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Redescription of *Oplitis paradoxa* (CANESTRINI & BERLESE, 1884), and the description of *Oplitis farrieri*, a new species (Mesostigmata: Uropodina: Oplitidae)

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Summary

The female of Oplitis paradoxa *(CANESTRINI & BERLESE, 1884) is redescribed from the designated lectotype at the BERLESE Acaroteca. The associated male is also redescribed. A comparison is made with the material published by the original authors. A new species,* O. farrieri, *is described. The use of the SEM has revealed, among other things, unknown morphological details on the structure of the 'perigenital plate', the vertex, the scabellum and the camerostome. A connective shield, uniting the dorsal and ventral surfaces, is described.*

Résumé

La femelle de Oplitis paradoxa *(CANESTRINI & BERLESE, 1884) est redécrite sur la base du lectotype choisi dans l'acarothèque de BERLESE. Le mâle associé à la femelle dans la collection est également redécrit. Une comparaison est faite avec les publications originales de ces auteurs. Une espèce nouvelle,* O. farrieri, *est décrite. L'utilisation du microscope électronique à balayage a révélé, entre autres, des détails morphologiques inédits concernant la structure de la 'plaque périgénitale', du vertex, du scabellum et du camerostome. Une structure réunissant les surfaces dorsale et ventrale est décrite.*

Introduction

While preparing a catalogue on the uropodine mites described by BERLESE, it soon became evident that many of the species needed to be restudied

either because no drawings and a too brief description were given at the time of the original publication or because the original descriptions and drawings were not satisfactory. The latter is the case for *Oplitis paradoxa*.

In 1884 CANESTRINI & BERLESE first described and depicted *Oplitis paradoxa* as *Uropoda paradoxa*. Since then, the definition of the species *paradoxa* has been doubtful, not only because of the poor original drawings and descriptions but also because CANESTRINI & BERLESE subsequently did not correct the ambiguities. The present paper attempts to clarify the situation.

Historical background

Uropoda paradoxa CAN. & BERL., 1884, was originally described from Padova, as yellowish in color and as living under the bark of old trees. Between 1884 and 1904 there were published three different drawings representing *paradoxa*, that is: 1. the original drawings, male and female, included in the 1884 publication of *Atti Soc. ven.- trent. sci.*, 9: 175, tav. IV., figs 1-7 (this same tavola was reissued by BERLESE, 1884); 2. a drawing, female, fig. 8, (BERLESE, 1904: 326); 3. a third drawing, female, fig. 30 in tav. VIII, found also in this latter publication.

1. CANESTRINI & BERLESE (1884: 175), written in Italian, contains certain discrepancies with regards both to the written description and to the legend accompanying tav. IV (see pl. I. fig. 1 of the present paper).

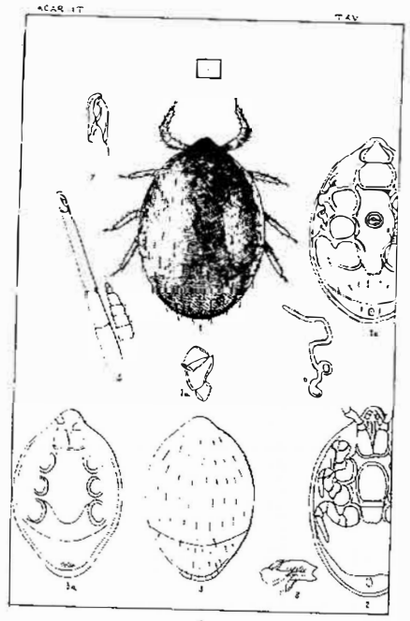
It reads, for instance, for the female that the sternal plate, on which is found the above mentioned genital plate, extends beyond the 4th pair of coxae (legs), terminating in a toothed (denticulated) edge and posterior to this is the undivided 'metapodio' which extends to the anal plate. Yet, in the drawing, their fig. 2, the sternal plate of the female to which CANESTRINI & BERLESE refer, does not extend beyond the 4th pair of coxae.

The description for the male is less complete. IT states that the genital opening is small and located between the 3rd pair of coxae. CANESTRINI & BERLESE's fig. 1a (see pl. I fig. 1) of the male does show, however, that the 'posterior denticulated edge' of the sternal plate does extend beyond coxae IV.

The legend of their plate contains many errors. The fig. 1a label appears twice; the 'coscia del secondo paio' should be labelled 1b; fig. 5 is not the 'Peritrema e stigma' as indicated in the legend but is labelled fig. 6 (there is no fig. 5); the figure labelled 6 (labbro inferiore) is actually labelled fig. 8 in the tavola; drawing fig. 7, the chela, is not listed.

Measurements for the female are given as *440* × *360* μm and that for the male as *420* × *320* μm.

The tavola is signed by BERLESE.



1.

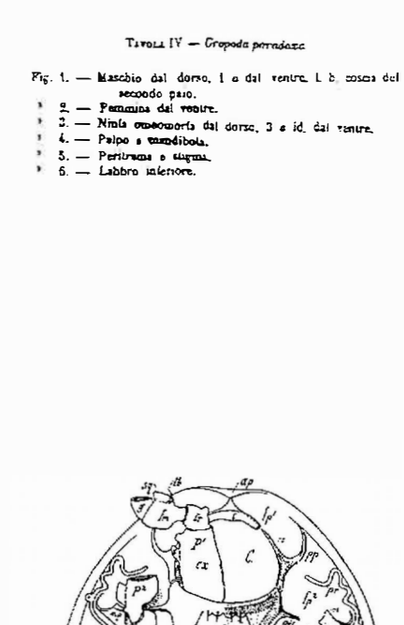
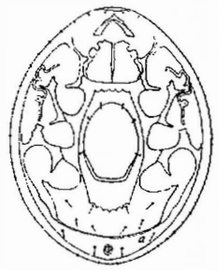


Tavola IV — *Uropoda paradoxa*

Fig. 1. — Maschio dal dorso. 1 a dal ventre. 1 b. coscia del secondo paio.
» 2. — Femmina dal ventre.
» 3. — Ninfa emeomorfa dal dorso. 3 a id. dal ventre.
» 4. — Palpo e mandibola.
» 5. — Peritrema e stigma.
» 6. — Labbro inferiore.

2.



TAB. VIII.

30. — *paradoxa*, foem. supina . . . . .

3.

Fig. 8. — *Urooplitella paradoxa* femm., dal ventre.

Plate I. *Oplitis paradoxa* (CANESTRINI & BERLESE, 1884)

Fig. 1. Tavola IV from CANESTRINI & BERLESE, 1884 with legend.
Fig. 2. BERLESE's fig. 8 from *Redia*, 1904: 326.
Fig. 3. BERLESE's fig. 30, Tav. VIII from *Redia*, 1904.

In the A.M.S.it edition, fasc. XI, n. 9 (BERLESE, 1884), the description is written in Latin. The habitat is listed as Padua, under the bark of dying tree. The measurement for the species is given as *450* μm. The legend lists fig. 1a as 'maris secundi paris coxa' whereas fig. 1a shows the ventral surface of the male; again fig. 7 (chela) is not listed; here fig. 6 is identified correctly in the legend as the 'peritrema circonflexum' and also here fig. 8 is correctly identified in the legend as the 'labium inferius lingulaque'.

How explain these inconsistencies? A simple checking would have easily remedied some of the errors, such as those of the legends. Others are less easily explained.

One might note that in 1884 BERLESE was 21 years old and had just received his degree in Natural Science at Padua under CANESTRINI. That year he described four uropodine mites: *Uropoda lamellosa*, *U. obovata*, *U. paradoxa* and *Discopoma venusta*. The first three were co-authored with CANESTRINI. He would go on to describe 139 uropodine mites, the last in 1923, *Phaulocylliba amplior*.

In 1903 (Redia 1: 249) BERLESE erected the genus *Uroplitella* with *Uropoda paradoxa* (C. & B.) as the type. BERLESE always used a single "o" when referring to genus and a double "o" when referring to the species, i.e., *Urooplitella paradoxa*.

2. In 1904 the characteristics for the genus *Uroplitella* were given as well as a key (p. 344) to the species known at that time: "*U. conspicua* BERL., *U. pusilla* BERL., *U. ovatula* BERL., *U minutissima* BERL., *U. paradoxa* C.& B., *U. leonardiana* (BERL.) and *U. pennsylvanica* BERL.". In the key he separated *paradoxa* from the other species on the following basis: a. Derma in omnibus scutis ventralibus nitidissimum; b. Peritrema biplicatum; c. Foem. ovalis, ad *520* μm long...*U. paradoxa* C. et B'.

3. In this 1904 publication, pl. I, figs 2-3, as stated above, there are two drawings, the one on page 326, fig. 8, and a second, fig. 30, on tav. 8. On page 325 BERLESE explains that 'In order to understand better what concerns the characters of the Uropodini, it is convenient that I present, in a concise fashion, certain things concerning their morphology and I help myself with a figure (interc. 8) which is not aimed precisely at the present paper but suits well the purpose.' The figure referred to by BERLESE, fig. 8, is labelled *Urooplitella paradoxa*. When one compares this drawing with the 1884 drawings and description, one can easily understand why certain acarologists have questioned the true identity of *U. paradoxa* in that fig. 30 of tav. 8 (see pl. I fig. 3, present paper) of *U. paradoxa* of the same publication differs in some details from fig. 8.

Literature from 1884

In 1885 (108) CANESTRINI re-published, verbatim, an Italian version of the CANESTRINI & BERLESE paper of 1884 on *U. paradoxa* with only himself as author. Included was a very stylized drawing of the male lacking

structural details but showing the peritreme, the position of the genital plate and the general form of the body.

