



TWO NEW SPECIES OF *OPHIONYSSUS* MÉGNIN (ACARI: MACRONYSSIDAE) PARASITIC ON LIZARDS OF THE GENUS *GALLOTIA* BOULENGER (REPTILIA: LACERTIDAE) FROM THE CANARY ISLANDS

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ABSTRACT - Two new species of the genus *Ophionyssus* Mégnin, 1884 (Acari: Macronyssidae) are described, *O. galloticolus* **spec. nov.** parasitizing the lacertid lizard *Gallotia galloti eisentrauti* from Tenerife, Canary Islands, Spain, and *O. setosus* **spec. nov.** parasitic on *Gallotia stehlini* from Gran Canaria, Canary Islands, Spain.

Key-words - Tasonorny, Acari, *Ophionyssus*, parasitic mites, Reptilia, lizards, *Gallotia*, Lacertidae, Canary Islands, Spain

INTRODUCTION

The genus *Ophionyssus* Mégnin, 1884, includes 13 valid species. One of these, *O. natricis* (Gervais, 1844), is cosmopolitan and parasitizes snakes in various parts of the world. Hence, the common name "snake mite" was proposed for this species by some authors. However, this species is rare on snakes living in their natural habitats but is generally common or even very common on snakes kept in zoos or in vivaria (Fain, 1962).

Among the other species of this genus, 11 are confined to lizards, belonging to 13 genera of five families. One species has been described from the giant anteater (*Myrmecophaga tridactyla*) from the Mato Grosso in Brazil (Fonseca, 1954) (Table 1). Lacertid lizards are parasitized by four species of *Ophionyssus*, i. e. *O. lacertinus* (Berlese, 1892) (Europe), *O. eremiadis* (Naglov and Naglova, 1960) (West Kazakhstan), *O. saurarum* (Oudemans, 1901) (Europe, South Africa), and *O. tropidosaurae* (Till, 1957) (South Africa).

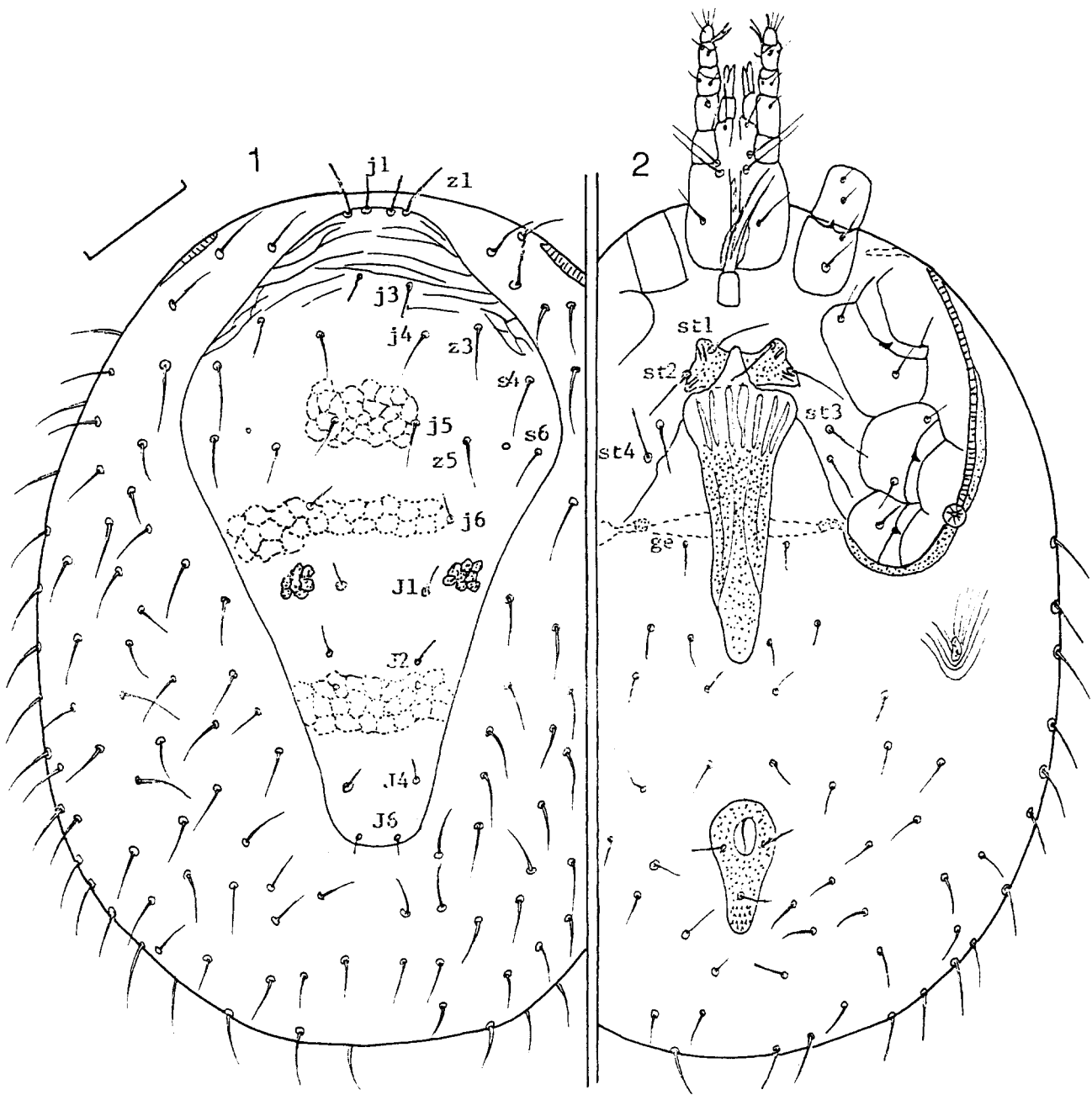
Recently, during a study of endo- and ectoparasites of lacertid lizards from the Canary Islands, the junior author collected a series of mites from two species of lizards of the endemic genus *Gallotia*. The study of these mites revealed they belonged to two species which are described here as new. The lizard hosts were parasitized

