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MESOSTIGMATIC MITES ASSOCIATED WITH COLEOPTERA IN THE
PIETERSBURG AREA

B Y

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T H E S I S

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	<u>C O N T E N T S.</u>	<u>P A G E.</u>
I.	INTRODUCTION	4.
II.	MATERIAL AND METHODS	5.
III.	FAMILY MACROCHELIDAE	5.
	GENUS <u>NEOPODOCINUM</u>	6.
IV.	FAMILY PACHYLAEALPTIDAE	16.
	GENUS <u>ELAPHROLAELAPS</u>	16.
	GENUS <u>PARALAEELAPS</u>	20.
V.	FAMILY EVIPHIDIDAE	22.
	GENUS <u>EVIPHIS</u>	22.
	GENUS <u>PELETHIPHIS</u>	28.
VI.	DISCUSSION	30.
VII.	SUMMARY	37.
VIII.	ACKNOWLEDGEMENTS	37.
IX.	REFERENCES	38.
X.	APPENDIX	39.

A B S T R A C T.

A survey is given of the specific mites and their numbers as associated with the beetles collected at Turfloop in the Pietersburg area during 1961. A detailed account is given of the Mesostigmata recovered from a total of 40 scarabaeid beetles. The emphasis is mainly on the family Eviphididae, the genus Neopodocinum, belonging to the family Macrochelidae and the genera Elaphrolaelaps and Paralaelaps of the family Pachylaelaptidae.

As additional illustration of the infestation rate, typical mite populations of four scarabaeid beetles are listed. A complete list of the beetles collected and the numbers of mites recovered from them, is given in the appendix.

The new species described are the following :-

Neopodocinum pirmalum, N. barbatum, N. pluma, N. pozzieteri, Paralaelaps pietersburgensis, Eviphis lootsi and Pelethiphis elphenor.

The subspecies, Eviphis cultratellus turfloopensis is figured and described and Elaphrolaelaps formidabilis Berlese, 1918, is redescribed. The male of Eviphis hastatellus hastatellus is described and figured and the suggestion is made that the male E. hastatellus hastatellus described and figured by Ryke and Meyer (1957) be transferred to E. hastatellus transvaalensis, Ryke and Meyer (1957). This study also comprises the differentiation between the two genera, Elaphrolaelaps and Paralaelaps.

I N T R O D U C T I O N.

The Acari have a world-wide distribution and they rival the insects in the extent to which they have colonized both terrestrial and aquatic habitats. Biological relationships of varying degrees of complexity are found between mites and other invertebrates, the most interesting and best known being the association of mites with insects. The co-existence of mites and other invertebrates in a variety of habitats not only provides the opportunity for predation between the groups but also affords ideal conditions for the development of more complex associations such as commensalism and parasitism. These various types of association have been discussed in some detail by Vitzthum (1941) and Trägårdh (1943). Trägårdh's classification appears to be generally applicable and consists of five major groups namely parasitic mites, predacious mites, exudate feeders, phoretic species, and commensals with social insects.

Coleoptera, especially those species of the superfamily Scarabaeoidea, support a varied fauna of mites ranging from sedentary phoretic species to specialized parasitic forms. The Trombidiform mites occur on beetles as parasites, either in the larval instar, for example hydrachnellids, or as adults; sometimes only the females are parasitic, as in the tarsonemids. The deutonymphs of certain Acariidae use the beetles as a means of transportation. These hypopi (non-feeding deutonymphs) carry a complicated sucker-bearing plate ventrally behind the fourth pair of legs and they often occur in enormous numbers on dung-inhabiting Coleoptera.

Numerous species of Mesostigmata, collected from the beetles are known, but only a few authors have paid special attention to the mite-beetle association as an important biocenose. There are three main families of Coleoptera which seem to be implicated in the association with these mites; being the following :- Passalidae, Scolytidae, and Scarabaeidae. All these families have one characteristic trait in common by showing the same kind of social organisation. Future investigation might prove that the seemingly simple relation between beetle and mite could be more complex than is usually assumed.

There has been no comprehensive taxonomic study of the Acari. associated with beetles in Southern Africa. Berlese described a few species in scattered papers (1910, 1921), and Ryke and Meyer (1957, 1958)

and Ryke (1959) investigated mites of the families Eviphididae, Macrochelidae and Pachylaelaptidae in the Western Transvaal and Mozambique.

MATERIAL AND METHODS.

The material for the present investigation was collected by the author on the campus of the University College of the North at Turfloop, Pietersburg, during March, April, October, November and December, 1961. The type material of the new species described is deposited in the collections of the Institute for Zoological Research, of the Potchefstroom University.

The beetles were collected by hand and immediately transferred into a collecting bottle containing enough 70% alcohol to cover the insect completely. The beetles were examined under a stereo microscope and the mites removed by means of a moistened camel's hair brush and washed off into a small vial containing 70% alcohol. The alcohol in the container was poured into a petri dish and any remaining mites were removed and added to those already in the vial. This procedure was then repeated to ensure that no mites were left behind. Such specimen vials were then stored in small bottles containing a label with data and 70% alcohol to prevent dessication.

Temporary mounts of the mites were made by transferring the specimens directly from the preservative to a drop of lactic acid on a slide. The specimens were cleared by gently warming the slide on a hot plate. Figures of the specimens were drawn with the aid of a Wild drawing tube attached to a Zeiss Microscope.

FAMILY MACROCHELIDAE VITZTHUM 1930.

Dorsal shield entire, variously ornamented and with 28 - 30 pairs of setae. Sternal shield with three pairs of setae; metasternal shields free, absent or fused into sternal-endopodal complex. Peritremes looped posteriorly and joining the stigma posteriorly. Genital shield with a pair of lateral accessory sclerites; with a ventrianal or anal shield. Male with separate ventrianal or anal shield, or with a holovertral shield; genital orifice presternal. Gnathosoma well developed; with salivary styli and distinct corniculi; tectum tripartite or unipartite; palpi with five free segments and palpal claw three-tined. Chelicerae chelate-dentate and with one

6/..... or two.....

or two setal brushes at the base of the digitus mobilis; male with strong spermatophoral process. Legs I without ambulacra in either sex; legs II to IV with claws and pulvilli; legs II and IV of male, and rarely legs II of female spurred. Laterodistal elements of pretarsi membranous, broad basally and devided or acuminate distally. Free- living in soil or vegetable debris or paraphages of insects. The laterodistal elements of the pretarsi show definite variations at the generic level in the Macrochelidae, but their value as a generic character is tempered by the fact that the structure is difficult to observe in most specimens.

GENUS NEOPODOCINUM OUDEMANS.

Neopodocinum Oudemans, A. C. (1902). Tijds. v. Ent. 45 : 24.

Neopodocinum originally was described as a member of the Laelaptinae, and was distinguished by its lack of ambulacra on legs I (Oudemans, 1902). Berlese (1922) writes as follows :-
The genus was created by Oudemans for the type species, N. jaspersi, which he described in 1900. The characteristics of the genus as described by Oudemans (1905) were incorrect, because the author took into account a new species Neopodocinum nederveeni of which he only described the male attributing ambulacra to legs I, stating that the females are without such structures. N. nederveeni is also decidedly a species of Megalolaelaps. The absence of ambulacra is impossible since they are present in the male of jaspersi which I have often come across together with its females and their young on different species of Catharsius in the East. Berlese furthermore concluded that N. jaspersi and N. vosi must be considered being synonyms. The genus Neopodocinum was subsequently referred to the family Macrochelidae and its inclusion in the family as a separate genus was justified on the basis of the presence of an anal rather than a ventrianal shield as in other macrochelid genera. Krantz (1962) defines the genus as follows :-
Dorsal shield broad, covering most of the dorsum; with 28 pairs of setae, most of which are smooth, setae D1 and M1 commonly ornamented. Sternal shield transversely narrowed medially, with three pairs of setae; metasternal shields free. With simple anal shield. Tectum unipartite. Lateral elements of pretarsi short, broad and distally acuminate. Chelicerae with a strong brush of setae ventrolaterally; movable digit of male with a large spermatophoral process. Legs I without ambulacra; legs II and often legs IV spurred in the male; pretarsal elements divided distally.

Neopodocinum pirmalum spec. nov.

This

These species is closely related to both N. jaspersi and N. afrum Berlese. The former was collected in the Far East and the latter in East Africa. In describing N. afrum, Berlese confines himself mainly to a comparison of the ventral setae of these two species and in particular to the distribution of the setae around the anal shield. In doing the same with the species in question it becomes clear that both jaspersi and afrum have a far greater number of setae in this region with jaspersi displaying more than double the number. Unfortunately, the short description and lack of sufficient drawings makes it difficult to recognise the species which Berlese described. In both jaspersi and afrum, the anal shield is much closer to the genital shield than is the case in N. pirmalum. Neopodocinum jaspersi bears six rows of setae between the post. margin of the anal shield and the posterior margin of the venter while N. afrum, according to a single drawing by Berlese, bears only three rows of setae. Neopodocinum pirmalum bears only one pair of setae in this region. Sternal setae I and II are relatively much shorter than the sternal setae III, metasternal setae and genital setae in the case of N. pirmalum as compared with both jaspersi and afrum. Furthermore, Berlese makes no mention in his description, nor in his drawing, of the separate metasternal shields as displayed by pirmalum. There is an obvious resemblance when comparing the dorsal shields of jaspersi and pirmalum except for the fact that the four anterior rows of setae are all pilose in the latter and not simple as is the case in jaspersi.

Female :-

Dimensions : Length of body	1328	/U
Breadth of body	883	/U
Length of leg I	742	/U
Length of leg II	898	/U
Length of leg III	711	/U
Length of leg IV	890	/U
Length of anal shield	187	/U
Breadth of anal shield	148	/U
Length of sternal shield	94	/U
Breadth of sternal shield	312	/U
Basis of tritosternum	31	/U

Dorsum (fig 1) :-

The dorsal shield is entire, reticulated and provided with 28 pairs of setae plus an extra unpaired short seta in the median line. In N. jaspersi the dorsal shield bears 27 pairs of setae and the extra seta is also present in this species (Krantz, 1962). The dorsal chaetotaxy consist of 15 dorsals, 16 laterals, 18 marginals and eight medians. Anteriorly the majority of the setae are pilose and the rest of the setae become slightly smaller and simple posteriorly.

Venter (fig 2) :-

The sternal shield is granular with undulating transverse lines anteriorly. The region between the anterior margin of the sternal shield and the base of the tritosternum is sclerotised. The sternal shield extends to the middle of coxae III. Both the anterior and posterior margin are deeply incised, giving the sternal shield a strip-like appearance. The sternal shield bears three pairs of strong simple setae of which sternal setae I are the shortest and sternal setae III the longest. In front of each of sternal setae II is a transverse line running inward to a position in line with sternal setae I. The metasternal setae extend from free metasternal shields. The genital shield is reticulated anteriorly and granulated posteriorly where it becomes convex in shape, bearing two simple setae laterally. The separate anal shield is fairly oval in shape. The post anal and the para anal setae are simple; the latter pair lying slightly anterior to the position of the anus. The twelve pairs of setae on the ventral interscutal membrane are pilose and distributed as depicted in fig. 2. The peritreme reaches to the middle of coxae IV where it is strongly looped in the region of the stigma. The tritosternum is biramous, the base short and the lacinae pilose.

Gnathosoma (fig 3.) :-

The hypostomal setae are simple. The capitular groove of the hypostome is provided with four rows of denticles. The corniculi are normal and the internal malae pilose. The internal posterior rostrals are more than three times the length and much stouter than the external and capitular setae. The rostral setae are also relatively long. The palp tarsus bears a three-pronged seta (fig. 4). The chelicerae (fig. 5) are chelatedentate, the movable digit bearing one large and three smaller teeth. The fixed digit has one small and three large teeth. The synarthrodial brush of setae is a little longer than half the length of the movable digit. The tectum (fig. 6), closely resembles that of N. jaspersi.

9/.. Legs :-

Legs :-

Tarsus 1 (fig 7) bears several sensory setae of which the one most distal is as long as the tarsus itself with two slightly shorter lateral setae. Prae-tarsus 1 does not terminate in an ambulacral apparatus, whilst legs 11, 111 and 1V are each provided with an ambulacral apparatus comprising two strong claws and a lobate pulvillus. Tarsus 11 (fig. 8) is provided with two stout spurs and three smaller spurs. The majority of the setae on the legs are spine-like.

Male :-

Dimensions :	Length of body	1408 μ
	Breadth of body	1072 μ
	Length of leg 1	781 μ
	Length of leg 11	937 μ
	Length of leg 111	820 μ
	Length of leg 1V	1289 μ
	Length of anal shield	235 μ
	Breadth of anal shield	188 μ
	Length of sterniti-genital shield	501 μ
	Breadth of sterniti-genital shield	327 μ
	Breadth of tritosternum base	37 μ

The dorsal chaetotaxy (fig.9) very much resembles that of the female. Comparing the setae of the sterniti-genital shield with their counterparts of the female described (fig.10), we find even greater relative lengths of setae 11; 111; 1V and V as compared with the length of seta 1 on the sterniti-genital shield. The pair of setae on the interscutal membrane anterior to the anal shield is simple and also more than twice the length of their pilose counterparts in the female. As for the other features, the venter resembles that of the female. The movable digit of the chelicera (fig. 11), is provided with a spermatophoral process. In the female there is a very small difference in lengths of legs 11 and 1V, whereas in the male leg 1V is 352 μ longer than the leg 11. Furthermore the simple setae on leg 1V are longer than those of the other legs. Leg 11, however, is much more stout and provided with strong spurs as illustrated in fig. 12. A few of the setae on leg 11 are also pilose.

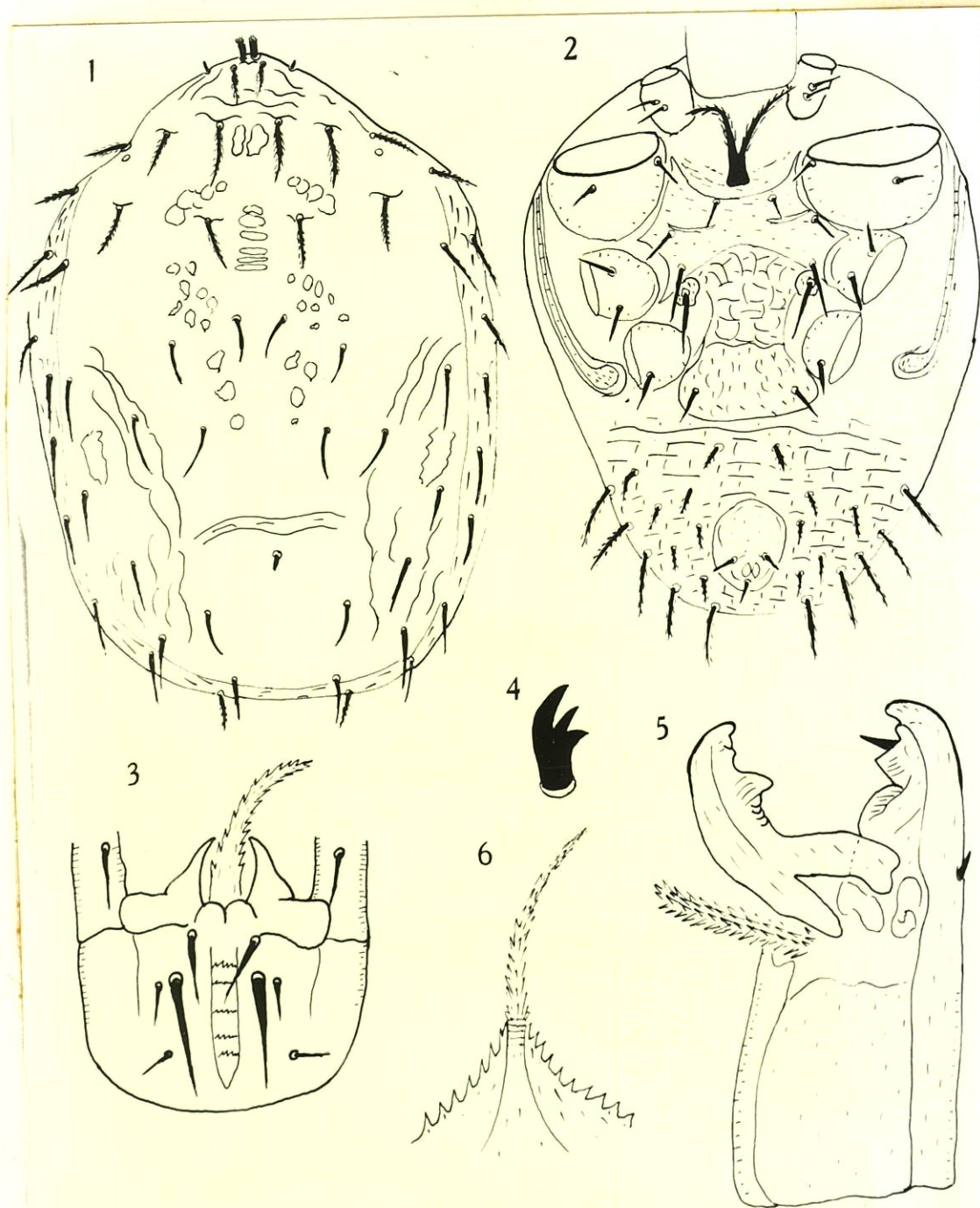
Deutonymph :-- ' ,

Dimensions :	Length of body	898/U
	Breadth of body	719/U
	Length of leg I	515/U
	Length of leg II	625/U
	Length of leg III	531/U
	Length of leg IV	695/U
	Length of anal shield	172/U
	Breadth of anal shield	146/U
	Breadth of sterniti-genital shield	163/U
	Length of sterniti-genital shield	484/U
	Width of tritosternum base	28/U