In 1897 (877), in CANESTRINI's "Prospetto dell'Acarofauna italiana", LEONARDI wrote that: "this species (*U. paradoxa*) which has never been found outside of Italy and which was described by CANESTRINI and BERLESE .... from the Prov. of Padova under the bark of *dead* trees has been found by us.." and he lists the many ants' nests where it was found. He goes on to say that the species is probably not a true "mirmecofila" since it was found by the original authors outside of ants' nests but is probably a frequent visitor, presumably there looking for food.

OUDEMANS (1902: 54) named a new species *Uropoda paradoxoides*. It had been found in dead leaves by a Prof. Oscar SCHNEIDER in San Remo, Italy. Its measurement is listed as 460 μm. He did not give a description but stated that it closely resembled *Cillibaena minor* (BERL.) and was closely related to *Uropoda paradoxa* BERL.

Then in 1903 (15) he gave a description of *U. paradoxoides* with three drawings of the female. He presumed that it differed from *U. paradoxa* because: "while the sternal plate was scalloped as in *U. paradoxa*, in *U. paradoxoides* it extended to the middle of the ventral plate, whereas, in *U. paradoxa* it reached only to the level of the groove of leg 4". OUDEMANS' works appeared in 1902 and 1903 and only the 1884 publications of *U. paradoxa* were available. An adequate comparison of the 'posterior scalloped edge of the sternal plate' would probably not have been possible since it was incorrectly represented in 1884.

In wanting to verify the synonymy of *U. paradoxoides* OUDEMANS, 1902 with *U. paradoxa* C. & B., 1884, I requested a loan of the type from the OUDEMANS's collection (Rijksmuseum van Natuurlijke Historie, Leiden), only to learn that the type was no longer in the collection. They did, however, forward the following three slides: no. 1 *Oplitis paradoxoides* OUDMS. 1902 (nymph. II) (from the galleries of the termite *Calotermes tectonae*, from Buitenzorg, Java, Cl. L.G.E. Kalshoven) (2); no. 2 idem. (males) (4); no. 3 idem. (females) (30). The material is not *O. paradoxa*.

SELLNICK (1941: 226) reported a species designated as *Oplitis paradoxa*? from the nest of the ant *Crematogaster impressa* EMERY found on the island Fernando Poo. These ants build their nests in coffee plantations. The size of the female is given as 484 μm × 396 μm, with the remark that it is smaller than that reported by BERLESE. SELLNICK says that the thickened area behind the perigenital plate is covered with small spots, hardly visible and arranged in the form of arcs. As SELLNICK's collection of mites was completely destroyed at the end of World War II, it is not possible to verify this identification

KRASINSKAYA (1961) published a study on the postembryological development of 6 uropodine mites, one of which was stated to be *O. paradoxa*.

HIRSCHMANN & ZIRNGIEBL-NICOL (1964: Taf. 5 fig. 236) published a sketch of the female genital area stated to be *O. paradoxa*.

HIRSCHMANN & ZIRNGIEBL-NICOL (1965: 32) gave a key to the Uropoda and on Taf. 8, no. 219 show what is labelled as the 'tectum' as well as the disposition of setae on the dorsal surface stated to be *Uropoda paradoxa*. The material from which the drawings were made was not given and in a letter from HIRSCHMANN (11 April, 1993) he says that the drawings are not based on the BERLESE type.

In 1967 (Folge 10: 22) these same two authors in their discussion of the genus *Oplitis* made *Uropoda paradoxoides* OUDEMANS, 1902 a synonym of *Uropoda paradoxa* CANESTRINI & BERLESE, 1884, stating that the types of both had been seen.

In 1969 (131) they cite some of the literature on *O. paradoxa*, giving its size as 480 × 390 μm for the female and 425 × 340 μm for the male. The distribution is listed as Italy, Switzerland, Russia and U.S.A. Fig. 171 (Taf. 21) depicts a ventral view of the male and female, a chela, and a ventral view of the gnathosoma. In the same personal communication, HIRSCHMANN has written that of the figs 171 only 171 WV and 171 VM are based on the BERLESE type from drawings made by ZIRNGIEBL-NICOL; the others are not.

In 1973 ZIRNGIEBL-NICOL (p. 37) described *Oplitis paradoxa*, male and female, without any accompanying drawings. Again, from the above mentioned personal commmunication, HIRSCHMANN has written that "the description is not concerned with the type preparation from BERLESE and where she writes to 'see type' this, in fact, refers to the genus type description as given in Folge 12: 21".

PECINA (1980: 382) reported what was said to be *O. paradoxa* from Czechoslovakia. The mites were found exclusively in the nests of ants of the genus *Lasius*.

In 1984 HIRSCHMANN (Folge 31: 159) did not accept *Uroplitella paradoxa* sensu KRASINSKAYA (1961) and made of it a new species, *O. krasinkayae*.

HIRSCHMANN (1991: 50) states that in his opinion the 3 figures given for *O. paradoxa* (that is the one of 1884 and the two of 1904) are concerned with different species. In this same publication (p. 36) he also says that the *O. paradoxa* (BERL.) sensu PECINA 1980 is related to *O. minutissima*. On page 44, along with other criteria for recognizing *O. paradoxa*, he gives the relationship between the anterior 'loops' of the perigenital plate to the posterior 'loops' of the perigenital plate as 6/6, i.e., 6 'loops' anteriorly, versus 6 'loops', posteriorly for the female. As will be shown later, there are actually 5 anterior 'loops' and 6 posterior 'loops' on the female of *O. paradoxa*.

Oplitis paradoxa (CANESTRINI & BERLESE, 1884)

The Berlese material:

Slides: 2/20: 'cotipi', Padova, under wood (3 males)
2/21: Padova, under wood (1 male & 1 female)
2/23: 'tipico', Veneto, rotting wood (1 male & 1 female)
2/24: Veneto, rotting wood (1 female)
96/13-15: Lake City, Florida (1 female/slide)
Vials (in alcohol): 3°/111, 113, 118, nidi formiche, Trentino, 1895

As explained by NORTON & KETHLEY (1989: 432) in their study on BERLESE's North American oribatid mites, the type-designator most commonly used by BERLESE was 'tipico', and he seemed to have used the terms 'tipico' and 'cotipo' to designate syntypes.

In the above series of slides marked '*paradoxa*', only one slide (2/23) is marked 'tipico'. Therefore, as apparently BERLESE intended, the female on slide 2/23, 'tipico', Veneto, recovered from rotting wood is hereby designated the lectotype. The male on the same slide is designated as the allotype. Those specimens on slides 2/20 and 2/21 are designated as syntypes. The specimens on slides 2/24 and 19/13-15 and those found in the three vials are not *O. paradoxa*.

The present study would seem to indicate that the male and female found on the slide marked 'tipico', 2/23, were the sources for the description and drawings, at least in part, for the 1884 publications and that the female on slide 2/23 was the specimen used by BERLESE for the discussion on the morphology of the Uropodina as well as for figures 8 and 30 for the 1904 publication. In the latter, BERLESE did not indicate from which slide he chose the specimen to illustrate the two female figures, nor did he mention the 1884 publications.

Below is a description of the lectotype of *O. paradoxa*, immediately followed by a comparison, where it is at all possible, with the material published in 1884 and 1904. The measurements were made with a calibrated reticulum in a Zeiss microscope with 10 × ocular and 20 ×, 40 × and a 60 × objectives.

FEMALE. Plate II.

The LECTOTYPE measures about 498 × 408 μm (the specimen is broken). The measurements were listed as 440 × 360 μm by CANESTRINI & BERLESE (1884); as 450 μm (by BERLESE (1884) and in BERLESE (1904) as 520 μm.

VENTER. As in many species of the genus *Oplitis*, *O. paradoxa* is protected ventrally by the imposing cuirass of the sterno-endopodal-ventral (s-e-v) plate (C-C), the ventro-anal (D-D), and the ventro-lateral plates (m), and, dorsally, by the dorsal plate. The coxae of legs II to IV articulate from acetabula on the endopodal region of the s-e-v plate.

BERLESE (1904: 326) referred to the s-e-v plate as the "grande scudo sternale (end) which hugs the internal half of the 'anche' (hips) of legs 2

to 4"; EVANS (1957: 243) called it the sterniti-geniti-ventral shield; KRASINSKAYA (1961: 133) the sternoventral plate (shield); HUNTER & FARRIER (1975: 597) refer to it as the sternal, endopodal and ventral regions of the perigenital ring.

PERIGENITAL DEPRESSION. Extending from just below the rim of the camerostome of the s-e-v plate, anteriorly, to the level of the most anteriorly placed setae of the ventral-plate-area is a large depression which surrounds the genital opening, the perigenital depression (Pl. II: figs 1,3 (B-B)). This area has been referred to as the perigenital shield by most acarologists, but, as will be shown when describing *O. farrieri*, the term perigenital depression better describes the structure when viewed using the SEM.

On the LECTOTYPE is 222 μm long × 140 μm at its broadest width. The anterior border of the perigenital depression has 5 'loops' (for want of a better term) with 4 setae occupying the two lateral 'loops' (Pl. II: figs 1,3 (E) (1,2)). The border is 65 μm wide. A single, short seta lies on either side of the border, just anterior to coxae II (Pl. II: figs 1,3 (3)).

The posterior border has 6 inverted 'loops' and one seta in each of the lateral 'loops' (Pl. II: figs 1,3 (F) (5)). It is slightly convex and measures 80 μm. The sides of the perigenital depression are smooth (Pl. II: figs 1,3 (G)).

Another pair of setae associated with the perigenital depression lies posterior to coxae IV (Pl. II: figs 1,3 (4)).

The setae found on the anterior and posterior borders as well as others associated with the perigenital depression are part of the sterno-endo-podal setae group to be discussed in detail under the description of the allotype.

