

ON THREE MITES OF THE GENUS *EPIDERMOPTES* RIVOLTA (ACARI).

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RECENTLY Fain (1963 a & b) proposed a new classification of the family Psoroptidae. On the basis of the study of the chaetotaxy, the solenidiotaxy and the fixation organs (backwardly-directed hooks) in the adults and immature stages, he considered that there were no essential differences between members of the Psoroptidae *s. str.* and several genera which had previously been placed in other families. Therefore, he proposed to include all these forms in the Psoroptidae and re-defined the family. The following eight sub-families were recognized:

1. *Psoroptinae*: comprising the genera of the old family Psoroptidae and the genus *Trouessalges* Fonseca.
2. *Psoralginae*: (syn: Acaroptidae): containing the genera *Psoralges* Trouess. *Edentalges* Fonseca and *Acaroptes* Womersley.
3. *Makialginae*: with the genera *Makialges* Gaud & Till, *Gaudalges* Fain and *Lemuralges* Fain.
4. *Cheirogalalinae*: to include *Cheirogalalges* Fain.
5. *Marsupialginae*: with one genus *Marsupialges* Fain, formerly placed in the Psoralgidae.
6. *Paracoroptynae*: consisting of two genera, the genus *Paracoroptes* Lavoipierre which was originally assigned to the Acaroptidae, and the genus *Pangorillalges*, formerly included in the Psoralgidae.
7. *Cebalginae*: a very homogenous group comprising six genera: *Cebalges* Fain, *Cebalgoides* Fain, *Procebalges* Fain, *Fonsecalges* Fain, *Schizopodalges* Fain and *Alouattalges* Fain.
8. *Dermatophagoidinae*: with only one genus *Dermatophagoides* Bogdanov, formerly included in the Epidermoptidae.

Discussing the relationship between the Psoroptidae and the Epidermoptidae, Fain (1963 b) stated: "En somme, les Epidermoptidae se différencient des Psoroptidae par des caractères relativement peu importants et qui ne justifient peut-être pas la séparation de ces deux groupes en familles distinctes. Nous préférons cependant conserver le statut actuel jusqu'à ce qu'une étude plus approfondie des Epidermoptidae puisse être entreprise et nous fasse mieux connaître les caractères morphologiques de ce groupe."

In order to make this comparative study it is necessary to re-describe in detail *Epidermoptes bilobatus* Rivolta, the type of the genus. Our attempts to locate the type material, or even specimens, of this species in the major acarological collections in Europe (Padua, Florence, Paris, Toulouse and Munich) proved fruitless and we assume that the types must be lost. Fortunately, one of us (G.O.E.) recently received numerous specimens of an *Epidermoptes* from the Veterinary Laboratories, Weybridge (England). The mites had been taken from mange-like lesions of the skin of a bantam fowl. These specimens do not agree with the female of *bilobatus* figured by Berlese (1896). In the Weybridge material the external scapular setæ (*sc.e.*) are short and reach as far as the sejugal furrow whereas in Berlese's illustration these setæ are very long and extend almost to the posterior margin of the hysterosoma. Rivolta's original figure of the species in 1876, however, shows the setæ *sc.e.* of the female to be short as in our specimens and this condition also obtains in the rather better drawing of the dorsum of the female given by Rivolta & Delprato (1880). In view of this we consider the species of *Epidermoptes* from the bantam fowl to be conspecific with *E. bilobatus* and for the purpose of stabilizing the nomenclature we have taken this opportunity of designating one of the females from the Weybridge material a neotype.

The status of the species figured by Berlese (1896) must remain in doubt although we are inclined to consider the apparent difference in the length of *sc.e.* between it and *bilobatus* an error in Berlese's figure. Dubinin (1953) in his redescription of *E. bilobatus* overlooked the discrepancy between Rivolta's and Berlese's illustrations of *bilobatus* and used Neumann's (1909) figures to illustrate the venter of the male and female, and a re-drawing of Berlese's figure* for the dorsum of the female!

The object of the present contribution is to give a detailed re-description of *E. bilobatus* and to describe two new species discovered on wild birds in Antwerp (Belgium) by A.F. The nomenclature used for the idiosomal chaetotaxy is that of Fain (1963 b).

Family EPIDERMLOPTIDAE.

Epidermoptes bilobatus Rivolta.

Epidermoptes bilobatus Rivolta (1876); Rivolta and Delprato (1880); Canestrini (1894); Berlese (1896); Neumann (1909); Hirst (1922); Vitzthum (1929); Dubinin (1953).

Symbiotes avium Caparini (1880)