Apart from a difference in size and other usual differences between this stage and the adult, it is very easily recognised as belonging to this particular species in general and in detail. The venter and tarsus II of the deutonymph are illustrated in figs. 13 and 14 respectively

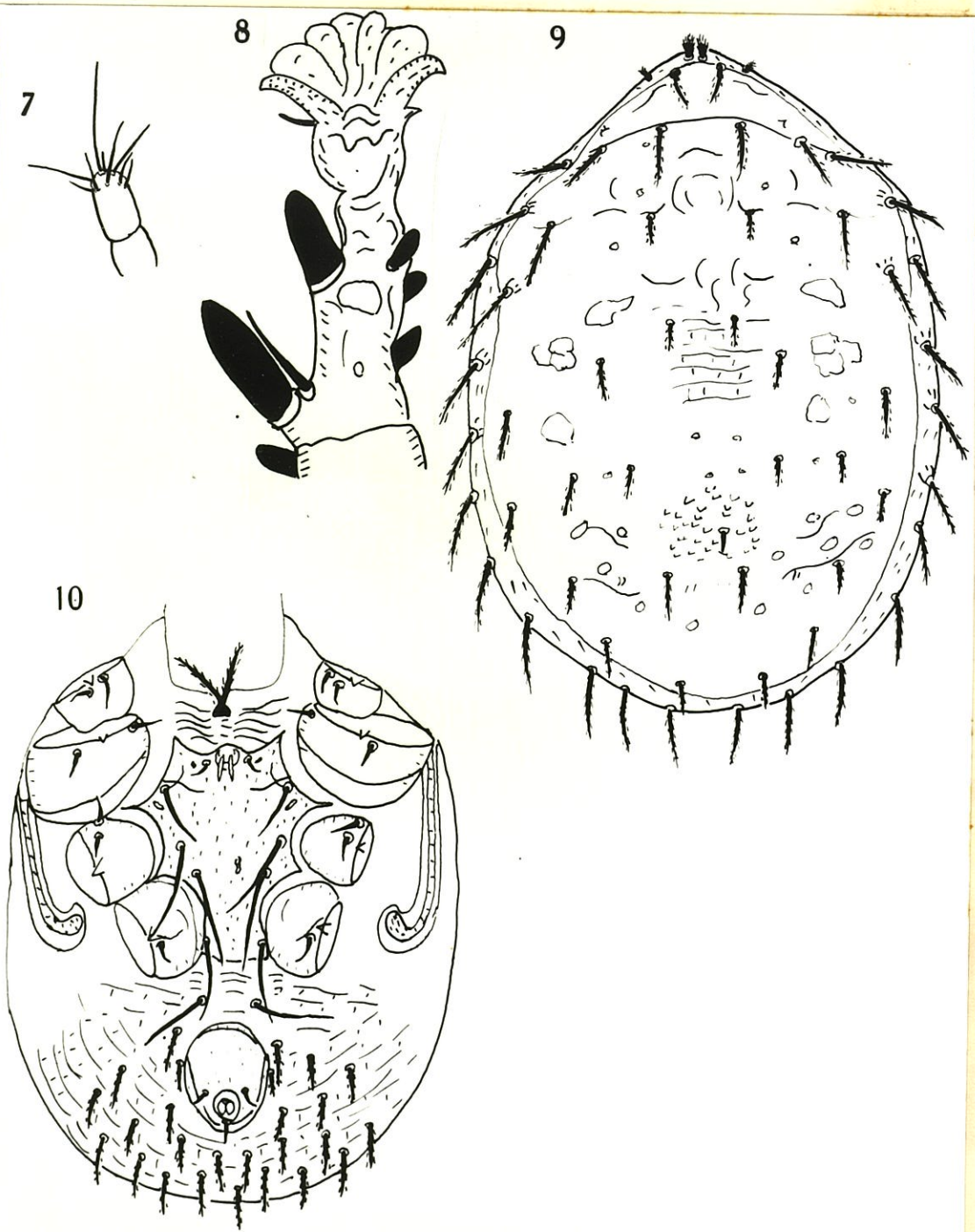
Host and locality :--

Holotype female, allotype male; morphotype deutonymph, and the following paratypes :-- 6 females, 3 males and 5 deutonymphs off Heliocopris pimal Fabricius, Turfloop, Pietersburg, Transvaal; 11th December, 1961.



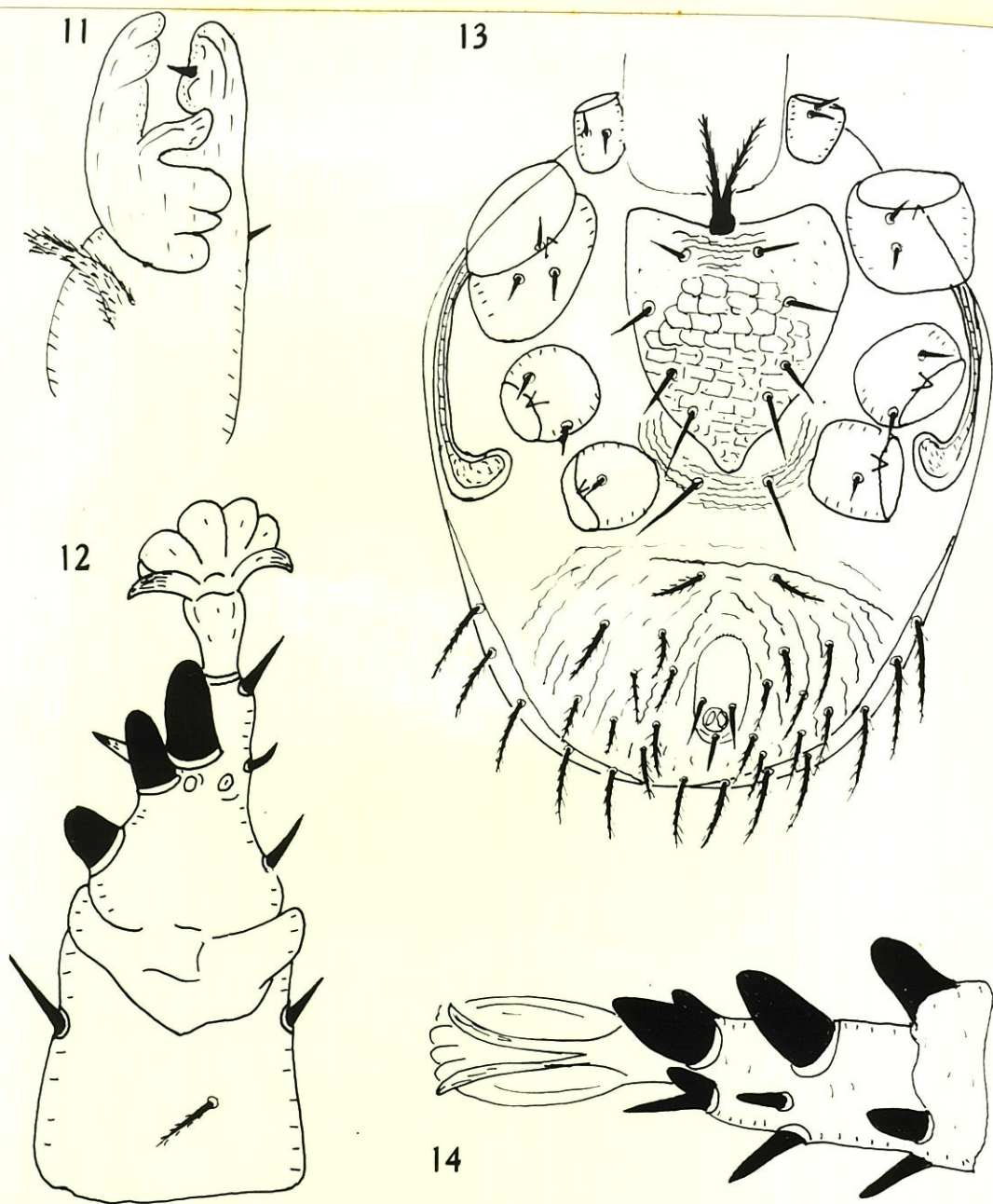
Figs. 1-6. *Neopodocinum pimalum*, spec. nov., female.

1. dorsum; 2. venter; 3. hypostome; 4. specialised seta on palntarsus;
5. chelicera; 6. tectum.



Figs. 7-14. *Neopodocinum pirmalum*, spec. nov.

7. tarsus I, female; 8. tarsus II, female; 9. dorsum, male; 10. venter, male;



Figs. II-I⁴. *Neopodocinum pirmalum*, spec. nov.

II. chelicera, male; I². tarsus II, male; I³. venter, deutonymph;
I⁴. tarsus II, deutonymph.

11.
Neopodocinum barbatum spec. nov.

Female :-

Dimensions :	Length of body	1952 μ
	Breadth of body	1408 μ
	Leg I	1523 μ
	Leg II	1406 μ
	Leg III	1538 μ
	Leg IV	1851 μ
	Length of sternum	234 μ
	Breadth of sternum	359 μ
	Length of anal plate	234 μ
	Breadth of anal plate	164 μ
	Base of tritosternum	47 μ

Dorsum (fig. 15) :-

The reticulated dorsal shield is provided with 29 pairs of setae of which eleven are dorsal; two median; six lateral and ten marginal. Except for the verticals, the setae of the dorsal series are simple and relatively short. The pilose marginal and antero-lateral setae are much longer.

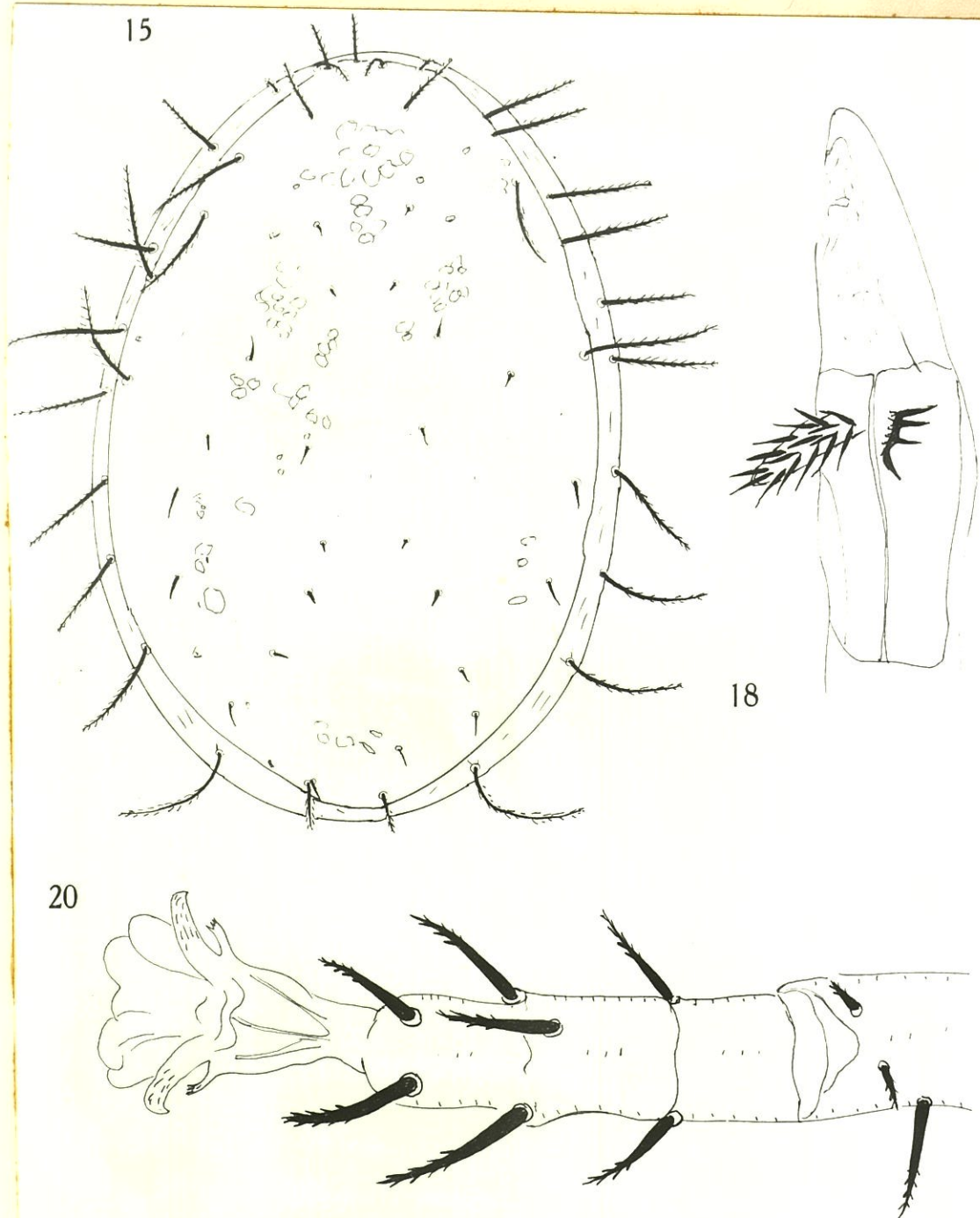
Venter (fig. 16) :-

Anteriorly between the sternal shield and the base of the tritosternum, the venter is sclerotised. The sternum bears three pairs of setae which are pilose distally. The metasternal setae are not projected off metasternal shields. Posteriorly the genital shield is convex, bearing a pair of distally pilose setae. All these setae are of moderate length. The anus is situated in the centre of the oval-shaped anal shield and the para-anal setae are placed in line with the anterior margin of the aperture. The interscutal membrane bears twenty-three pairs of setae, all of which are pilose distally. The peritreme loops strongly in the region of the stigma.