CANESTRINI & BERLESE. The 1884 figures do not indicate the presence of the perigenital depression, as such. The sternal plate is described as extending beyond the 4th pair of 'legs' and terminating with a toothed edge and the drawing shows a sort of plate terminating with a toothed edge with a line separating it from the genital plate. The toothed edge stops at the level between coxae III and IV (Pl. I, fig. 1 (2)).

BERLESE. In the 1904 publication the perigenital depression is clearly indicated. Fig. 30 shows five 'loops' and no setae for the anterior border and fig. 8 shows 4 loops with four setae, one in each 'loop'. In both figures the posterior border is correctly indicated, however, fig. 30 shows it curving excessively (Pl. I, figs 2-3).

GENITAL PLATE. In the LECTOTYPE the large oval-shaped, truncated genital plate is 140 μm long and 110 μm wide. Its anterior tip is approximately at the level of the anterior border of coxae II and it reaches approximately to the middle of coxae IV. Four pairs of setae on the perigenital depression border the genital opening (Pl. II: figs 1,3 (A) (8)).

CANESTRINI & BERLESE. Figure 2 of tav. IV also shows the anterior tip of the genital plate at the level of the anterior border of coxae II. However,

the posterior border is shown to terminate at the level between the coxae of legs III and IV. No setae are shown on the perigenital depression.

BERLESE. Both figures 8 and 30 show the genital plate correctly positioned. On fig. 8, four pairs of setae are shown around the genital opening but only 3 pairs are shown on fig. 30.

GENITAL APERTURE. A thick, chitinous 'endoskeleton' frames the opening of the genital aperture (Pl. II: figs 1,3 (H)). It is apparently contiguous, laterally, with the endopodal apodemes of coxae II to IV and anteriorly with the sternal apodeme. Where the posterior limit of this frame joins the endopodal apodemes of coxae IV, it forms a shelf.

The operculum articulates with this posterior margin of the genital 'endoskeletal' frame and is 'hinged ' to it much as an oven door is hinged on a stove. Membranes attached to the frame of the genital 'endoskeletal' aperture and to the internal surface of the operculum limit the opening of the operculum.

This 'endoskeletal' structure has been depicted by HUNTER & FARRIER (1975: fig. 43) for *Oplitis virgilinus* as well as for several other *Oplitis* species described by them.

While studying the series of slides designated by BERLESE as *paradoxa*, the female specimen on slide 2/24 revealed musculature associated with the genital 'endoskeletal' frame. A description of these muscles is included here to help explain the workings of the genital aperture and the operculum (see pl. III).

Muscles appear to originate from the middle of the base (shelf) of the genital 'endoskeletal' frame, to fan out left and right and to insert on the apodemes between coxae III and IV (Pl. III: figs 1-4). A second group of muscles originate and insert from these same apodemes and crisscross behind these muscles. The contraction of this series of muscles would be responsible for the opening of the genital aperture.

On the same specimen, slide 2/24, muscles can be seen on the ventro-anal plate as well. Fig. 4 shows muscles on either side of the anal opening originating from the posterior rim of the ventro-anal plate and inserting on its anterior rim. Contraction of these muscles could cause a buckling, possibly aiding in the opening of the valves of the anal opening.

VENTRAL-PLATE-AREA. In the LECTOTYPE there are 9 visible ventral setae on the ventral-plate-area: four on the right side and five on the left side. The ventral setae are long, slender and slightly saber-shaped. Posteriorly, a strong suture separates the ventral-plate-area from the ventro-anal and ventro-lateral plates (Pl. II: figs 1,3 (I)).

CANESTRINI & BERLESE No ventral setae shown; BERLESE. No ventral setae shown on fig. 8 and 3 pairs shown on fig. 30 (Pl. I, fig. 1 (2)).

VENTRO-ANAL PLATE. On the LECTOTYPE, there are two pairs of paranal setae and a single postanal seta. The more anterior pair of paranal setae

are about the same length as the ventral setae and about three times longer than those of the posterior pair (Pl. II: figs 1,3 (D) (9)).

VENTRO-LATERAL PLATE. Contiguous, laterally, with the ventro-anal plate is the ventro-lateral plate (to be be described in more detail under the description for *O. farrieri*). There is one pair of vento-lateral setae (Pl. II: figs 1,3 (M) (10)).

CANESTRINI & BERLESE. No setae are shown on the ventro-anal plate; BERLESE. Fig. 8 shows one pair of paranal setae (pa) and fig. 30 shows one pair of paranal setae and the ventro-lateral setae.

PERITREMES. On the LECTOTYPE they are bi-convoluted with a medially projecting extension (Pl. II, fig. 1 (P)).

CANESTRINI & BERLESE. No drawing of peritremes; BERLESE. The drawings of the peritremes on figs 8 and 30 approximate those of the lectotype.

Plate II. Female: Lectotype of *Oplitis parodoxa*

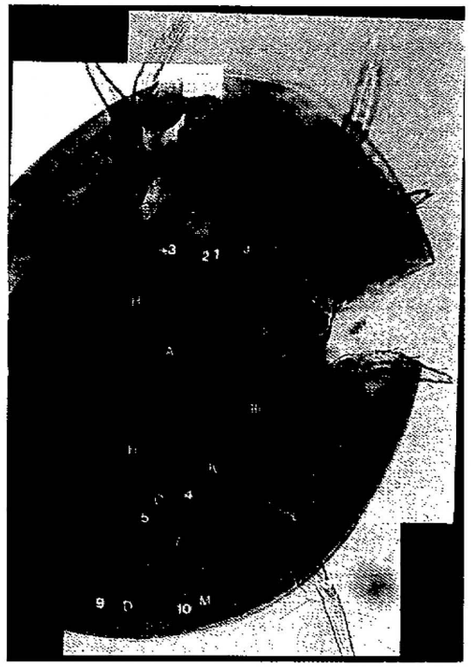
Fig. 1. Partial ventral view.
Fig. 2. Partial dorsal view.
Fig. 3. Details of ventral surface (drawn from the lectotype).

Legend:

A. genital plate
B-B. perigenital depression
C-C. sterno-endopodal-ventral plate (s-e-v)
D. ventro-anal plate
E. anterior border of perigenital depression
F. posterior border of perigenital depression
G. side of perigenital depression
H. part of endoskeleton supporting genital opening
I-I. ventral plate area of sterno-endopodal-ventral plate
J. camerostome
K. sternal portion of sterno-endopodal-ventral plate
L. leg grooves
M. ventro-lateral plate
P. peritreme
T. tritosternum

1-5. five pairs of sterno-endopodal setae:
no.1-no.2. in two lateral loops of anterior border of perigenital depression
no.3. on each side of anterior border of perigenital depression, anterior to coxae II
no.4. posterior to coxae IV
no.5. in lateral loops of posterior border of perigenital depression
7. ventral setae
8. setae on perigenital depression surrounding genital opening
9. ventro-anal setae
10. ventro-lateral setae

I - IV. legs or coxae I - IV



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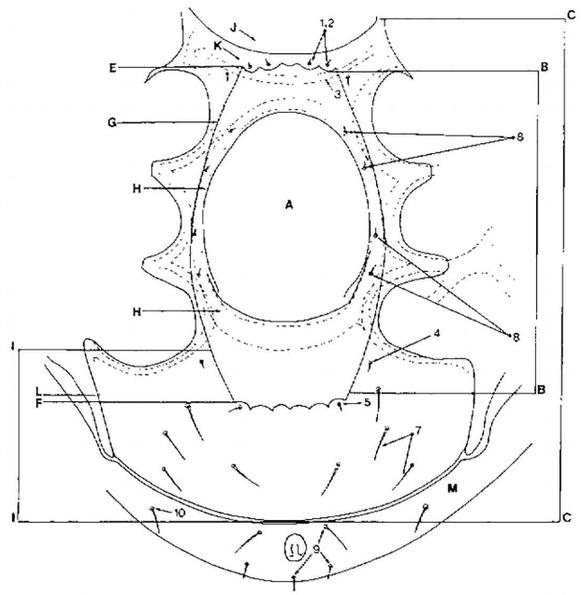


3.

Dorsal plate. On the Lectotype the dorsal plate was difficult to study. From the photo one can see its slender, saber-shaped setae (Plate II: fig. 2).

Neither Canestrini & Berlese nor Berlese indicated the type of dorsal plate for the female.

Ornamentation. There appears to be no ornamentation on the ventral or dorsal surfaces of the Lectotype.

Berlese. In the key given in 1904 Berlese described the ventral surface as being without ornamentation.

Male. Plate IV.

The Allotype male measures 414 × 336 μm. Canestrini & Berlese reported 420 × 320 μm.

Venter. The sterno-endopodal-ventral plate is as described for the female.

Perigenital depression. On the Allotype it is 200 μm long and 100 μm wide at its broadest width (B-B). It extends into the ventral-plate-area at about the level of the most anteriorly placed ventral setae. Its anterior border (E) has 5 'loops', as in the female, but only 2 setae, one in each of the most lateral 'loops' (1) instead of 4 as found in the female. The anterior border is 60 μm long.

The posterior border (40 μm long) (F) has four inverted 'loops' with two setae, one in each of the most lateral 'loops'. There are small pores associated with the setae on the posterior border (6). As in the female there is a pair of short setae at the base of coxae IV (5). The sides of the perigenital depression are smooth (G) (Pl. IV: figs 1,3).

Canestrini & Berlese. The perigenital depression, fig. 1a, is shown as found on the Allotype except for the anterior border. In fig. 1a the same straight line represents the anterior border of the perigenital depression and the posterior edge of the camerostome, no 'loops' are depicted. These 'loops' are not easily discernible and could have been missed in 1884.

Genital plate. The circular genital plate (A) of the Allotype, 30 μm in diameter, lies at a level intermediate between coxae II and III. There are three pairs of setae (8) near the genital opening on the perigenital depression as opposed to 4 pairs in the female. The most anterior pair is anterior to the junction between coxae II and III; the second pair is at the level of the middle of coxae III and the most posterior pair lies just anterior to the junction between coxae III and IV. The genital opening is between the anterior and middle pair of setae.