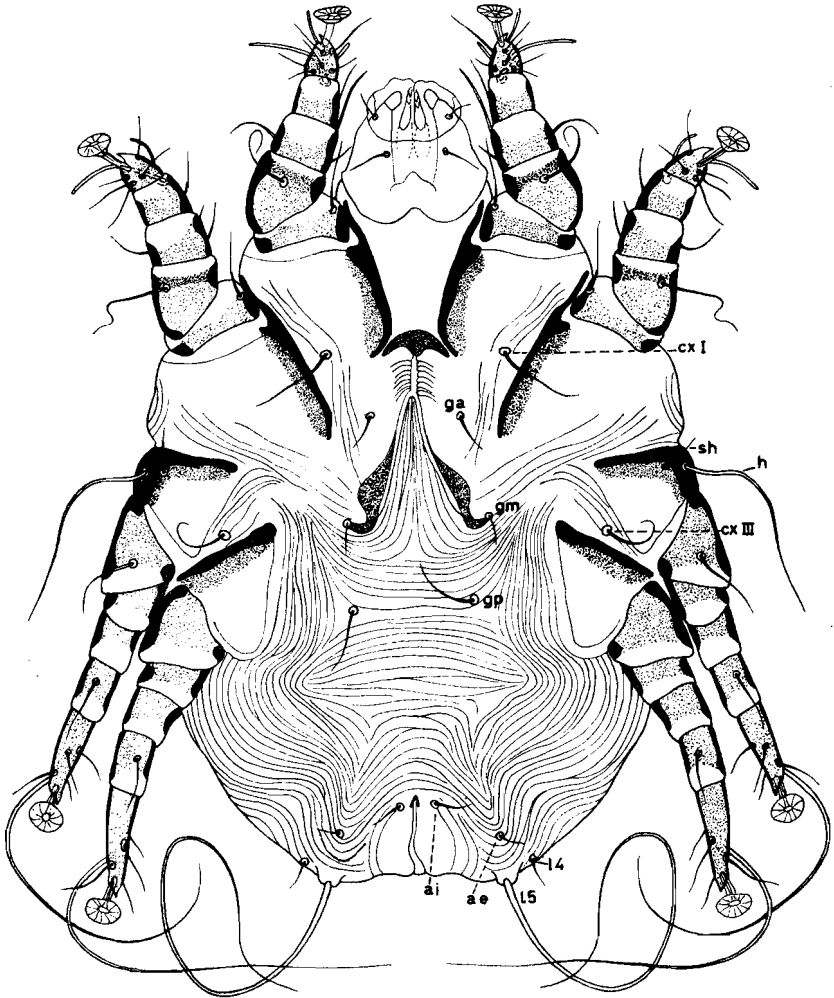
Dermatophagus gallinarum Fiedberger (1881)

NEOTYPE FEMALE (figs. 1, 2, 7 to 10 a): Idiosoma broadly oval in outline, approximately 235 μ long and 182 μ wide, and with a distinct sejugal furrow (fig. 2). Total length (gnathosoma included) 264 μ . Propodosomal shield finely punctured, about 75 μ long and 109 μ at its greatest width, and bearing setæ *sc.e.* (18 μ) and *sc.i.* at its postero-lateral corners. Setæ *sc.i.* about one-third to one-quarter the length of setæ *sc.e.*

* There can be no doubt that the figure of the dorsum of the female given by Dubinin is based on Berlese's figure although certain dorsal setæ omitted by Berlese have been included in Dubinin's re-drawing. The setæ *sc.e.* are exactly as shown in the original.

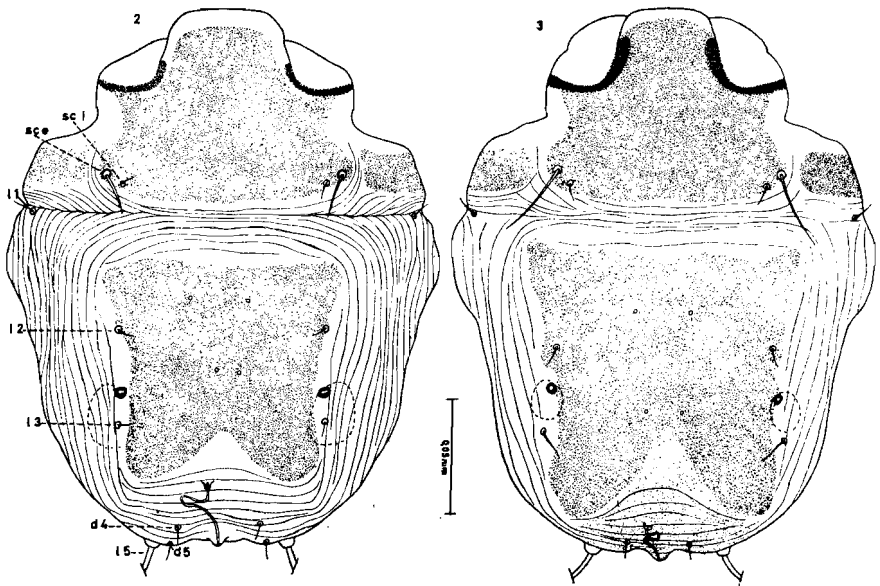
Dorsum of hysterosoma with a finely punctured subrectangular shield which is strongly incised posteriorly. Hysterosomal shield, $72\ \mu$ in median length, $96\ \mu$ in maximum length and $105\ \mu$ at its greatest breadth, with setae *l 2* and two pairs of "pore-like" areas representing bases of dorsal setae normally present in most of the Psoroptidae. Remainder of dorsal chaetotaxy comprising six pairs of simple setae: *l 1*, *l 2*, *l 3*, *l 5*, *d 3*, and *d 4*. Setae *l 5* whip-like and measure about $190\ \mu$ in length. Setae *l 4* displaced ventro-laterally. Humeral seta (*h*) much longer and thicker

Fig. 1.



Epidermoptes bilobatus Rivolta. Neotype female in ventral view.

Figs. 2-3.



Dorsal view of the females of *Epidermoptes bilobatus* Rivolta, neotype (2) and *Epidermoptes odontophori* sp.n. (3)

than the subhumeral (*sh*). Openings of lateral abdominal glands conspicuous and situated at a distance of about 11μ anterior of *l* 3. Unsclerotized cuticle coarsely striated.

