HAMMER, 1958.

Type: *Nodocepheus dentatus* Hammer, 1958.

Hammer (1958) characterised this genus as having broad lamellae, very long lamellar cusps ending in large teeth, a distinct dorsosejugal suture, two very long tubercles on the anterior border of the hysterosoma, marginal notogastral setae, and pedotectum I with a long free tip furnished with teeth. Representatives of this genus are short and broad without any sculpture on the integument.

Only two species have been described for this genus, *Nodocepheus dentatus* Hammer, 1958 and *Nodocepheus hammerae* Balogh, 1961. *Nodocepheus dentatus* has rather short, flat and brushlike sensillae, becoming broader evenly towards the tip; large tubercles, each with two blunt knobs anteriorly; short and straight rostral setae and eight pairs of dorsal setae. *Nodocepheus hammerae* on the other hand, has longer, tufty sensillae; much larger tubercles, each with two toothlike processes on the outer edge and directed backwards; medially curved rostral setae bearing several small bristles; and six pairs of notogastral setae. In contrast with the straight, anteriorly and medially directed lamellar setae of *Nodocepheus dentatus*, *Nodocepheus hammerae* apparently has none. Furthermore, whereas *Nodocepheus hammerae* is relatively small, with correspondingly small ventral setae, the opposite is true of *Nodocepheus dentatus*.

In the Republic of South Africa no specimens of *Nodocepheus* Hammer, 1958 have been found.

(GENUS **LAMELLOCEPHEUS** BALOGH, 1961), nom. nud.

Type: *Tectocepheus personatus* Berlese, 1910.

Without giving an accompanying figure, Berlese described a specimen in 1910 under the name of *Tectocepheus personatus* (not *Tegeocranus personatus* as stated by Berlese (1913) and Balogh (1961b, 1963, 1965)). He attributed the following characteristic features to his species: lamellae very long and straight; sensilla short, clavate and setose; a flat depression anteriorly in the middle of the notogaster, very small setae at the posterior margin of the notogaster and a granulated integument. In 1913 Berlese placed *Tectocepheus personatus* Berlese, 1910 under the newly established genus *Tegeocranellus* Berlese, 1913. At the same time he gave a figure of the specimen, which leaves no doubt that it belongs neither to the genus *Tectocepheus* Berlese, 1895, nor to the genus *Tegeocranellus* Berlese, 1913.

Balogh (1961) consequently created a new genus, *Lamellocepheus*, for its reception, which he incorporated in his keys of 1961, 1963 and 1965. Even though Knülle (1954) pointed out the misconception in connection with *Tegeocranus personatus* and *Tectocepheus personatus*, Balogh (1961) nevertheless regarded *Tegeocranus personatus* Berlese, 1910 instead of *Tectocepheus personatus* Berlese, 1910 as the type of this genus. The author has received no reply from Balogh as to whether he had actually published a definition or description of *Lamellocepheus* Balogh, 1961 or not. Negative answers were received from acarologists such as Beck, Bohnsack, Franz, Ramsay and Turk in personal communications. Except for his mentioning *Lamellocepheus* as a new genus in his work of 1961, Balogh apparently did not describe such a genus. In accordance with the requirements demanded by the International

Code of Zoological Nomenclature, the genus *Lamellocepheus* Balogh, 1961 must therefore be regarded as invalid.

Grandjean (1962) also considers the genus *Lamellocepheus* as invalid. In 1962 he stated that he had made *Tectocepheus personatus* Berlese, 1910 (=*Tegeocranellus personatus* Berlese, 1913) the type of a new genus, *Tessacarus*, and that he would describe it as *Tessacarus personatus* Grandjean, 1962 in a future work. In a recent personal communication from Grandjean, he stated that his proposed genus has not yet been described. For the present Grandjean's genus *Tessacarus* must therefore be regarded as invalid, in accordance with the International Code of Zoological Nomenclature. However, in his publication of 1962 Grandjean mentioned the following three characteristics in connection with his *Tessacarus personatus:* the presence of a rostral slit and a pedotectum I, and the absence of a lenticular area.

The doubtful validity of *Lamellocepheus* Balogh, 1961, and *Tessacarus* Grandjean, 1962 taken in conjunction with the shape of the sensillae and the lamellae, the excavated dorsum and the absence of any conspicuous, protruding tubercles on the shoulders of the notogaster, render it highly improbable that *Tectocepheus personatus* Berlese, 1910 is a tectocepheid at all. In a future reclassification, regardless of which genus becomes validated, the possible assignment of this species to the family Charassobatidae Grandjean, 1929 should be considered strongly.