Canestrini & Berlese. The drawing of the genital plate, fig. 1a, is positioned correctly. There were no setae shown on the perigenital depression around the genital opening.

Ventral-plate-area. On the Allotype there are 6 (7?) setae on the ventral-plate-area (I-I): 4 slender, saber-shaped setae on the right side of the mite and two on the left side. There is a 3rd unpaired, ventral seta on the left side, midway between coxae IV and the edge of the posterior border of the perigenital depression. It is shorter than the ventral setae, (7A).

Canestrini & Berlese. Fig. 1a only partially shows the ventral-plate-area.

Ventro-anal and *Ventro-lateral plates* are as described for the female.

Peritremes. The peritremes of the Allotype are not in folds as are those of the Lectotype, but have a simple, broad arch which appears very close to the edge of the mite (Pl. IV: fig. 1 (P)).

Canestrini & Berlese. The depicted peritreme is the same as the Allotype.

Sterno-endopodal setae. The term 'sterno-endopodal' as used here is purely descriptive and refers to the position of setae associated with the perigenital depression.

On the Lectotype there are 5 pairs of s-e setae: pairs no. 1 and no. 2 are found in the four lateral loops of the anterior border of the perigenital depression; pair no. 3 just anterior to coxae II; pair no. 4, posterior to coxae IV and pair no. 5 occupy the lateral 'loops' of the posterior border of the perigenital depression (Pl. II: figs 1,3 (1-5)).

On the Allotype there are 6 pairs of s-e setae: pair no. 1 is found in the lateral loops of the anterior border of the perigenital depression: pair no. 2 about the middle of coxae II; pair no. 3 between the coxae of legs II and III; pair no. 4 between the coxae of legs III and IV; pair no. 5 posterior to coxae IV and pair no. 6 occupies the lateral 'loops' of the posterior border of the perigenital depression (Pl. IV: fig. 3 (1-6)).

Dorsal plate. The dorsal plate of the Allotype was difficult to study.

Canestrini & Berlese. Fig. 1 gives a stylized drawing of the dorsal surface.

Conclusion.

It would seem that while the 1884 drawings labelled *Uropoda paradoxa* may have been, in part, derived from several specimens considered at the time to be syntypes with the type, figures showing the adult male and female (Figs 1,1a,2) and the male peritreme (6) do, for the most part, represent the male and female on slide 2/23 marked 'tipico'. The 1904 drawings can easily be traced to slide 2/23. Since neither the chelicerae, pedipalps, or nymphs (Figs 3,4,7) are visible on slide 2/23, they were obviously drawn from another source. The only specimen of the series showing protracted chelicerae is on slide 96/14.

Based on the published drawings of the specimens identified as "*O. paradoxa*", it would seem that those of Hirschmann & Zirngiebl-Nicol

(1964), PECINA (1980) and KRASINSKAYA (1961) are not conspecific with the lectotype. Of the two drawings published by HIRSCHMANN & ZIRNGIEBL-NICOL (1969), i.e. figs 171 VM & VW, only fig. 171 VM corresponds to the lectotype. *Uropoda paradoxoides* OUDEMANS, 1903, might be a synonym but due to the loss of the type, this cannot be verified.

Taxonomic keys including *O. paradoxa* published by various authors should be carefully reviewed, as well as their information concerning its distribution and habitat.

Oplitis farrieri n. sp.

Through the gracious generosity of Drs M. CASTAGNOLI and R. NANNELLI, I was granted permission to remove for SEM a male and a female from vial 3°/111 containing numerous specimens. The material was collected in 1895 from ants' nests in Trentino and the label indicated it to be a possible syntype of *O. paradoxa*. They represent a new species. The type, female, and allotype male have since been deposited at the Acaroteca.

The scanning electron microscope, JEOL, model JSM - 35 was used for the present study. The magnification range varied from 260× - 4000×.

In describing *O. farrieri* I have chosen to follow principally the 1904 general description for the Uropodina given by BERLESE because so many of the details described by him have been validated by this SEM study. It became evident while describing *O. paradoxa* that many features to be discussed for *O. farrieri* could have been included in the study of *O. paradoxa*. I purposely avoided using them in order not to anticipate the description of *O. farrieri*.

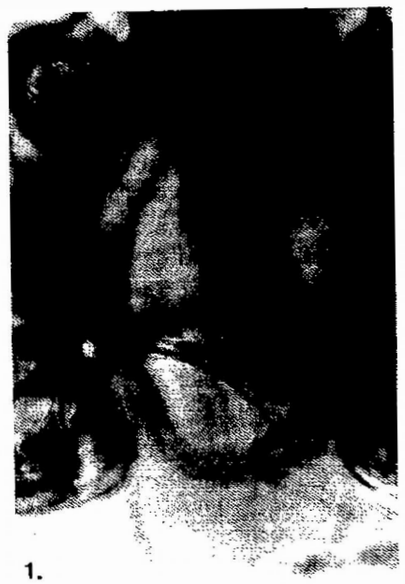
MALE.

333 μm × 237 μm

DORSUM. The convex-shaped dorsal shield is composed of three regions (shields): the centro-dorsal, cdr, the latero-dorsal, ldr, and the marginal, mgr. The number, size, shape and position of the saber-shaped setae on the dorsal shield are as shown on pl. V, figs 1-4.

Plate III. *Oplitis* sp. - Photographs taken of female specimen on slide 2/24 of the *paradoxa* series at the Berlese Acaroteca to show musculature related to the genital and anal apertures.

Fig. 1. Shows muscles originating from posterior border of endoskeletal support of genital opening and fanning out and inserting on apodemes between coxae III & IV. Shows muscles criss-crossing behind these and attached to these same apodemes.
Fig. 2. Shows muscles criss-crossing and attaching to apodemes.
Fig. 3. Idem.
Fig. 4. Shows muscles on either side of anal opening originating from the posterior rim of the ventro-anal plate and inserting on its anterior rim.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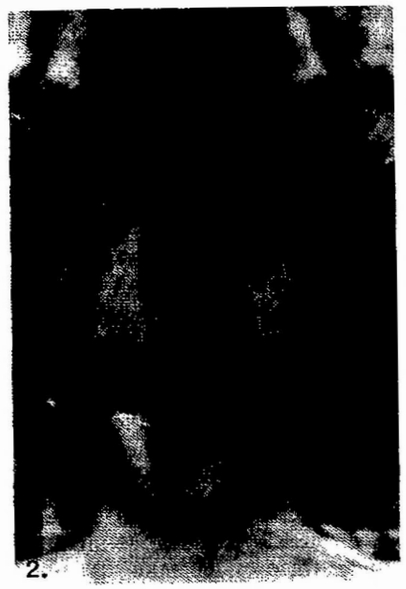
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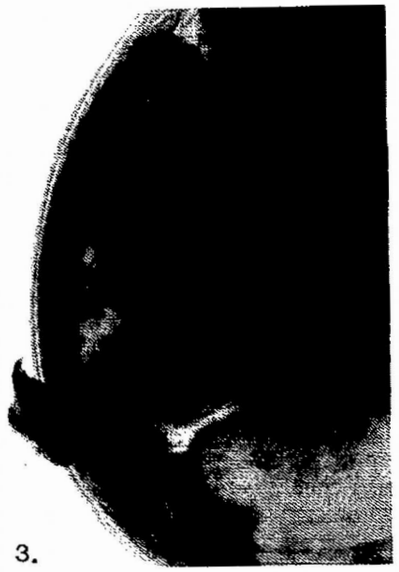
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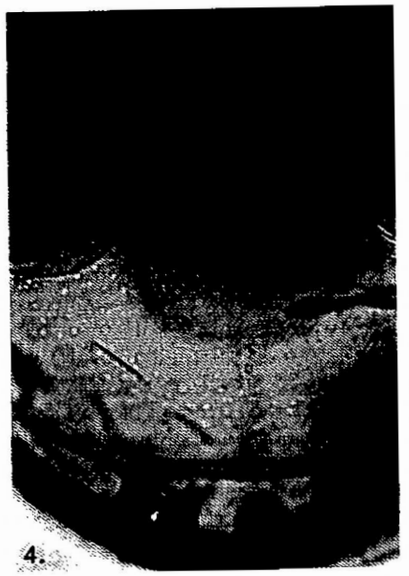

4.

The centro-dorsal region ('scutum dorsuale medium', BERL.: 325) is distinctly outlined by a slightly raised rim. The latero-dorsal and marginal regions form a single region anteriorly (X) and their point of origin is shown on figs 1,2-4(+) (Pl. V).

The latero-dorsal region is easily differentiated from the centro-dorsal region not only by the slightly raised rim of the centro-dorsal region, but also by the saber-shaped setae along the line which separates it from the marginal region.

Evenly spaced, shorter, saber-shaped setae, oriented towards the edge of the mite, line the edge of the dorsum and characterize the marginal region.

Posteriorly, four pairs of centrally located setae are found in the space between the centro-dorsal and latero-dorsal regions. Anteriorly, where the latero-dorsal and marginal regions form a single region, there are 7 pairs.

CONNECTIVE SHIELD (Pls V: figs 1-2,4-6(CS); VI: fig. 1; VII: figs 2-5; VIII: fig. 1; IX: fig. 1). The following description of the connective shield for the male of *O. farrieri* applies also for the female as well.