Epimera I convergent and separated posteriorly by the pregenital sclerite (epigynium); epimera II-IV as in fig. 1. Genital orifice in the form of an inverted Y; genital sclerites expanded in their posterior halves. Anus sub-terminal. Chætotaxy comprising two pairs of coxal setæ (*cx*I and *cx*III), three pairs of genitals with median pair (*gm*) on posterior hook-like processes of genital sclerites and two pairs of anals (*ai* and *ae*). Genital discs completely lacking. Bursa copulatrix opening terminally.

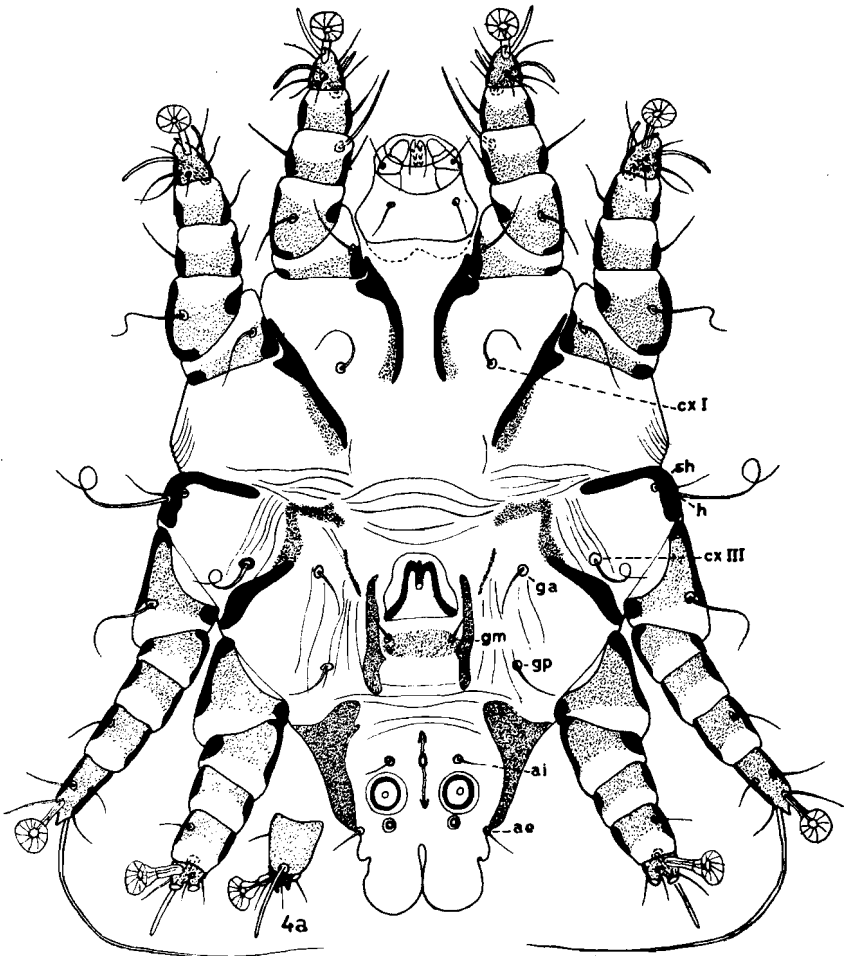
Gnathosoma small compact. Pedipalps two-segmented, enveloped by membranes. Chelicerae chelate-dentate.

All legs with five well-formed free segments excluding the ambulacrum which comprises a slender pedicel bearing a disc-like pulvillus. Trochanter and femur I each with one ventral seta; chætotaxy of genu, tibia and tarsus of leg I as in fig. 7. Trochanter and femur II each with one ventral seta. Chætotaxy of genu, tibia and tarsus of leg II as in fig. 8. Trochanter III with a single ventral seta, femur III and genu III devoid of setæ; chætotaxy of tibia and tarsus as in fig. 9. Trochanter, femur and genu IV without setæ, chætotaxy of tibia and tarsus as in fig. 10. Solenidia: tarsi 2-1-0-0; tibiae: 1-1-1-1; genera 1-1-0-0. All tarsi with a distal claw-like process which is situated dorsoapically on tarsi I and II (fig.

7-8) and ventro-apically on tarsi III and IV (fig. 9, 9 a, 10, 10 a). Tarsi I and II about three-quarters the length of their respective tibiae; tarsi III-IV at least one and one-half times the length of their tibiae.

