Abh. Ber. Naturkundemus. Görlitz	Band 77 Heft 2	S. 99 – 250	2006

ISSN 0373-7586

The predatory mite genus *Lasioseius* Berlese, 1916 (Acari, Gamasina)

Axel Christian[1] & Wolfgang Karg[2]

[1]Staatliches Museum für Naturkunde Görlitz

[2]Kleinmachnow

Contents

Abstract

The cosmopolitan predatory mite genus *Lasioseius* is described morphologically and taxonomically. Aspects of the biology and ecology of the species are explained.

Lasioseius Berlese belongs to the family Podocinidae Berlese, 1916, which includes the closely related genera *Hoploseius* Berlese, *Andregamasus* Costa, *Aceodromus* Muma, *Podocinum* Berlese, *Podocinella* Evans & Hyatt, *Neojordensia* Evans, and *Aceoseius* Sellnick.

The genus *Lasioseius* is divided into 5 subgenera: *Lasioseius* s. str., *Borinquolaelaps* Fox, 1946 n. comb., *Crinidens* Karg, 1980 n. comb., *Cuspiacus* n. subgen., and *Endopodalius* n. subgen. Keys to subgenera and to the 156 species are presented. 13 new species from rain forests of Ecuador are described. All species are illustrated with regard to species-specific characters.

Zusammenfassung

Die Raubmilbengattung *Lasioseius* Berlese, 1916 (Acari, Gamasina) – Die Arten der weltweit verbreiteten Gattung *Lasioseius* werden morphologisch und taxonomisch beschrieben und Erläuterungen zu ihrer Biologie gegeben.

Lasioseius Berlese gehört zusammen mit den nahe verwandten Gattungen *Hoploseius* Berlese, *Andregamasus* Costa, *Aceodromus* Muma, *Podocinum* Berlese, *Podocinella* Evans & Hyatt, *Neojordensia* Evans und *Aceoseius* Sellnick zur Familie Podocinidae Berlese, 1916.

Die Gattung *Lasioseius* wird in 5 Untergattungen eingeteilt: *Lasioseius* s. str., *Borinquolaelaps* Fox, 1946 n. comb., *Crinidens* Karg, 1980 n. comb., *Cuspiacus* n. subgen., und *Endopodalius* n. subgen. Die Bestimmungsschlüssel enthalten die Untergattungen und 156 Arten. Aus dem Regenwald von Ecuador werden 13 neue Arten beschrieben. Alle Arten der Gattung sind mit Abbildungen illustriert, die charakteristische Artmerkmale zeigen.

Introduction

The predatory mite genus *Lasioseius* Berlese, 1916 is one of the most diverse genera of the Cohors Gamasina. *Lasioseius* displays many primitive characters, such as body setation, setae form, configuration and ornamentation of female shields, etc. Furthermore, the genus is ecologically highly variable and, in soil habitats, mites of this genus are among the most abundant representatives of the mesofauna. It is, therefore, not surprising, that in the past 20 years more than 80 new species of the genus *Lasioseius* have been described, especially from tropical regions. Further new species from the tropical rain forest of Ecuador, gathered by A. Zicsi, University of Budapest, initiated our taxonomic investigations of *Lasioseius*. This genus was revised by KARG (1980), and he treated 70 species in his worldwide key. Due to the numerous new species we decided to again revise the genus *Lasioseius* on the basis of present knowledge.

The original descriptions of all species referred to in this paper were studied, the type-material of 39 species was examined and new morphological data were included. Nevertheless, this monograph on the genus *Lasioseius* partly remains a revision of literature data.

Biology and postembryonic development

The species of the genus *Lasioseius* Berlese are distributed worldwide. However, investigations of the Sub-Antarctic region are still lacking. Most of the species inhabit the upper soil layers of forests, meadows and arable fields (CHRISTIAN 1993, KARG 1993). Furthermore, nests of rodents and birds are also known to be inhabited by *Lasioseius* species. Investigations of moist rain forests have shown that several species are able to live on leaves of different trees (WALTER & LINDQUIST 1997). In regard to these, we have added specific information in the keys to the *Lasioseius* species.