by haemogregarine blood parasites. The junior author suspected that these mites were probably involved in the transmission and life cycle of the protozoan blood parasites (Bannert *et al.*, 1995).

MATERIALS AND METHODS

Mites were sampled in the field from the lizard, *Gallotia galloti eisentrauti* at Bajamar, Tenerife and from *Gallotia stehlini* at San Lorenzo, Gran Canaria. Mites were very abundant on both lizard species. Protonymphs and adults were found on their hosts most frequently around the eyes, in the ears (tympanic membrane), around the cloaca, in the skin folds of the neck and collar, and on the legs. Rearing of mites was conducted in the laboratory on their natural hosts in separate mite-proof ten-aria. Mites were allowed to feed only on adult lizards. The host lizards were maintained as described by Bannert (1998). In order to minimize blood loss, individual host lizards were exposed to the mites for less than three weeks at intervals of several months.

All collected mites were preserved in 70% ethanol. Some were cleared in lactic acid before mounting in PVL (polyvinyl-lactophenol) or in Hoyer's mounting medium. All measurements are in micrometers (μm). Setal no-



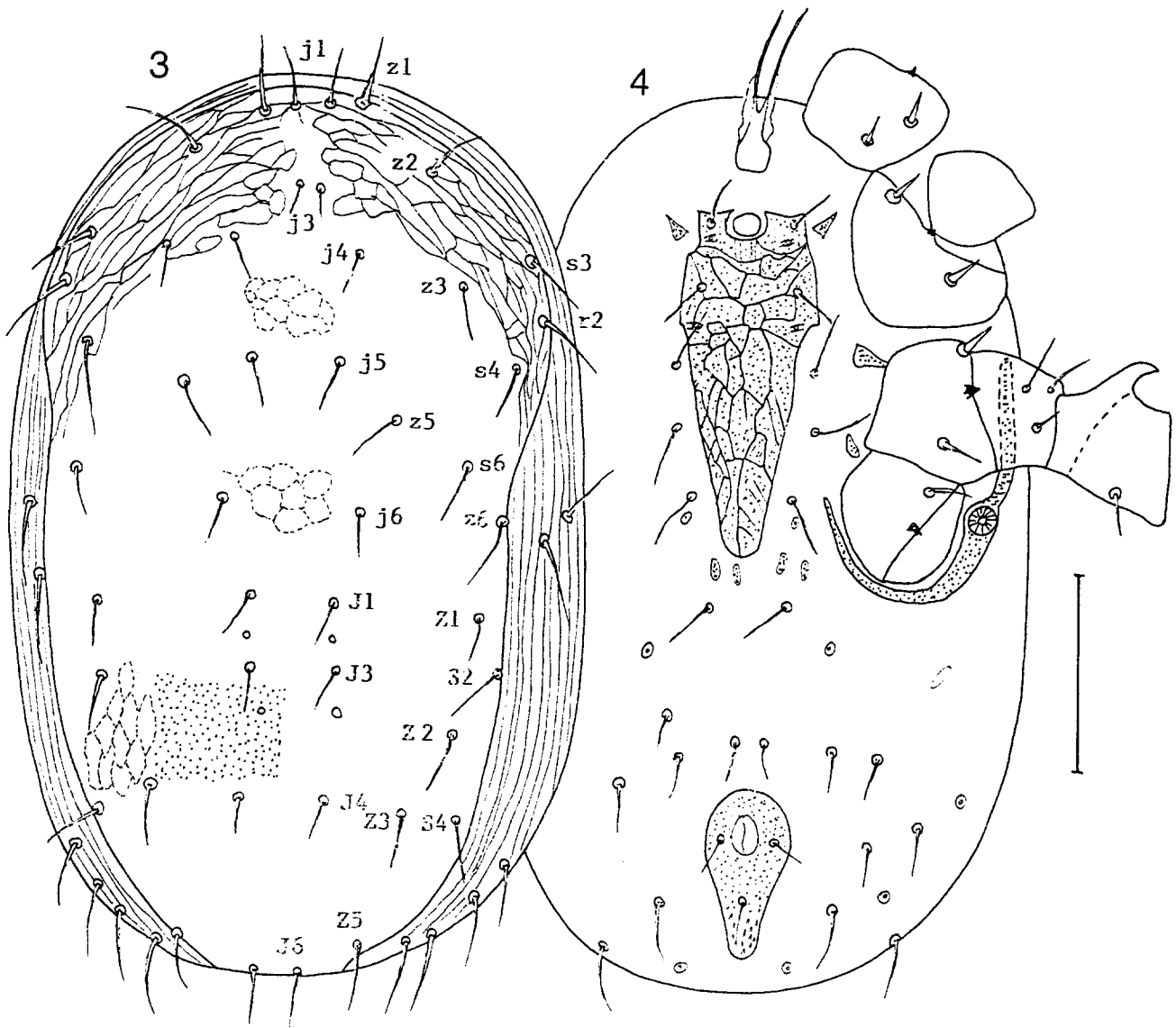
Figs. 1-2. *Ophionyssus gallotocolus* sp. n. (Female) - 1. dorsum, 2. venter (scale line 100 μ m)

nomenclature of the dorsal shield follows that of Evans and Till (1979) except at some places where we have used the nomenclature of Micherdzinski (1989).