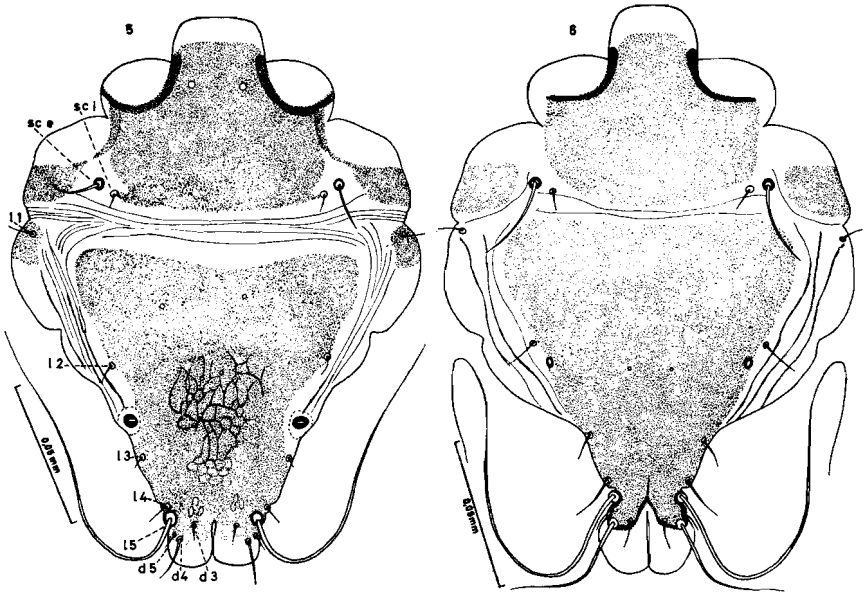
MALE (figs. 4, 4 a and 5): Idiosoma strongly attenuated in its posterior half and terminating in a bilobed appendage (fig. 5); length (including gnathosoma) 200μ , greatest width 136μ . Sejugal furrow distinct. Propodosomal shield finely punctured, about 52μ long and 75μ at its greatest width, and bearing setae *sc.i*. Setae *sc.e.* (16μ) lying on striated integument.

Fig. 4.



Epidermoptes bilobatus Rivolta, male in ventral view.

Figs. 5-6.



Dorsal view of the males of *Epidermoptes bilobatus* Rivolta (5) and *Epidermoptes odontophori* sp. n. (6).

Dorsum of hysterosoma almost entirely covered by a hysterosomal shield (95μ long 106μ in greatest width) with a median reticulated area and bearing setae *l* 2, *l* 3, *l* 4, *l* 5, *d* 3, *d* 4 and *d* 5 (fig. 5). Setae *l* 2-*l* 4, *d* 3 and *d* 5 short. Setae *d* 4 about 15μ in length and *l* 5 long, whip-like. Setae *l* 1 situated antero-laterally on platelets. Openings of the latero-abdominal glands conspicuous.

Form of the epimera, genital region and anal region and the chaetotaxy of the venter as in fig. 4.

Segmentation, chaetotaxy and solenidiotaxy of legs I-III essentially the same as in the female. Leg IV relatively shorter, and the segments broader than in the female; solenidion of tibia longer than in female and similar to that of tibia I. Tarsus IV less than one-half the length of the tibia, with a bifid claw-like process dorsally (fig. 4 a) and a pair of stalked sucker-like structures ventrally.

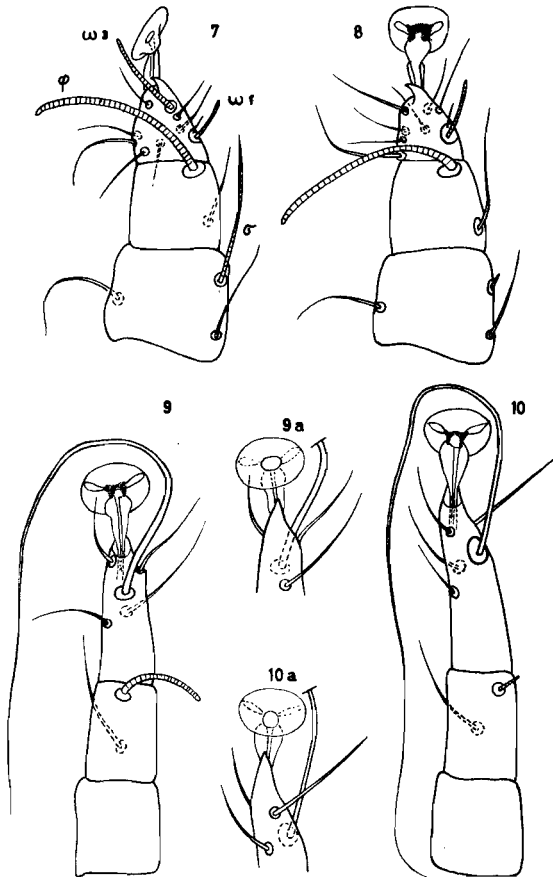
TRITONYMPH (fig. 11): Idiosoma approximately 170μ long and 140μ at its greatest width. Propodosomal shield punctured and 58μ long. Sejugal furrow distinct. Setae *sc.e.* and *sc.i.* lying on striated cuticle with *sc.i.* about one-third to one-quarter the length of *sc.e.* (fig. 11). Dorsum of hysterosoma without shield but with six pairs of setae distributed as in the female. Setae *l* 1, *h* and *sh* displaced ventro-laterally. Latero-abdominal gland and pore conspicuous. Sclerotization and

chætotaxy of the venter as figured. With three pairs of genital setæ and two pairs of genital discs. Chætotaxy of the legs, solenidia, and the form of the ambulacra essentially the same as in the female.

PROTONYMPH: Idiosoma approximately $140\ \mu$ long and $120\ \mu$ at its greatest width. Sclerotization and chætotaxy of the dorsum of the idiosoma as in the tritonymph. Sclerotization of the venter as in the tritonymph. Chætotaxy differing in having one pair of genital setæ (*gp*) and one pair of genital discs (often poorly sclerotized and difficult to see) and in lacking the trochanteral setæ (I to III) and the seta on tibia IV. The tarsus IV apparently bears only 3 setæ. Solenidia: tarsi 1-1-0-0; tibiæ 1-1-1-0; genu 1-1-0-0.

