

THREE NEW SPECIES OF THE FAMILY SPHAEROLICHIDAE
(ACARI : ENDEOSTIGMATA) FROM SOUTH AFRICA

BY

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ABSTRACT

The three new species described are *Sphaerolichus cuspidonasus*, *S. oculus* and *S. narinusus*.

RÉSUMÉ

Les trois nouvelles espèces décrites sont *Sphaerolichus cuspidonasus*, *S. oculus* et *S. narinusus*.

INTRODUCTION

This family is represented by a single genus, viz. *Sphaerolichus* which was described by BERLESE in 1904 with *S. armipes* as the nominate species. THOR & WILLMANN (1941) gave brief notes on this species and referred the genus to the family Pachygnathidae. When in 1939 GRANDJEAN published a detailed description of the species *S. barbarus*, he established the family Sphaerolichidae to accommodate this genus. In 1968 SHIBA published a redescription of the latter species which differs from the South African species in several respects.

Family SPHAEROLICHIDAE Grandjean, 1939.

Sphaerolichidae Grandjean, 1939 : 1-122 ; Baker & Wharton, 1952 : 196-197.

The characteristics of this family are : idiosoma soft and globular ; propodosoma extending far backwards thus comprising almost half the idiosoma ; propodosoma with 2 pairs of filamentous sensillae (*le* and *bo*) and 4 pairs of plumose setae (*ro*, *xa*, *xp* and *in*) ; sensillae *le* situated on a large naso ; one pair of lateral eyes present ; laterally situated post-ocular tubercles and a median eye may be present ; podocephalic canal prominent ; hysterosoma with 8 pairs of plumose setae which are arranged in 4 transverse rows ; hysterosoma not segmented (except perhaps in *S. armipes*) ; adults with 2 pairs of genital papillae ; female without internal genital setae or ovipositor, male with 9 pairs of internal genital setae ; palpal tarsus terminally with 2 relatively long setae ; ectomalae (rutella) absent ; chelicerae with opposed chelae ; coxae adjacent ; legs

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slender ; femur I divided into 3 sections ; femora II, III and IV divided into 2 sections ; tarsus and tibia I with many sensory setae ; femora I and II each with a single filamentous trichobothrium ; tarsus I bidactyl and tarsi II, III and IV tridactyl.

Type species : *Sphaerolichus armipes* Berlese, 1904.

Genus SPHAEROLICHUS Berlese, 1904.

Sphaerolichus Berlese, 1904 : 14 ; Grandjean, 1939 : 1-122 ; Thor & Willmann, 1941 : 152 ; Shiba, 1968 : 49-58.

Diagnostic characteristics : As for the family.

Sphaerolichus — key to the South African species.

1. Setae *xp* situated anterior to the eyes ; with one pair of lateral eyes and a median eye ; post-ocular tubercles absent..... *S. oculus* spec. nov.
- Setae *xp* situated medially to the eyes ; lateral eyes and post-ocular tubercles present. 2
2. Setae *xp* shorter than the other dorsal setae ; post-ocular tubercles faintly covered with striae ; median eye absent..... *S. cuspidonasus* spec. nov.
- Setae *xa* and *xp* longer than the other dorsal setae ; post-ocular tubercles densely covered with striae ; median eye prominent..... *S. narinosus* spec. nov.

Sphaerolichus cuspidonasus spec. nov., figs. 1-21.

MALE (figs. 1-18).

Dimensions : length of body (incl. gnathosoma) 325-365 μm ; length of body (excl. gnathosoma) 266-290 μm ; breadth of body 180-199 μm ; length of chelicerae 83-86 μm ; leg I 345-350 μm ; leg II 301-306 μm ; leg III 264-269 μm ; leg IV 450-456 μm .

Dorsum (figs. 1-5).

These mites are white to light yellow in colour. The idiosoma is globose and there is no demarcation between the propodosoma and the hysterosoma (fig. 1). Sensillae *le* are situated on the naso and are filamentous and finely ciliate. The latter sensillae are 59 μm long and situated 13 μm apart whilst sensillae *bo* are 70 μm long and situated 49 μm apart. Setae *ro*, *xa*, *xp* and *in* are plumose with *in* the longest and *xp* the shortest. Integumental striae are present ventrally on the large naso (fig. 2) and no median eye could be detected. One pair of lenslike lateral eyes and a pair of post-ocular tubercles are present. The post-ocular tubercles are covered with fine striae (fig. 3). A pair of small cuplike structures is present in the integument lateral to the eyes. Similar structures are present lateral to the anal pore. Eight pairs of plumose setae, situated in 4 transverse rows and becoming progressively smaller from the anterior to the posterior ones, are present on the hysterosoma. The integumental striae take a longitudinal course on the propodosoma and transverse on the hysterosoma. The striae on the naso are smooth whilst those on the rest of the idiosoma are provided with small, longitudinally arranged lamellae (fig. 4.) The podocephalic canal (fig. 5) is diverticulated and can easily be observed.

Venter (figs. 6-7).

Six pairs of para-genital setae, 6 pairs of genital setae and 9 pairs of internal genital setae are present (fig. 6). The internal setae can be divided into 3 groups. The first 6 setae on each side are of equal length and are plumose anteriorly. The seventh pair of setae is large and quadrifurcate whilst the last 2 pairs are small and plumose. Two pairs of small, elongate papillae are present. A large copulatory structure is present internal to the genital opening but the exact shape could not be determined. The anal opening is almost contiguous with the genital opening (fig. 7). Three pairs of anal setae and 2 pairs of para-anals are present. Genital tracheae as Grandjean described for *S. barbarus* could not be detected.

Gnathosoma (figs. 8-10).

The palpi (fig. 8) are 6 segmented. The palpal tarsus bears on solenidion and 4 setae, 2 of which are large and situated terminally. One of the terminal setae is pilose whilst the other is finely ciliate in the distal half. Each chelicera (fig. 9) bears 2 long dorsal setae. Each chela terminates in a strong tooth; fixed chela with 2 large protuberances on the inner surface, anterior protuberance with a cluster of fine rays. Movable chela with 2 thumblike protuberances on inner surface, fine rays appear at base of anterior protuberance and at apex of chela. Hypognathum (fig. 10) large, divided by a longitudinal groove and carries 5 pairs of setae. The anteriorly directed branch of the podocephalic canal is perceptible in the hypognathum. The labrum-epipharynx projects slightly beyond the anterior margin of the hypognathum.