As a rule, the species of the genus *Lasioseius* are predatory. They feed on Collembola, on soil-inhabiting mites such as *Tyrophagus* spec. and *Tarsonemus* spec. as well as on nematodes. On leaves, they feed predominately on spider mites and rust mites. However, there are observations that some species of the genus also feed on fungi. In particular, mouth parts of species with a longer row of closely set teeth on the digitus fixus of the chelicerae can be used to crush fungal hyphae (WALTER & LINDQUIST 1989). Regarding feeding experiments, it seems that fungi serve as a supplemental food resource.

The postembryonic development comprises the stages: Larva, protonymph, deutonymph and adult (Figs I, II). Development requires 9 to 19 days from egg to adult depending on temperature. Below 10 °C development stagnates with the protonymph (Tab. 1).

Tab. 1 Postembryonic development of *Lasioseius berlesei* (Oudemans, 1938) (after KARG 1962)

Temp. (°C)	Developmental periods (d)			
	Larva	Protonymph	Deutonymph	Total
18 – 20	2 – 3	3 – 4	4 – 8	9 – 15
14	4	6 – 7	6 – 8	16 – 19
9	4 – 9	14 – 37	no further development (4-month observation period)	
4 – 5	no development (10-month observation period)			

Morphology and chaetotaxy

The dorsum of deutonymphs and adults is covered by a holonotal shield. The venter of females is characterised by a sternal shield bearing 3 pairs of setae, a pair of metasternal plates each with a simple seta, a genital shield bearing one pair of setae and a ventro-anal shield with mostly 5 – 7 pairs of setae (rarely 1 – 3). The male venter is covered by a sternum (5 pairs of setae) and a ventro-anal shield (Fig. II).

The transverse series of setae on the idiosoma are residues of the ancestral body segments developed in all groups of Articulata (KAESTNER 1956, EVANS 1992, MORITZ 1993). The gnathosoma consists of the cheliceral and pedipalpal segment which lacks dorsal setae. The podosoma includes the 4 segments of legs and is fused with the genital segment. This can be seen by 5 pairs of setae (st1 to st5) distinctly recognisable on the venter (Fig. II). During ontogenesis, deviations arise concerning the positions of dorsal pairs of setae. One pair of setae on the vertex (s1) tends to move into a position posterior to i1. In species of Gamasina in a more plesiomorphic condition this character shows the normal position (Fig. IIIa), whereas in *Lasioseius* the position of the setae pair s1 has changed (Fig. IIIb). On the opisthosoma, 5 distinct dorsal transverse series of setae also indicate 5 body segments.

Due to this arrangement of setae, we refer in the comparative morphology to 5 series of setae on the anterior half of the dorsum (i1 – i5, z1 – z5, s1 – s5) as well as to 5 series on the posterior half of the dorsum (I1 – I5, Z1 – Z5, S1 – S5).

At the margins of the idiosoma, there is a varying number of setae (3 – 12 pairs) which cannot be assigned to certain transverse series. These r- and R-setae are mostly localised on a membrane lateral to the holodorsal shield (Fig. II).

Systematics and determination

The genus *Lasioseius* was erected by BERLESE in 1916. As the type species of the genus, he referred to *Seius muricatus* Berlese ex Koch (erroneously spelt *S. musicatus*). The species *Seius muricatus* Berlese ex Koch, 1887 is not identical with the species *Seius muricatus* C. L. Koch, 1839, therefore much confusion exists concerning the publication of the name *Typhlodromus berlesei* by OUDEMANS, 1938 as a nomen novum for the species *Seius muricatus* described by BERLESE in 1887. A diagnosis of the genus *Lasioseius* was not published by BERLESE (1916), and consequently some species are wrongly included in other genera.

WALTER & LINDQUIST (1989, 1997) referred the genus *Lasioseius* to the Ascidae sensu LINDQUIST & EVANS (1965). In our view, the family concept of 1965 does not conform with the results of phylogenetic investigations. In connection with ecological investigations the phylogeny of the Gamasina was studied and used for their classification. Consequently, families and superfamilies were characterised by synapomorphies according to the methods of HENNIG (1950, 1979). The Gamasina were subdivided into 6 superfamilies (KARG 1998a). Keys for the determination of 17 families, 13 subfamilies, 203 genera and about 1000 species were proposed (KARG 1993, CHRISTIAN & KARG 1998). Concerning the Ascidae sensu LINDQUIST & EVANS (1965), the results showed that this group comprised 21 genera belonging to various families. WALTER (1998) also emphasised that: »The Ascidae sensu Lindquist & Evans is not monophyletic«.