Genus *Ophionyssus* Mégnin, 1884
Ophionyssus gallotocolus spec. nov.
 (Figs. 1-6, 9-12)

FEMALE, holotype (Figs. 1, 2, 9, 10) - Length and width of idiosoma: 840 x 630, 4 paratypes: 710 x 540,

S75 s 600, 900 s 690, 930 s 750 (holotype and first two paratypes preserved in alcohol and not cleared before mounting, two other paratypes cleared in lactic acid before mounting). Dorsum: Dorsal shield 558 s 300 (ratio length/width = 1.86). Measurements of 4 paratypes: 570 s 306 (ratio length/width = 1.86); 570 x 316 (ratio = 1.8); 558 x 300 (ratio = 1.88); 585 s 300 (ratio = 1.88). Ratio of 10 other females ranges from 1.50-1.90. Shield almost completely covered by network of punctate striae forming polygonal cells on posterior part and irregular elongate



Figs. 3-4. *Ophionyssus gallotocolus* sp. n. (Male) - 3. dorsum, 4. venter (scale line 100 μ m)

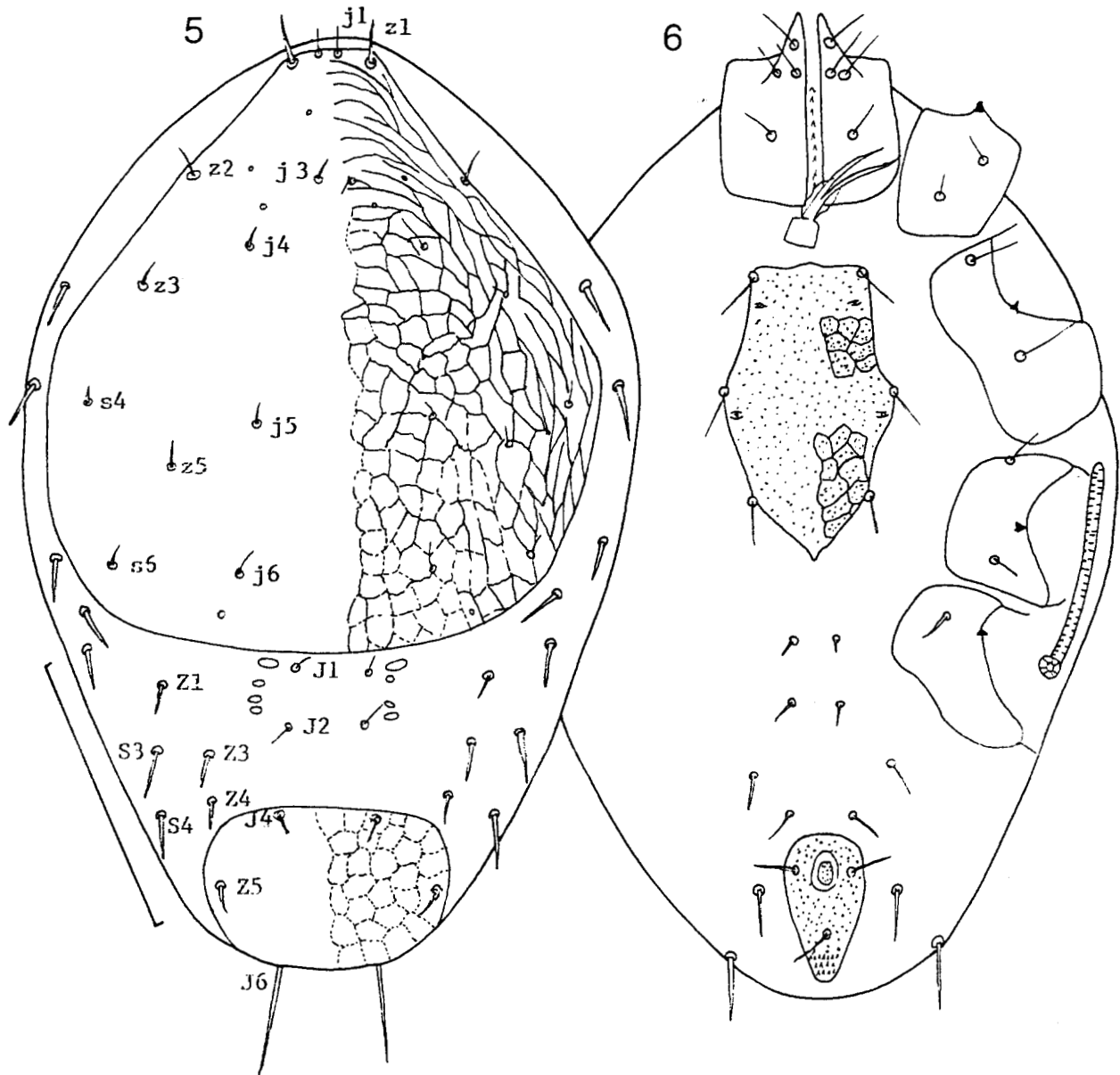
structures on anterior shield. Length of 14 pairs of setae on shield: *j1* 30, *j3* 20, *j4* 29, *j5* 21, *j6* 13, *J1* 15, *J2* 18, *J4* 79, *J6* 10, *z1* 42, *z3* 33, *z5* 22, *s4* 33, *s6* 30. Soft cuticle of idiosoma with 60-70 pairs of slightly curved setae, 25-45 long, dorsally and dorso-laterally (at each side of the podonotal shield).