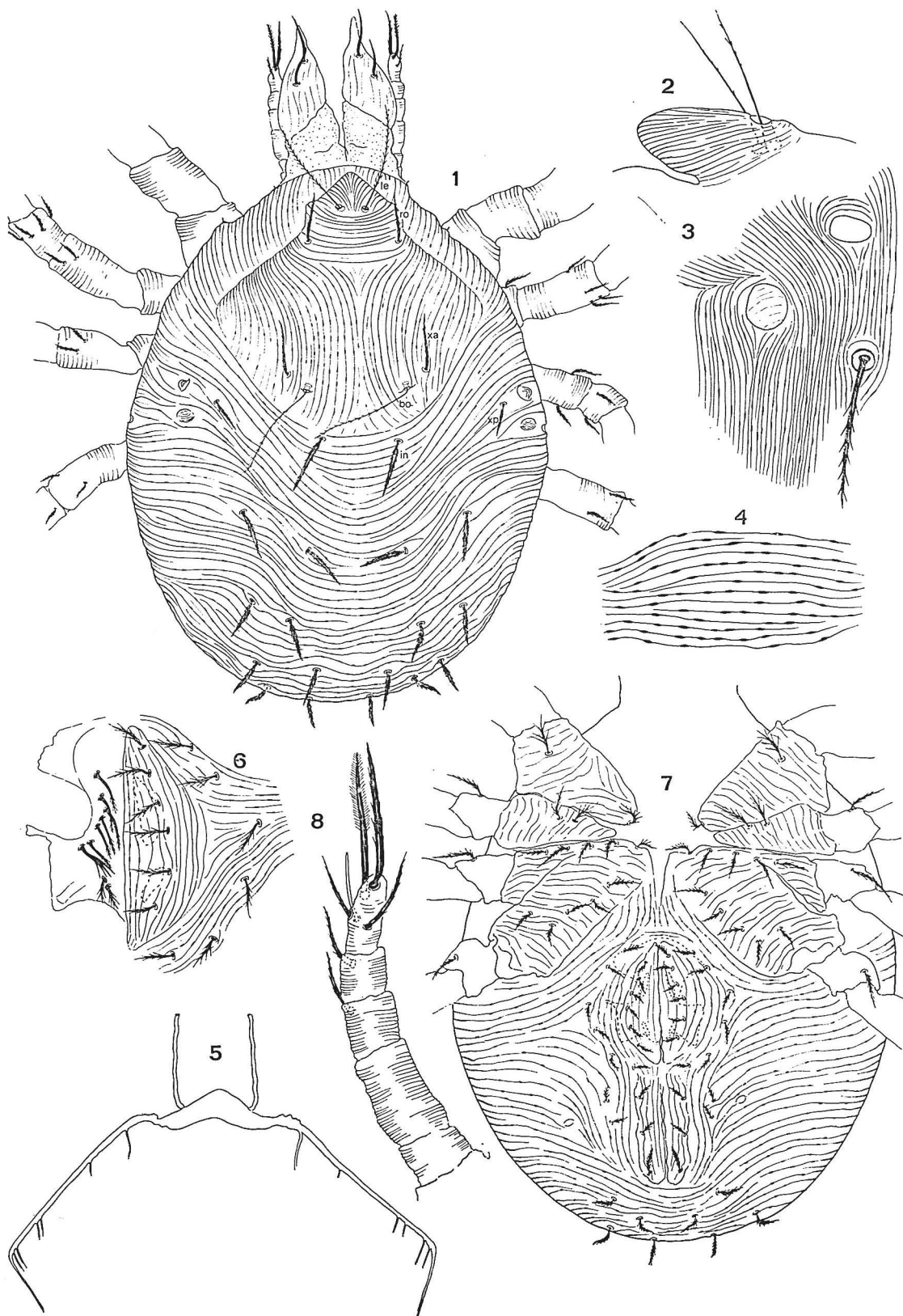
Legs (figs. 11-18).

The legs are relatively long and moderately covered with setae. Femur I is divided into 3 parts while femora II, III and IV are each divided into 2 parts. Tarsus I (fig. 11) bears one plumose seta, 3 obtuse solenidia, 3 spear-shaped trichobothria, 5 slender solenidia, one peglike microsensory seta near the anterior margin of the segment (fig. 12), one peculiar shaped seta (famulus) (fig. 13) and 14 lanceolate solenidia. Tibia I (fig. 14) bears 3 plumose setae, 3 spear-shaped trichobothria, 2 peglike microsensory setae, 45 lanceolate solenidia as well as one large solenidion (fig. 15) which is finely ciliate anteriorly. Genu I (fig. 16) bears 9 plumose setae (one is fairly large) and 2 small obtuse solenidia. Femur I (fig. 16) bears 10 plumose setae and one filamentous trichobothrium. Femur II bears a similar trichobothrium. The setal formulae for legs II, III and IV are (with the sensory setae in parentheses): tarsi 31 (3) — 29 (1) — 26; tibia 12 (1) — 10 (2) — 19 (1); genua 6 (1) — 5 — 5; femora 11 (1) — 9 — 7; trochanters 1 — 1 — 1 and coxae 3 — 5 — 5. Some of the setae proper near the anterior margin of tarsi II, III and IV (fig. 17) are exceptionally small. Tarsus I terminates in 2 strong, curved claws which are decorated with fine ridges on either side. Tarsi II, III and IV each bear 3 uneven claws (fig. 18).

FEMALE Unknown.

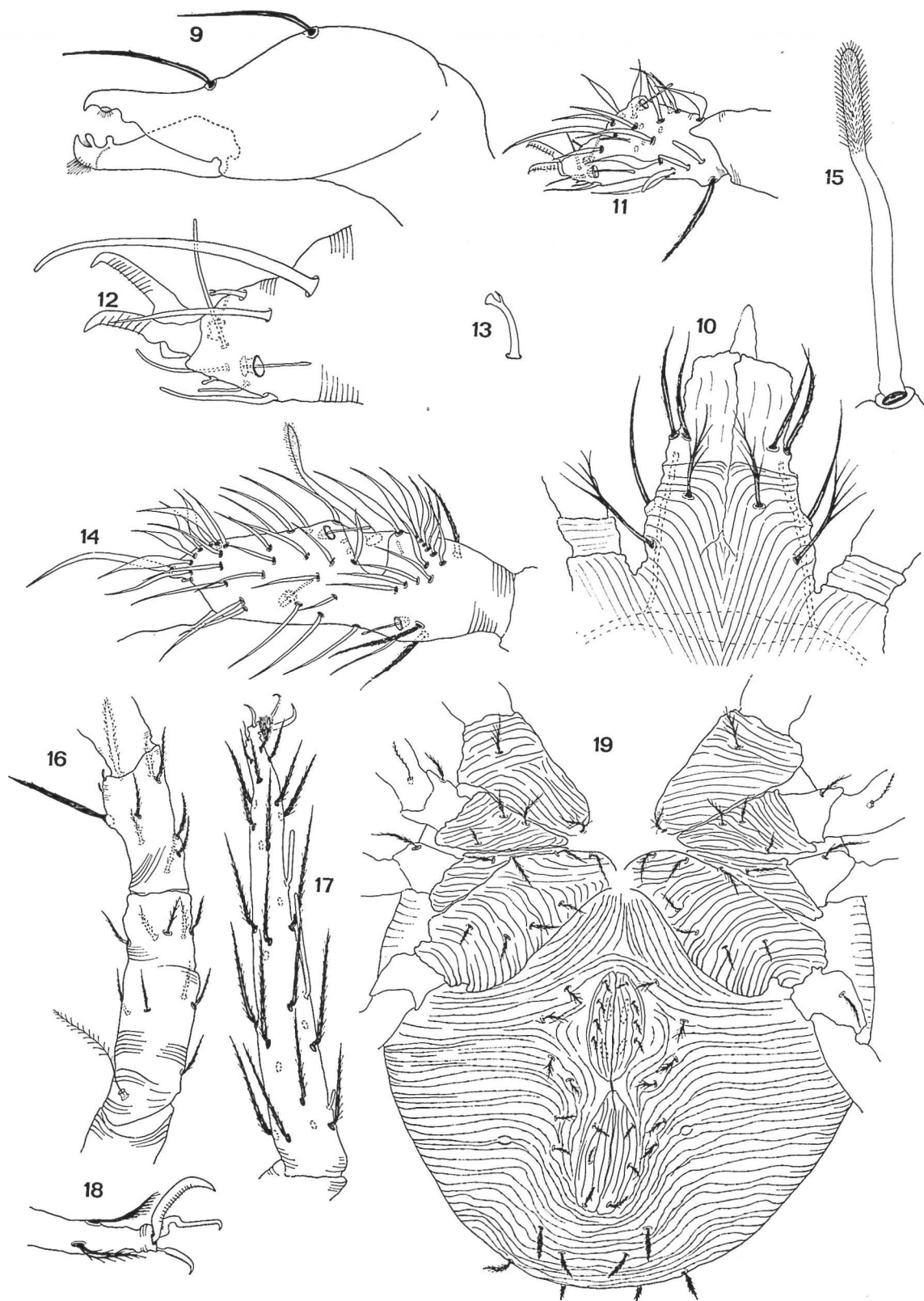
TRITONYMPH (fig. 19).