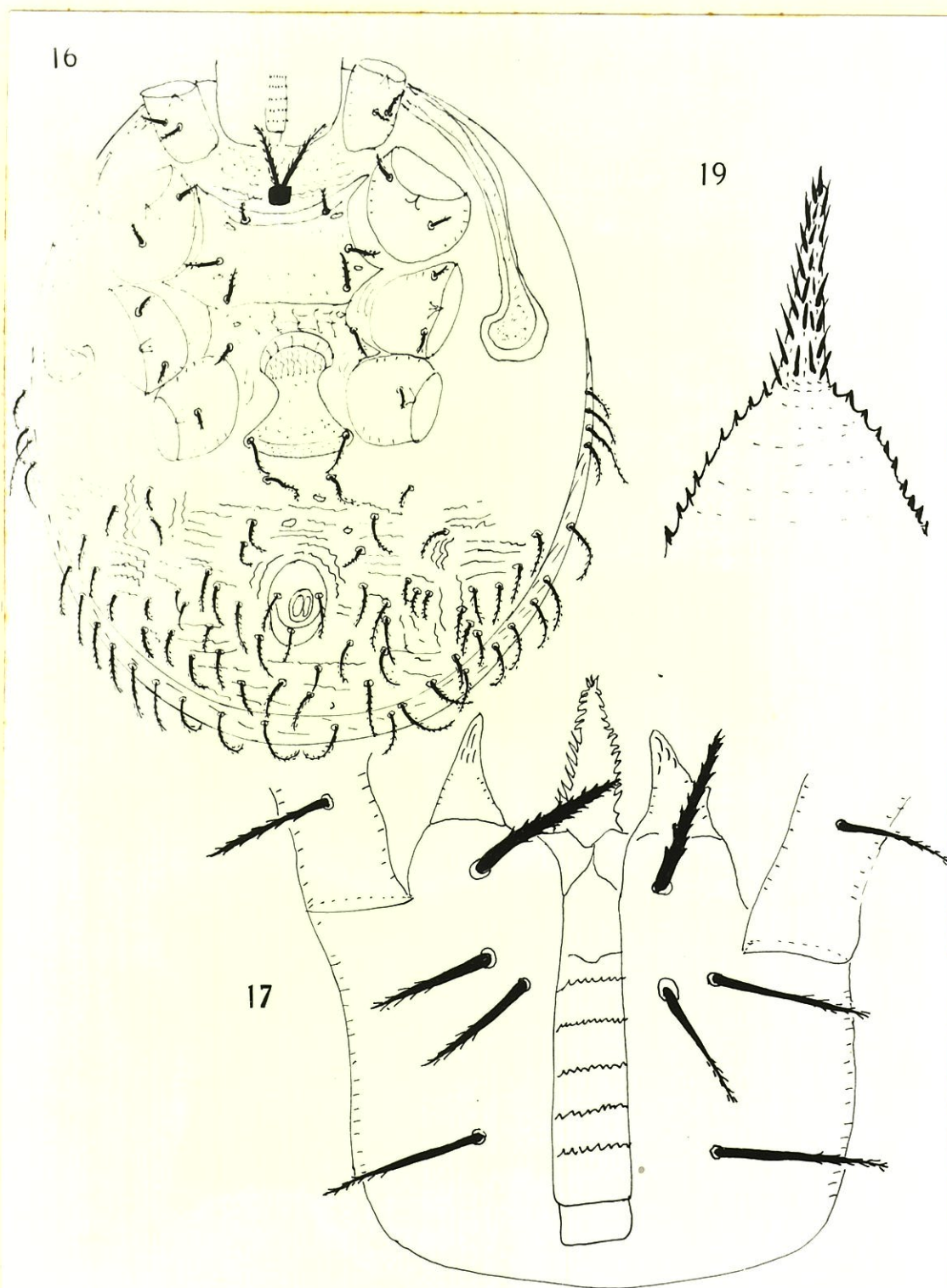
Gnathosoma (fig 17) :-

The hypostomal setae are of more or less equal length and are pilose distally. The capitular groove has five transverse rows of denticles. The corniculi are normal and the internal malae are pilose. The synarthrodial brush of setae is about half the length of the movable digit of the chelicera (fig. 18). The denticulated tectum is illustrated in fig. 19.

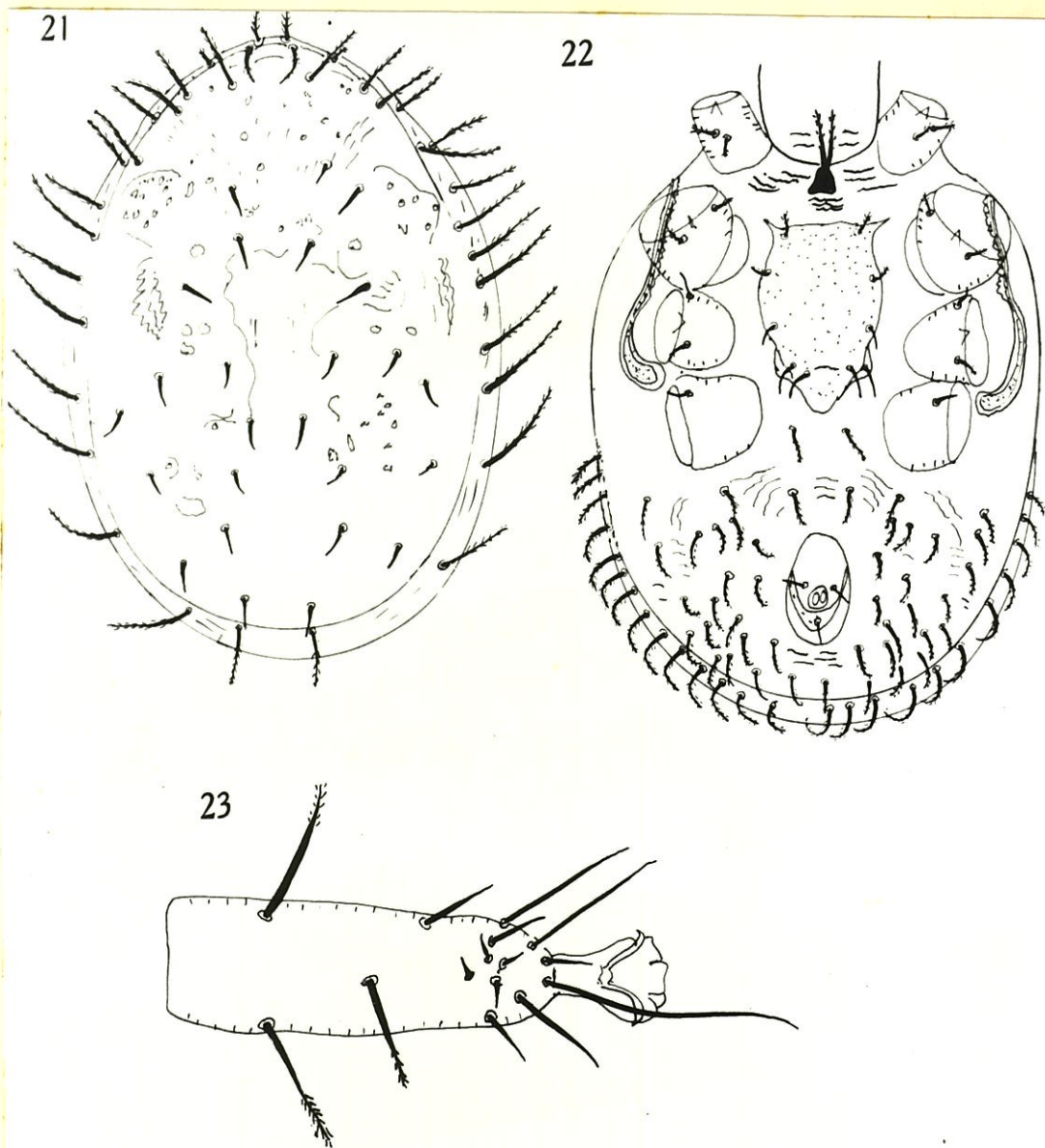
12/... Legs :-



Neopodocinum barbatum, spec. nov. female. 15, dorsum; 18, chelicera; 20, tarsus II.



Neonodocinum barbatum, spec. nov. female. I6, venter; I7, hypostome; I9, tectum.



Neonodocinum barbatum, spec. nov. deutonymph. 21, dorsum; 22, venter; 23, tarsus II.

Legs :-

All the legs have pulvilli but leg I is without the claws. Leg II (fig. 20) is without spur-like setae. All the setae on the legs are pilose distally.

Host and Locality :-

Holotype female and morphotype deutonymph off Copris elphenor Turfloop, Pietersburg, Transvaal; 6th December 1962.

Deutonymph :-

Dimensions :	Length of body	1484 μ
	Breadth of body	937 μ
	Leg I	1132 μ
	Leg II	1093 μ
	Leg III	1171 μ
	Leg IV	1453 μ
	Length of sternum	367 μ
	Breadth of sternum	312 μ
	Length of anal shield	266 μ
	Breadth of anal shield	164 μ
	Base of tritosternum	55 μ

The chaetotaxy of its dorsum (fig. 21) is basically similar to that of the female. The sternum bears five pairs of setae, all practically equal in length, and sternal setae IV and V are placed more or less in a transverse (fig 22) row. The anterior part of the peritreme is undulated. The chaetotaxy of the interscutal membrane of the venter is also similar to that of the female. The ambulacral apparatus of legs II; III and IV are similar to that of the female, but leg I is furnished with a delicate claw (fig. 23). The general chaetotaxy of the legs and gnathosoma resembles that of the female.

Host and locality :-

Holotype female and morphotype deutonymph off Copris elphenor, Turfloop, Pietersburg, Transvaal; 6th December, 1961.

Neopodocinum pluma, spec. nov.Deutonymph :-

This nymph is referred to the genus Neopodocinum on account of the following :- The cylindrical kind of pilose vertical setae; the

13/.. unipartite.....

unipartite tectum; and the separate anal shield. As in N. jaspersi (= N. vosi) the dorsal shield is divided in the deutonymph (Oudemans, 1903).

Dimensions :	Length of body	680 /U
	Breadth of body	469 /U
	Leg I	398 /U
	Leg II	383 /U
	Leg III	414 /U
	Leg IV	508 /U
	Length of anal plate	92 /U
	Breadth of anal plate	51 /U
	Length of sternal plate	209 /U
	Breadth of sternal plate	157 /U
	Basis of tritosternum	14 /U

Dorsum (fig. 24) :-

The reticulated dorsal shield is divided in the posterior third of the body. It is provided with 28 pairs of setae, seven pairs of which are dorsal; eight pairs lateral; one pair median and twelve pairs marginal. The vertical and first marginal setae are pilose whereas the two pairs of posterior dorsals are simple. The rest of the dorsal setae are conspicuously feather-like in appearance and relatively long. The anterior dorsals are longer than the rest of the setae, the longest pair measuring 190 μ .

Venter (fig 25.) :-

The sternal shield bears three pairs of simple setae of approximate equal length. The region between the sternum and the base of the tritosternum is sclerotised. Three pairs of setae surround the oval-shaped anal shield. The anus is situated in the posterior part of the shield which bears three simple circum-anal setae; the para-anal setae are placed in front of the operture. The peritreme is strongly looped posteriorly.

Gnathosoma (fig. 26) :-

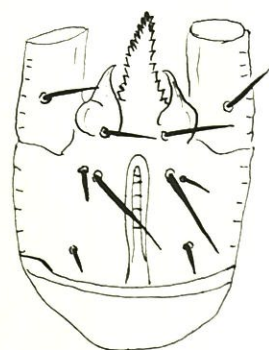
The hypostomal setae are simple. The internal posterior rostrals are more than three times the length of the external and capitular setae. The rostral setae are also relatively long. The capitular groove has six rows of denticles. The palp tarsus bears the usual three-pronged seta and a distal rod-like seta. The tectum is unipartite.

Legs :-

Legs II; III and IV are each provided with a pulvillus and a

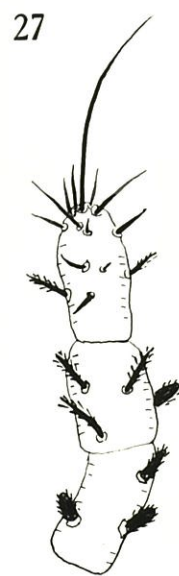
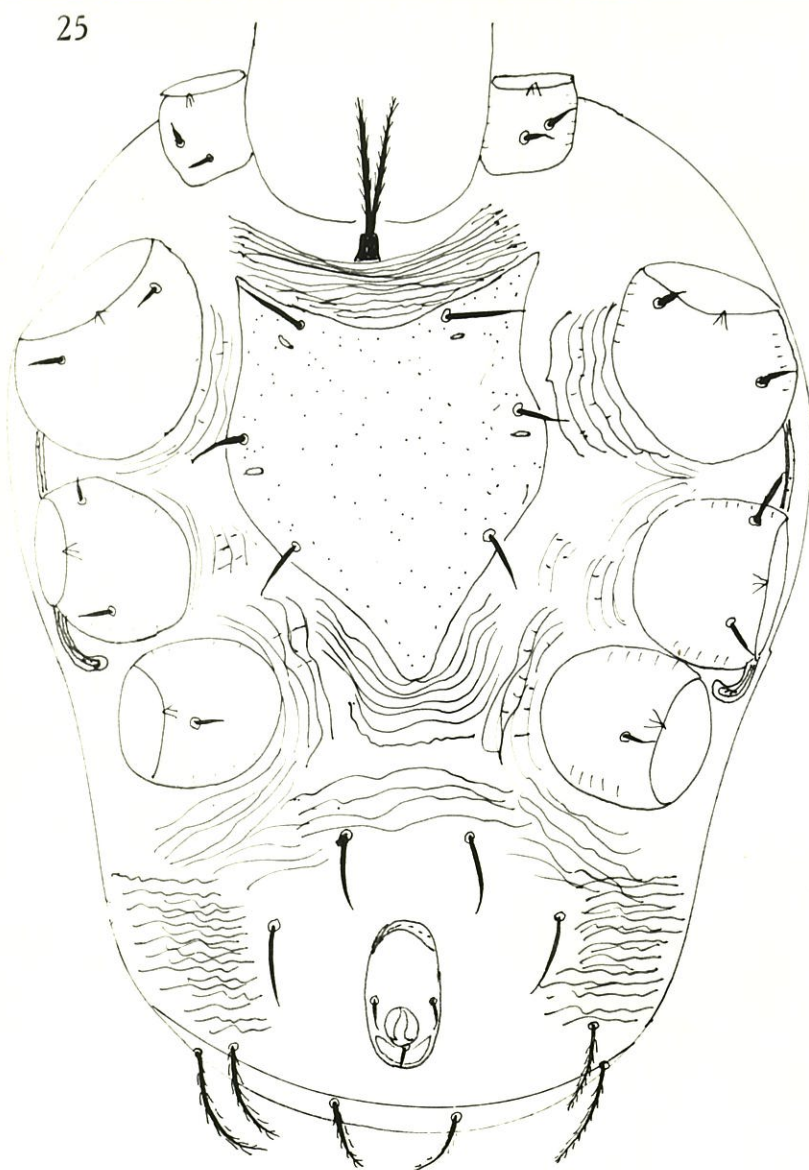
14.. / pair

24



26

Neopodocinum pluma, spec. nov., deutonymph. 24, dorsum; 26, hypostome.



28

Neorodocinium pluma, spec. nov. deutonymph. 25, venter; 27, tarsus I; 28, tarsus II.

pair of claws. Tarsus I (fig. 27) has distally a long and laterally two shorter sensory setae and lacks an ambulacral apparatus. The genu and femur of the tarsus display a few setae which are leaf-like and pilose. Leg II (fig. 28) bears stout spurs and the fourth leg is furnished with strong spine-like setae. On all legs the majority of setae are pilose, the rest being simple.

Host and locality :-

Holotype deutonymph and three paratype nymphs off Hellicoprion pinalis, Turfloop, Pietersburg, Transvaal; 11th December, 1961.

Neopodocinum potgieteri, spec. nov.

Deutonymph :

This nymph is referred to the genus Neopodocinum on account of the following :- the cylindrical kind of pilose vertical setae; the unpartite tectum and the separate anal shield. This species is also characterized by a divided dorsal shield in the deutonymph.

Dimensions :	Length of body	953 μ
	Breadth of body	719 μ
	Leg I	875 μ
	Leg II	929 μ
	Leg III	836 μ
	Leg IV	1015 μ
	Sternum length	327 μ
	Sternum breadth	194 μ
	Anal shield length	215 μ
	Anal shield breadth	123 μ
	Tritosternum base	31 μ

Dorsum (fig. 29) :-

The reticulated dorsal shield is divided in the posterior third of the body and bears twenty pairs of setae, eight pairs of which are dorsal; three pairs lateral and nine pairs marginal. The majority of the setae on the shields are simple, those on the anterior part being pilose. The marginal setae are all directed upwards. In comparison with the other species, the vertical setae are long.

Venter (fig. 30) :-

The sternal shield bears three pairs of setae of which sternal

.../setae

setae are pilose distally, the others being simple. The three pairs are more or less of equal length. The anus is placed in the centre of the anal shield, the latter being fairly oval in shape. Bow-shaped lines surround the anal setae laterally. Only four pairs of relatively long pilose setae surround the anal shield on the ventral interscutal membrane.

Gnathosoma (fig. 31) :-

The rostral and capitular setae are of fairly equal length, all being pilose distally. The capitular groove is provided with five rows of denticles. The synarthrodial brush of setae on the chelicera (fig. 32) is quite conspicuous.