The Ascidae Oudemans s. str. must be separated from the Ameroseiidae Evans, Phytoseiidae Berlese, Podocinidae Berlese, and the Halolaelapidae Karg. The genus *Lasioseius* belongs to the Podocinidae Berlese, 1916. This family includes the following closely related genera: *Lasioseius* Berlese, 1916, *Hoploseius* Berlese, 1914, *Podocinum* Berlese, 1882, *Podocinella* Evans & Hyatt, 1957, *Aceoseius* Sellnick, 1941, *Aceodromus* Muma, 1961, *Neojordensia* Evans, 1957, and *Andregamasus* Costa, 1965. Keys for their determination were proposed by KARG (1993).

The sperm access system in adult female *Lasioseius* is of the phytoseioid type (EVANS 1992). The complexity and specificity of the sperm access system makes it a useful diagnostic character at the species level (WALTER & LINDQUIST 1997). At a higher phylogenetic level, the sperm access systems are obviously insignificant because both the phytoseioid type and the laelaptoid type can be found within various families or even genera (KARG 2003).

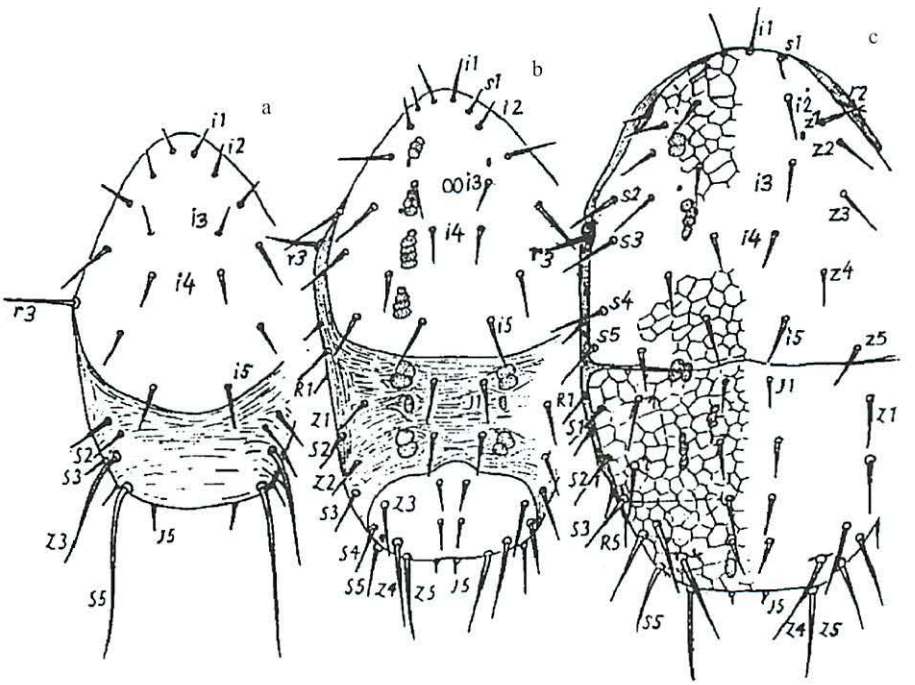

Fig. 1 *Lasioseius* Berlese dorsal: a larva, b protonymph, c deutonymph

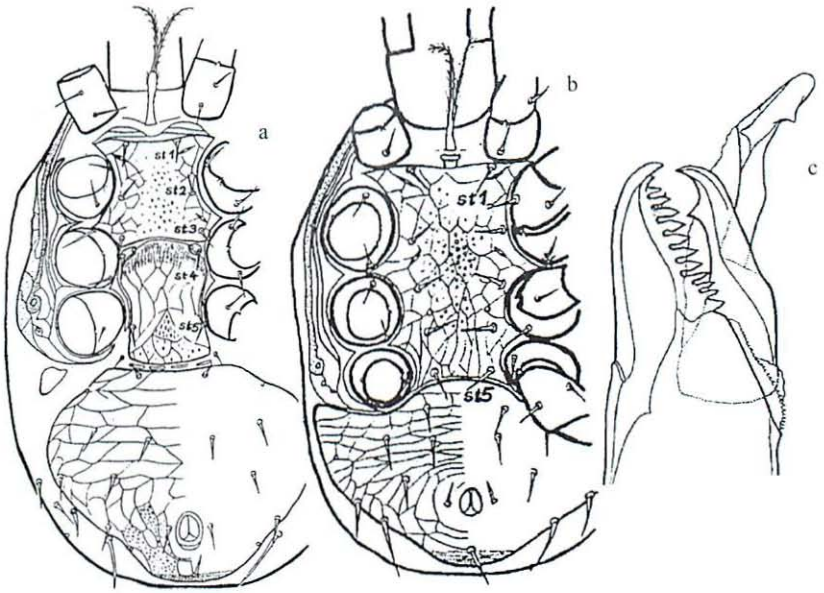

Fig. II *Lasioseius* Berlese ventral: a female, b male, c chelicera of male

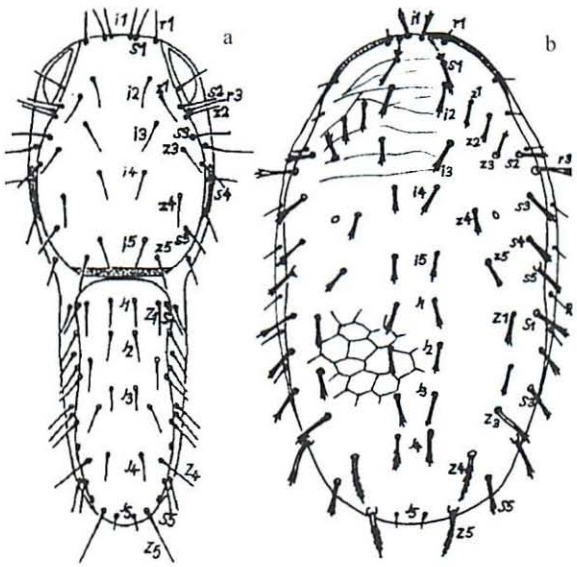

Fig. III dorsal chaetotaxy: a *Protogamasellopsis* Evans & Purvis, b *Lasioseius* Berlese

Diagnosis of the genus *Lasioseius*

Lasioseius Berlese, 1916

Type species: *Seius muricatus* Berlese ex Koch, 1887

not *Seius muricatus* C. L. Koch, 1839
= *Typhlodromus berlesei* Oudemans, 1938
= *Lasioseius aba* Baker & Wharton, 1952
= *Lasioseius sylvestris* Pinchuk, 1972