No specimens of this genus were found in the Republic of South Africa.

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SUMMARY

Two new species, *Tegeocranellus knysnaensis* and *Tegeocranellus sacchareus*, are described. A comprehensive redescription of the inadequately described and poorly figured *Tectocepheus sarekensis* (Trägårdh, 1910) Balogh, 1943 is also given. Special attention has been paid to the chaetotaxy of the legs as an additional means of distinguishing between closely related taxa.

It is suggested that the genera *Tegeocranellus* Berlese, 1913 and *Lamellocepheus* Balogh, 1961 be removed from the family Tectocepheidae Grandjean, 1953.

Further work is necessary to clear up the systematic position of the various taxa of the family Tectocepheidae Grandjean, 1953, especially that of the genus *Tectocepheus* Berlese, 1895.

REFERENCES

AOKI, J. 1964. Some oribatid mites (Acarina) from Laysan Island. *Pacif. Insects* 6 (4): 649-664.

BALOGH, J. 1943. Magyarország pancelosatkái (Conspectus Oribateorum Hungariae). *Mat. természettud. Közl.* 39(5): 1-202.

BALOGH, J. 1958. Oribatides nouvelles de L'Afrique tropicale. *Revue Zool. Bot. afr.* 48(1-2): 1-34.

BALOGH, J. 1961a. Some new Oribatidae from Central-Africa (Acari). *Annls. Univ. Scient. bpest. Rolando Eötrös* 4(72): 3-7.

BALOGH, J. 1961b. Identification keys of world oribatid (Acari) families and genera. *Acta zool. hung.* 7(3-4): 243-345.

BALOGH, J. 1963. Identification keys of Holarctic oribatid mites (Acari) families and genera. *Acta zool. hung.* 9(1-2): 1-60.

BALOGH, J. 1965. A synopsis of the world oribatid (Acari) genera. *Acta zool. hung.* 11(1-2): 5-99.

BERLESE, A. 1882-1903. *Acari, Myriapoda et Scorpiones hucusque in Italia reperta.* Padua, 9: 1-1017.

BERLESE, A. 1905. Acari nuovi. Materiali pel Manipulus 5. *Redia* 2: 231-238.

BERLESE, A. 1910. Liste di nuove specie e nuovi generi di Acari. *Redia* 6: 242-271.

BERLESE, A. 1913. Acari nuovi. Manipoli 7-8. *Redia* 9: 77-111.

BERLESE, A. 1915. Acari nuovi. Manipulus 9. *Redia* 10: 13-150.

FRANZ, H. 1950. *Bodenzoologie als Grundlage der Bodenpflege.* Berlin, Akademieverlag. 1-316.

GRANDJEAN, M. F. 1929. Existence d'une versicule externe ou d'un organe poreux sousalain dans plusieurs genres d'Oribatei. *Bull. Mus. Hist. nat.* 1(2): 406-409.

GRANDJEAN, M. F. 1953. Essai de classification des Oribates (Acariens). *Bull. Soc. zool. Fr.* 78(5-6): 421-446.

GRANDJEAN, M. F. 1962. Le genre *Tegeocranellus* Berl. 1913. (Oribates). *Acarologia* 4(1): 78-100.

HAARLØV, N. 1942. A Morphologic-systematic-ecological investigation of Acarina. *Meddr. Grønland* 128(1): 1-71.

HAARLØV, N. 1952. Systematics and ecology of the genus: Tectocepheus Berlese 1896 (Acarina). *Ent. Meddr.* 26: 424-437.

HAARLØV, N. 1957. Microarthropods from Danish soils. *Spolia zool. Mus. Hauniensis* 17: 1-60.

HAMMER, M. 1958. Investigations on the oribatid fauna of the Andes Mountains. I. The Argentine and Bolivia. *Biol. Skr.* 10(1): 1-129.

HAMMER, M. 1961. Investigations on the oribatid fauna of the Andes Mountains. II. Peru. *Biol. Skr.* 13(1): 1-157.

HAMMER, M. 1962a. Investigations on the oribatid fauna of the Andes Mountains. III. Chile. *Biol. Skr.* 13(2): 1-96.

HAMMER, M. 1962b. Investigations on the oribatid fauna of the Andes Mountains. IV. Patagonia. *Biol. Skr.* 13(3): 1-37.

HENDRIKSEN, K. L. and LUNDBECK, W. 1917. Grønlands Landarthropoder (Insecta et Arachnidae groenlandicae). *Meddr. Grønland* 22.