Skirting the entire rim (edge) of the mite is a narrow strip of hyaline-like cuticle. As the SEM pictures show, this cuticle is not part of the ventral surface of the mite just as it is not part of its dorsal surface, but the margin which separates and at the same time unites the dorsal and ventral surfaces. It is dotted with short, pointed, evenly spaced setae along its middle. BERLESE (327, (Mg)) referred to this connective shield, which he considered to be part of the ventral surface, as the 'ventral marginal shield'. He wrote: "The ventral marginal shield (scudo marginale ventrale (Mg)) is fused with the dorsal shield and, thus, the edges of the body are protected" (Pl. I, Mg). While the term connective shield is adopted here, another acceptable term might be submarginal shield. This, however, would have implied that it is part of the dorsal shield, which does not appear to be the situation.

Figure 5 (Pl. V), a photo taken at the level of leg groove IV, shows the connective shield (CS) and the three regions forming the dorsal shield. Immediately dorsal to the connective shield is the marginal region (MGR), easily discernible by its oval-shaped pits; dorsal to the marginal region is the latero-dorsal region (LDR) with its distinctive setae and dorsal to this, the centro-dorsal region (CDR). Figure 6, pl. V, shows the connective shield at the level of the suture separating the ventral-plate-area from the ventro-anal and ventro-lateral plates.

The connective shield is devoid of any of the decorative pits found on the dorsal shield. In slide preparations the connective shield is not easily discernible because the dorsal surface is pressed against the ventral surface.

An apparently similar structure, in part, has been described by WOODRING & GALBRAITH (1976: 21) for *Fuscouropoda agitans* (BANKS, 1908). They hypothesized that the effects of contraction of dorsal-ventral muscles could result in depression and elevation of the dorsal plate and, thus, 'delicately regulate body fluid pressure'.

ATHIAS-BINCHE (1988, fig. 12) in her paper on *Janetiella* (*D.*) *stoechas* has clearly depicted the connective shield between the dorsal and ventral surfaces but there is no explanation concerning the structure.

VENTER.

STERNO-ENDOPODAL-VENTRAL PLATE. The s-e-v plate is as described for *O. paradoxa*.

PERIGENITAL DEPRESSION. In the male the depression is 170 μm long and 82 μm wide (Pl. VI: figs 1-4). The sterno-endopodal sides of the depression are smooth. SEM photographs have revealed that the anterior and posterior borders are actually puckered by a series of shallow ridges and grooves tapering towards the depressed plate. When viewed perpendicularly, these appear to form a series of loops along the borders. They have been called differently by various authors: CANESTRINI & BERLESE (1884: 175) referred to the posterior border (the anterior border was not depicted as such) as being "toothed", HIRSCHMANN and HIRSCHMANN & ZIRNGIEBL-NICOL in their publications as 'garlands' or 'scallops', HUNTER & FARRIER (1975: 599) as being "crenulated'. I will refer to them as loops.

In the male there are 5 loops forming the anterior border of the perigenital depression (E) and a single seta is found in each of the most lateral loops (l). As in the female, there is a pore on the left side of the border. The border is 43 μm long.

The posterior border of the perigenital depression extends to the level of the most anteriorly placed ventral setae on the ventral-plate-area. It has 5 loops with one seta in each of the most lateral loops (F)(6). The border curves slightly posteriorly. It is 29 μm long.

STERNO-ENDOPODAL SETAE. In the male there are 6 pairs of setae surrounding the perigenital depression: no. 1 is found in each of the lateral loops of the anterior border; no. 2 at the level of the middle of coxae II; no. 3 between coxae II and III; no. 4 between coxae III and IV; no. 5 at the base of coxae IV, and no. 6 is found in each of the lateral loops of the posterior border (Pl. VI: figs 1-4 (1-6)).

GENITAL OPENING. The genital opening is located on the level between coxae II and III. The genital plate (A) is 27 μm long and 25 μm wide. There are three pairs of setae on the perigenital depression near the genital opening (Pl. VI: figs 1-3 (7)). The 1st pair is located anterior to the genital opening at the level just posterior of the middle of coxae I. These are pointed, needleshaped setae and the longest of the three pairs. The 2nd pair, extremely minute, is located directly posterior to the lst pair at about the level between coxae II and II and the 3rd pair, also extremely minute, directly beneath the 2nd pair at about the level of the middle of coxae III. The second and third pairs are not pointed.

The cover of the male genital opening (Pl. VI: fig. 3) appears to be formed by a hinged cap which fits over the rim of what apparently is the opening to the genital atrium.

VENTRAL-PLATE-AREA. Its richly marked alveolar surface, plus the presence of 7 (8?) robust, saber-shaped ventral setae (four on the left side of the mite and three on the right side) easily differentiates the ventral-plate-area ("corazza", BERL.: 327) contribution to the formation of the s-e-v plate. Laterally, it extends to and adjoins the acetabula and leg grooves IV (Pl. VI: figs 1-2 (I)). A strong suture separates it from the ventro-anal and ventro-lateral plates; the setae at the base of coxae IV is on the ventral-plate-area.

VENTRO-ANAL PLATE (Pl. VI: figs 1-2). There are two pairs of paranal setae, plus, a simple, postanal seta bordering the valves of the anal opening. The anterior pair of paranal setae are like the robust, sabershaped ventral setae; those of the posterior pair and the postanal setae are much shorter and thinner.

VENTRO-LATERAL PLATE (Pls VI: figs 1-2; VIII: figs 1-2). The ventro-lateral plate is contiguous with the ventro-anal plate and has one pair of ventro-lateral setae (10).

When one follows the rim of the ventro-lateral plate anteriorly, one can see that it not only widens at its most anterior point, but that it dips ventrally, joining, at midpoint, the scabellum, (S), thus, forming leg grooves I. BERLESE (p. 326) named this point of contact between the ventro-lateral plate and the scabellum (tectum), the vertex (Pl. I: fig. 2, (ap)). It has two setae, the vertex setae (Pls VI: fig. 2; VII: figs 1-6; VIII: fig. 2).

The inner surface of the ventro-lateral plate forms the lateral sides of the mite. As will be described later, on its surface are found the scabellum, the peritremes and the frames for leg grooves IV. In addition to leg grooves I, it contributes to the formation of leg grooves II and III, and exopodals I; exopodals III bifurcated onto its surface.

Plate IV. Male. Allotype of *Oplitis paradoxa*.

Fig. 1. Ventral view.

Fig. 2. Shows detail of posterior border of perigenital depression and relationship of edge of depression with the most anteriorly placed ventral setae; note pore associated with sterno-endopodal setae 6.

Fig. 3. Illustration drawing of ventral surface.

Legend same as for female of *O. paradoxa*, except for following details:

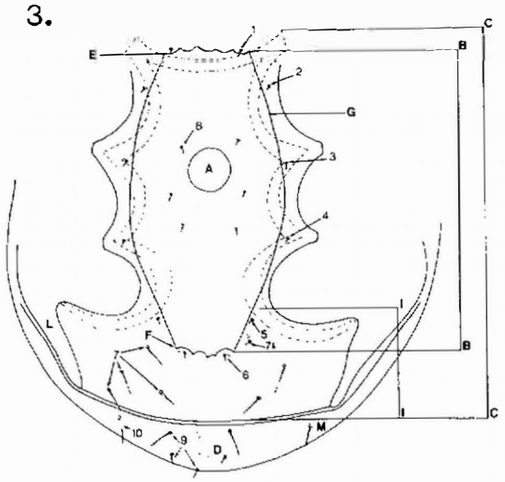
a. Sterno-endopodal setae 1-6

b. 7A, unpaired ventral ? seta on left side of mite

1.

2.

3.



VERTEX. The relationship between the ventro-lateral plate and the vertex is poorly depicted in BERLESE's drawing (Pl. I: fig. 2(ap)). While the present study shows the vertex to be part of the ventro-lateral plate, several authors have considered it as part of the dorsal shield, and, indeed, in BERLESE's text (329) the vertex is included with his discussion of the dorsal shield. In 1943 (p. 96) TRÄGÅRDH, investigating the presence of the vertex shield in various groups, wrote that: "Finally we turn to the Uropodina in order to find out the possible equivalent to the vertex shield. As a matter of fact we have not far to look, because in many of them the dorsal shield ends in a kind of crest, bearing one or several vertex hairs".

EVANS (1957: 243) writes in his discussion on the Uropodoidea: "the 'vertical setae' are often situated on a distinct 'vertex shield' which is separated from the dorsal shield by a strip of cuticle (in all probability the connective shield as described here). This shield may be strongly developed and act as a prow (TRÄGÅRDH, 1943)".

Plate V. *Oplitis farrieri*, n. sp. (SEM)

Fig. 1. Side view of dorsal shield showing rim limiting the centro-dorsal region; the point of origin of the latero-dorsal and marginal regions (+); the connective shield skirting margin of mite; the ventral inflection of anterior portion of venter.

Fig. 2. Frontal view of dorsal shield showing rim of centro-dorsal region, arrangement of setae at the undivided middle of dorsal shield (X) prior to origin of latero-dorsal and marginal regions (+), the connective shield.

Fig. 3. Note arrangement of setae marking division between latero-dorsal and marginal regions; the four pairs of setae, posteriorly, at widest separation of latero-dorsal and marginal regions and the shorter, exteriorly oriented marginal setae.