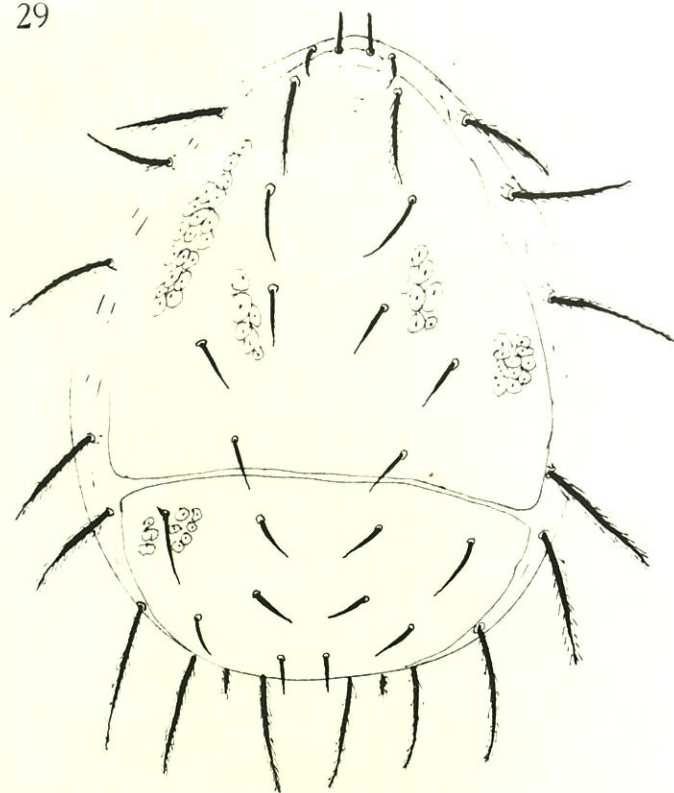
Legs :-

All the legs are provided with pulvilli, the first pair being provided with very delicate claws and equipped with a long sensory seta. The setae on the legs are either simple, spine-like or pilose distally (fig. 33).

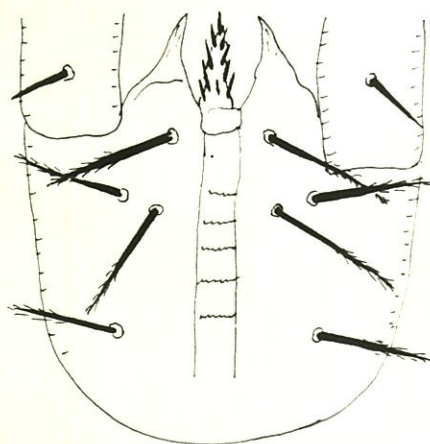
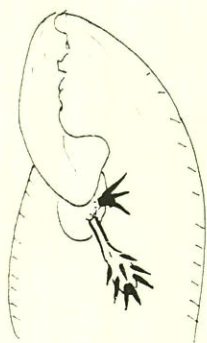
Host and locality :-

Holotype deutonymph off Copris elphenor, Turfloop, Pietersburg, Transvaal; four paratype nymphs off H. neptunus Bohemann and six nymphs off C. elphenor, Turfloop, Pietersburg, Transvaal; December 1961.

29



32



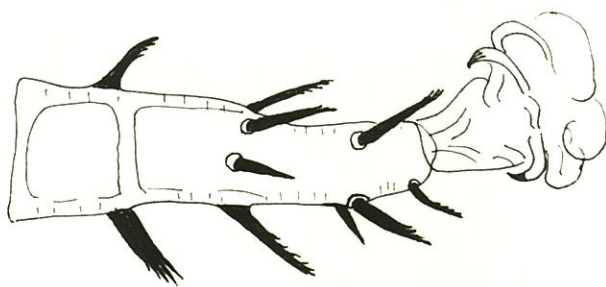
31

Neopodocinum potgieteri, spec. nov. deutonymph. 29, dorsum; 31, hypostome;
32, chelicera.

30



33



Neopodocinum potgieteri, spec. nov. 30, venter; 33, tarsus II.

Family Pachylaelaptidae Berlese 1913.

The Pachylaelaptids are readily distinguished from other parasitoids by the sclerotization of the venter. The inter-coxal region in the female is occupied by the fused sternal-endopodal shield which extends posteriorly to the level of coxae IV. A large exopodal-peritrematal shield which may also be fused with the metapodal shields, flanks the genito-ventral shield. Leg II in the male is heavily armed. Tarsus II in the female may also be provided with stout spurs distally. The forked seta on the palpal tarsus has three tines. All tarsi are provided with pretarsi.

Genus Elaphrolaelaps Berlese (1910) and genus Paralaelaps Trägårdh (1908). The genus Elaphrolaelaps was instituted by Berlese (1910) as a subgenus of Pachylaelaps. The females were characterised by the absence of spurs on the legs, the presence of spurs being typical of the genus Pachylaelaps sens. str. In 1908 Trägårdh erected the genus Paralaelaps, as a subgenus of Pachylaelaps, the characters of the subgenus being very similar to those of Elaphrolaelaps. The described species of Paralaelaps possess many setae, especially on the ventral interscutal membrane. Berlese described three species of Elaphrolaelaps namely fenestratus, formidabilis and terrificus. He also regarded the male, described by Trägårdh (1908) as Pachylaelaps castaneus, as a possible member of the genus. In both Elaphrolaelaps and Paralaelaps the genito-ventral shield is relatively widely removed from the anal shield. Ryke (1959) described the female, male and deutonymph of Elaphrolaelaps sternalis and provisionally referred the species to the genus Elaphrolaelaps on account of the number of setae on the venter and dorsum. Examination of additional material proves the genus Elaphrolaelaps not to be congeneric with Paralaelaps, a conclusion based mainly on the chaetotaxy of the dorsum and of the interscutal membrane of the venter. The type species, Paralaelaps kibonotensis, described and drawn by Trägårdh, 1908, is provided dorsally with very long simple setae and the interscutal membrane of the venter bears a dense covering of long simple setae, whereas the species of Elaphrolaelaps are provided with some average sized and some very short simple setae on the dorsum and few simple setae on the interscutal membrane of the venter.

Elaphrolaelaps formidabilis Berlese, 1918.

Female :

Dimensions :	Length of body	1624 μ
	Breadth of body	1101 μ
	Leg I	1226 μ
	Leg II	1343 μ
	Leg III	1757 μ
	Leg IV	1718 μ
	Length of anal shield	187 μ
	Breadth of anal shield	218 μ
	Length of sternal shield	375 μ
	Breadth of sternal shield	281 μ
	Base of tritosternum	39 μ

Dorsum (fig.34) :-

The reticulated dorsal shield bears 33 pairs of simple setae. The lateral setae on the edge of the shield are longer than the relatively short setae in the middle region. The two vertical setae are also short. The dorsal shield does not cover the entire dorsum and the setae on the interscutal membrane of the dorsum are similar to those on the lateral margin of the shield.

Venter (fig.35) :-

The reticulated sternal metasternal shield is fused with the endopodal shields and bears four pairs of simple setae. The compound peritrematal-exopodal-metapodal shields flank the reticulated genito-ventral shield and all these shields lie in a fairly semi-circular plane. The genito-ventral shield bears two pairs of simple setae. The anal shield is more or less triangular in shape with a small indent in its anterior margin; the usual three setae are present. The peritreme reaches anteriorly as far as coxae I and posteriorly as far as the region between coxae III and IV. The distribution of the setae on the ventral interscutal membrane is shown in the figure. This species is characterised by the presence of a seta on the posterior end of the peritrematal-podal shield.

Gnathosoma (fig. 36):-

The hypostome bears the normal number of setae with no striking difference in length. The capitular groove is provided with six rows of denticles. Both fixed and movable digits of the chelicerae fig. 37 are tridentate. The tectum shown in figure 38 is denticulate distally and laterally.

/.. Legs :-

Legs :-

Distinct claws are absent on all the legs. The enpodia are well developed. Legs III and IV are much longer than legs I and II. Leg II (fig.39) is provided with four spine-like setae. The majority of the other setae on the legs are simple, relatively long and strong.

Male :-

Dimensions :	Length of body	1405	µ
	Breadth of body	960	µ
	Leg I	1408	µ
	Leg II	1280	µ
	Leg III	1280	µ
	Leg IV	1600	µ
	Length of anal shield	45	µ
	Breadth of anal shield	45	µ
	Length of sternal shield	368	µ
	Breadth of sternal shield	297	µ
	Base of tritosternum	25	µ

Dorsum :-

The dorsal chaetotaxy and reticulations resemble those of the female.

Venter (fig.40) :-

The sterniti-genital shield is fused with the ventri-anal shield, thus forming a holovenral shield which does not fuse with the dorsal shield posteriorly. This shield bears fourteen pairs of simple setae as in addition to the postanal and two para-anal setae. Their distribution is shown in the figure. In other features, the venter resembles that of the female. The movable digit of the chelicera (fig.41), is provided with a spermatophoral process. Leg II (fig.42) is provided with tubercles on the femur and tibia, and tarsus. The femur of leg IV also bears a spur. The other setae on the legs are either spine-like or simple.

Deutonymph :-

Dimensions :	Length of body	1054	U
	Breadth of body	679	U
	Leg I	1132	U

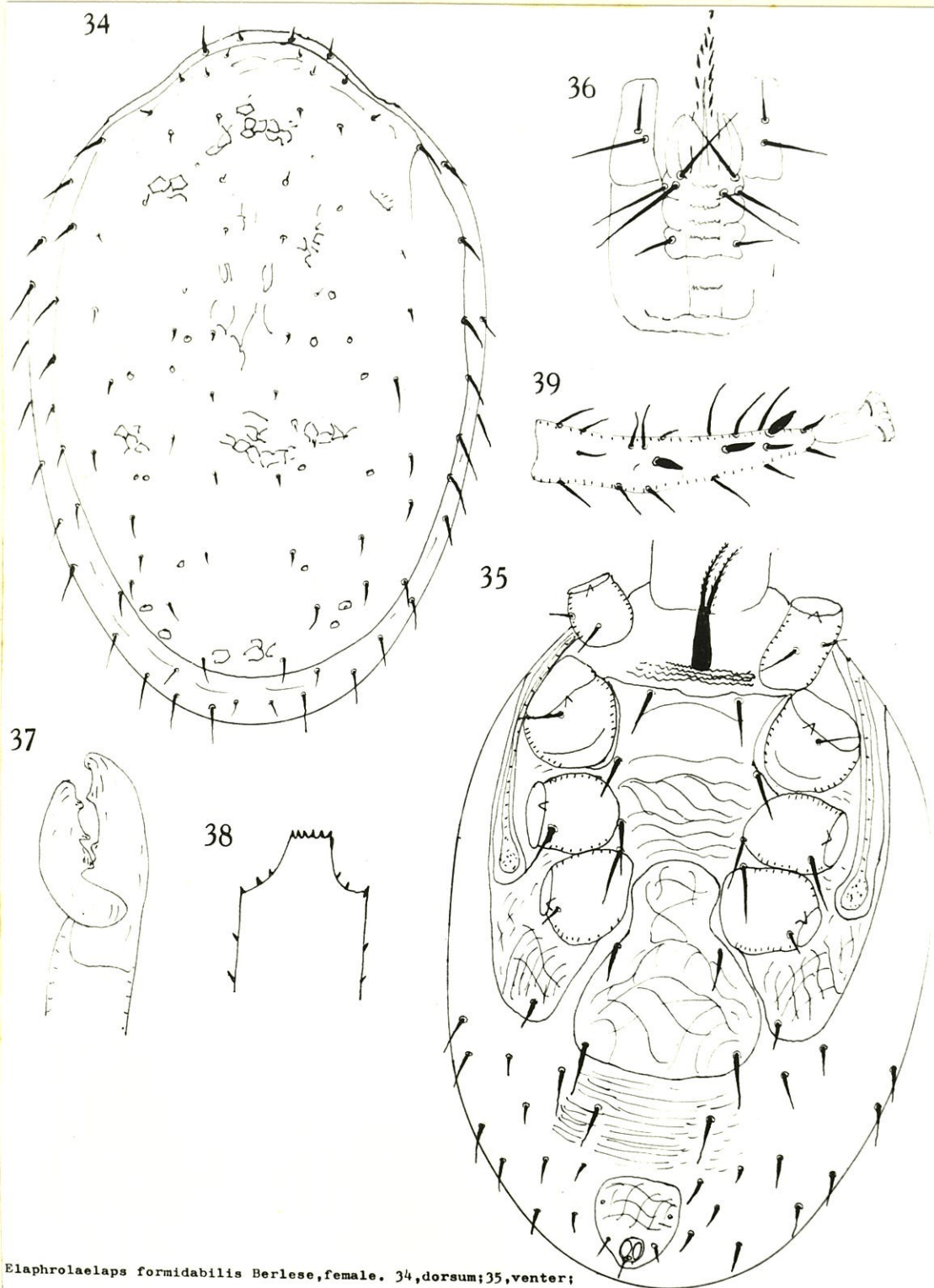
Deutonymph :- (Contd.)

Dimensions	: Leg II	1015 /U
	Leg III	1093 /U
	Leg IV	1250 /U
	Length of anal shield	141 /U
	Breadth of anal shield	156 /U
	Length of sternal shield	469 /U
	Breadth of sternal shield	211 /U
	Base of tritosternum	47 /U

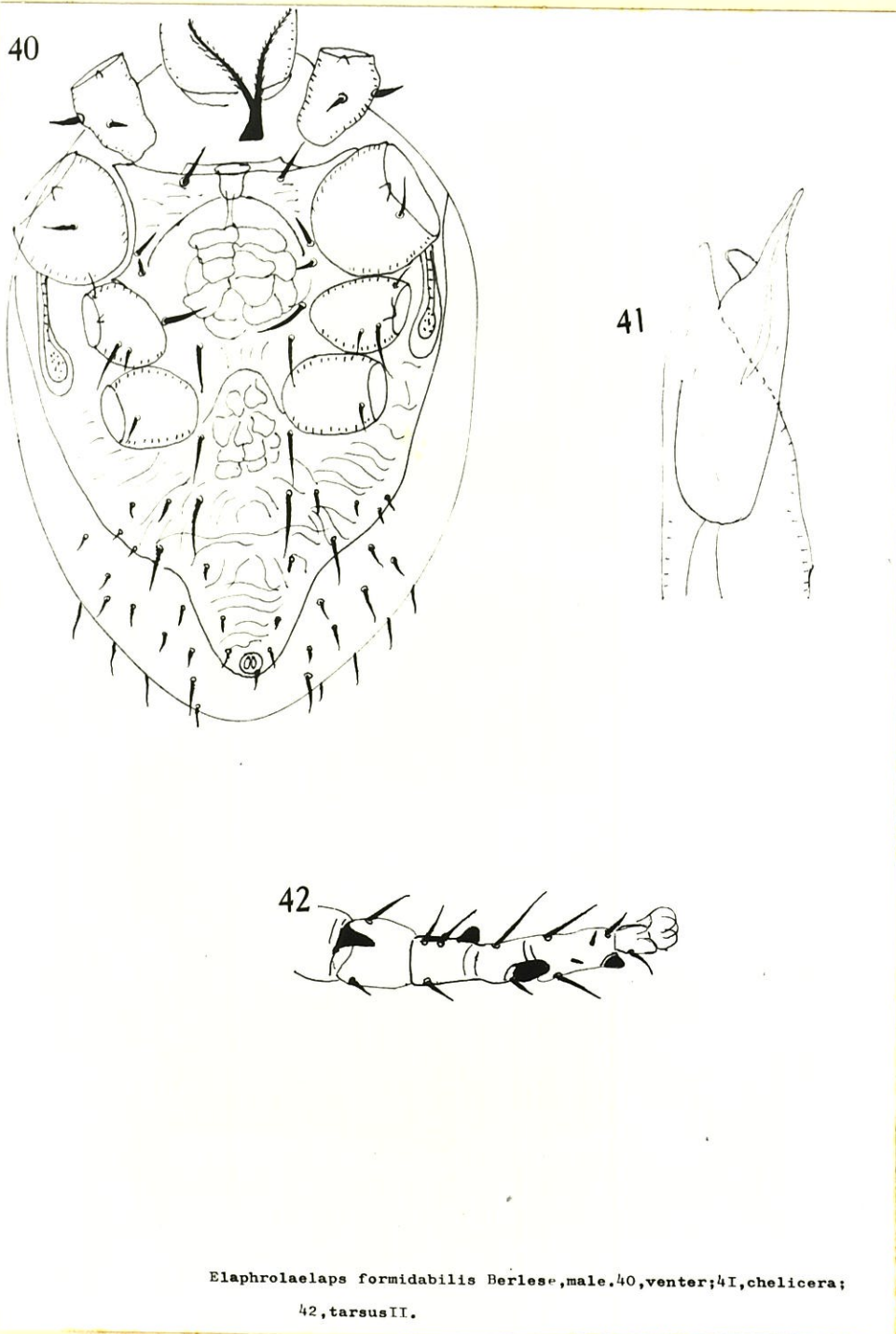
As in E. sternalis (fig. 43), the dorsal shield has two lateral incisions more or less in the posterior third of the dorsum. The distribution of the dorsal setae is basically the same as in the adult. The verticals are small like the majority of the other dorsal but the majority of the marginal setae are relatively long. The gnathosoma resembles that of the adult. The sternum (fig. 44), bears four pairs of fairly long simple setae. On the interscutal membrane of the venter are sixteen pairs of simple setae of which those anterior to the anal shield are the longest. The peritremes are conspicuously short, stretching only the distance between coxae II and IV. All the legs have ambulacra and delicate claws. Leg II (fig. 45) is provided with three spine-like setae on the tarsus and all the legs bear strong simple setae.