Adults and deutonymph with holodorsal shield; dorsal setae mostly conspicuously trispinate, partly acicular; however, caudal dorsal setae frequently pectinate, posterior half of dorsum with a maximum of 15 pairs of setae, 1 – 12 pairs of setae on the membrane lateral to the holodorsal shield: r- and R-setae, however marginal seta r3 (= humeral seta) conspicuous and situated on the dorsal shield. Females with ventrianal shield bearing 5 – 7 pairs of setae (exceptionally 1 – 3 pairs), adanal setae inserted anteriorly behind the margin of the anus; tectum mostly with 3 branches or 3 groups of points, sometimes irregularly denticulate. Corniculi strong, sometimes split; 8 hypognathal rows, first row smooth, 7 rows multidenticulate; movable digit of chelicerae in most subgenera with 3 teeth, in one subgenus with 5 teeth, fixed digit of chelicerae with a setiform pilus dentilis and with a saw-like dental row of teeth, spermatodactyl of males shaped like a finger. Legs II – IV with median lobes of pulvilli rounded; genu III with 8 or 9 setae; femora I and II with 12 and 11 setae, respectively.

The genus *Lasioseius* consists of 5 subgenera:

Lasioseius s. str., *Borinquolaelaps* Fox, 1946 n. comb., *Crinidens* Karg, 1980 n. comb., *Cuspiacus* n. subgen., and *Endopodalius* n. subgen.

Subgenera of *Lasioseius*, keys to species complexes and species, descriptions of new species

Abbreviations and information for use of the keys:

Ids: idiosoma, ds: dorsal seta(e), ps: postanal seta, te: tectum, ventral: ventrianal shield; all measurements in µm, idiosoma size given as length or length x width in µm.