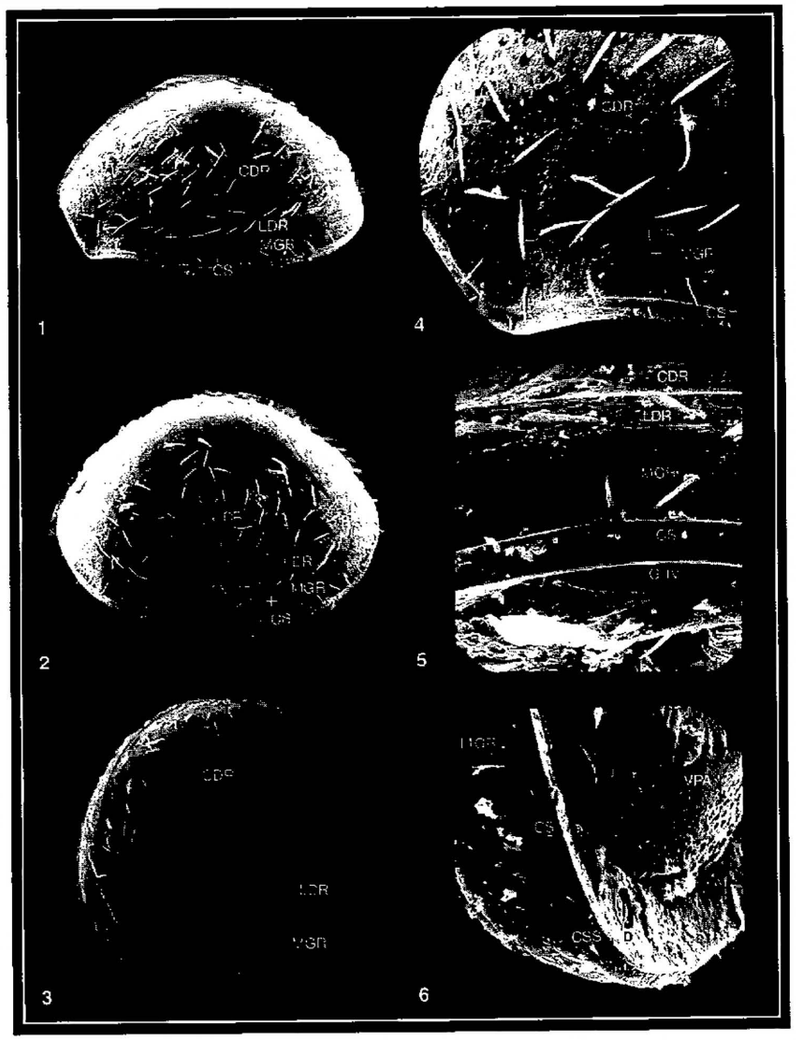
Fig. 4. Enlargement of anterior surface of dorsal shield.

Fig. 5. View taken at level of leg groove IV to show relationship of connective shield to ventral and dorsal surfaces. Immediately dorsal to connective shield is the marginal region of the dorsal shield; dorsal to marginal region is latero-dorsal region (note setae marking division) and dorsal to the latero-dorsal region is the centro-dorsal region (note rim).

Fig. 6. Female. View taken to show the robust, sharp, short, evenly-spaced setae lining middle of connective shield; note suture separating the ventro-anal and ventro-lateral plates from the ventral-plate-area of the s-e-v plate.

Legend:

CDR.	centro-dorsal region of dorsal shield	M.	ventro-lateral plate
CS.	connective shield	MGR.	marginal region of dorsal shield
CSS.	seta of connective shield	VPA.	ventral-plate-area
D.	ventro-anal plate	+.	point of origin of latero-dorsal and marginal regions of dorsal plate
LGIV.	leg groove IV	X.	undivided anterior, middle of dorsal shield
LDR.	latero-dorsal region of dorsal shield		



ATHIAS-BINCHE (1988: 15) for *Janetiella* (*D.*) *stoechas* describes the dorsal shield of the adult as 'allongé, avec un vertex important'. Yet, when one studies the SEM pictures, figs 16(B) & 17(A), one can see that the 'vertex' is the anterior limit of the ventral surface of the mite, anterior the scabellum.

The following descriptions of the exopodals, camerostome and scabellum in the male applies for the female as well.

EXOPODALS. BERLESE (1904: 327) named the exopodals the 'propleure' (pp) between legs I and II, the 'mesopleure' (mp) between legs II and III and the 'metapleure' (mtp) between legs III & IV.

Exopodals I (propleure, pp). BERLESE described exopodals I as beginning from the sternum (he showed them separated from the sternum (Pl. I: fig. 2), and bifurcating towards the margin of the mite into two branches, one of which (os) closed the camerostome laterally and the other (pp) outlined leg grooves I. Actually exopodals I have a double origin: a posterior portion from dorso-lateral extensions (EA) from the sternal portion of the s-e-v plate and an anterior portion derived from cuticular extensions/ outgrowths from the inner surface of the ventro-lateral plate (EB) (Pl. VII: figs 1,6). Exopodals I will be elaborated upon under the discussion on the formation of the camerostome.

BERLESE described exopodals II and III as each having a 'posterior tooth-shaped process (o) which infiltrates between the trochanter and the femur of the following leg, as well as a second tooth-shaped process (os) which insinuates itself between the femur and the tarsus of the preceeding leg. Thus are circumscribed the leg grooves more or less open to the outside, externally, closed perfectly on the other side formed from the lateral edge of the sternum'.

Plate VI. Male: *Oplitis farrieri* (SEM).

Figs 1-2. Ventral views.

Fig. 3. Details of anterior border of perigenital depression: note loops forming the anterior border; sterno-endopodal setae no. 1, 2, 3; setae on perigenital depression associated with genital opening (7).

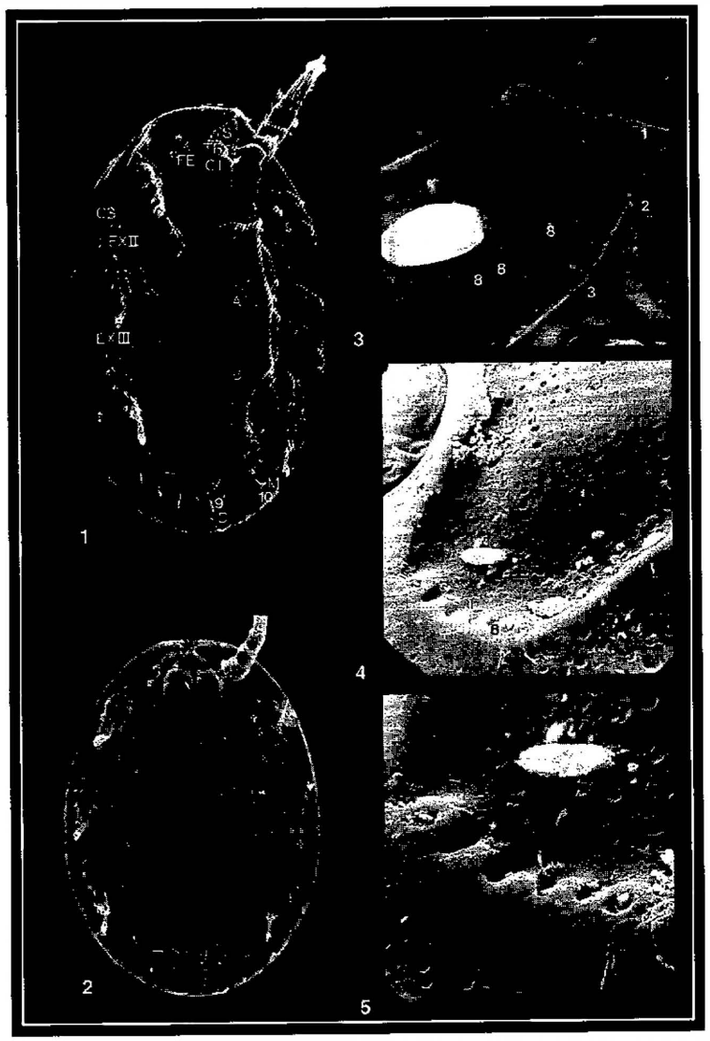
Fig. 4. Details of posterior border showing five loops of perigenital depression with sterno-endopodal setae no. 6 in lateral loops. Note sterno-endopodal setae no. 5 at base of coxae IV.

Fig. 5. Idem enlarged.

Legend: same as given for female of *O. paradoxa*, in addition:

EXI.	exopodal I	CS.	connective shield
EXII.	exopodal II	V.	vertex

note: sterno-endopodal setae 1-6; 5 loops forming posterior border of perigenital depression



Exopodals II (mesopleure) are very complicated structures (Pls VI: figs 1-2; VIII: figs 1-2; IX: figs 1,2 (A-B); X: figs 1-1A). Their general shape is as shown by BERLESE (Pl. I: fig. 3 (mp)). The anterior surfaces of exopodals II contribute to the formation of leg grooves II and terminate in a cup-like structure which receives the tarsal segments of legs II when the legs are retracted. The posterior, smooth surfaces of exopodals II arch slightly above the anterior portion and contribute to the formation of leg grooves III. The non-elevated area of exopodals II are very porous.

On pl. IX (Figs 2-2A), one can see that the peritrematic shield on the left side of the male encircles the cup-like portion of exopodal II and in so doing contributes to the formation of leg grooves II and III. The posterior limit of the peritrematic shield helps form the anterior surface of leg groove III. The stigma is found in the wall of leg groove III.

Plate VII. Camerostome of *O. farrieri* (SEM)

Fig. 1. Male. Shows thick lateral sides of sternal region of s-e-v plate and three processes which branch from it: OS, PS[1], EA. Note V-shaped outgrowths, "V", from inner surface of ventro-lateral plate, vertex plus setae, scabellum. Note position of coxae and trochanters and crests of coxae.

Fig. 2. Male. Note tubercles and setae of trochanters, lacinae of tritosternum, scabellum, vertex, connective shield.

Fig. 3. Male. Note expanded, triangular form of anterior surface of ventro-lateral plate to form vertex with its two setae.

Fig. 4. Female. Looking into sternal collar. Note position of coxae I, trochanters, femurs, tarsi, tritosternum and gnathosoma; note V-shaped outgrowth from inner surface of ventro-lateral plate.

Fig. 5. Female. Lateral view of camerostome, note crests on coxae I, position of trochanters, thickened side of scabellum against which femur rests, double origin of exopodals I.