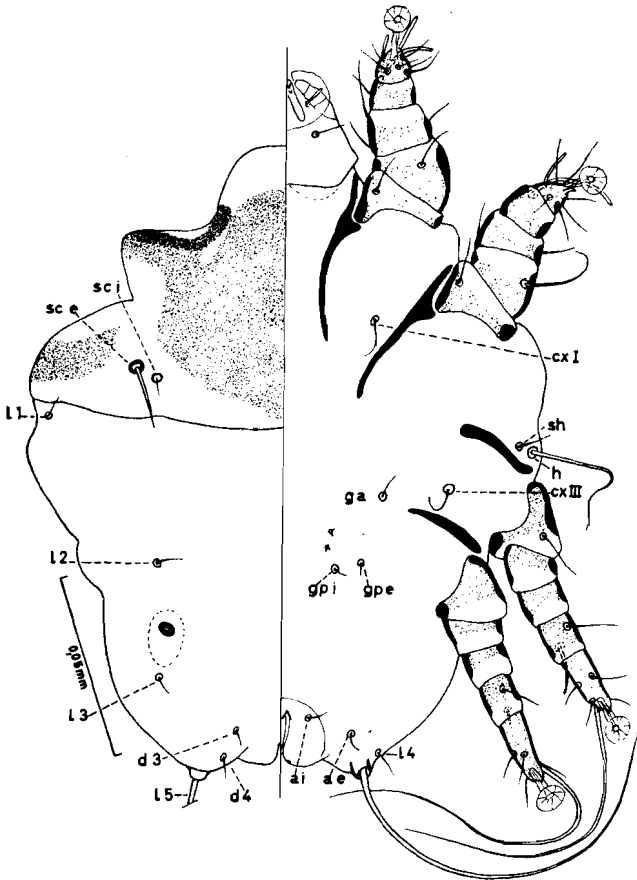
LARVA (fig. 12): Idiosoma approximately $120\ \mu$ long and $90\ \mu$ at its greatest width. Sclerotization of the dorsum essentially as in the trito-

Figs. 7-10 a



Epidermoptes bilobatus Rivolta, neotype ♀: genu, tibia and tarsus, in dorsal view, of legs I (7), II (8); III (9); IV (10). Apical part of tarsi III (9 a) and IV (10 a) in ventral view.

Fig. 11.

*Epidermoptes bilobatus* Rivolta: tritonymph.

nymph. Setae *sc.e.* and *sc.i.* situated on striated cuticle (fig. 12). Hysterosoma lacking setae *d 3*, *d 4*, *d 5* and *l 4*. Latero-abdominal glands conspicuous. Sclerotization of venter as figured. Chaetotaxy comprising setae *cx I* and *cx III* only; the anal setae are lacking. Leg chaetotaxy; tibiae and genua as in the female; trochanters I to III as in the protonymph, tarsi with 6-6-5 setae. Solenidia: tarsi 1-1-0; tibiae 1-1-1; genua 1-?-0.

Host and locality: Free on skin and under fine corneous pellicule of the skin of a bantam fowl, Surrey, England. (4 IV 1963).

Type: Neotype female (1964 : I : 28 : 1) in the Collections of the British Museum (Nat. Hist.).

Epidermoptes odontophori sp. n.

This species is close to *E. bilobatus*. It differs from the latter in the following characters: in the two sexes the hysterosomal shield is proportionally distinctly broader and the setæ *sc.e.* are longer; in the male the opisthosoma is more abruptly narrowed, the lobes are longer and the setæ *d 4* are much longer and stronger.

FEMALE (holotype) (figs. 3, 13): Idiosoma 240 μ long and 186 μ wide. Total length (gnathosoma included) 270 μ . In two paratypes: idiosoma 250 \times 180 μ ; 248 \times 186 μ . Shape of the body as for *E. bilobatus*. Cuticle more coarsely striated than in that species. Hysterosomal shield larger and more deeply incised posteriorly than in *E. bilobatus*: median length 72 μ , maximum length 126 μ , maximum width 120 μ (in 3 paratypes the maximum length and width are 117 \times 117 μ ; 120 \times 117 μ and 112 \times