Venter - Tritosternum with hyaline lateral membrane, base 35 long, two laciniae setulose, about 90 long. Sternal shield with two pairs of lyrifissures and bearing faint longitudinal striations, anterior border distinctly concave. 27 long in midline and 42 long in lateral region; maximum width 93. Length of *st1* 33, *st2* 40. *st3* and *st4* about 30. Distance between *st1* 51, between *st2* 97, between *st1-st3* 90. Genital shield prolonged anteriorly by a membranous triangular lobe, total length (including lobe) 270, maximum width at level of *st3* 94, at level of genital setae 45. Peritremes 240 long, extending beyond

anterior margin of coxae II, between coxa I and II. Few specimens with peritremes reaching posterior border or exceptionally posterior third of coxae I. Peritrematal shield fused posteriorly with podal element of coxa IV. Anal shield 120 long and 60 wide, with anterior setae 16 long and posterior setae 18 long. Soft cuticle of opisthosoma with about 30-40 pairs of setae, laterals 30-40 long, more median setae 8-25 long. Gnathosoma (include palps) 210 long and 93 wide. Corniculi membranous. Deutosternal groove with 7-8 denticles in a single row. Chelicerae - segment I 30, segment II 130, movable digit 42. Chaetotaxy of legs:

Tibia I $2 \frac{3}{2}, \frac{2}{1} 2$; Tibia IV $2 \frac{1}{1}, \frac{3}{1} 2$; Genu IV $2 \frac{2}{1}, \frac{3}{1} 2$;