Fig. 6. Female. Showing position of leg segments when legs I are collapsed. Note crests on coxae I and position of trochanters; note crests, protuberances and setae of femurs and relationship of femurs to scabellum; note femurs resting against sternal contribution to exopodals I (EA) (right side); relationship of rest of leg I segments with regards to scabellum and anterior portion of camerostome.

Legend.

CI.	coxa I	OS.	medially-directed process
CR.	crest	PS^1.	laterally-directed process
EA.	ex.I: sternal portion of s-e-v pl. contribution	X.	undivided portion of dorsal shield
EB.	ex.I: ventro-lateral plate contribution	+.	point of origin of lateral-dorsal & marginal regions of dorsal shield
FE.	femur	TR.	trochanter
GE.	genu	V.	vertex
S.	scabellum	"V".	V-shaped outgrowth from inner surface of ventro-lateral plate
TA.	tarsus		
T.	tritosternum		
TI.	tibia		

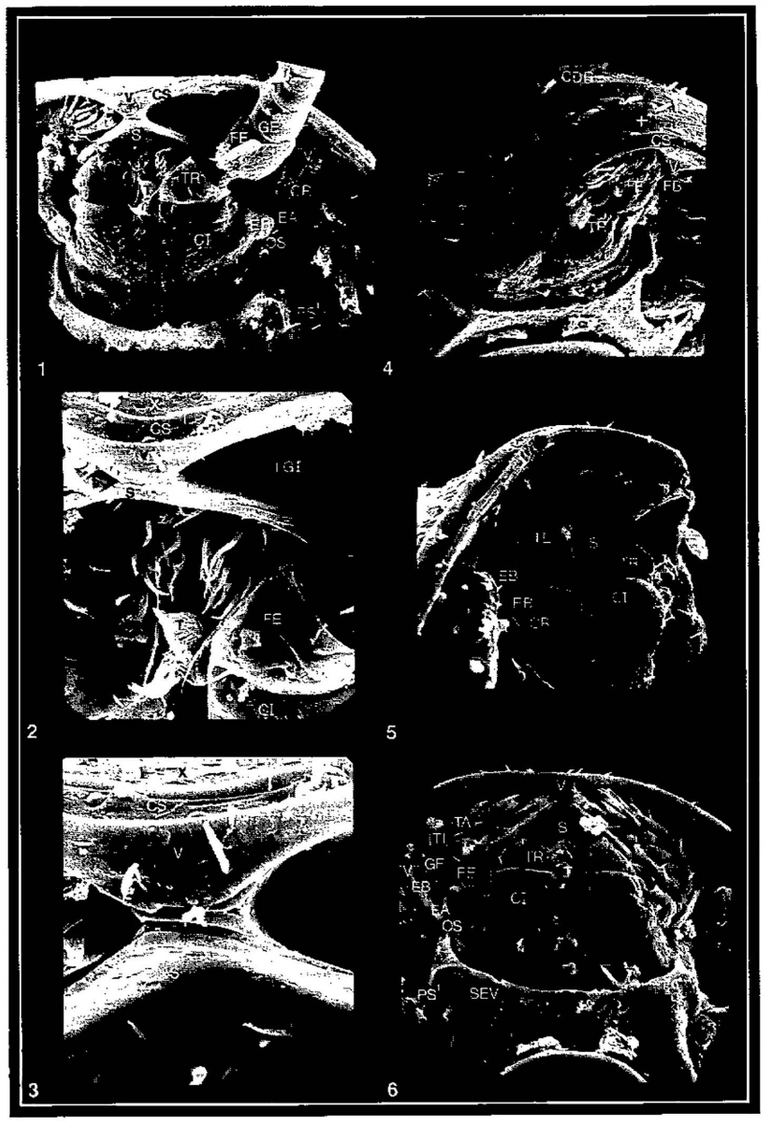


Plate VIII. Female: *Oplitis farrieri* (SEM)

Figs 1-2. Ventral views
Fig. 3. Detail of anterior border of perigenital depression; note sterno-endopodal setae pairs no. 1 and no. 2.
Fig. 4. Detail of posterior border of perigenital depression; note sterno-endopodal setae pair no. 4.

Legend same as for *O. paradoxa* and for male of *O. farrieri*.

Exopodals III (metapleure) are less complicated in structure than exopodals II (Pls I: fig. 2 (mtp); VI: figs 1-2; VIII: figs 1-2). They contribute to the formation of the frame for leg grooves II. Their posterior surfaces form the frame and, it would appear, the floor for leg grooves III, perhaps along with some contributions from the metapodal shields. See also fig. 16(B) of *Janetiella* (*D.*) *stoechas*, ATHIAS-BINCHE (1988).

Medially, exopodals II and III, when the legs are at rest, apparently slightly overlap the corresponding endopodal portions of the s-e-v plate. Endoskeletal support for these exopodals is contiguous with the corresponding endoskeletal support for the endopodal portions of the s-e-v plate and is part of the endoskeletal framework described under *O. paradoxa*, see HUNTER & FARRIER (1976: 43, fig. 43). Apparently, this could permit a certain amount of articulation of exopodals II and III with the corresponding endopodal portions of the s-e-v plate. Their highly porous surfaces probably reduce their weight without impairing their structural strength. This alveolar aspect has been referred to as punctations by HUNTER & FARRIER (1976).

CAMEROSTOME. In 1904 BERLESE wrote (p. 326): "..one sees that the first pair of legs and the rostrum are together compressed in a large round aperture, the camerostome (C), limited above by the tectum (scabellum), below by the anterior border of the sternum and by the processi propleurici (os) on the sides".

The camerostome, so defined and drawn by BERLESE, actually incorporates two sections: *A*. a flattened, elliptically-shaped, posterior cavity formed from sternal elements from the s-e-v plate, and, *B*. a fanshaped, anterior portion formed, laterally and dorsally, by apodemes I and the inner surface of the ventro-lateral plate, and, ventrally, by the dorsal wall of the above-mentioned cavity.

As the SEM photographs show, there are three processes or extensions which branch from each side of the anterior surface of the s-e-v plate: one curves medially, a second is directed dorso-laterally and a third is directed laterally (Pls VII: figs 1,6; X: fig. 1).

1. The medially-directed processes BERLESE thought (processi propleurici (Pl. I: fig. 2 (os)) completed the closure of the camerostome by joining the sides of the scabellum. As the photographs show these processes (OS) do close the camerostome dorsally but not by meeting with the sides of the scabellum. They meet posterior to the scabellum on the inner surface of the ventro-lateral plate to form a flattened, elliptically-shaped cavity. The cavity is framed by the 'processi propleurici' or medially-directed processes, dorsally, and ventrally and laterally by the border of the s-e-v plate. BERLESE depicted these extensions as separated from the sternal border, they are not.

The 'sternal collar' formed by these medially-directed processes isolates within its borders legs I, the gnathosoma and the tritosternum. Upon retraction of legs I, the sternal collar accommodates the coxae and trochan-

ters of legs I, the tritosternum and the gnathosoma (Pls VII: figs 1,6; X: fig. 1); see also ATHIAS-BINCHE (1988: figs 16(B), 17(A)).

ATHIAS-BINCHE (1977: 35, see fig. 23) in her discussion on the evolution of the coaptation of legs I to the gnathosoma states that the association was reinforced dorsally by a common, resistant membrane which unites the two coxae above the dorsal surface of the gnathosoma. The study here would seem to indicate that this common, resistant membrane is no doubt the synarthrodial membrane(s) attaching the gnathosoma, tritosternum and legs I to the inner surfaces of this sternal collar, thus, permitting their articulation.

2. The dorso-lateral extensions (EA) contribute to the formation of exopodals I along with cuticular outgrowths/extensions (EB) from the inner surface of the ventro-lateral plate. The two extensions appear to overlap, perhaps joined by membranes which would give them a certain amount of flexibility (Pls VI: figs 1,2; VII: figs 1,6; IX: fig. 1; X: fig. 1).

As is shown on pl. VII (figs 1,6) there are strongly chitinous, V-shaped, cuticular outgrowths from the inner surface of the ventro-lateral plate in the region of the camerostome. The elongated points of these V-shaped outgrowths form the anterior half of exopodals I (EB).

The medial sides of these V-shaped outgrowths become the curved, lateral walls of the anterior portion of the camerostome, containing within their borders the genual, tibial, and tarsal segments of legs I when they are retracted (Pl. VII: fig. 6); the curved, opposite sides contribute to the formation of leg grooves II.

3. The laterally-directed processes (Pl. I: fig. 2 (ps^1)), contribute to the formation of leg grooves II and the acetabula for legs II (Pls VII: fig. 1; X: fig. 1). (It should be noted that on BERLESE's fig. 8 the processes from the sternal plate are labelled as: ps^1, ps^2, and ps^3, whereas the Italian text reads $p8^1$, $p8^2$, and $p8^3$).

LEGS I (Pls VI: fig. 1; VII: figs 1,6; IX: figs 1-2). When legs I are retracted their large, flat coxae, (CI), fitted with large, chitinous crests on their lateral surfaces and the trochanters (TR) form a formidable wall in front of the gnathosoma and the tritosternum.

Looking into the camerostome when the legs I are at rest, one can see that the leg segments are collapsed in such a way that the femurs (FE) are positioned between exopodals I, that portion (BA) derived from the s-e-v plate, and the thickened sides of the scabellum. The genual (GE), tibial (TI) and tarsal (TA) segments sit in the left and right portions of leg grooves I, framed, anteriorly, by the inner walls of the ventro-lateral plate, posteriorly, in part, by the anterior surface of the scabellum and, laterally, by the part of exopodals I (EB) derived from the walls of the ventro-lateral plate. As described previously, the contact of the vertex with the scabellum forms leg grooves I.

Plate IX. Male: *Oplitis farrieri* (SEM), Peritremes.