JACOT, A. P. 1937. Journal of the North American moss-mites. *Jl. ent. Soc.* 45: 353-375.

JOHNSTON, D. E. 1965. A catalogue of the determined species of Acari (Excl. Ixodides) in the collections of the Institute of Acarology. *Department of Zoology Entomological Publication Series* 29: 1-65.

KARPPINEN, E. 1956. Untersuchungen über die Oribatiden (Acar., Oribatei) von Kilpisjärvi in Nordfinnland. *Ann. ent. fenn.* 22(3): 121-129.

KARPPINEN, E. 1958. Über die Oribatidenfauna (Acar.) in den Uferzonen von einem Teiche im Kirchspiel Lammi in Südfinnland. *Arch. Soc. "Vanamo"* 12(2): 128-143.

KNÜLLE, W. 1954. Die Arten der Gattung Tectocepheus Berlese (Acarina: Oribatei). *Zool. Anz.* 152(11/12): 280-305.

KOCH, C. L. 1836. *Deutschlands Crustaceen, Myriapoden und Arachniden. Ein Beitrag zur Deutschen Fauna.* Regensburg, 5.

KOCH, C. L. 1842. *Übersicht des Arachnidensystems.* Nürnberg.

MAYR, E., LINSLEY, E. G. and USINGER, R. L. 1953. *Methods and principles of systematic zoology.* McGraw-Hill Book Company, Inc., London, New York, Toronto.

MICHAEL, A. D. 1879. A contribution to the knowledge of British Oribatidae. *Jl. R. Microsc. Soc.* 2: 225-251.

MICHAEL, A. D. 1880a. A further contribution to the knowledge of British Oribatidae. (Part I). *Jl. R. Microsc. Soc.* 3(1): 32-43.

MICHAEL, A. D. 1880b. A further contribution to the knowledge of British Oribatidae. (Part II). *Jl. R. Microsc. Soc.* 3(1): 177-201.

MICHAEL, A. D. 1884-1888. British Oribatidae. Vol. I. *Ray. Soc.* 1: 1-336.

MICHAEL, A. D. 1898. Oribatidae. *Tierreich* 3: 1-93.

MICHELČIČ, F. 1957. *Milben (Acarina) aus Tirol und Vorarlberg.*

OUDEMANS, A. C. 1900. New list of Dutch Acari. 1st Part. *Tijdschr. Ent.* 43: 150-171.

SELLNICK, M. 1928. Formenkreis Hornmilben, Oribatei. *Tierwelt Mitteleur.* 3(3): 1-42.

SELLNICK, M. 1960. Formenkreis: Hornmilben, Oribátai. *Tierwelt Mitteleur.* 3(4): 45-134.

SENGBUSCH, H. G. 1957. Checklist of oribatoid mites in the vicinity of Mountain Lake Biological Station, Virginia. (Acarina, Oribatei). *Virginia J. Sci.* 8(2): 128-134.

SEYD, E. L. 1962. The moss mites of Kinder Scout, Derbyshire (Acari: Oribatei). *J. Linn. Soc. (Zool.)* 44(300): 585-591.

STRENZKE, K., DE LESSE, H. and DENIS, J. 1955. Oribates (Acariens). In: "Microfaune du sol de l'eqe Groenland." Volume I. Arachnides. *Espēditions Polaires Françaises* 7: 1-80.

TRÄGARDH, I. 1904. Monographie der arktischen Acariden. *Fauna arct.* 3: 1-78.

TRÄGARDH, I. 1910. Acariden aus dem Sarekgebirge. *Naturw. Unters. Sarekgebirg.* 4: 375-586.

TUXEN, S. L. 1943. Die zeitliche und räumliche Verteilung der Oribatiden-Fauna (Acar.) bei Maelifell, Nord-Island. *Ent. Meddr.* 23(21): 321-336.

VAN DER HAMMEN, L. 1952. The Oribatei (Acari) of the Netherlands. *Zool. Verh.*, Leiden 17: 1-139.

VAN DER HAMMEN, L. 1960. *Fortuynia marina* nov. gen., nov. spec., an oribatid mite from the intertidal zone in Netherlands New Guinea. *Zool. Meded.*, Leiden 37(1): 1-9.

VANĚK, J. 1960. *Tectocepheus knüllei* n. sp. (Acarina, Oribatoidea). *Acta Soc. ent. Bohem. (Csl.)* 57(4): 397-401.

WOOLLEY, T. A. 1960. Some interesting aspects of oribatid ecology (Acarina). *Ann. ent. Soc. Amer.* 53(2): 251-253.