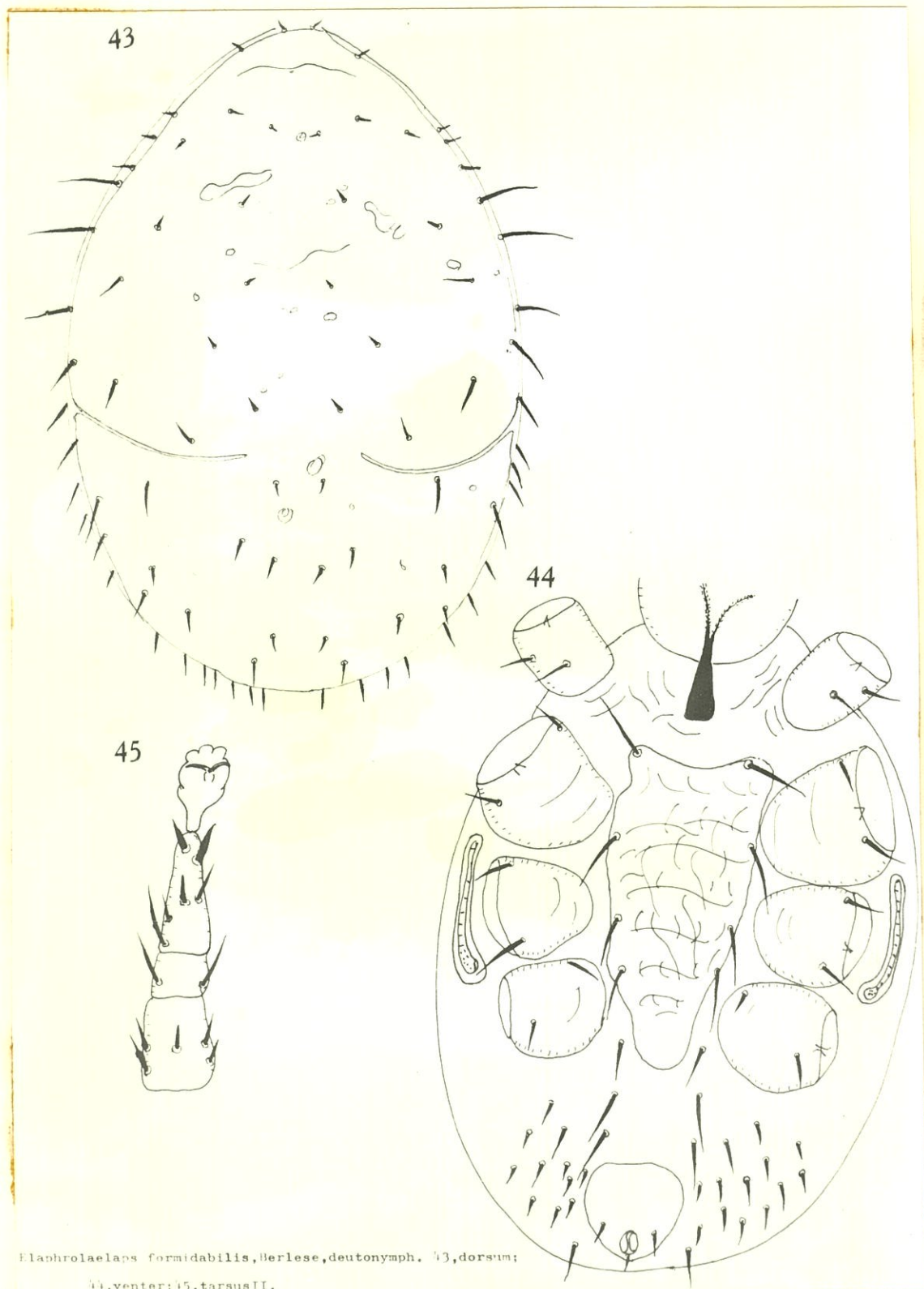
Host and locality :-

Holotype female; allotype male; morphotype deutonymph and two paratype females off Copris elphenor, Turfloop, Pietersburg, Transvaal 22 April, 1961.



Elaphrolaelaps formidabilis Berlese, female. 34, dorsum; 35, venter;
36, hypostome; 37, chelicera; 38, tectum. 39, tarsus II.





Elaphrolaelaps formidabilis, Berlese, deutonymph. 43, dorsum;
 44, venter; 45, tarsus II.

Paralaelaps pietersburgensis spec. nov.

This species can easily be distinguished from P. kibonotensis on the basis of the large number of setae on the genito-ventral shield.

Female :-

Dimensions :	Length of body	1484	µ
	Breadth of body	757	µ
	Leg I	1250	µ
	Leg II	1211	µ
	Leg III	1250	µ
	Leg IV	1796	µ
	Length of anal shield	140	µ
	Breadth of anal shield	132	µ
	Length of sternal shield	515	µ
	Breadth of sternal shield	234	µ
	Base of tritosternum	47	µ

Dorsum (fig. 46) :-

The fairly oval-shaped dorsal shield only covers about three-quarters of the dorsum. It is provided with very long and slender simple setae. The interscutal membrane of the dorsum is densely covered with relatively long simple setae.

Venter (Fig. 47) :-

The inter-coxal region is occupied by the fused sternal-endopodal shield which extends posteriorly to the level of coxa IV. The exopodal-peritrematal shield is fused with the metapodal shield and is produced behind coxa IV. The shield bears four pairs of fairly long simple setae of approximately equal length. The first pair of these setae is borne on a well sclerotised portion of the shield.

The flask-shaped genito-ventral shield bears a large number of simple setae. In this respect it differs from P. kibonotensis with its two pairs only. The interscutal membrane of the venter is conspicuously densely covered with fairly long simple setae. The anal shield bears the usual number of circum-anal setae. The base of the tritosternum is nearly as long as the lacinae themselves.

Gnathosoma (fig. 48) :-

The hypostome bears the normal number of setae which are all simple. The capitular groove is provided with six rows of denticles.

The shape of the tectum is depicted in fig. 49.

Legs :-

Leg 1V is more than 500 U longer than the other three pairs. All the legs are provided with setae, the longest macroseta being 352 occurring on leg 1V. All the legs have pulvilli but only leg 1 is without claws. Tarsus (fig. 50) is provided with four spine-like setae as well as other long simple setae.

Male :-

Dimensions :	Length of body	1484 /U
	Breadth of body	843 /U
	Leg 1	1203 /U
	Leg 11	1172 /U
	Leg 111	1200 /U
	Leg 1V	1718 /U
	Length of anal shield	31 /U
	Breadth of anal shield	39 /U
	Length of sternum	586 /U
	Breadth of sternum	234 /U
	Base of tritosternum	39 /U

Dorsum :-

The dorsal shield is broader than that of the female - but the chaetotaxy resembles that of the female.

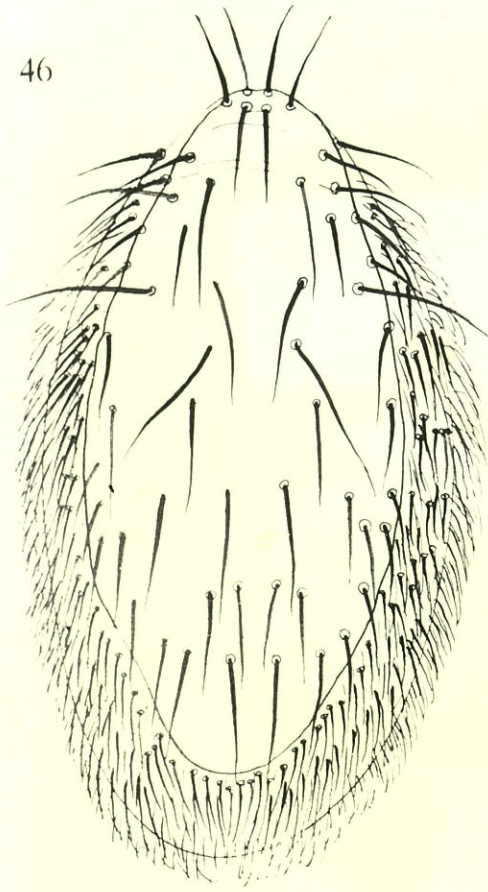
Venter : (fig. 51) :-

The holoventral shield is not fused with the dorsal shield posteriorly. This shield is reticulated and bears five pairs of fairly long simple setae to the level of the margin of coxae 1V. Apart from the usual anal setae the posterior region of the holoventral shield is covered with numerous simple setae. The peritremes reach anteriorly as far as the vertical setae and the stigmata are situated in line with the anterior margin of coxae 1V. The hypostomal setae are the normal number and there is not much difference in length. The spermatophoral process (fig. 52) of the chelicerae is very long.

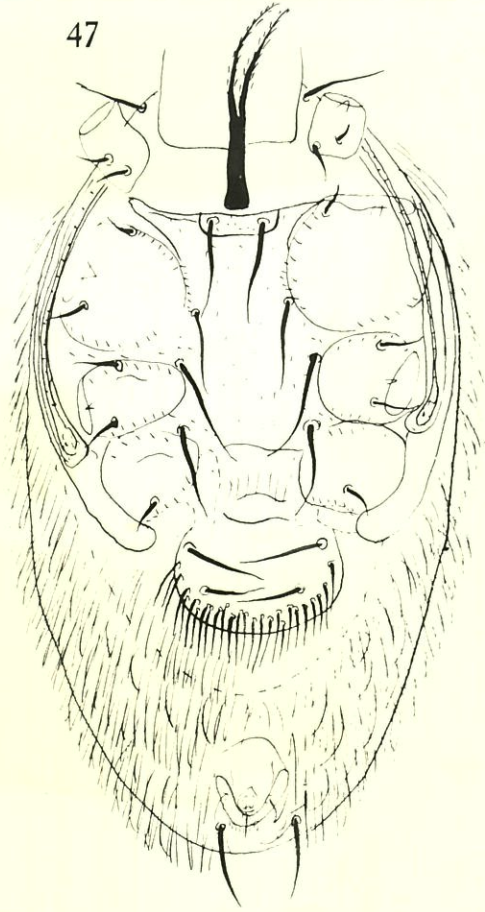
Legs :- The very long fourth legs are also furnished with macrosetae, the longest being 352 U in length. Legs 11; 111 and 1V are all provided with weak claws. Leg 11 (fig. 53) is very powerful and armed with tubercles on the femur, genu and tibia.

Host and Locality :- Holotype female and allotype male off Kheper nigroaeneus Bohemann; Turfloop, Pietersburg, Transvaal; 12th March, 1961.

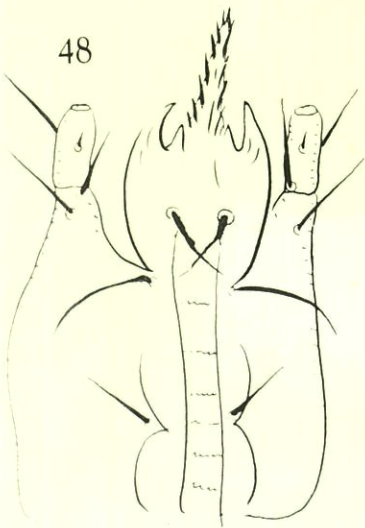
46



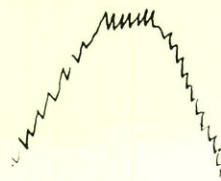
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48



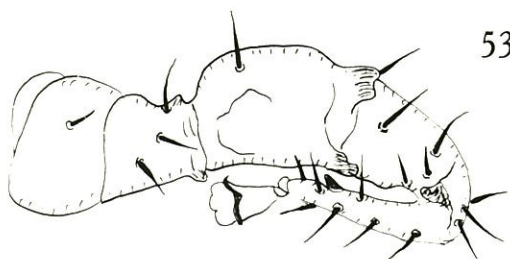
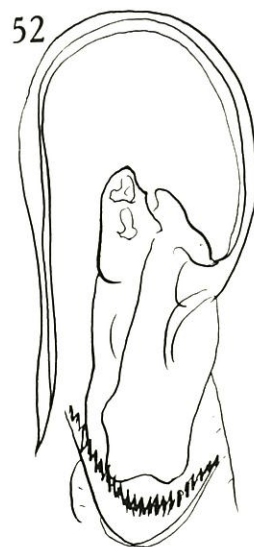
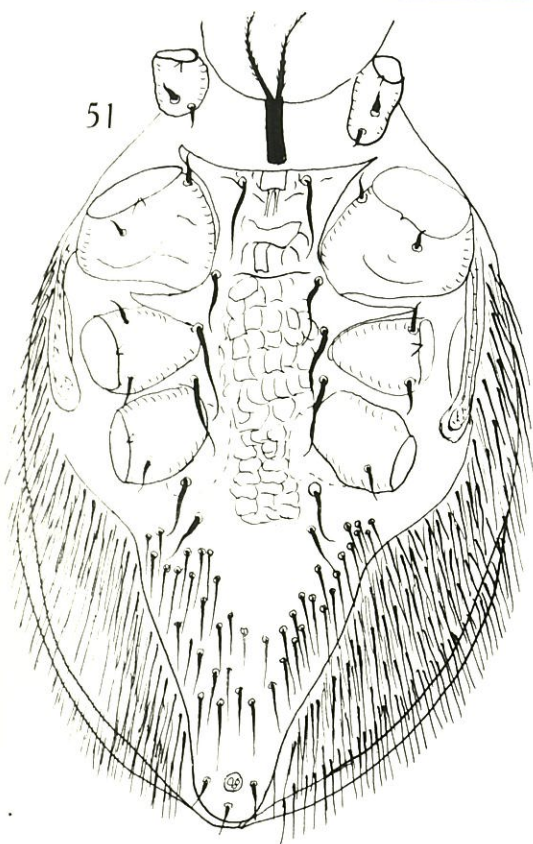
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50



Paralaelaps pietersburgensis, spec. nov., female. 46, dorsum; 47, venter;
48, hypostome; 49, tectum; 50, tarsus II.



Paralaelaps pietersburgensis, spec. nov., male. 51, venter; 52, chelicera;
53, tarsus II.

Family Eviphididae Berlese 1913.

The family Eviphididae Berlese comprises the sub-families Eviphidinae Berlese and Thinoiseiinae Evans 1954. The Eviphidinae contains the following genera :-

1. Eviphis (sens. str.) Berlese 1903 (Syn. : Copriphis Berl. 1910 and Groiphis Berl. 1903) (Type : Iphis ostrinus G.L. Koch 1839.)
2. Alliphis Halbert 1923 (Type : Gamasus halleri G. & R. Can. 1881)
3. Pelethiphis Berl. 1911 (Type : Copriphis (Pelethiphis) insignis Berl. 1911).

4. Scarabaspis Womersley 1956 (Type : Scarabaspis aspersa Wom. 1956).
Thirteen species and sub-species of Eviphidinae were previously known to occur in South Africa. the majority of which were described by Ryke & Meyer (1957). These are :-

Eviphis capensis Ryke and Meyer 1957, E. hastatellus hastatellus (Berl.) 1910;

E. hastatellus transvaalensis Ryke and Meyer 1957, E. cultratellus (Berl.) 1910; E. tubicolus (Berl.) 1903; Alliphis evansi Ryke and Meyer 1957;

A. halberti Ryke and Meyer 1957; Pelethiphis rufescens (Lombardini) 1941; Pelethiphis berlesi Ryke and Meyer 1957; P. geyeri Ryke and Meyer 1957; P. vaneedeni Ryke and Meyer 1957; P. eiseleni Ryke and Meyer 1957; Scarabaspis africanus Ryke and Meyer 1957.

An anal shield is present in both sexes of Eviphidinae. In the male the anal shield is separated from a sterniti-genital shield. The palp tarsus bears a two-pronged seta. The tectum is elongate and usually denticulate. Members of this sub-family are free-living or associated with beetles.

Characteristics the following :-

Genus Eviphis Berlese; palp tarsus with pair of closely associated rod-like setae distally. Peritrematal shields strongly developed posterior to coxae IV. Setae on coxae I, normal. Metasternal shield usually fused with endopodal shields.