Dimensions: length of body (incl. gnathosoma) 283-342 μm ; length of body (excl. gnathosoma) 226-269 μm ; breadth of body 150-199 μm .



FIGS. 1-8 : *Sphaerolichus cuspidonasus* spec. nov., male.

1. — Dorsum. 2. — Naso, lateral. 3. — Lateral eye and post-ocular tubercle. 4. — Dorsal integument.
5. — Podocephalic canal. 6. — Genital opening. 7. Venter. 8. — Palp.



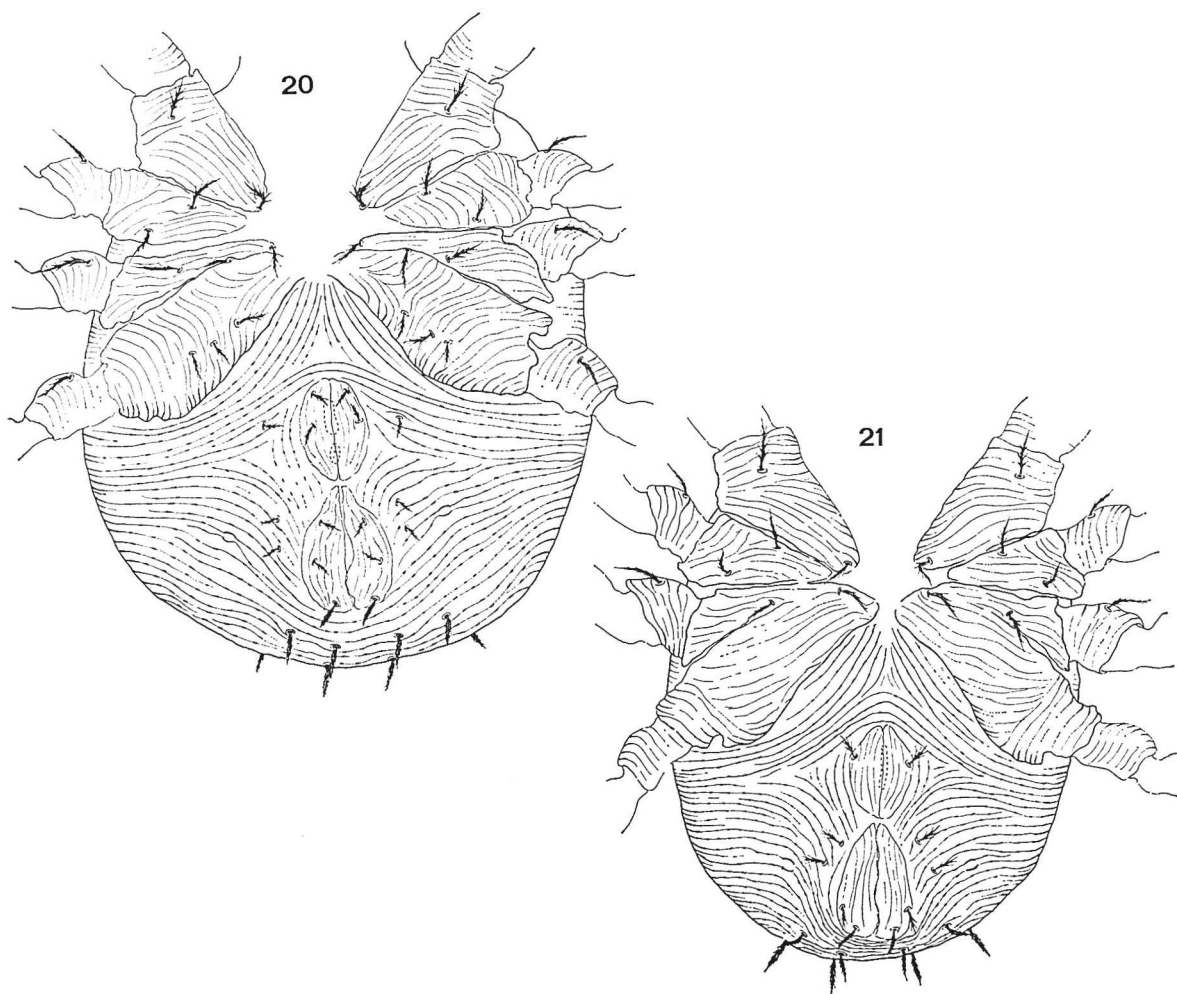
FIGS. 9-19 : *Sphaerolichus cuspidonasus* spec. nov.

9. — Chelicera, male. 10. — Hypognathum, male. 11. — Tarsus I, male. 12. — Anterior part of tarsus I, male. 13. — Famulus. 14. — Tibia I, male. 15. — Large solenidion from tibia I. 16. — Femur and genu I, male. 17. — Tarsus II, male. 18. — Ambulacrum, leg. II. 19. — Venter, tritonymph.

The tritonymph can be differentiated from the adult male on account of its smaller size, the detail of the genital field and the presence of the dehiscence furrow. The genital field (fig. 19) is provided with 4 pairs of genital setae, 4 pairs of paragenital setae but no internal setae. Two pairs of small elongate papillae are present. The dorsal aspects are identical to those of the male. The formulae for the leg setae are, with a few exceptions, similar to those of the adult. Femur II bears 10 plumose setae and one filamentous trichobothrium. Tarsus III bears 28 plumose setae and one solenidion while tibia IV bears 17 plumose setae and one solenidion. Coxae III and IV bear 4 plumose setae each.

DEUTONYMPH (fig. 20).

Dimensions : length of body (incl. gnathosoma) 253-263 μm ; length of body (excl. gnathosoma) 183-187 μm ; breadth of body 143-146 μm .



FIGS. 20-21 : *Sphaerolichus cuspidonasus* spec. nov.
20. — Venter, deutonymph. 21. — Venter, protonymph.

Dorsally, the body bears the same number of setae as that of the adult. The genital field (fig. 20) is provided with 2 pairs of genital setae and one pair of paragenital setae. Two pairs of papillae are present. The pedipalpi and hypognathum are identical to that of the adult but the legs bear notably less setae.

PROTONYMPH (fig. 21).

Dimensions : length of body (incl. gnathosoma) 175-209 μm ; length of body (excl. gnathosoma) 151-159 μm ; breadth of body 106-113 μm .