Fig. 12

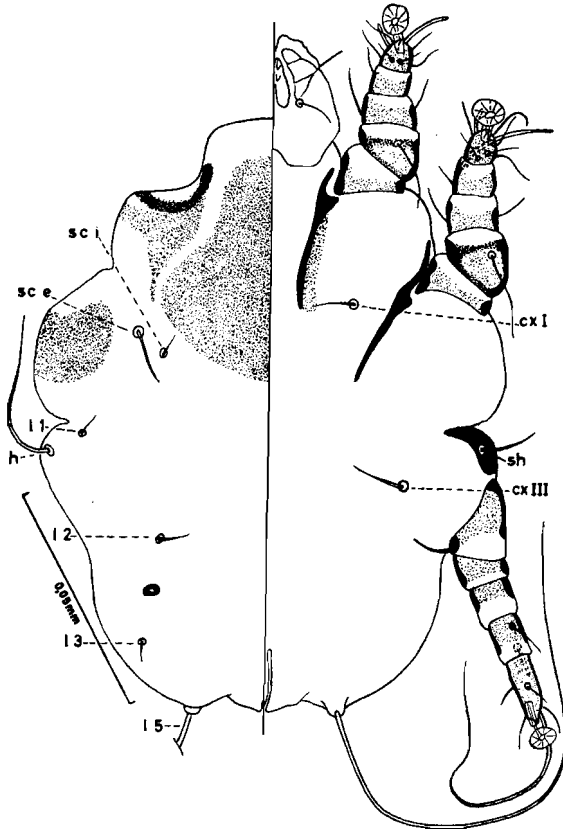
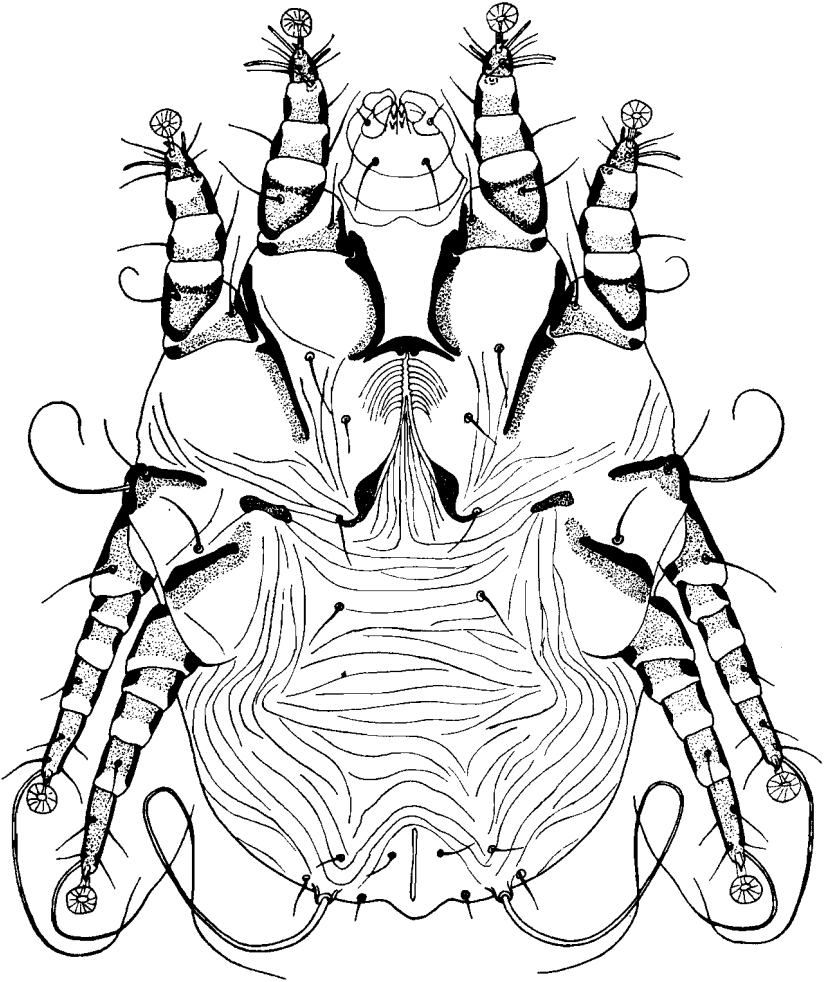
*Epidermoptes bilobatus* Rivolta: larva.

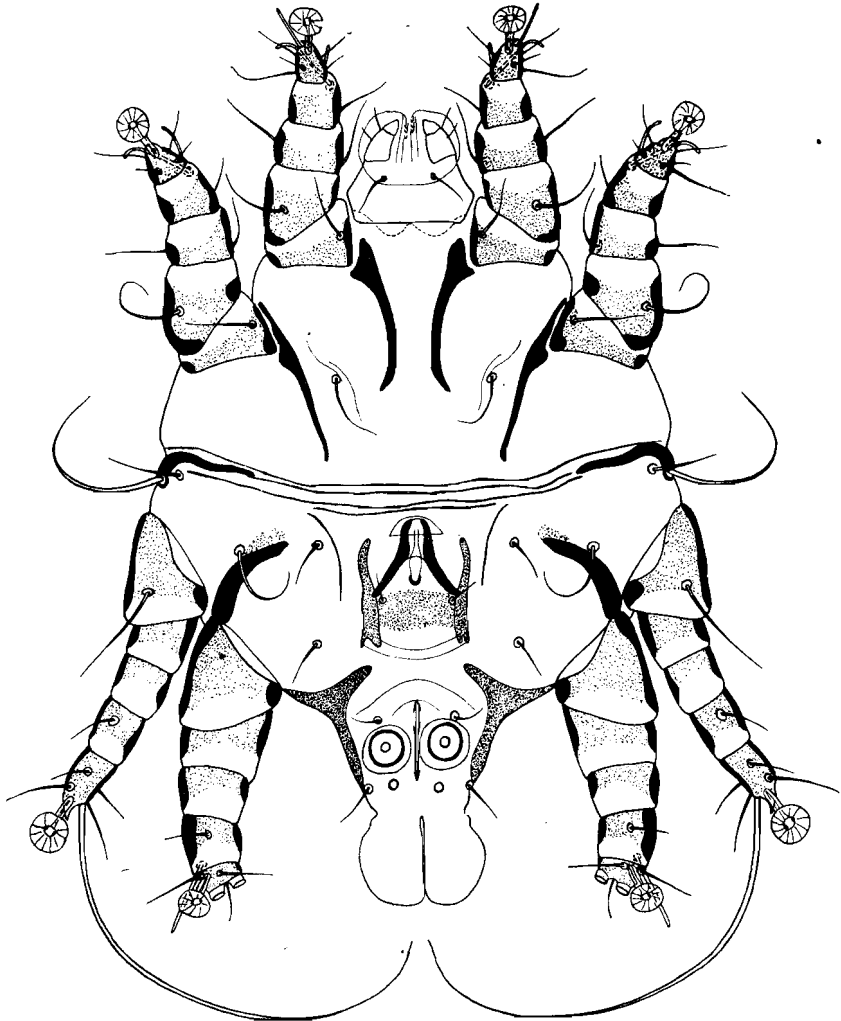
Fig. 13.