Femur IV $0 \frac{2}{2}, \frac{1}{0} 1$

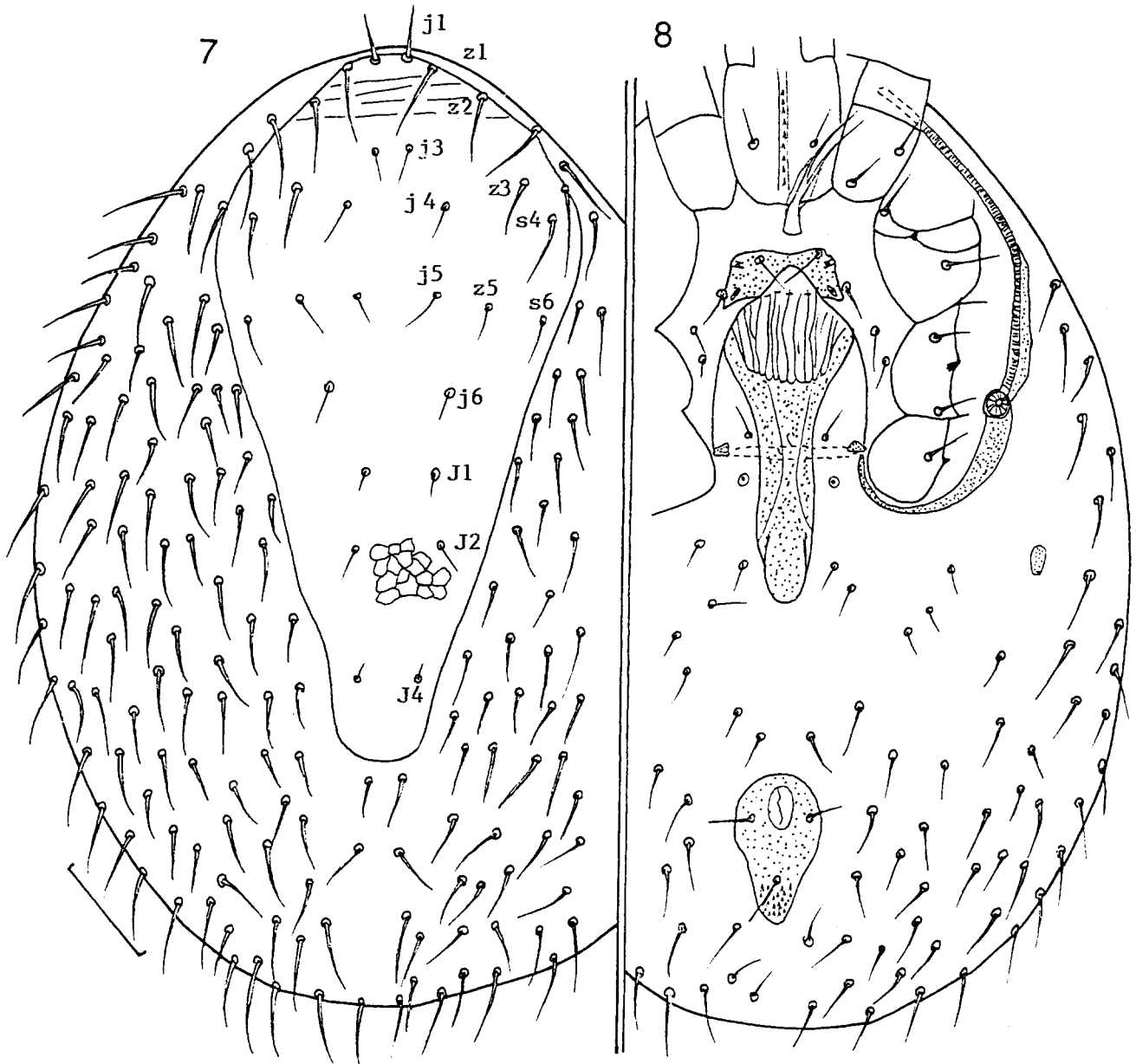


Figs. 5-6. *Ophionyssus gallotocolus* sp. n. (Protonymph) - 5. dorsum, 6. venter (scale line 100 μ m)

MALE (Figs. 3, 4, 11, 12) - Length and width of idiosoma of four paratypes: 460 s 300; 468 s 255; 459 x 285; 450 x 240. Dorsum - Length of holodorsal shield 460, width 255 in anterior third and 216 in middle, bearing same setal pattern as in female. Shield with 46 setae (22 + 24). Soft cuticle of lateral regions with few stout setae, 30 long: postero-dorsal region with 4-5 pairs of spinelike setae, 30-35 long.

Venter - Tntosternum as in female. Stemo-genital shield 186 long, 72 wide in its anterior third, with well marked network of striae, bearing two pairs of setae and two pairs of lyrifissures. Anal shield 73 long, 45 wide,

with three setae, 15-16 long. Peritremes 81 long, extending to anterior margin of cosae III. Soft cuticle of opisthogaster with 7-8 pairs of thin, short setae (12-15) and one more posterior pair of stronger, longer setae. Three pairs of thin setae (length 15-25) on soft cuticle between stemo-genital shield and cosae. Length of tarsi I-IV: 120, 80, 90, 105; tibiae 63, 50, 54, 70; genua: 59, 48, 60, 60. Femur III prolonged ventrally by a strong cuned spur. Gnathosoma - Chelicerae: total length (including digits): 120, length of movable digit 33. Movable digit with deep furrow containing a spermatodactyl.

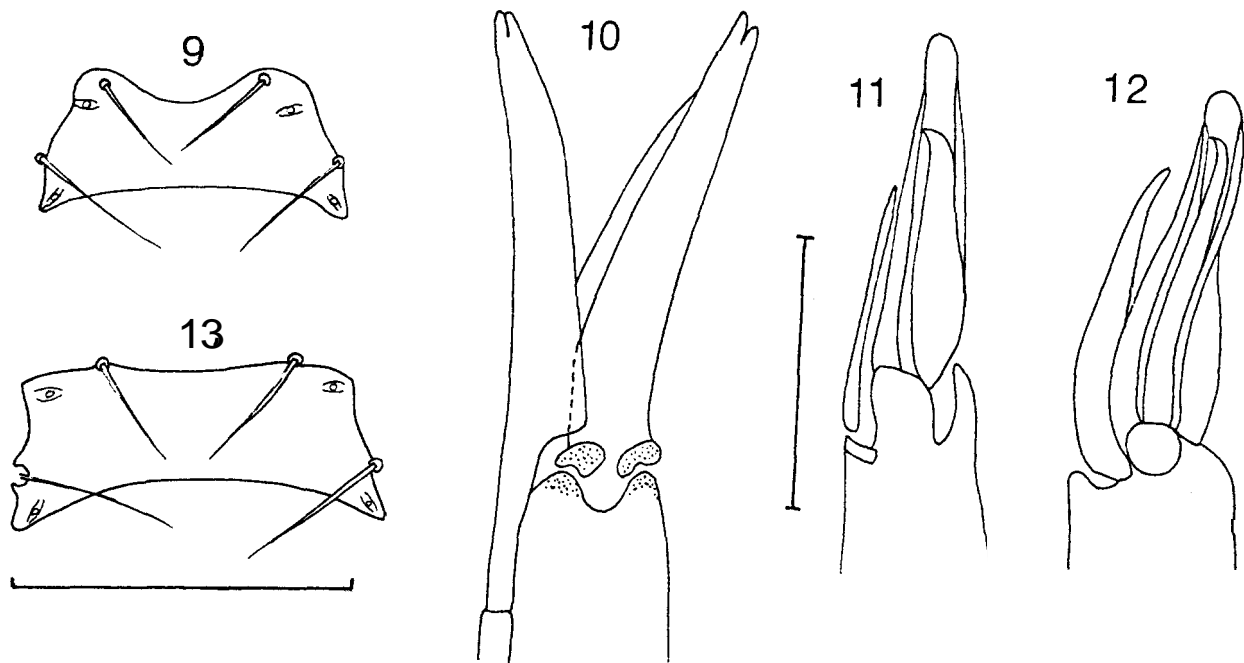


Figs. 7-8. *Ophionyssus setosus* sp. n. (Female) - 7. dorsum, 8. venter (scale line 100 μ m)

DEUTONYMPH - Among four specimens in the collection three are in poor condition. One specimen is better but very transparent. Idiosoma measures 610 long. Chaetotaxy well developed but all setae much smaller than in female. Shields not visible. Legs long, thick, ending in very small claws. Gnathosoma well developed, cheliceral digits 12 long. Peritremes very narrow, 80 long.