Eviphis cultratellus turfloopensis subspec. nov.

Female :-

Dimensions : Length of body 898

Female :-

Dimensions :	Length of body	898 /U
	Breadth of body	703 /U
	Leg 1	508 /U
	Leg 11	508 /U
	Leg 111	601 /U
	Leg 1V	664 /U
	Length of anal shield	211 /U
	Breadth of anal shield	202 /U
	Length of sternal shield	172 /U
	Breadth of sternal shield	164 /U
	Basis of tritosternum	31 /U

Dorsum (fig. 54) :-

The dorsum is provided with 29 pairs of setae. The ten pairs of marginal setae (except Mg.1) are lanceolate and considerably longer than the seven pairs of lateral; three pairs of median and nine pairs of dorsal setae. The vertical setae are spine-like.

Venter (fig. 55) :-

Sternal setae 1 and 11 are simple and 111 are modified into spurs. Similar spurs occur on the large metasternal-endopodal plates and genital shield. Coxae 1 to 111 each bear two setae and coxa 1V bears only one seta. The posterior setae on coxae 1; 11 and 111 are modified into spurs while the seta on each of coxae 1V is spine-like. The fact that the posterior setae of coxae 1 are also modified into spurs, is the main difference between this subspecies and E. cultratellus cultratellus. The broad peritrematal shields are produced behind coxae 1V. Anteriorly the peritreme extends to the level of the anterior margin of coxae 1. The metapodal shields are free. The interscutal membrane of the venter bears ten pairs of setae, including one lateral to each of the peritrematal shields. Neither the four pairs referred to as being lanceolate nor the post-anal seta are so much developed in this subspecies. The tritosternum is also typical of the genus Eviphis.

Gnathosoma (fig. 56) :-

The elongated tectum is denticulate. The rostral setae are approximately two thirds of the length of the internal posterior rostral setae. The other two pairs of hypostomal stae are considerably shorter. The shafts of the retracted chelicerae reach posteriorly to the level of the hind margin of the sternal shield. The palp tarsus is provided

.../with the

with the usual two-pronged seta and a pair of closely- associated rod-like setae.

Legs :-

All the legs have well-developed claws and pulvilli. The more slender leg I has a relatively small claw. Leg II (fig. 57) bears two spur-like setae. The majority of the setae on the legs are simple; others are spine-like.

Deutonymph :

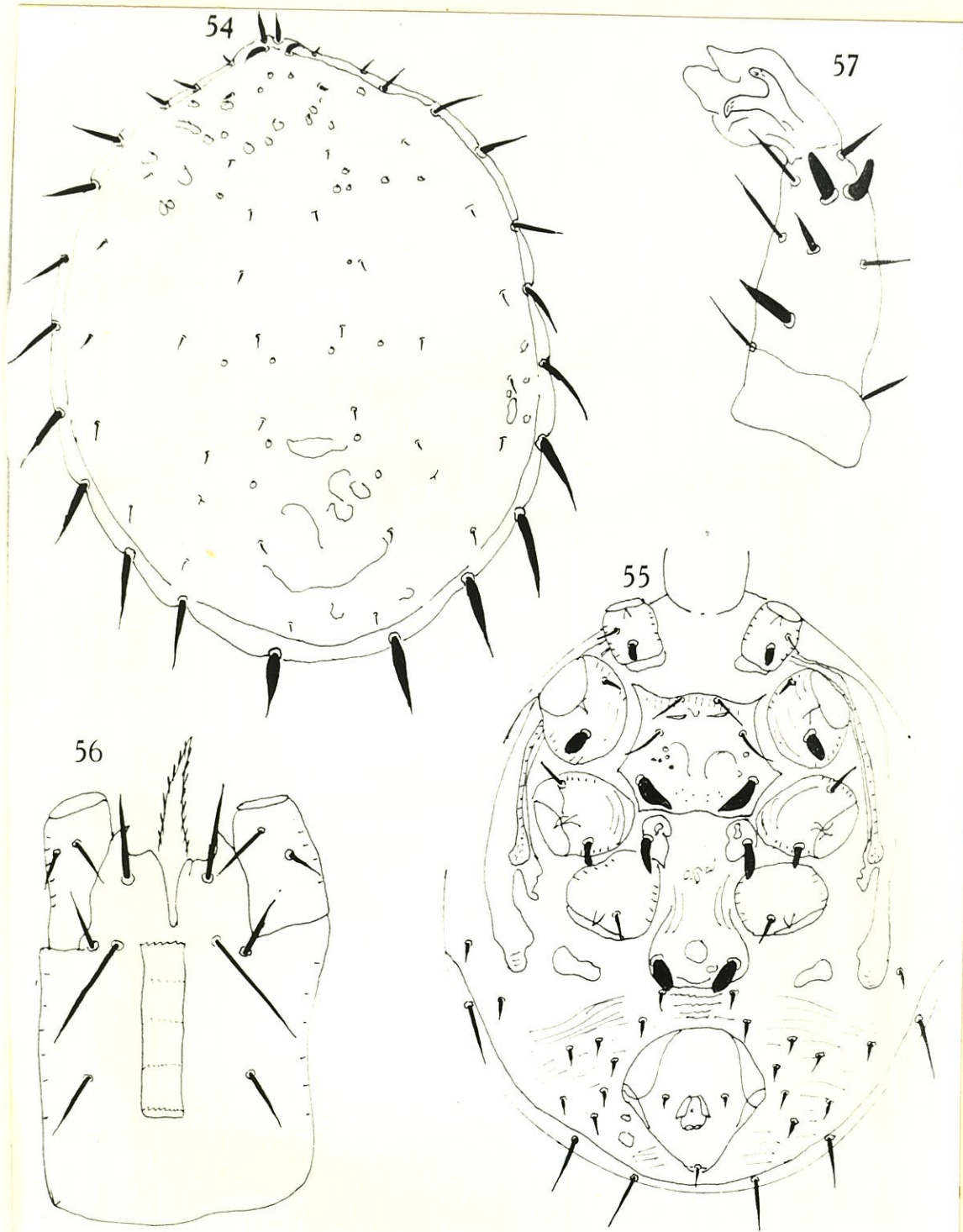
Dimensions	:	Length of body	742	/U
		Breadth of body	586	/U
		Leg I	391	/U
		Leg II	391	/U
		Leg III	469	/U
		Leg IV	508	/U
		Length of anal shield	156	/U
		Breadth of anal shield	117	/U
		Length of sternal shield	281	/U
		Breadth of sternal shield	156	/U
		Basis of tritosternum	23	/U

The chaetotaxy of the dorsum is the same as that of the female. The sternal shield (fig. 58) is furnished with five pairs of setae the first pair of which is simple, the rest being all modified into spur-like setae. The chaetotaxy of the coxae and the interscutal membrane of the venter is similar to that of the female.

The peritrematal shields and the peritremes are basically the same as those of the female and the same holds for the detail of the gnathosoma and the legs. Both female and nymph have the anterior region of the sternum striated and bear two easily recognisable, boat-shaped pores, behind sternal setae 1.

Host and locality :-

Holotype female and morphotype deutonymph off Copris elphenor, Turfloop, Pietersburg, Transvaal; 6 December 1961; One paratype female and one nymph off Copris elphenor, Turfloop, Pietersburg, Transvaal; 7th December, 1961.



Eviphis cultratellus turfloopensis, subsp. nov., female.

54, dorsum; 55, venter; 56, hypostome; 57, tarsus II.

58



Eviphis cultratellus turfloopensis, subspec. nov., deutonymph.

58, venter.

Eviphis hastatellus hastatellus Berl.

Male :-

Dimensions	: Length of body	445 /U
	Breadth of body	305 /U
	Leg I	328 /U
	Leg II	289 /U
	Leg III	273 /U
	Leg IV	328 /U
	Length of anal shield	92 /U
	Breadth of anal shield	84 /U
	Length of sternal shield	225 /U
	Breadth of sternal shield	86 /U
	Base of tritosternum	14 /U

It is suggested that the male described and figured by Ryke and Meyer (1957) as being the male of the species E. hastatellus hastatellus, be transferred to E. hastatellus transvaalensis, Ryke & Meyer, the female of which was also described by the same authors (1957).

Dorsum (fig. 59) :-

The chaetotaxy is the same as that described for the female of E. hastatellus hastatellus.

Venter (fig. 60) :-

The male described by Ryke and Meyer illustrated the important difference between male and female by the absence of a pair of spur-like setae in position III of the sternum. Furthermore the female displayed spur-like setae in the posterior positions of coxae II and III. These features are now commonly shared by the male in question and the female E. hastatellus hastatellus. The other setae on the sterniti-genital shield and the coxae are strongly developed but not spine-like, this being a feature also shared by the female. The interscutal membrane of the venter of the male is provided with eight pairs of strong setae tending to become spine-like. All other features of the male and female as regards the venter, are the same.

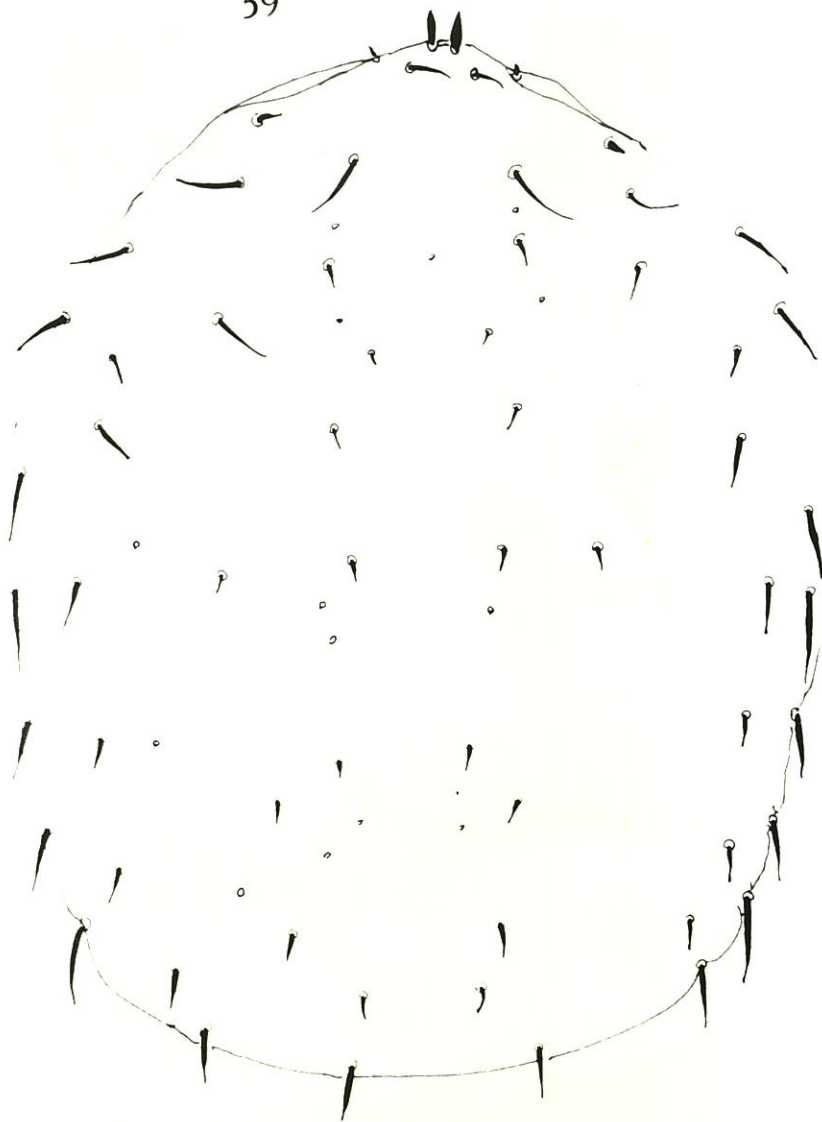
Gnathosoma (fig. 61) : Resembles that of the female.

Legs :-

The same as reflected by the female described. Leg II is depicted in fig. 62.

Host and locality : One holotype male off Helicopriss pirlal Fabricius, Turfloop, Pietersburg, Transvaal; 11th December, 1961.

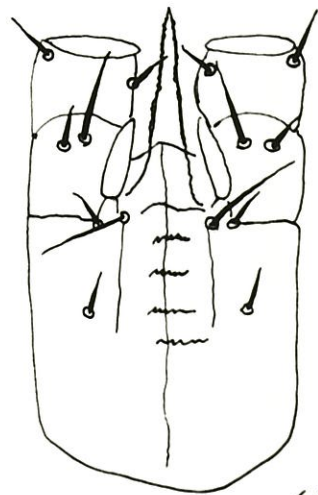
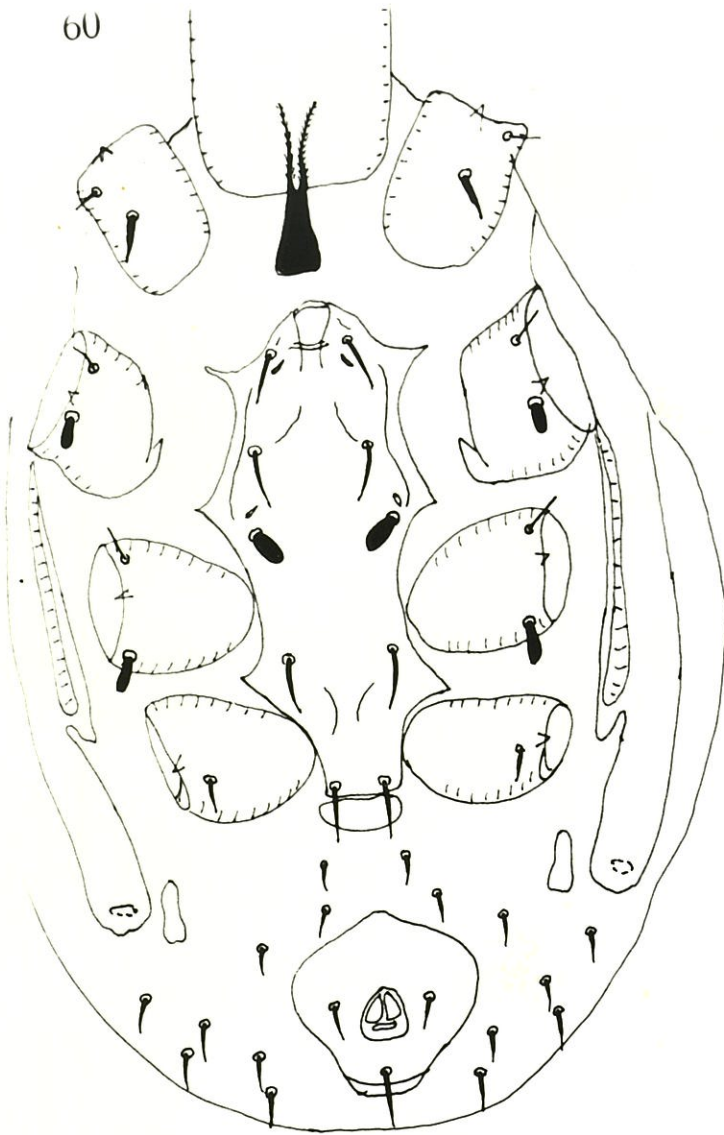
59



62

Eviphis hastatellus hastatellus, male. 59, dorsum; 62, tarsus I.

60



61

Eviphis hastatellus hastatellus, male. 60, venter; 61, hypostome.

Eviphis lootsi spec. nov.

Female :-

Dimensions	:	Length of body	664 /U
		Breadth of body	374 /U
		Leg I	469 /U
		Leg II	391 /U
		Leg III	406 /U
		Leg IV	523 /U
		Length of anal shield	109 /U
		Breadth of anal shield	101 /U
		Length of sternal shield . . .	133 /U
		Breadth of sternal shield ..	109 /U
		Base of tritosternum	23 /U

This species is closely related to Eviphis capensis Ryke and Meyer. It differs in the following respects :-

The distribution of the dorsal setae is the same but the lateral and marginal setae are much shorter and more spine-like instead of being lanceolate as is the case in E. capensis. The peritrematal plates as well as the peritremes are of a different shape. Both have free metasternal shields but in this species they are more rectangular in shape and do not touch the sternum at all. Both have a seta lateral to the posterior part of the peritrematal shield, but this species has ten instead of nine pairs of simple setae on the interscutal membrane of the venter.

Dorsum (fig. 63) :-

The dorsal shield is provided with 29 pairs of setae. The ten marginal setae are spine-like and they are the longest. The eight lateral, eight dorsal and three median setae are much shorter.