*Epidermoptes odontophori* sp.n., female in ventral view.

112 μ). The *sc.e.* setæ are very finely attenuated apically and are about 35 μ long (35 to 42 μ in paratypes). Setæ *l 5* about 180 μ long. Other characters as in *E. bilobatus*.

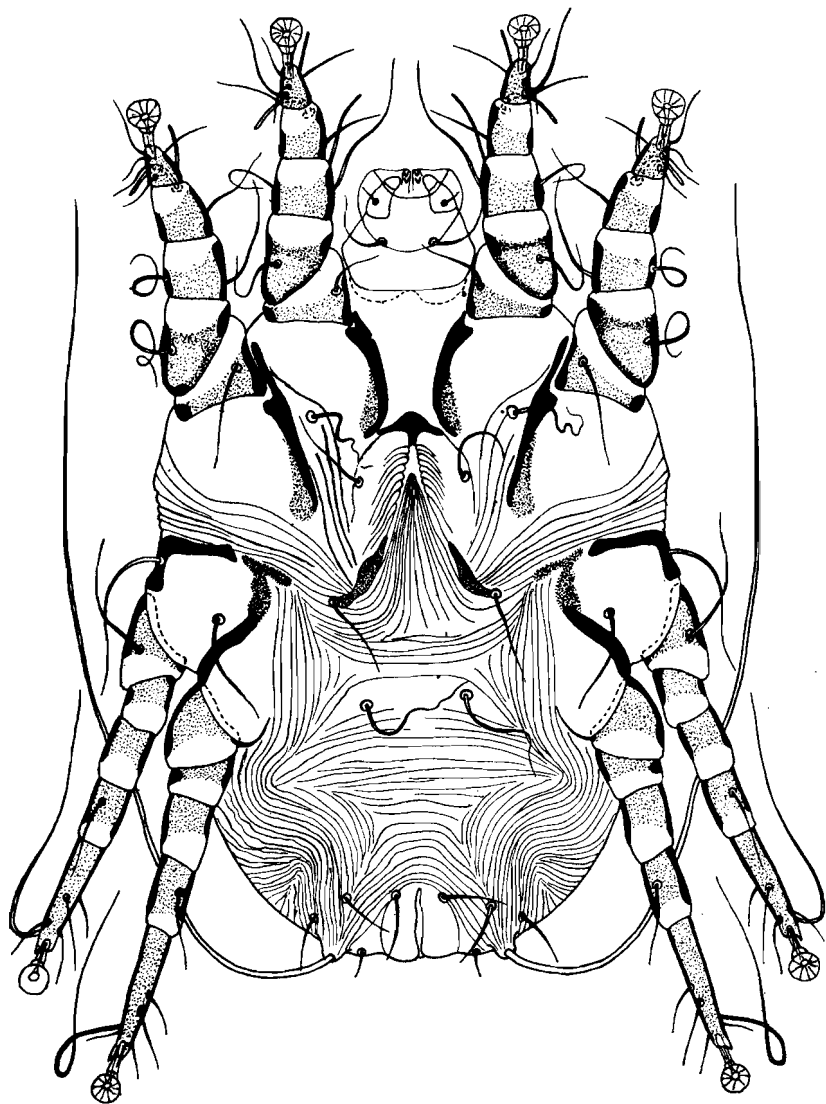
MALE (allotype) (figs 6, 14): Idiosoma 189 μ long, 135 μ maximum width. Dorsum as in *E. bilobatus* except that the *sc.e.* setæ are longer (30 to 35 μ), the hysterosomal shield larger and devoid of a median network. Most of the dorsal and the lateral setæ are longer than in *E. bilobatus* especially *d 4* which is about 50 μ long (15 μ in *E. bilobatus*).

Fig. 14.



Epidermoptes odontophori sp. n., male in ventral view.

Fig. 15.



Epidermoptes perdicicola sp.n., female in ventral view.

Posterior lobes longer and more membranous than in *E. bilobatus*. Legs as in *E. bilobatus*, the posterior legs a little thicker, especially the leg IV Tarsi IV very short. Other characters as in *E. bilobatus*.

TRITONYMPH: Length of the idiosoma 192 μ , maximum width 153 μ . General aspect as in *E. bilobatus* except that *sc.e.* setae are longer. The genital discs are very poorly sclerotized as in *E. bilobatus*. Chaetotaxy and solenidiotaxy as in that species.