The keys are presented in a form in which the number with a specific character state is followed by the species related to by this character state; the alternative character state appears after these species; the number of the alternative character state is always given in brackets:

1(6) Character »a«

2(3) Specific character »b« (species one)

3(2) Alternative specific character »b«

4(5) Individual character »c« (species two)

5(4) Alternative individual character »c« (species three)

6(1) Alternative character »a«

The keys refer to the characters of females, males are illustrated if known.

Habitats of the species are usually litter and soil; in particular cases details are mentioned.

Key to characters of the subgenera with type species

1(2) Endopodal plates of coxae III and coxae IV fused and extraordinarily wide taking up the area between coxae, genital shield and sternal shield. Digitus mobilis of the chelicerae with 5 teeth, median branch of tectum long and split terminally:

Endopodalius n. subgen. (p. 134)

Type species: ***Lasioseius (Zygoseius) alter*** Vitzthum, 1925 – Note: It was proved that the genus determination by Vitzthum did not apply to the species. *Zygoseius* is not congeneric and is not related to *Lasioseius* (LINDQUIST & EVANS 1965). *Zygoseius* is a genus of the family Halolaelapidae (KARG 1998b).

– Key 3 for the determination of the known species.

2(1) Endopodal plates inconspicuous, digitus mobilis mostly with 3 teeth, margin of tectum diversely shaped.

3(4) Only one metapodal plate on each side of the body behind coxae IV. Dorsal setae at most acicular or pectinate, rarely trispinate:

Lasioseius Berlese, 1916 s. str. (p. 107)

Type species: ***Typhlodromus berlesei*** Oudemans, 1938

– Keys 1 and 2 for the determination of the known species grouped into two species complexes.

4(3) Metapodal plates divided into two little plates (the two plates are sometimes fused), dorsal setae acicular or trispinate or pectinate.

5(6) Anus remarkably large, length of anus = 1/4 to 1/3 of the length of the ventrianal shield; ventrianal shield bearing 5 pairs of setae. A number of dorsal setae trispinate:

Borinquolaelaps Fox, 1946 n. comb. (p. 141)

Type species: ***Borinquolaelaps dentatus*** Fox, 1946

– Key 4 for the determination of the known species.

6(5) Anus not remarkably large, ventrianal shield with 5 – 7 pairs of setae, dorsal setae trispinate or acicular.

7(8) A number of dorsal setae trispinate:

Crinidens Karg, 1980 n. comb. (p. 148)

Type species: ***Lasioseius corticeus*** Lindquist, 1971

– Keys 5, 6 and 7 for the determination of the known species grouped in three species complexes.

8(7) Most dorsal setae acicular, some caudal setae pectinate:

Cuspiacus n. subgen. (p. 205)

Type species: ***Lasioseius helvetius*** Chant, 1958 – Note: *Criniacus* Karg, 1980 is a synonym of *Hoploseius* Berlese because the type species *L. drosophili* Chant, 1963 belongs to the genus *Hoploseius* Berlese, 1914

– Keys 8 and 9 for the determination of the known species grouped in two species complexes.

Subgenus *Lasioseius* Berlese, 1916 s. str.

Type species: *Typhlodromus berlesei* Oudemans, 1938

According to the type species, the subgenus *Lasioseius* Berlese, 1916 s. str. includes species with only one metapodal plate on each side of the body behind coxae IV but no extraordinary wide endopodal plates of coxae III and IV and the digitus mobilis mostly with 3 teeth.

The subgenus is grouped into two species complexes distinguished from one another by the following character:

Metapodal plates about as large as the anus: *Lasioseius-berlesei*-complex: **Key 1**

Metapodal plates 3 to 12 times larger than the anus: *Lasioseius-inguinalis*-complex: **Key 2**

Key 1: The known species of the *Lasioseius-berlesei*-complex (including a new species from Ecuador)

1(46) Posterior margin of sternal shield nearly straight, sternal setae thin and acicular.

2(29) Ventra bearing 3 – 6 pairs of setae.

3(4) Ventra with 3 pairs of setae, ids = 442 (Figs 1.1.1. – 1.1.4.):

L. allii Chant, 1958

– Europe, Africa.

4(3) Ventra with 4 – 6 pairs of setae.

5(20) Ventra with 4 – 5 pairs of setae.

6(9) Dorsum with a median, longitudinal elevation from ds i3 to I1 or to I3, anterior border of dorsum heavily sclerotised.