Venter (fig. 64) :-

The free metasternal shields are fairly rectangular in shape and well removed from the sternum. Each is provided with a simple seta. The reticulated sternal shield has the usual three pairs of setae and two pairs of pores. The setae on the genital shield are placed on small rounded projections. The peritrematal shields are strongly developed posterior to coxae IV. The metapodal shields are free. The interscutal membrane of the venter bears ten pairs of simple setae one of which is situated lateral to the posterior part of the peritrematal shield, on either side.

Gnathosoma (fig. 65) :-

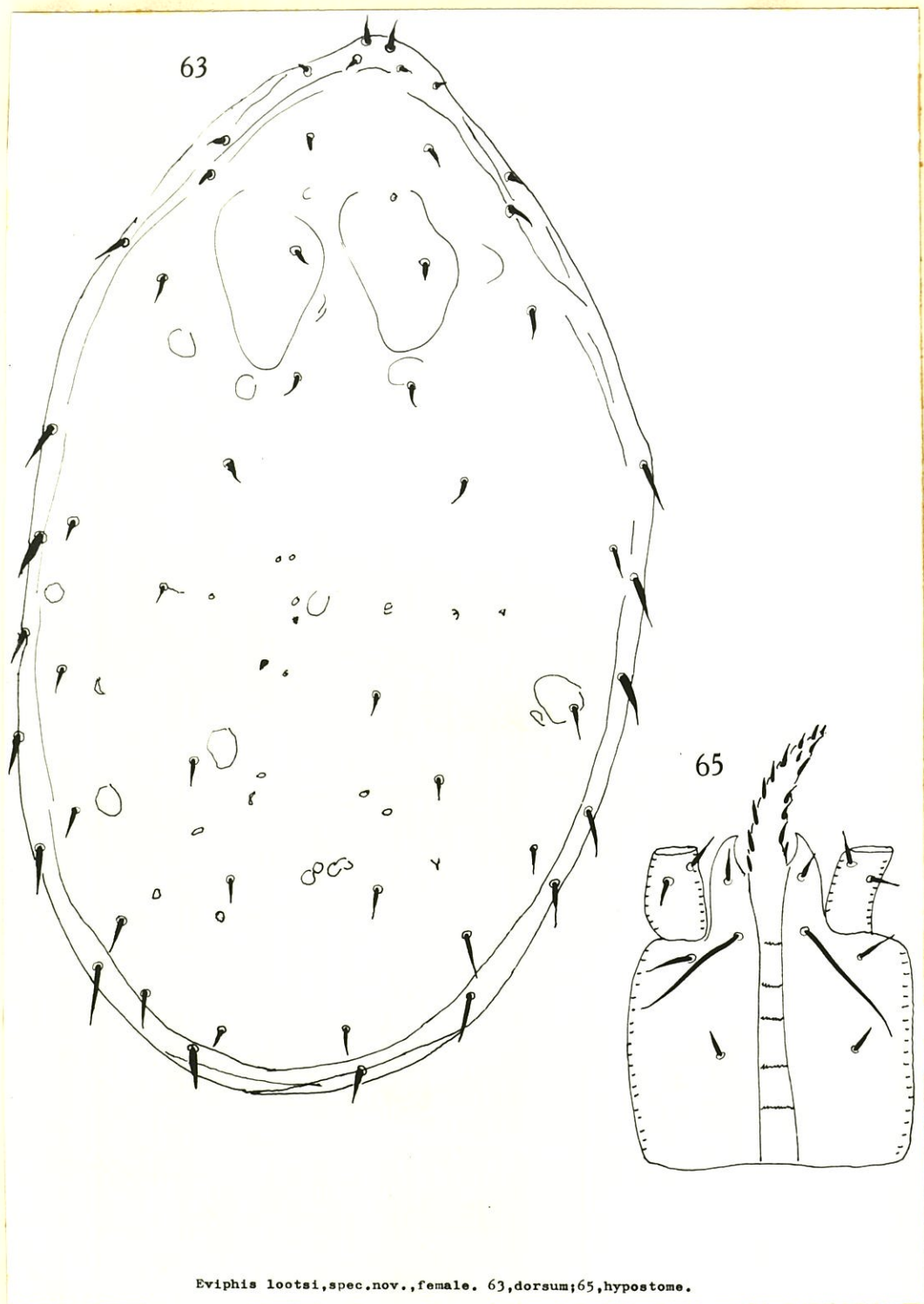
The tectum is elongate and denticulate. The internal posterior rostral setae are about three times the length of the rest of the hypostomal setae. The chelicerae are chelate-dentate. The palp tarsus bears a pair of closely associated rod-like setae which are S-shaped as well as a two-tined specialised seta.

Legs :-

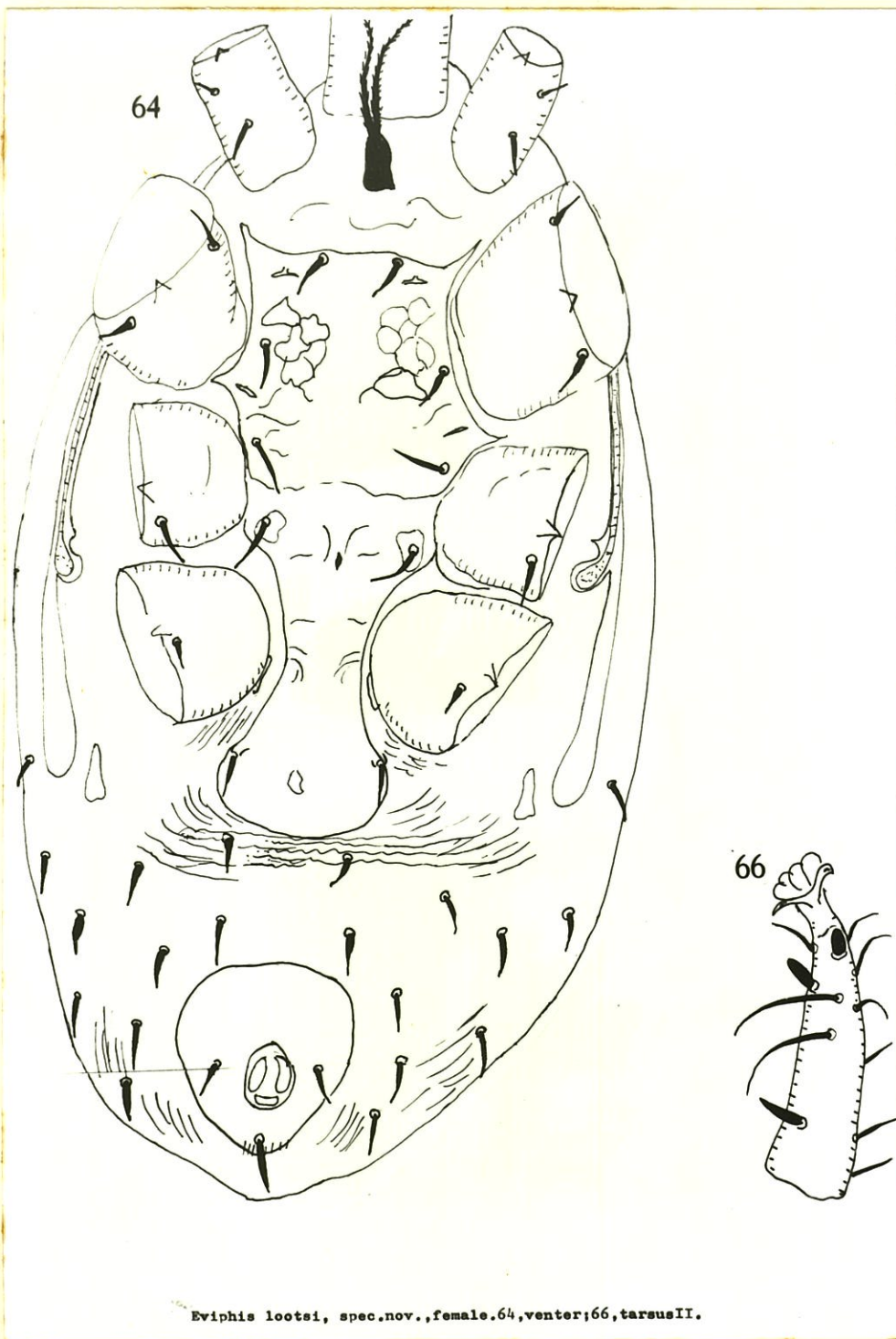
Claws and pulvilli are well developed on all legs. Leg 11 (fig. 66) bears two spurlike setae on the tarsus and a pair of simple setae which lie together and which are much longer than the rest of the simple setae on all legs.

Host and locality :-

Holotype female off Copris elphenor, Turfloop, Pietersburg, Transvaal; 7 December, 1961.



Eviphis lootsi, spec. nov., female. 63, dorsum; 65, hypostome.



Eviphis lootsi, spec. nov., female. 64, venter; 66, tarsus II.

Genus Pelethiphis Berlese 1911.

Peritrematal shields not developed posterior to coxae IV; vertical seta not short and spine-like, some dorsal setae long and others minute; metasternal setae on integument or on small metasternal plates; either sclerotised or one or more pra endopodal plates between sternal shield and base of tritosternum. Palp tarsus with sickle-shaped seta.

Pelethiphis elphenor spec. nov.

Female :-

Dimensions :	Length of body	594 /U
	Breadth of body	414 /U
	Leg I	578 /U
	Leg II	406 /U
	Leg III	469 /U
	Leg IV	601 /U
	Length of anal shield	82 /U
	Breadth of anal shield	74 /U
	Length of sternal shield	153 /U
	Breadth of anal shield	92 /U
	Basis of tritosternum	39 /U

Dorsum (fig. 67) :-

The dorsal shield bears 41 pairs of setae, D1, L1, Mgl being lanceolate in shape and L1 being the longest. The rest are all simple or spine-like. The setae are arranged into four groups :-

the dorsal (D1-9); median (M1-6); lateral (L1-11);

marginal (Mgl-15) groups. Unlike the rest of the known South African species, the marginal setae are all short. Anteriorly, in the first quarter of the dorsum, a ridge runs obliquely on either side.

Venter (fig. 68) :-

The sternum bears three pairs of simple setae which are more or less equal in length. Two pores are placed behind sternal setae II. The pair of metasternal setae is borne on small free metasternal shields. The flask-shaped genital shield bears the usual pair of simple setae. The peritrematal shield extends to the posterior margin of coxa III. In the vicinity of coxae II, the peritreme forms two small protuberances on either side. The peritremes terminate anterior to coxae I. The inter-scutal membrane of the venter is provided with thirteen pairs of simple

setae. The pear-shaped anal shield bears the three circum-anal setae. The region between the sternum and tritosternum base is sclerotised and the base itself has a small platelet on either side.

Gnathosoma (fig. 69) :-

The capitular and rostral setae do not differ much in length and are simple. The capitular groove bears five rows of denticles.

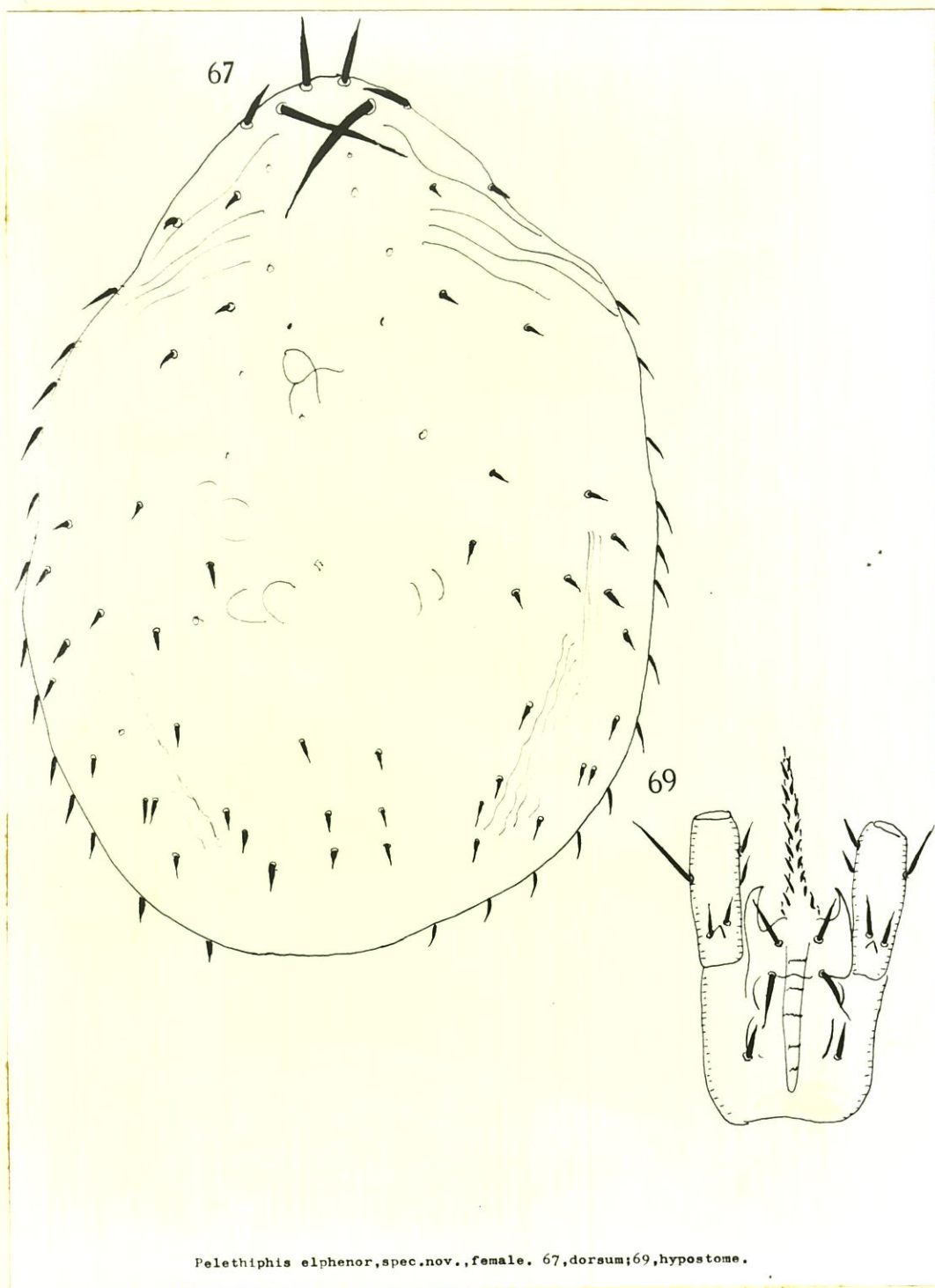
Legs :-

Claws and pulvilli are present on the pretarsi. The majority of setae are simple. The most characteristic features of this species are to be found on the legs and are the following :-

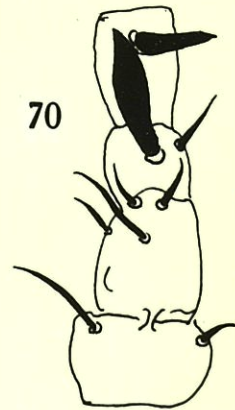
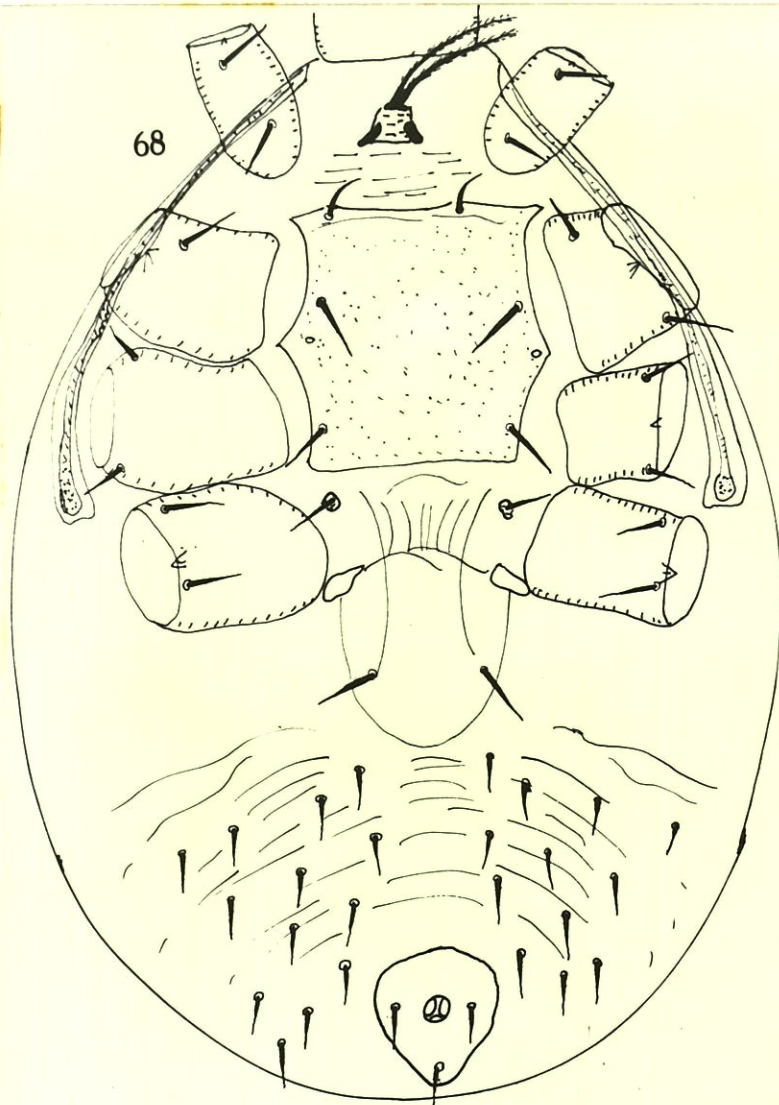
Both femur and genu of leg II (fig. 70), are armed with a conspicuous spur-like seta; the genu of leg IV carries one exceptionally long rod-like seta.