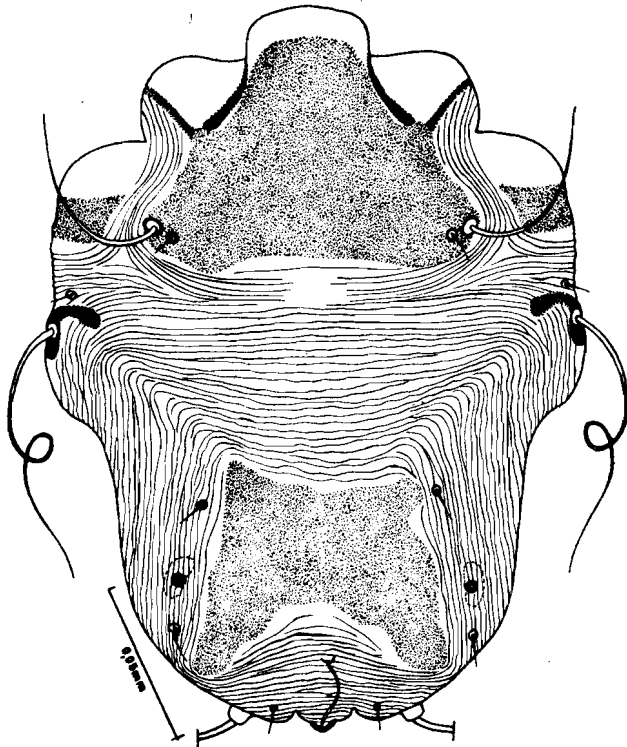
PROTONYMPH: Length of the idiosoma 174 μ , maximum width 138 μ . General aspect as in *E. bilobatus* except that the *sc.e.* setae are distinctly longer.

LARVA: Idiosoma 114 μ in length, 81 μ in width.

Host and locality: Free on the skin or under a fine corneous pellicule of the skin, of *Odontophorus capueira* (Spix). This bird was imported from Brazil, South America, and died in Antwerp a few days after its arrival (19 July 1963). The bird had a generalized superficial mange over its body.

Types: Holotype and allotype in Institut royal des Sciences naturelles de Belgique (Bruxelles); paratypes in the British Museum (Nat. Hist.) and in the collection of A. Fain.

Fig. 16.



Epidermoptes perdicicola sp.n., female in dorsal view.

Epidermoptes perdicicola sp. n.

This new species is easily distinguished from the two other species of the genus by the smaller size of the idiosoma, the greater length of the legs, the much smaller size of the hysterosomal shield, the greater length of most of the setæ of the idiosoma and the legs especially setæ *s.c.e.*, the *h*, the *sh*, the coxals, the genitals, the anals, *l* 4 and *l* 5.

FEMALE (holotype) (figs. 15, 16): Idiosoma 213 μ long and 162 μ wide; total length (gnathosoma included) 237 μ . In a paratype much flattened the total length is 255 \times 175 μ . Hysterosomal shield 65 μ long and 75 μ wide, widely incised posteriorly (in a paratype: 72 \times 78 μ). Length of the setæ *s.c.e.* 60 μ (66 μ in the paratype), the setæ *l* 5, 260 μ . Cuticle chætotaxy and solenidia as in *E. bilobatus*. All the legs are distinctly longer than in the two other species of *Epidermoptes*.

TRITONYMPH: Total length 195 μ , maximum width 140 μ .

Host and locality: On the skin of *Perdix b. barbata* Ver. and Desm., (holotype ♀ and one tritonymph); this bird had been imported from Asia and died in Antwerp in January 1963. On the skin of *Alectoris graeca chukar* (Gray) (female paratype).

Types: In the Institut royal des Sciences naturelles de Belgique, Bruxelles.

REFERENCES

- BERLESE, A. 1896. Acari Myriapoda et Scorpiones hucusque in Italia reperta. Portici et Padua fasc. 79, No. 3.
- CANESTRINI, G. 1894. Prospetto dell' Acarofauna Italiana. Padua, 6a, 826.
- CAPARINI, —. 1880. Nuova forma di rogna nei polli, etc., *Boll. veterin. Napoli*, 1, (3), 65.
- DUBININ, V. 1953. Fauna USSR. *Inst. Acad. Sci. U.S.S.R. Arachnoidea*, 6, (6), 73, fig. 13.
- FAIN, A. 1963 a. Diagnoses de nouveaux Acariens parasites (Familles Psoroptidae et Sarcoptidae) *Rev. Zool. Bot. Afr.*, 68, 1-2, 153-156.
- . 1963 b. Les Acariens producteurs de gale chez les Lemuriens et les Singes avec une étude des Psoroptidae (Sarcoptiformes). *Bull. Inst. roy. Sci. nat. Belgique*, 39, No. 32, 1-125.
- FEIDBERGER, —. 1881. Deutsch, Zeitschr. *Theirmed. u. Vergl. Pathol.*, 7, 281.
- HIRST, A. S. 1932. Mites injurious to domestic animals. *Brit. Mus. (nat. Hist.) Econ. Ser.*, 13, 65.
- NEUMANN, L. G. 1909. *Parasites et Maladies Parasitaires des Oiseaux Domestiques*. Paris: 42.
- RIVOLTA, S. 1876. Nuova forma di rogna nei polli. *Giorn. anat. fisiol. et patol. degli animali* 8, fasc 6, 247.
- RIVOLTA, S. & DELFRATO. 1880. *Ornitofatra*: 300-301, figs. 61-62.
- VITZTHUM, H. G. 1929. *Milben. Acari. Tierwelt Mitteleur*, 3, (7), 102.