Though much smaller, the idiosoma bears the same number of setae as that of the other ontogenetic stages. One pair of genital setae and one pair of papillae are present (fig. 21). The pedipalpi and hypognathum are identical to that of the adult but the legs bear notably less setae. The dehiscence furrow is prominent.

MATERIAL STUDIED.

♂-Holotype, 1 ♂-paratype, 10 paratype tritonymphae, 3 paratype deutonymphae and 5 paratype protonymphae collected from pasture soil, Potchefstroom, Tvl., during the period March 1969-April 1970, P. D. Theron.

***Sphaerolichus oculus* spec. nov., figs. 22-34 and pls. I A-II D.**

FEMALE (figs. 22-31 and pls. IA-IID).

Dimensions : length of body (incl. gnathosoma) 266-286 μm ; length of body (excl. gnathosoma) 223-257 μm ; breadth of body 120-166 μm ; length of chelicerae 56 μm ; leg I 200-204 μm ; leg II 203-205 μm ; leg III 183-186 μm ; leg IV 286-289 μm .

Dorsum (fig. 22 and pls. IA-ID).

The idiosoma is soft, white to light yellow in colour and is more elongate than that of *S. cuspidonasus*. The propodosoma (fig. 22) bears the normal 4 pairs of setae and 2 pairs of sensillae. Sensillae *le* which are situated on the naso are finely ciliate, 46-49 μm long and situated 7 μm apart while sensillae *bo* are 64-67 μm long and situated 55-56 μm apart. The naso (pl. IA) is large, dorsally provided with smooth striations and bears a lenslike median eye on the underside (pl. IB). Setae *xp* are situated directly anterior to the lateral eyes which are prominently striated (pl. IC). There is no post-ocular tubercles. The podocephalic canal is similar to that of *S. cuspidonasus*. Eight pairs of relatively short, plumose setae are present on the hysterosoma. The striae which are provided with small, longitudinally arranged lamellae (pl. ID) take a longitudinal course on the propodosoma and longitudinal to transverse on the hysterosoma.

Venter (fig. 23).

The genital field is provided with 6 pairs of paragenital setae, 7-8 genital setae, but no internal setae. The 2 pairs of papillae are elongate, flattened and difficult to observe. A small structure is present internal to the genital covers. The anal opening is separated from the genital opening and is provided with 2 pairs of anal setae and 2 pairs of para-anals.

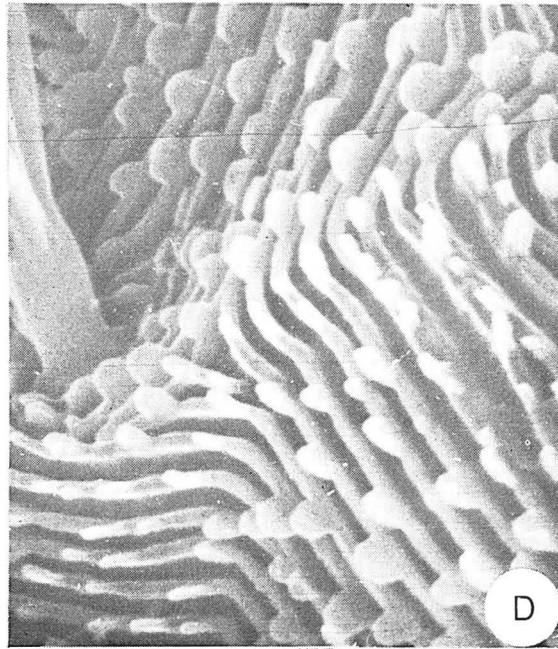
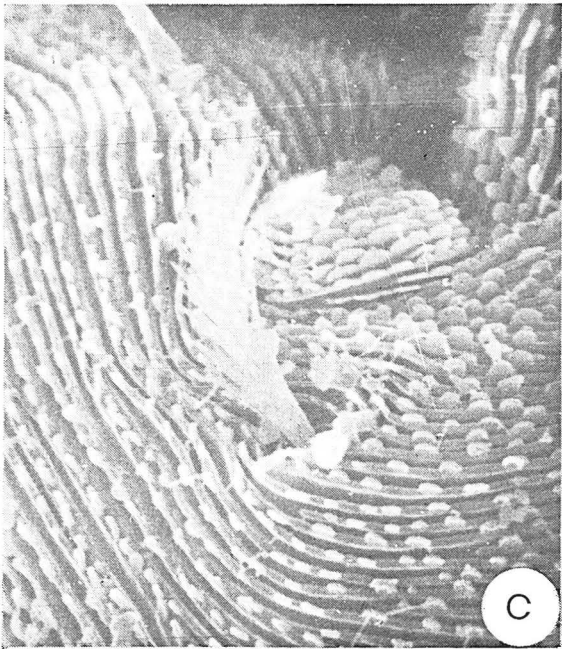
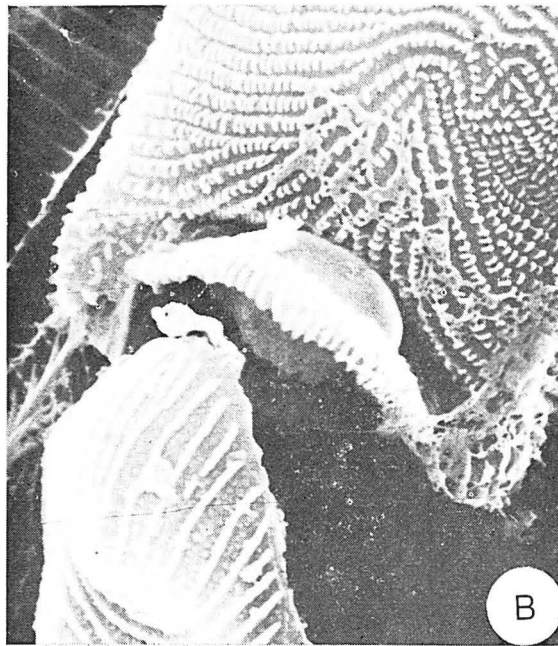
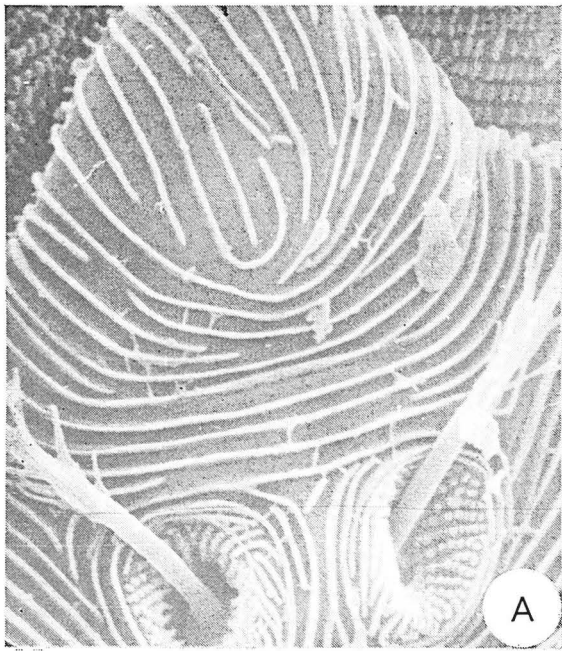
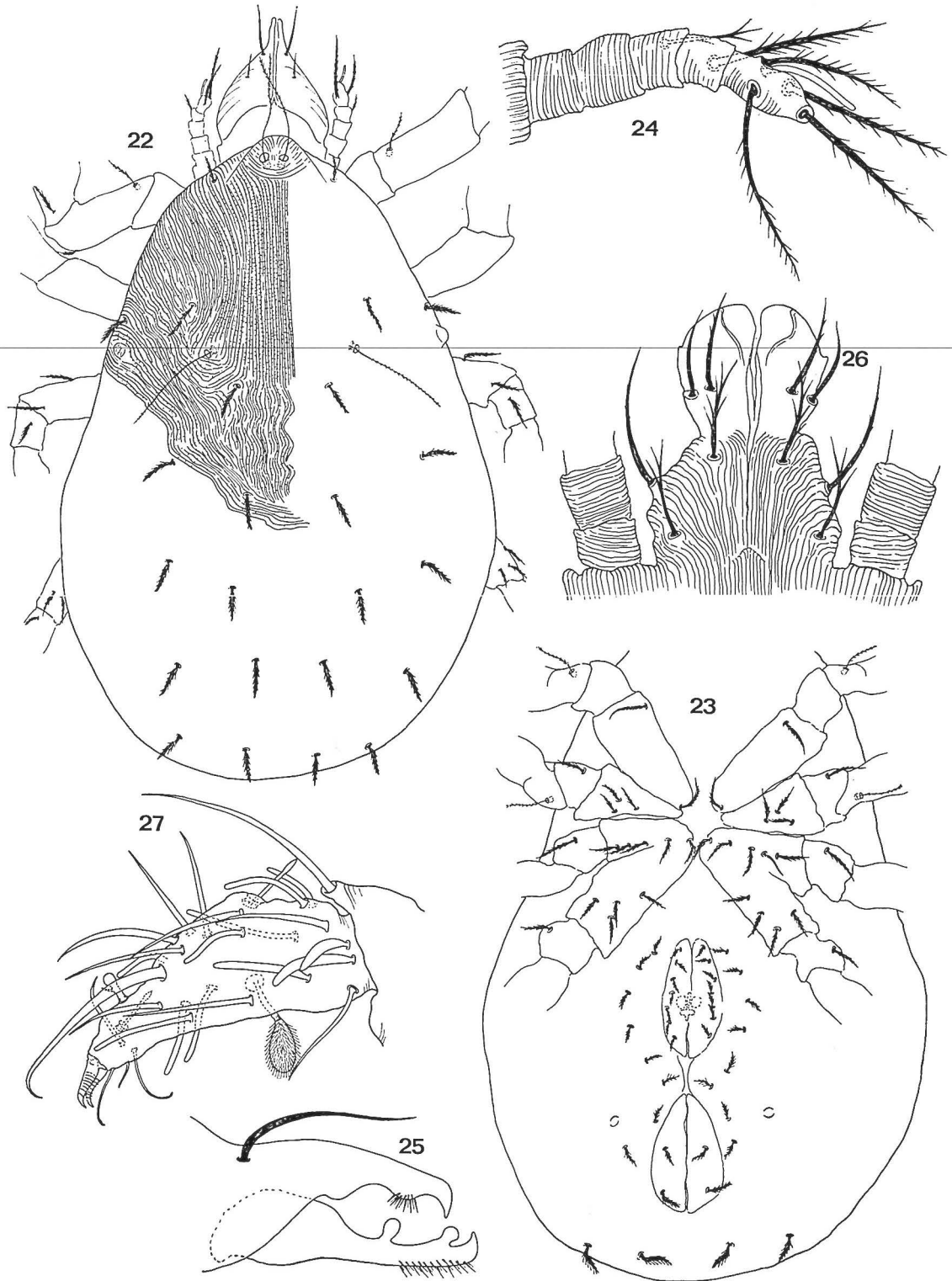