Host and locality :-

Holotype female off Copris elphenor, Turfloop, Pietersburg, Transvaal, 3rd. March, 1961.



Pelethiphis elphenor, spec. nov., female. 67, dorsum; 69, hypostome.



Pelethiphis elphenor, spec. nov., female. 68, venter; 70, leg II.

DISCUSSION.

For this investigation 83 beetles were collected, belonging to the following families :-

Scarabaeidae;
Tenebrionidae;
Carabidae;
Dynastidae;
Cerambycidae;
Meloidae;
Curculionidae.

These beetles rendered a total number of 1,720 mites, representing an average of 20.7 mites per beetle. A complete list of the beetles collected and the number of mites recovered from them are given in the Appendix.

The Scarabaeidae were then selected for a detailed study of the Mesostigmata. This investigation produced the following data :-

1,619 Mites came off a total of 40 scarabaeid beetles. Of these, 795 were Trombidiformes and Acarididae; 824 belonged to the Mesostigmata. The average number of mites in general per beetle was 40.5; while the average number of Mesostigmatic mites per beetle totalled 20.6. The largest number of mites was found on a single specimen of Heliocopris pirmal Fabricius, 218 of which were Trombidiformes and Acarididae, and 45 being Mesostigmata. The largest number of Mesostigmata collected from one specimen was 121 found on Heliocopris pirmal Fab.

A total of 15 larvae were collected from six specimens of the family Tenebrionidae, i.e. Distretus discoideus Guerin and Phanerotomea ovulum Haag. These members of Tenebrionidae were the only ones examined and carried no adust mites.

A larval beetle, probably belonging to a member of the Scarabaeidae, was also investigated for mites and produced eight specimens of Coleolaelaps boas.

The Mesostigmata collected are represented as follows :-

Mesostigmata	Number of mites collected.
Eviphididae Berlese 1913	
<u>Eviphis</u> (sens. str.) Berlese 1903	
<u>E. cultratellus</u> Berlese 1910	11
<u>E. hastatellus</u> Berlese 1910	74
<u>E. lootsi</u> spec. nov.	<u>1</u>
	86
<u>Alliphis</u> Halbert 1923	
<u>A. evansi</u> Ryke 1957	46
<u>A. santosdiasi</u> Ryke 1959	<u>187</u>
	233
<u>Pelethiphis</u> Berlese 1911	
<u>P. geyeri</u> Ryke 1957	5
<u>P. eiseleni</u> Ryke 1957	39
<u>P. elphenor</u> spec. nov.	<u>1</u>
	45
<u>Scarabspis</u> Womersley 1956	
<u>S. africanus</u> Wom.	30
<u>Scarabaspis</u> spec. nov.	<u>1</u>
	31
	395
Macrochelidae Vitzthum 1930	
<u>Macrocheles</u> datr. 1829	
<u>M. "A"</u>	76
<u>M. "B"</u>	41
<u>M. "C"</u>	53
<u>M. "D"</u>	24
<u>M. "E"</u>	30
<u>M. "F"</u>	<u>28</u>
	252
<u>Neopodocinum</u> Oudemans 1902	
<u>N. pirmalum</u> spec. nov.	16
<u>N. barbatum</u> spec. nov.	14
<u>N. pluma</u> spec. nov.	12
<u>N. potgieteri</u> spec. nov.	<u>11</u>
	53
	305

Mesostigmata	Number of mites collected
Pachylaelaptidae Berlese 1913	
<u>Pachylaelaps</u> Berlese 1886	32
<u>Elaphrolaelaps</u> Berlese 1910	
<u>E. formidabilis</u> Berlese 1918	6
<u>Paralaelaps</u> Trägårdh 1908	
<u>P. pietersburgensis</u> spec. nov.	8
	46
Parasitidae Oudemans 1910	47
Rhodacaridae Oudemans 1902	
<u>Digamasellus</u> Berlese 1892	8
Laelaptidae Berlese 1892	
<u>Coleolaelaps</u> Berlese	
<u>C. boas</u> Ryke & Meyer 1958	8

The above analysis reflects the following facts :-

The family Eviphididae is represented by four genera, comprising 10 species, from a total of 395 specimens. The genus Alliphis yielded the largest number of specimens, namely 233, of which 187 specimens belonged to the species Alliphis santosdiasi. The family Macrochelidae is represented by 2 genera only, comprising 10 species and a total of 305 specimens. The genus Macrocheles is the largest contributor, with six species and 252 specimens. The family, Pachylaelaptidae rendered 46 specimens representing three genera. The 47 members belonging to the Parasitidae were not identified below family level and the eight specimens of the family Rhodacaridae all belonged to the genus Digamasellus. The family Laelaptidae was represented only by eight members of Coleolaelaps boas, as collected from the abovementioned immature beetle.

Considering the different beetles and the numbers of mites associated with them, the following facts are exposed :-

The family Scarabaeidae, in this collection, is represented by eight genera, i.e. :-

33/ Helicopris pimal.....

Heliocopris pirmal Fabricius

Number of beetles investigated 9
 Mean number of mites per beetle 103.1

Species of mites recovered from these beetles :-

E. cultratellus cultratellus; E. hastatellus hastatellus; E. hastatellus transvaalensis; P. eiseleni; P. geyeri; A. evansi; A. santosdiasi; M. "A"; M. "B"; M. "C"; M. "D"; M. "E"; M. "F"; Digamasellus spec.
Pachylaelaps spec., N. pirmalum spec. nov., N. pluma spec. nov. Members of the Parasitidae were also recovered.

Heliocopris neptunus Bohemann

Number of beetles investigated 2
 Mean number of mites per beetle 28.7

Species of mites recovered from these beetles:-

E. hastatellus hastatellus; E. hastatellus transvaalensis;
M. "A"; M. "B"; M. "C"; M. "D"; N. potgieteri spec. nov. Pachylaelaps spec.
 Some Parasitidae were also recovered.

Heliocopris anderssoni Bates

Number of beetles investigated 1
 Mean number of mites per beetle 11

Species of mites recovered from this beetle :-

E. hastatellus hastatellus; Pachylaelaps spec. Digamasellus spec.
M. "B".

Kheper nigroaeneus Bohemann

Number of beetles investigated 3
 Mean number of mites per beetle 41.3

Species of mites recovered from these beetles :-

A. santosdiasi; M. "A"; M. "E"; M. "F"; Paralaelaps pietersburgensis spec. nov.; Pachylaelaps spec. nov.

Copris elphenor Klug.

Number of beetles investigated	21
Mean number of mites per beetle	23.8

Species of mites recovered from these beetles:-

E. lootsi spec. nov; E. cultratellus cultratellus; E. hastatellus
hastatellus; E. cultratellus trufloopensis; P. geveri; P. eiseleni;
P. elphenor spec. nov; Scarabaspis africanus; A. evansi;
Elaphrolaelaps formidabilis; M. "A"; M. "B"; M. "C"; M. "D"; M. "E";
M. "F"; N. potgieteri; N. pluma; N. barbatum; Pachylaelaps spec.

Some members belonging to the Parasitidae were also found on these beetles.

Copris spec.

Number of beetles investigated	3
Mean number of mites per beetle	6.3

Species of mites recovered from these beetles :-

Gonostethus impressus Scoch.

Number of beetles investigated	1
Mean number of mites per beetle	5

Species of mites recovered from this beetle :-

Trox squamiger Roth

Number of beetles investigated	2
Mean number of mites per beetle	1

Species of mites recovered from these beetles ?

Schizonycha spec.

Number of beetles investigated	5
Mean number of mites per beetle	0

Bolboceras spec.

Number of beetles investigated	1
Mean number of mites per beetle	0

Rhabdotis aulica Fabricius

Number of beetles investigated	2
Mean number of mites per beetle	0

As an additional illustration of the infestation rate, the mite populations of four scarabaeid beetles are listed below. These are also more or less typical samples :-

1. Helicopris pimal Fabricius.

<u>Macrocheles</u> spec. "C"	7♂, 9♀, 7 nymphs.
<u>Macrocheles</u> spec. "A"	4♂, 3♀, 1 nymph.
<u>Macrocheles</u> spec. "B"	1♂, 1 nymph.
<u>Digmasellus</u> spec.	1♂
<u>Alliphis santosdiasi</u>	15♂, 21♀, 50 nymphs.
<u>A. evansi</u>	1♂
Trombidiformes and Acaridiae	40

2. Helicopris pimal Fabricius.

<u>Macrocheles</u> spec. "C"	3♂, 4♀, 4 nymphs
<u>Macrocheles</u> spec. "A"	2♂, 2♀, 3 nymphs
<u>Macrocheles</u> spec. "B"	2♂, 1 nymph
<u>Neopodocinum</u> spec.	2♂, 1♀, 1 nymph
<u>Parasitidae</u>	9 nymphs
<u>Pachylaelaps</u> spec.	1 nymph
<u>Alliphis evansi</u>	2♂
<u>Pelethiphis geyeri</u>	1♂
Acaridiae	4 nymphs.

3. Copris elphanor Klug.

<u>Macrocheles</u> spec. "C"	6♂, 3♀, 4 nymphs
<u>Macrocheles</u> spec. "B"	1 nymph
<u>Neopodocinum</u> spec.	2♂, 1 nymph.
<u>Parasitidae</u>	1 nymph
<u>Pelethiphis geyeri</u>	2♂
<u>Eviphis cultratellus</u>	1♀, 1 nymph.
Trombidiformes	5 specimens.

4. Copris elphanor Klug.

<u>Macrocheles</u> spec. "C"	10 [♂]	1 nymph
<u>Macrocheles</u> spec. "E"	20 [♂] 10 [♀]	1 nymph
Parasitidae		1 nymph
<u>Pachylaelaps</u> spec	10 [♂]	
<u>Scarabaspis africanus</u>	10 [♂]	
Trombidiformes and Acaridiae	37	specimens.

SUMMARY.

Papers dealing with the association of beetles and mites have been reviewed briefly. In this research project, 83 beetles were investigated re their mite fauna and special reference was made to the identification of the Mesostigmatic mites occurring on the Scarabaeidae beetles, collected at Turfloop, Transvaal. A total of 1,619 mites, 824 of which belong to the Mesostigmata were identified. New species are described and figured, belonging to the genera listed below :-

<u>Neopodocinum pirmalum</u>	♂, ♀	nymph
<u>Neopodocinum barbatum</u>	♀	nymph
<u>Neopodocinum pluma</u>		nymph
<u>Neopodocinum potgieteri</u>		nymph
<u>Elaphrolaelaps formidabilis</u> Berlese 1918	♂ ♀ and nymph	
<u>Paralaelaps pietersburgensis</u>	♂ and ♀	
<u>Eviaphis cultr. turfloopensis</u>	♀	
<u>Eviaphis hastatellus hast.</u>	♂	
<u>Eviaphis lootsi</u>	♀	
<u>Pelethiphis elphenor</u>	♀	

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A P P E N D I X.

GROUP	NAME OF BEETLES.	IDENTITY NUMBER.	NUMBER OF MITES.	COLLECTION DATE.
<u>Scarabaeidae</u>				
	<u>Schizonycha spec.</u>	104	0	4.3.1961
		125	0	6.3.1961
		124	0	24.3.1961
		122	0	1.3.1961.
		105	0	24.3.1961
	<u>Conostethus impressus</u>	116	5	7.3.1961
	<u>Rhabdotis aulica</u> (Fabricius)	115	0	20.3.1961
		119	0	20.3.1961
	<u>Kheper nigroaeneus</u> (Bohemann)	61	0	5.12.1961
		88	52	7.12.1961
		139	0	11.12.1961
		92	62	7.12.1961
	<u>Bolboceras spec.</u>	108	0	21.4.1961
	<u>Heliocopris perimal</u> (Fabricius)	62	0	5.11.1961
		101	161	17.12.1961
		78	263	26.3.1961
		71	81	26.3.1961
		142	67	11.12.1961
		141	169	11.12.1961
		131	27	7.12.1961
		83	263	29.3.1961
		70	59	29.3.1961
		137	42	11.12.1961
	<u>Heliocopris neptunus</u> (Bohemann)	91	69	17.12.1961
		136	0	11.12.1961
		138	17	11.12.1961
	<u>H. anderssoni</u> (Bates)	90	11	7.12.1961
	<u>Copris elphenor</u> (Klug)	94	4	22.4.1961
		107	3	23.3.1961
		66	9	6.12.1961
		130	25	7.12.1961
		67	45	6.12.1961
		97	30	4.4.1961.
		80	9	6.12.1961.
		77	5	23.3.1961

GROUP NAME OF BEETLES	IDENTITY NUMBER	NUMBER OF MITES	COLLECTION DATE
<u>Copris elphenor</u> (Contd.)	89	57	3.4.1961
	9	60	
	98	43	
	93	16	2.3.1961
	128	27	7.12.1961
	73	12	6.4.1961
	79	1	29.3.1961
	84	27	
	129	46	7.12.1961
	110	1	23.3.1961
	109	2	1.4.1961
	72	1	28.8.1961
	81	53	2.4.1961
	135	0	7.12.1961
	68	34	6.12.1961
	106	38	24.3.1961
	96	12	4.10.1961
	111	0	6.4.1961.
<u>Copris spec.</u>	95	14	2.4.1961
	76	2	7.12.1961
	100	0	23.3.1961
	80	3	17.12.1961
<u>Trox squamiger</u> (Roth)	118	0	2.4.1961
	82	1	25.3.1961
Carabidae			
<u>Haplotrachelus holoopleurus</u>	87	0	7.12.1961
	140	0	7.12.1961
Cerambycidae			
<u>Phantasia Carinata</u> (Fahraeus)	102	1	9.12.1961
Meloidae			
<u>Mylabris oculata</u> (Thunberg)	120	0	25.3.1961
Curculionidae			
<u>Cleonus spec.</u>	112	0	6.4.1961

GROUP	NAME OF BEETLES	IDENTITY NUMBER	NUMBER OF MITES	COLLECTION DATE
<u>Dynastidae</u>				
	<u>Temnorhynchus coronatus</u>	117	0	13.4.1961
	<u>Oryctes boas</u> (Fabricius)	99	0	12.10.1961
	<u>Phanerotomea ovulum</u> (Haag)	86	0	7.12.1961
		63	7	29.11.1961
		85	0	7.12.1961
		64	1	6.12.1961
		75	1	7.12.1961
<u>Psammodes (Parmularia)</u>				
	<u>batesi</u> (Haag)	114	0	8.4.1961
		133	0	7.12.61
		134	0	7.12.1961
		123	0	6.4.1961
		132	0	7.12.1961
		103	0	8.4.1961
	<u>Distretus discoideus</u> (Guerin)	69	1	6.12.1961
		65	2	6.12.1961
	<u>Amiantus gibbosus</u> (Fahraeus)	60	0	1.12.1961
	<u>Gonopus tibialis</u> (Fabricius)	113	0	10.4.1961
	<u>Anomalipus crassecauda</u>	74	0	7.12.1961
	<u>Anomalipus granatus</u> (Fairmaire)	127	0	25.3.1961
	<u>Micrantereus scaberrimus</u> (Fairmaire)	121	0	25.3.1961