PROTONYMPH (Figs. 5, 6) - Length and width of idiosoma of four paratypes: 2SS \times 204; 3 12 \times 210; 3 18 \times

210; 342 \times 216. Podonotal shield 192 long, 168 wide (ratio length/width 1.14), with 11 pairs of small setae. Pygidial shield 54 long, 72 wide, with three pairs of setae: *J4* very thin, short (6-8), *J6* strong, rodlike, 29 long, ending in very thin apex, *Z5* 9 long and slightly thicker than *J4*. Both dorsal shields with reticular pattern. Soft cuticle of dorsum antero-laterally with four pairs of spines, more posteriorly with six spines; all spines 13-22 long. Median opisthonotum with three pairs of much smaller setae.



Figs. 9-13. *Ophionyssus gallotocolus* sp. n. - 9. sternal shield (Female), 10. cheliceral digits (Male), 11. cheliceral digits in ventral view (Male) and 12. cheliceral digits in ventro-lateral view (Male). *O. setosus* sp. n. (Female) - 13. sternal shield (scale lines: Figs. 9 and 13 = 100 μ m; Figs. 10-12 = 25 μ m).

Venter - Sternal shield 99 long, 57 wide, bearing 3 pairs of thin setae. Anal shield 45 long, 33 wide, with anterior pair of setae 12 and posterior seta thicker but shorter (9 long). Soft cuticle of median region of opisthogaster with four pairs of very thin setae (7-15), and more posterior and lateral two pairs of spines. Chelicerae (including digits) 110, movable digit 27. Peritremes 65-75 long.

LARVA - Very transparent six larvae, two in the molting stage. One larva 360 long, 300 wide, cuticle poorly sclerotized, without shields and peritremes. Posterior third of idiosoma with three long setae (anal setae) ventrally, 60 long; two pairs of setae dorsally, 100 long; and one pair of more posterior marginal setae, 90 long. All setae subcylindrical. Chelicerae with very small digits. Idiosoma of four other specimens recently collected measures 305-375 long, 230-265 wide, anal setae 42-52 long; three pairs of postro-dorsal setae 75-90 in long.

HOST AND LOCALITY - All specimens collected by the junior author from the lizard *Gallotia galloti eisentrauti* (Lacertidae) from Bajamar, Tenerife, Canary Islands, Spain.

Holotype female collected on 27.II.1997. Paratypes collected from same host at different times during the years 1997 to 1999 (October-December 1997, January-

March 1998, and February and June 1999). Number of mites collected: 18 females, four males, three deutonymphs, 30 protonymphs, and 12 larvae.

Holotype female, five paratype females, two males, one deutonymph, eight protonymphs, and three larvae are deposited in the IRSNB (Institut Royal des Sciences naturelles de Belgique, Brussels, Belgium). Other paratypes deposited in the following institutions: Museum of Natural History, Institute of Systematic Zoology, Humboldt University of Berlin, Germany; Museo Insular de Ciencias Naturales, Tenerife, Spain; and in the Institute of Zoology and Zoological Museum of the University of Hamburg, Germany.

ETYMOLOGY - The species name is derived from the species name of the host.

DIAGNOSIS - *Ophionyssus gallotocolus* is distinguished from all other species of the genus by the following characters:

Male - Femur III of male of *O. gallotocolus* bears a strong ventral curved spur which is unique in this group of mites. However, femur III of the male of *O. lacertinus* (Berlese, 1892), the closest species, bears a thick straight spine (but not a spur) significantly different in shape and structure from the spur of *O. gallotocolus*.

Protonymph - Pygidial shield of *O. galloticolirs* bears three pairs of setae, i.e. *J4* very thin and short, *Z5* slightly longer and thicker and *J6* much longer and thicker than the former. Only three species have a pygidial shield with three pairs of setae, i.e. *O. galeotes* Domrow *et al.*, 1980, *O. natricis* (Gervais, 1844), and *O. eremiadis* Naglov and Naglova, 1960. Pygidial shield of *O. galeotes* is much wider (115) than long (65) and bears setae *Z4* (on anterior corners of the shield), *Z5* and *J6*; setae *Z5* are longer and thicker than in our species and *J1* are absent. In *O. natricis* *Z5* and *J6* are thick, long and equal in length, and the dorso-lateral setae on soft cuticle are not spine-like. In *O. eremiadis* all the dorsal setae are very thin and short, the pygidial shield is about twice as wide as long. It is to be noted that in *O. lacertinus*, a species very close to *O. galloticolirs*, the pygidial shield bears only two pairs of setae, i.e. *J4* and *J6*.