PLATE IA-ID : *Sphaerolichus oculus* spec. nov., female.

- IA. — Naso with sensillae $\times 5\ 250$;
- IB. — Naso torn, with median eye $\times 4\ 750$;
- IC. — Lateral eye $\times 5\ 100$;
- ID. — Hysterosomal integument $\times 10\ 500$;



FIGS. 22-27 : *Sphaerolichus oculus* spec. nov., female.
22. — Dorsum. 23. — Venter. 24. — Palp. 25. — Chelae. 26. — Hypognathum. 27. — Tarsus I.

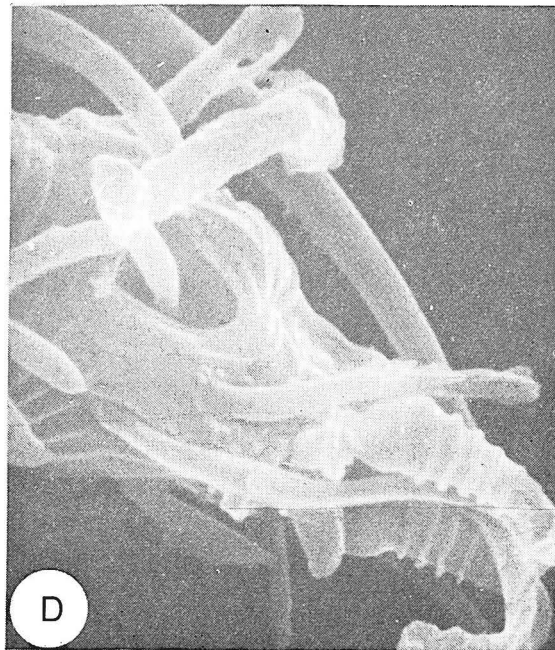
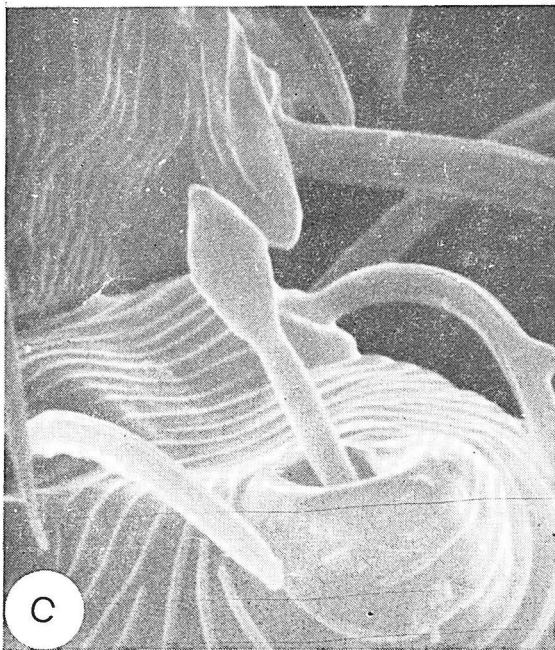
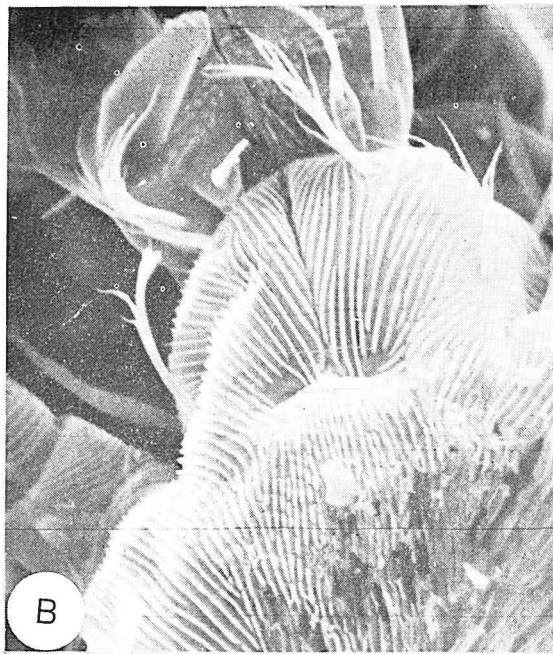
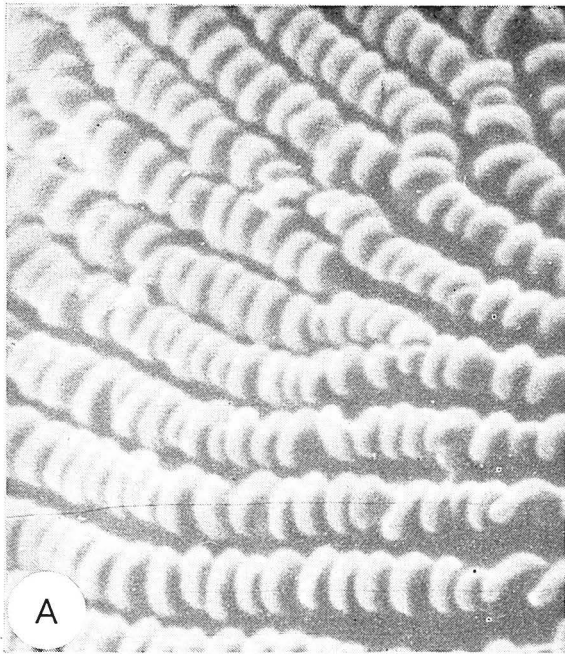