RIGHT SIDE OF MITE

1. Peritreme circles exopodal II and stigmata is against its posterior surface. Note double aspect of ex. II: porous anterior surface and smooth posterior surface.

1A. Idem enlarged.

LEFT SIDE OF MITE

2. Peritreme follows curvature of exopodal II; note raised peritrematic plate and position of stigmata.

2A. Idem.

Legend:

B.	perigenital depression
CI.	coxa I
CR.	crest
CS.	connective shield
EA.	dorso-laterally directed process from sternal portion of s-e-v plate which contributes to formation of exopodal I
EXII.	exopodal II
G.	side of perigenital depression
LGIII.	leg groove III
PS.	peritrematic shield
2.	sterno-endopodal seta no. 2

Plate X. Female: *Oplitis farrieri*

Right side of mite

1. Note raised, ear-shaped form of peritrematic plate.

1a. Idem enlarged. Note origin of peritreme within leg grooves II.

Left side of mite

2. Peritreme.

2a. Idem enlarged.

Legend:

EA. dorso-laterally directed process from s-e-v plate which contributes to formation of exopodal I

EB. point of V-shaped, cuticular outgrowth from inner surface of ventrolateral plate which contributes to formation of exopodal I

EXII. exopodal II

LGIII. leg groove III

OS. medially-directed process from s-e-v plate which contributes to formation of sternal collar

PS[I]. laterally-directed process from s-e-v plate which helps form leg groove II

The chitinous crests found on the coxae of legs I of the male differ from those found on the female. Those of the female are rather oval in shape and punctuated by slight dentitions on their dorsal and lateral surfaces. Those of the male are broader than those of the female and rather rectangular in shape with a single tooth on their dorsal, medial surfaces.

The trochanters do not seem to have crests as such but large tubercles with long serrated setae.

The crests which decorate the femurs seem to be the same in both sexes. The medial surfaces of the femurs, from which project the rectangularly-shaped crests, appear to be more thickly chitinized that their lateral surfaces. The surfaces of the crests appear to be thickened. Large tubercles and a strongly developed seta are associated with the crests. The medial surfaces of the femurs are directed towards the sides of the scabellum when the legs are retracted (Pl. VII: fig. 6).

Much smaller, serrated crests are found also on the genual and tibial segments, Athias-Binche (1977: 35) hypothesized that the encroachment of legs I towards the gnathosoma and the transformation of coxae I as we find in the Higher Uropodina (Uropodoidea) could be an adaptation in response for better protection for the gnathosoma. She proposed as well, a second hypothesis, that is that coxae I and the presence of the camerostome contributes to strengthen the base of the gnathosoma, which would provide greater support for the chelicerae when they are protracted from the gnathosoma.

Along with these, I would like to propose a third hypothesis. That is that, when mites began to exploit niches occupied by organisms such as termites and ants, attracted either by the hydrocarbons of their cuticle and/or their pheromones, the first pair of legs gradually began to adopt a function as sensory organs. As this affiliation with the gnathosoma proved advantageous, a greater priority to their role as antennae could have reduced the necessity for aggressively-structured mouthparts and a greater need to protect the mouthparts, resulting with the eventual encroachment/coaptation of the first pair of legs towards the gnathosoma and the eventual sealing off of the gnathosoma, tritosternum and legs I by the formation of a sternal collar as described above.

Subsequent development would have seen the reduction of the gnathosoma to a purely sucking and pumping apparatus; the chelicerae being used more as piercing instruments and a greater role being played by the tritosternum for transporting the fluids and necessary food elements towards the gnathosoma.

The fan-shaped, anterior portion of the camerostome, as we now know it, as well as the scabellum, could have resulted to accommodate the femoral, genual, tibial and tarsal segments of legs one, when the legs were retracted.

ATHIAS-BINCHE (1977: 34) observed that with the greater development of the coxae of legs I, the gnathosoma eventually loses its coloration and that its walls become thinner, which one would expect from the above hypothesis, see fig. 18 (A) of same publication.

SCABELLUM. The scabellum originates from the expanded, inner surface of the ventro-lateral plate. When legs I are retracted, it spans the space between the medial surfaces of the femurs and arches over the gnathosoma, coxae I, trochanters I and the tritosternum. Its dorsal surface serves as a platform for primarily the tarsal segments of legs I (Pl. VII: figs 1-2, 5-6). See also *Janetiella (D.) stoechas*, fig. 16 (B), ATHIAS-BINCHE (1988).

TRITOSTERNUM. The well-developed lacinae of the tritosternum (T) can be seen between the anterior surfaces of coxae I and the trochanters.

PERITREMES (Pl. IX). The peritreme associated with the left side of the mite has been discussed under exopodals II. Apparently peritremes of the male and female not only differ from each other, but the two peritremes on the individuals of same sex may be slightly different as well. A more thorough study is indicated.

FEMALE. Plate VIII.

355 μm × 318 μm

DORSUM. The dorsum is the same as described for the male.

VENTER. STERNO-ENDOPODAL-VENTRAL PLATE. The s-e-v plate is the same as described for *O. paradoxa*.

PERIGENITAL DEPRESSION. The perigenital depression is 175 μm long × 122 μm wide and extends to the level of the most anterior pair of ventral setae (Pl. VIII: figs 1-2). Its sides are smooth.

In the female there are 5 loops forming its anterior border with setae located in loops 1,2 and 4,5. A pore appears to be present on the left side of the border as in the male. The anterior border is 56 μm long (Pl. VIII: figs 1-3).

The posterior border is 74 μm long and curves slightly posteriorly (Pl. VIII: figs 1-2, 4). Eight loops form its posterior border with a single seta located in each of the most lateral loops as in the male.

STERNO-ENDOPODAL SETAE. In the female there are 4 pairs of sterno-endopodal setae, as opposed to 6 pairs in the male: no. 1 and no. 2 occupy the lateral four loops of the anterior border of the perigenital depression; no. 3 is posterior to coxae IV; no. 4 is found in the lateral loops of the posterior border of the perigenital depression.

With regards to the loops forming the anterior and posterior borders of the perigenital depression of both sexes, it might be postulated that during egg laying or copulation these folds would be capable of expanding and contracting much as a bellows, thus permitting a certain amount of flexibility to the perigenital area.

GENITAL OPENING. The genital opening extends from the anterior level of coxae II to the base of coxae IV. The genital plate is broadly egg shaped and is 127 μm long × 105 μm wide. Its truncated, straight, posterior edge narrows slightly. The distance from the base of the genital plate to the posterior border of the perigenital depression is 35 μm; the distance from the anterior edge of the genital plate to the anterior border of the perigenital depression is 22 μm (Pl. VIII: figs 1-2). See also the genital opening discussion for *O. paradoxa*.

There are four minute setae on the perigenital depression which dot the rim of the genital opening as in *O. paradoxa* (Pl. VIII: figs 1-2).

VENTRAL-PLATE-AREA is as described for the male, but the number of ventral setae differs. The female has 5 (6?) robust, saber-shaped setae, two on the left side of the mite and three on the right.

PERITREMES. As in the male, the left and right peritremes appear different in structure (Pl. X: figs 1-4).

LEGS (Pls VII: fig. 6; VIII: figs 1-2). See description as given for the male.

All other structures are as described for the male.

To better understand the overall relationship between the components making up the ventral surface of *O. farrieri*, a model of the female was constructed using different colors of plasticine to represent the various parts. The model proved so helpful to the writer that a photograph of it is included (Pl. XI). Certain liberties were taken with some of the areas in order to simplify the model. The appendages, gnathosoma, genital plate, pores and setae are not included.

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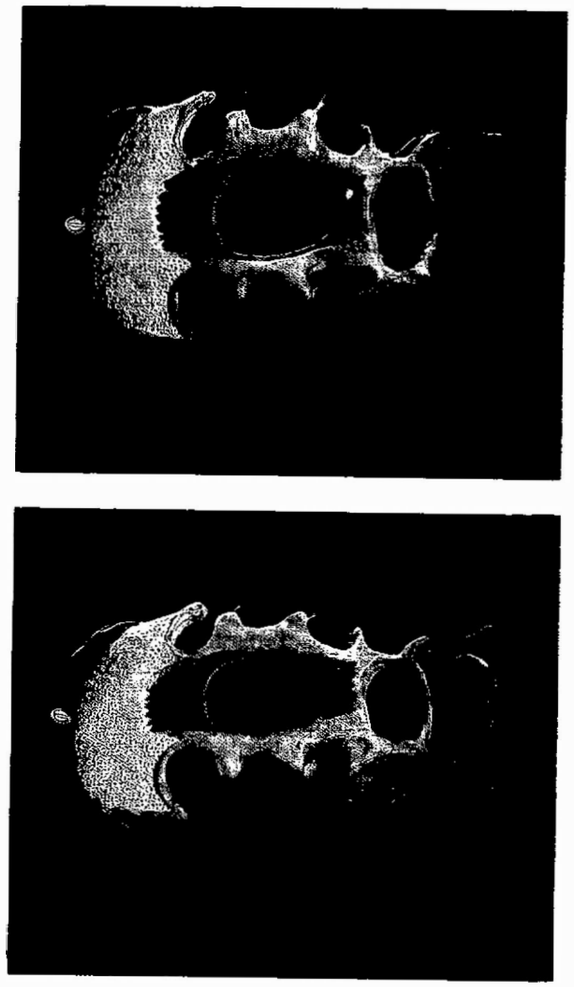

Plate XI. Plasticine model patterned after the main features of the ventral surface of the female of *O. ferrieri*.

Color scheme:

blue:	ventro-lateral plate	dark green:	endoskeleton, in part
grey:	scabellum	white:	ventral-plate-area of s-e-v plate
yellow:	sternal + endopodal portions of s-e-v plate = sternal collar	black:	peritreme
light green:	perigenital depression	rust:	connective shield

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