7(8) Ventra with 5 pairs of setae, nearly quadrate, ds short, no seta of the i- or I-series reaching the next seta of the series, anterior margin of dorsum drawn out into a blunt prow, ids = 528 (Fig. 1.2.):

L. frontalis Evans & Sheals, 1959

– Indonesia.

8(7) Ventra with 4 pairs of setae, triangular, no metapodal plates visible, ds longer, several setae reaching the next setae of the series, border of dorsum angularly obtuse, ids = 475 (Fig. 1.3.):

L. polydesmophilus Evans & Sheals, 1959

– Indonesia.

9(6) Dorsum without a median elevation.

10(11) Ventra longer than wide, sternal shield medially with a layered-like structure, most ds tricarinate, caudal ds pectinate, ids = 455 (Fig. 1.4.):

L. sinensis, Bei & Yin, 1995

– China, Cinar Liaoning Province, Kaiyuan County.

11(10) Ventra as wide as long or wider than long.

12(13) Ventra as wide as long; caudal setae of venter acicular; te with 3 well-developed processes, pointed distally; ids = 510 (Fig. 1.5.):

L. rühmi Hirschmann, 1972

– Chile, near Valdivia from *Araucaria*, together with bark beetles.

13(12) Ventra wider than long.

14(15) Sternal shield reticulate, te with 3 short processes, ids = 363 (Fig. 1.6.):
L. carrisseensis Aswegen & Loots, 1969
– Africa, Carrisse park near the Lauchime river.

15(14) Sternal shield smooth or punctate.

16(19) Sternal shield smooth.

17(18) Te with 3 short branches, equal in length, distally serrate, ids = 452 – 457 (Fig. 1.7.):
L. qianensis Gu & Wang, 1990
– China, Duyun City from *Apodemus agrarius* and Zhenning County, from *Rattus norvegicus*.

18(17) Te with 3 long branches, distally serrate, middle branch 2x as long as the lateral branches, ids = 600 – 610 (Fig. 1.8.):
L. imitans (Berlese, 1910)
syn.: *Ameroseius imitans* Berlese, 1910
– India.

19(16) Sternal shield punctate, te with 3 short broad branches, the middle branch longer than the lateral branches, the branches distally serrate, ds relatively long, ds I4 = distance I4 – Z4, ids = 408 (Fig. 1.9.):
L. trifurcipilus Gu & Guo, 1996
– China.

20(5) Ventra with 6 pairs of setae.

21(22) Ds I5 as long as i5, i1 thickened, middle branch of te bifid, lateral branches simple, ids = 379 – 425 (Figs 1.10.1. – 1.10.2.):
L. kirai Ishikawa, 1976
– Malaysia.

22(21) Ds I5 tiny, 1/5 to 1/3 the length of i5, te smooth or with 3 branches or serrate.

23(24) Anterior margin of te smooth, ds trispinate with serrate margin, sternal setae 1 almost half as long as sternal setae 2 and 3, ids = 410 x 254 (Figs 1.11.1. – 1.11.2.):
L. kshamae Bhattacharyya, 2003
– India, West Bengal.

24(23) Te with 3 branches or serrate.

25(28) Te with 3 branches, number of ds not reduced.

26(27) Branches of te pointed and slender, ds pectinate, distally expanded, ds i1 remarkably long: length = I3, ids = 555 – 587 (Fig. 1.12.):
L. epicrioides (Krantz, 1962)
syn.: *Hyattella epicrioides* Krantz, 1962
– Africa, Garamba.

27(26) Branches of te short and broad, apically serrate, most of ds acicular, caudal ds pectinate, i1 = 2/3 the length of I3, ids = 493 – 533 (Fig. 1.13.):
L. punctatus Gu & Huang, 1990
– China.

28(25) Te serrate, number of ds reduced, without I2 and I3, Z5 (= 77) = 3x the length of I4, Z4 = S5 = 71, all ds faintly serrate, ids = 396 (Fig. 1.14.):
L. annandalei Bhattacharyya & Bhattacharyya, 2001
– India, Gulmarg, Jamma and Kshmir.

29(2) Ventra bearing 7 pairs of setae.

30(37) Dorsum with distinctly reduced number of setae: lacking 2 pairs of I-setae on posterior half of dorsum.