PLATE IIA-IIID : *Sphaerolichus oculus* spec. nov., female.

- IIA. — Integument from basal part of chelicerae $\times 19\ 000$;
IIB. — Hypognathum, ventral $\times 1\ 400$.
IIC. — Spear-shaped trichobothrium on tarsus I $\times 10\ 000$;
IID. — Ambulacrum, tarsus I $\times 10\ 000$.

Gnathosoma (figs. 24-26 and pls. IIA-IIB).

The palpal setae (fig. 24) are relatively large and all of the same shape, thus differing from those of the other species. The cheliceral setae are nude with the anterior one much longer than the posterior one. Each chela bears 2 large protuberances on the inner surface and terminates in a strong tooth (fig. 25). The anterior protuberance of the fixed chela is provided with a cluster of fine rays. Transverse lamellae (pl. IIA) appear on the striae of the basal cheliceral segment. The hypognathum (fig. 26 and pl. IIB) bears 4 pairs of setae ventrally and one larger pair dorso-laterally.

Legs (figs. 27-31 and pls. IIC-IID).

The legs are obviously shorter than those of *S. cuspidonasus*. All femora are divided but femur IV is shorter and not as distinctly divided as that of *S. cuspidonasus* and *S. narinosus*. Tarsus I, (fig. 27) which is small and without any branched setae, bears 11 obtuse solenidia, 14 mucronate solenidia, 2 spear-shaped trichobothria (pl. IIC), one famulus and one large solenidion of which the anterior part is inflated and finely ciliated. Tibia I (fig. 28) bears one plumose seta, 3 obtuse solenidia, 24 mucronate solenidia, 3 spear-shaped trichobothria, one peglike micro-sensory seta and one large solenidion of which the anterior part is inflated and finely ciliated. Genu I bears 9 plumose setae whilst femur I (fig. 29) bears 10 plumose setae and one finely ciliate filamentous trichobothrium. A similar trichobothrium appears on femur II. With the sensory setae in parentheses the formulae for the setae of legs II, III and IV are as follows : tarsi 29 (4) — 28 (1) — 27 ; tibiae 11 (1) — 10 (2) — 14 (2) ; genua 6 — 5 — 5 ; femora 9 (1) — 9 — 8 ; trochanters 1 — 1 — 1 and coxae 3 — 3 — 6. The solenidia on legs II, III and IV are of different lengths but are all obtuse (fig. 30). Tarsus I bears two strong claws (pl. IID) whilst tarsi II, III and IV each bear 2 unequal claws as well as a clawlike empodium (fig. 31). The claws and empodia of this species are similar to but much smaller than those of *S. narinosus*.

MALE (fig. 32).

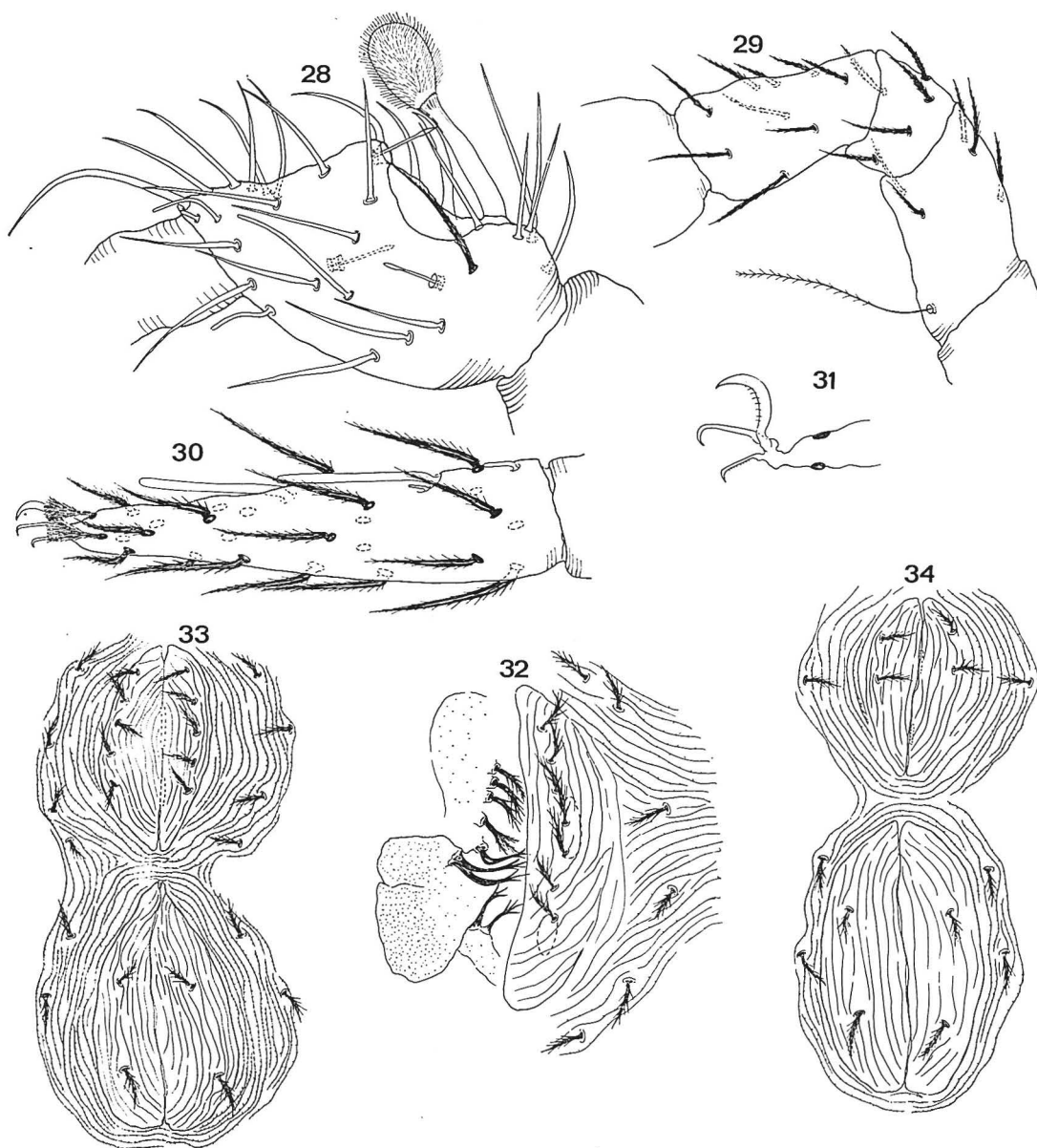
Dimensions : length of body (incl. gnathosoma) 256-259 μm ; length of body (excl. gnathosoma) 230-236 μm ; breadth of body 149-159 μm .