Female - *O. galloticolus* belongs to a group of 10 species that lacks a pygidial shield in the female. Within this group, only four species have a dorsal shield with 11-15 pairs of setae, i.e. *O. tropidosaurae* Till, 1957, *O. lawrencei* Till, 1957, *O. saurarium* (Oudemans, 1901), and *O. lacertinus* (Berlese, 1892). Among these species *O. lawrencei* differs from our species by the much shorter peritremes (not extending beyond coxae III), *O. tropidosaurae* is characterized by the long and very thick setae on the soft cuticle of the body on the antero-lateral and postero-lateral regions, by the very long and narrow genital shield and the very large tarsal claws. Our species differs from *O. saurarium* by the shape of the dorsal shield which is 3.5 times as long as wide and by the different chaetotaxy of the legs:

Tibia IV $2 \frac{1}{1}, \frac{2}{1} 2$; Genu IV $2 \frac{2}{1}, \frac{2}{1} 2$ (in *O. saurarium*)

Finally, it differs from *O. lacertinus* by the less elongated shape of the dorsal shield (ratio length/width = 2.6 in this species, instead of 1.50 to 1.90 in our species), the much greater length of the genital shield (270 in our species and 144 in *O. lacertinus*), the greater length of the peritremes, which extend beyond the anterior margin of coxae II in our species, and the shape and size of the anal shield (120 x 60 instead of 106 x 84 in *O. lacertinus*) (see Evans and Till, 1966; Micherdzinski, 1980).

***Ophionyssus setosus* spcc. nov.**
(Figs. 7, 8, 13)

FEMALE. holotype (Figs. 7, 8, 13) - Length and width of idiosoma: 804 x 600, four paratypes: 763 x 600, 810 x 650, 840 x 660, and 900 x 720. Cuticle of idiosoma finely striated. Dorsum - Dorsal shield 600 long, 280 wide (ratio length/width 2.10). In six paratypes ratio varies

between 2.02 - 2.04, with same pattern of setae and polygonal cells as in *O. galloticolirs*. Shield with 14 pairs of setae, longer than in *O. galloticolru*: *j1* 42, *j3* 27, *j4* 30, *j5* 30, *j6* 25, *J1* 22, *J2* 24, *J4* 18, *z1* 55, *z2* 50, *z3* 46, *z5* 33, *s4* 42, *s6* 40. Setae *56* lacking but *z2* present (absent in *O. galloticolirs*). Soft cuticle of dorsum with 80-90 pairs of setae, 30-63 long.

Venter - Tritosternum as in *O. galloticolirs*. Sternal shield with anterior margin very slightly concave, maximum length of midline 33, of lateral parts 47, maximum width 101, bearing two pairs of lyrifissures and two pairs of setae (posterior pair on margins), *st1* 36, *st2* 40-45 long; distance between *st1* 48, between *st2* 96, between *st1-st3* 105. Genital shield prolonged anteriorly by a triangular membranous lobe, total length (including lobe) 280, maximum width at level *st3* 105, at level of genital setae 42. Anal shield 115 x 69, three anal setae very thin apically, 30-36 long. Soft cuticle of venter with 40-50 pairs of setae, those of lateral region longer (30-60) than those of median region of opisthogaster (5-30). Peritremes 275 long, extending to anterior border of coxae I. Gnathosoma (including palps) 201 x 118, movable digit 54. Chaetotaxy of legs as in *O. galloticolus*.

MALE - Length and width of idiosoma of four paratypes: 485 x 300; 450 x 270; 470 x 285; 465 x 310. Dorsal shield as long as idiosoma, wide. Chaetotaxy as in male of *O. galloticolus*.

Venter - Sternogenital shield 195 long, maximum width 78, with a well-developed pattern of setae, two pairs of lyrifissures and two pairs of setae, 22-25 long. Anal shield 84 long and 50 wide, with three setae, 20-25 long. Soft cuticle of idiosoma as in *O. galloticolus*. Femur of leg III with ventral spur similar to that of *O. galloticolus*. Total length of chelicerae (including movable digit) 120, movable digit 38.

DEUTONYMPH - Unknown.

PROTONYMPH - Seven specimens in poor condition. Measurements of specimen: Idiosoma 345 x 240. Podonotal shield 210 long, 195 wide, bearing 11 pairs of short setae. Pygidial shield 70 long and 90 wide, with *J4* very thin and short (10 long), *Z5* slightly longer (13) and thicker, *56* rod-like and 35 long and end in a very thin apex. Peritremes 70 long, extending to anterior margin of coxae III. Chelicerae 130 long (total length including movable digit), movable digit 30. Setae on soft cuticle of idiosoma as in *O. galloticolus*.

LARVA - Larva is not distinguishable from that of *O. galloticolus*. In four specimens collected recently, idiosoma measures from 305-365 long and 230-290 wide, three anal setae 55-60 long. long posterodorsal setae measuring 75-95.

HOST AND LOCALITY - All specimens collected by the junior author from *Gallotia stehlini*, San Lorenzo,

Table 1 . Hosts and geographical distribution of *Ophionyssus* spp. parasitic on lizards.