The male can be distinguished from the female on account of its smaller size and the detail of the genital field. The genital opening (fig. 32) is encircled by 6 pairs of plumose paragenital setae and each genital cover bears a row of 7 plumose setae. Two pairs of small, elongated papillae and 9 pairs of internal setae are present. The first 4 pairs of internal setae are densely plumose with the fourth pair trifurcate. The other five pairs of setae are all trifurcate with the last 2 pairs smaller than the first 3 pairs.

TRITONYMPH (fig. 33).

Dimensions : length of body (incl. gnathosoma) 235-239 μm ; length of body (excl. gnathosoma) 212-217 μm ; breadth of body 114-117 μm .

The dorsal aspects of the tritonymph are similar to those of the adult. Each genital cover bears a row of 5 plumose setae. Four pairs of paragenital setae and 2 pairs of genital papillae are present.



FIGS. 28-34 : *Sphaerolichus oculus* spec. nov.

28. — Tibia I, female. 29. — Femur & genu I, female. 30. — Tarsus II, female. 31. — Ambulacrum of tarsus II, female. 32. — Genital opening, male. 33. — Genito-anal region, tritonymph. 34. — Genito-anal region, deutonymph.

DEUTONYMPH (fig. 34).

Dimensions : length of body (incl. gnathosoma) 222-230 μm ; length of body (excl. gnathosoma) 195-199 μm ; breadth of body 132-137 μm .

Dorsally, the body bears the same number of setae as that of the adult. Two pairs of genital and one pair of paragenital setae are present. The two pairs of genital papillae are difficult to detect.

PROTONYMPH.

Dimensions : length of body (incl. gnathosoma) 206-215 μm ; length of body (excl. gnathosoma) 188-193 μm ; breadth of body 115 μm .

Although much smaller the dorsum bears the same number of setae as that of the adult. One pair of genital setae and one pair of genital papillae are present.

MATERIAL STUDIED.

♀-Holotype, 13 ♀-paratypes, 3 ♂-paratypes, 2 paratype tritonymphae and 2 paratype deutonymphae collected from pasture soil covered by *Themeda triandra*, Potchefstroom, Tvl., III-IV, 1970, P. D. Theron ; 2 paratype protonymphs collected from soil on the bank of the Komati River, Carolina, Tvl., 26. iv. 1972, K. N. de Kock.

***Sphaerolichus narinosus* spec. nov., figs. 35-46.**

Sphaerolichus narinosus can be recognised by the relative length of the palpal tarsus, setae *xa* and *xp* which are obviously longer than the hysterosomal setae and by the presence of lateral eyes, post-ocular tubercles as well as a median eye.

FEMALE (figs. 35-46).

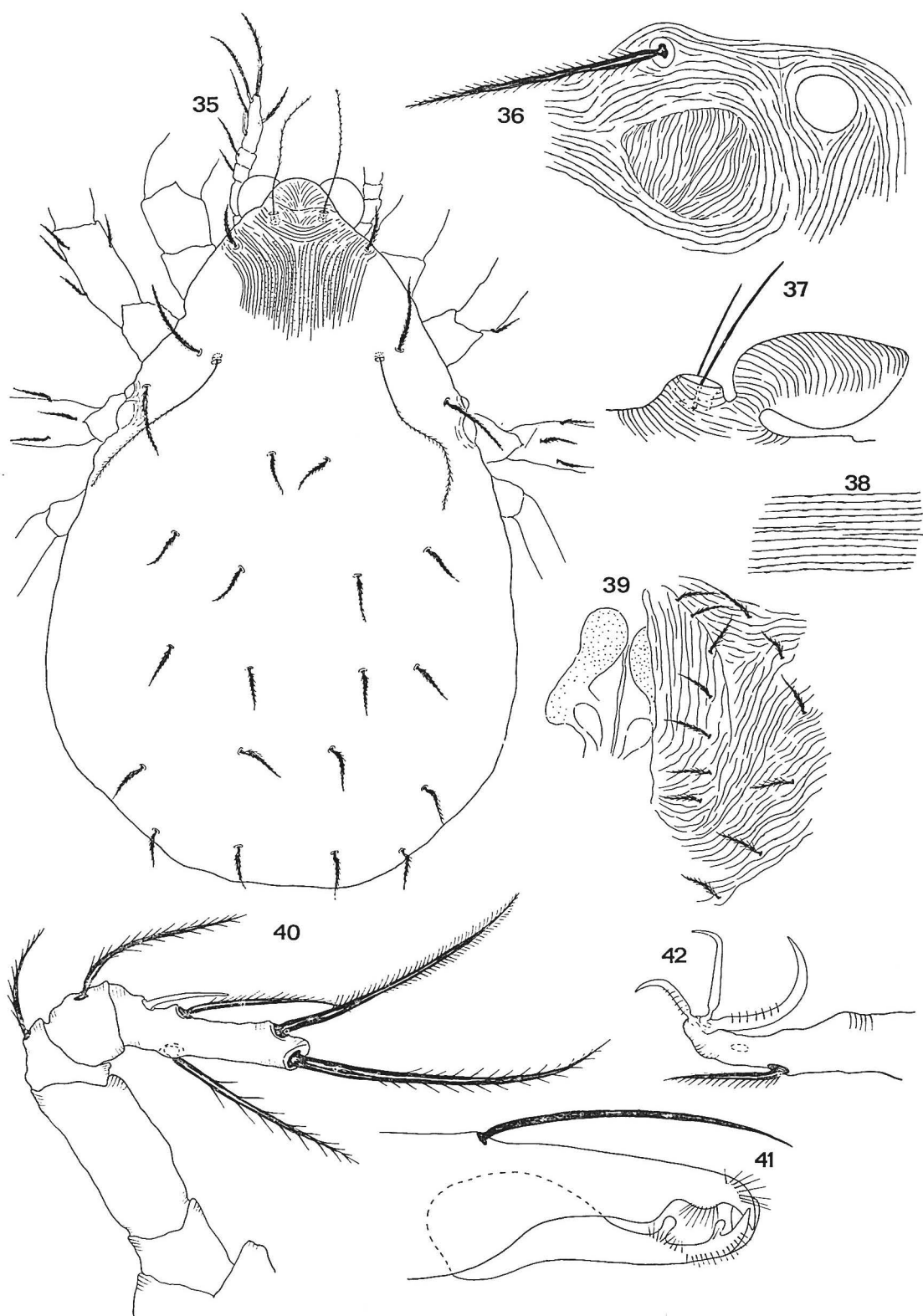
Dimensions : length of body (incl. gnathosoma) 313-346 μm ; length of body (excl. gnathosoma) 289-310 μm ; breadth of body 224-229 μm ; leg I 374-379 μm ; leg II 333-335 μm ; leg III 294-298 μm ; leg IV 464-468 μm .