Mite species	Host	Family of host	Locality	References
<i>I. lacertinus</i> Berlese, 1892)	<i>Podarcis</i> [<i>Lacerta</i>] <i>muralis</i> (Laurenti, 1768) <i>Lacerta viridis</i> (Laurenti, 1768) <i>Podarcis</i> [<i>Lacerta</i>] <i>sicula</i> (Rafinesque-Schmalz, 1810)	Lacertidae	Great Britain, Netherlands, Italy	Berlese, 1892; Evans & Till, 1966; Micherdzinski, 1980
<i>I. sauratum</i> Oudemans, 1901)	<i>Lacerta agilis</i> Linnaeus, 1758 <i>L. viridis</i> (Laurenti, 1768) <i>Zootoca</i> [<i>Lacerta</i>] <i>vivipara</i> (Jacquin, 1787) <i>Podarcis</i> [<i>Lacerta</i>] <i>taurica</i> (Pallas, 1814) <i>Lacerta trilineata</i> Bedriaga, 1886 <i>Podarcis</i> [<i>Lacerta</i>] <i>muralis</i> (Laurenti, 1768)	Lacertidae	Europe (common) Rumania	Oudemans, 1901; Zemskaya, 1951; Feider & Solomon, 1958; Beron, 1966; Evans & Till, 1966 Feider & Solomon, 1958
(?= <i>Liponyssus gordonensis</i> Hirst, 1923)	<i>Mabuya quinquestrata</i> * (?= <i>M. quinquetaeniata</i> Lichtenstein, 1823)	Scincidae	Africa	Hirst, 1923; Micherdzinski, 1980
(?= <i>Neoliponyssus africanus</i> Till, 1957)	<i>Pseudocordylus microlepidotus</i> (Cuvier, 1829)	Cordylidae	Cape Province, South Africa	Till, 1957; Micherdzinski, 1980
<i>O. arnhemlandensis</i> (Womersley, 1956)	<i>Carlia fusca</i> (Duméril & Bibron, 1839)	Scincidae	Australia	Womersley, 1956; Domrow, 1985
<i>O. lawrencei</i> (Till, 1957)	<i>Mabuya striata</i> (Peters, 1844) <i>M. sulcata</i> (Peters, 1867) <i>M. binotata</i> (Bocage, 1867)	Scincidae	South Africa	Till, 1957
<i>O. mabuyae</i> Till, 1957	<i>Mabuya striata</i> (Peters, 1844) <i>M. sulcata</i> (Peters, 1867)	Scincidae	South Africa	Till, 1957
<i>O. tropidosaurae</i> (Till, 1957)	<i>Tropidosaura cottrelli</i> (Hewitt, 1925) <i>T. gularis</i> Hewitt, 1927	Lacertidae	South Africa	Till, 1957

Gran Canaria, Canary Islands, Spain. Holotype female collected on 12.XII.1998. Paratypes - 38 females, five males, seven protonymphs, and four larvae, collected December 1993 and June 1999. Holotype and nine paratype

females, two males, three protonymphs, and two larvae are deposited in the collection of IRSNB. Other paratypes are deposited as in *O. gallicolus*.

Table 1. Hosts and geographical distribution of *Ophiomssis* spp. parasitic on lizards (continued).

Mite species	Host	Family of host	Locality	References
<i>O. eremiadis</i> Naglov & Naglova 1960	<i>Eremias arguta</i> (Pallas, 1773) <i>E. velox</i> (Pallas, 1771)	Lacertidae Agamidae	West Kazakhstan	Naglov & Naglova, 1960
<i>O. galeotes</i> Domrow et al., 1980	<i>Hoplodactylus duvauceli</i> (Duméril & Bnbon, 1836)	Pygopodidae	New Zealand	Domrow et al., 1980
<i>O. scincorum</i> Domrow et al., 1980	<i>Leiopisma</i> spp. <i>Hemiergis decresiensis</i> (Cuvier, 1829)	Scincidae	New Zealand, Tasmania South Australia	Domrow et al., 1980 Domrow, 1985
<i>O. ehmanni</i> Domrow, 1985	<i>Egernia striolata</i> (Peters, 1870)	Scincidae	South Australia	Domrow, 1985
<i>O. javanensis</i> Micherdzinski & Lukoschus, 1987	<i>Mabuia rugifera</i> (Stoliczka 1870)	Scincidae	Java	Micherdzinski & Lukoschus, 1987
<i>O. galloticolus</i> Fain & Bannert, sp. n.	<i>Gallotia galloti</i> (Oudart, 1839)	Lacertidae	Tenerife	present work
<i>O. setosus</i> Fain & Bannert, sp. n.	<i>Gallotia stehlini</i> (Schenkel, 1901)	Lacertidae	Gran Canaria	present work

*The species name *M. quinquestriata* used by Hirst, 1923 and Micherdzinski, 1980 does not exist. The authors possibly mean *M. quinquetaeniata* (Lichtenstein, 1823).

ETYMOLOGY - The species name refers to one of the morphological characters, namely the dorsal shield setae.

DIAGNOSIS - The female of *O. setosus* differs from *O. galloticolus* as follows:

1. Dorsal shield relatively narrow, ratio length/width = 2.00 to 2.17 (instead of 1.50-1.90 in *O. galloticolus*). Setae *J6* absent and *z2* present (reverse of *O. galloticolus*). Most setae of this shield are distinctly longer in *O. setosus*.

2. Anterior border of sternal shield distinctly more concave in *O. galloticolus* than in *O. setosus*.

3. Chelicerae long, with even longer movable digits.

4. Peritremes longer, extending to anterior margin of cosae I (peritremes in *O. galloticolus* generally do not reach posterior margin of coxae I but exceptionally they extend to posterior third of cosae I).

5. Soft cuticle of idiosoma dorsally and ventrally with setae more numerous and distinctly longer in *O. setosus*.

These characters appear to be constant in the two populations and we think that they are sufficient to describe as two distinct species.

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