Dorsum (figs. 35-38).

The body is soft and there is no demarcation between the propodosoma and the idiosoma (fig. 35). Sensillae *le* are 46-48 μm long and 24 μm apart, whilst sensillae *bo* are 81-83 μm long and 76 μm apart. Both pairs of sensillae are finely ciliate. Setae *ro* and *in* are of the same length as the hysterosomal setae but setae *xa* and *xp* are about twice as long. Setae *xp* are situated medially to the eyes. The lateral eyes are smooth, lenslike and protruding whilst the post-ocular tubercles are larger than the eyes and striated (fig. 36). A large lenslike median eye (fig. 37) is situated on the underside of the naso. The lamellate structures on the integumental striae (fig. 38) are similar in shape but smaller than those of *S. cuspidonasus*. The podocephalic canal is similar to that of *S. cuspidonasus*. The 8 pairs of plumose hysterosomal setae are situated in 4 transverse rows. The hysterosoma is unsegmented.

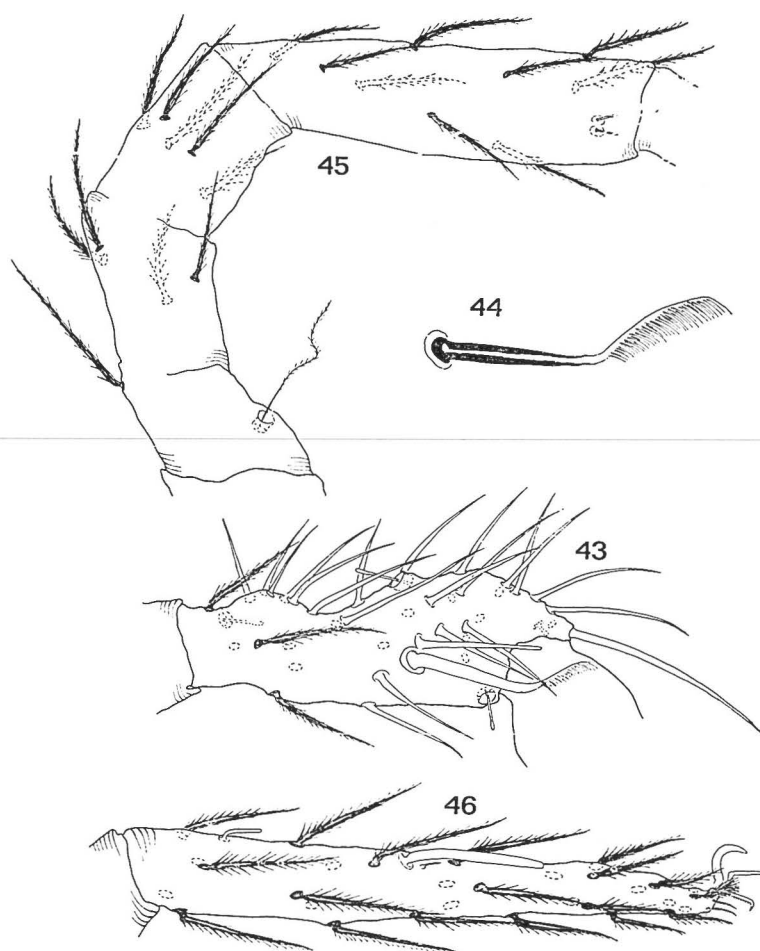
Venter (fig. 39).

Seven pairs of genital setae, 6 pairs of paragenital setae and 2 small pairs of papillae are present (fig. 39). An internal structure is present beneath the genital covers. The anal pore is surrounded by 3 pairs of anal setae and 2 pairs of para-anal setae. The holotype female carries 2 eggs, each about 116-120 μm long.



FIGS. 35-42 : — *Sphaerolichus narinosus* spec. nov., female.

35. — Dorsum. 36. — Lateral eye and post-ocular tubercle. 37. — Lateral view of naso. 38. — Dorsal integument. 39. — Genital opening. 40. — Palp. 41. — Chelae. 42. — Ambulacrum, leg II.



FIGS. 43-46 : *Sphaerolichus narinosus* spec. nov., female.
43. — Tibia I. 44. — Large solenidion of tibia I. 45. — Femur & genu I. 46. — Tarsus II.

Gnathosoma (fig. 40-41).

The palpal tarsus, which is relatively long bears one solenidion and 4 setae. The 2 terminal setae are one and a half times as long as the others and one of these is more finely ciliate than the other. The chelicerae (fig. 41) are longer than those of the other 2 species described here. The fixed chela is provided with 2 protuberances of which the anterior one is covered with a cluster of fine hair. The movable chela is provided with 3 thumblike protuberances of which the posterior one is surrounded with a cluster of fine hair. Both chelae are covered with fine hair on the outer surface and each terminates in a strong tooth.

Legs (fig. 42-46).

The legs are relatively long and all femora are completely divided. Tarsus I is bidactyl with the claws strongly curved anteriorly. The claws and empodium of each of tarsi II, III and IV are similar to but obviously larger than those of *S. oculus*. The formulae for the normal leg setae (with the sensory setae excluded) are : tarsi 0 — 34 — 28 — 27 ; tibiae 3 — 12 — 10 — 19 ; genua 9 — 6 — 5 — 5 ; femora 10 — 11 — 10 — 8 ; trochanters 0 — 1 — 1 — 1 ; coxae

2 — 3 — 4 — 5. Tibia I (fig. 43) bears besides the 3 pilose setae, 3 spear-shaped trichobothria, one peglike microsensory seta, 33 long tapering solenidia and one large solenidion (fig. 44). Genu I (fig. 45) bears 2 small adjacent solenidia. A finely ciliate, filamentous trichobothrium is present on both femora I and II. Tarsus II (fig. 46) bears 2 obtuse solenidia of unequal size together with one microsensory seta. Tibia II, III and IV each bear one obtuse solenidion.

MATERIAL STUDIED.

♀-Holotype and 4 ♀-paratypes collected from soil in an *Acacia karroo* biotope, Potchefstroom, Tvl., III. 1969, P. D. Theron.

ACKNOWLEDGEMENTS

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REFERENCES

- BAKER (E. W.) & (G. W.) WHARTON, 1952. — An introduction to Acarology. — New York, Macmillan Co., 465 p.
- BERLESE (A.), 1904. — Acari nuovi. Manipulus III. — Redia **2** (1) : 10-32.
- GRANDJEAN (F.), 1939. — Quelques genres d'acariens appartenant au groupe des Endeostigmata. Annls. Sci. nat. Zool. **11** (2) : 1-122.
- SHIBA (M.), 1968. — Prostigmatic mites from Japan (III). On some endeostigmatic mites. — Reports of Research Matsuyama Shinonome Junior College **3** (2) : 219-228.
- THOR (S.) & (C.) WILLMANN, 1941. — Acarina-71a. Eupodidae, Penthelodidae, Penthaleidae, Rhagidiidae, Pachygnathidae, Cunaxidae. — Das Tierreich **71** : 129-164.