31(32) Dorsum without ds I3 and I4, I1 as long as i5, ids = 440 – 570 (Figs 1.15.1. – 1.15.3.):

L. berlesei (Oudemans, 1938)
syn.: *Seius muricatus* Berlese ex Koch, 1887; *Typhlodromus berlesei* Oudemans, 1938; *L. aba* Baker & Wharton, 1952; *L. sylvestris* Pinchuk, 1972
– Europe.

32(31) Dorsum without I2 and I3 or without I2 and I5.

33(36) Dorsum without I2 and I3.

34(35) Setae of the ventra nearly equal in length, only ps short: = ½ the length of the adanal setae, ds Z3 = 3½x the length of I4, ids = 352 (Figs 1.16.1. – 1.16.2.):

L. parberlesei Bhattacharyya, 1968
– India.

35(34) Seta V1 of the ventra remarkably short: = ½ the length of V2, ps long: = 2x the length of adanal setae, sternal shield and ventra reticulate, ds I4 very short: = ½ the length of I1 and ⅓ the length of i5, te with 3 short broad branches distally serrate, ids = 419 – 436 (Fig. 1.17.):

L. paucispathus Gu & Wang, 1990
– China, Guizhou Province, from *Rattus norvegicus*.

36(33) Dorsum without I2 and I5, caudal setae of dorsum and venter distally furcate, metapodal plates like small rods, sternal shield and ventra reticulate, ids = 715 (Fig. 1.18.):

L. schizopilus Gu & Huang, 1990
– China, Shaanxi Province, from *Rattus nitidus*.

37(30) Number of ds not reduced.

38(43) Ventra remarkably wide, length : width = 4 : 6 to 4 : 7.

39(40) Dorsum with net structure consisting of interconnecting tubercles, ids = 354 – 389 (Fig. 1.19.):

L. dundoensis Aswegen & Loots, 1969
– Africa

40(39) Dorsal net structure consisting of simple lines.

41(42) Metapodal plates nearly circular, ids = 500 (Fig. 1.20.):

L. miscellus n. sp.
– Ecuador.

42(41) Metapodal plates oval, ids = 355 (Fig. 1.21.):

L. camudembelensis Aswegen & Loots, 1969
– Africa.

43(38) Ventra a little wider than long, length : width = 4 : 5 to 5 : 6.

44(45) Ds acicular, ids = 410 – 430 (Fig. 1.22.):

L. lawrencei (Evans, 1958)
syn.: *Proctolaelaps* (*Neojordensia*) *lawrencei* Evans,1958
L. frondeus Karg, 1965; *L. berlesei* sensu WESTERBOER, 1963
– Europe.

45(44) Ds tricarinate, ids = 410 (Fig. 1.23.):

L. diffindatus n. nom. pro *L. kargi* Christian, 1990
– Europe.

46(1) Posterior margin of sternal shield arcuately excavated, the anterior pair of sternal setae thick and thorn-like.

47(50) Anterior region of dorsal shield with 7 – 9 thick thorn-like setae, ventra with 3 pairs of setae.

48(49) Most of the ds acicular, ds i2 and i3 thorn-like, ds Z5 = 3 – 4x the length of I4, ids = 460 (Fig. 1.24.):

L. bispinosus Evans 1958
– Europe.

49(48) Marginal and caudal ds and ds of the vertex trispinate, ds i2, i3 and i4 thorn-like, ds Z5 = 3 – 4x the length of I4, ids = 539 (Fig. 1.25.):

L. parabispinosus Kandil 1980
– Hungary, Maco area.

50(47) Anterior region of dorsal shield without thorn-like setae. Most of the ds trispinate, ventra rectangular and with 3 pairs of setae, ds Z5 = 4 – 5x the length of I4, ids = 508 (Fig. 1.26.):

L. zicsii Kandil, 1980
– Hungary, Maco area.

Subgenus *Lasioseius* Berlese, 1916 s. str.

Lasioseius-berlesei-complex

Lasioseius allii Chant, 1958

(Figs 1.1.1. – 1.1.4.)

CHANT, D. A. (1958): Descriptions of six new species of *Garmania* Nesbitt and *Lasioseius* Berlese (Acarina, Aceosejidae). – Can. J. Zool. **36**: 383 – 390

Holotype: United States National Museum, Washington D. C. (USA)

Paratypes: Entomology laboratory, Belleville (Canada)

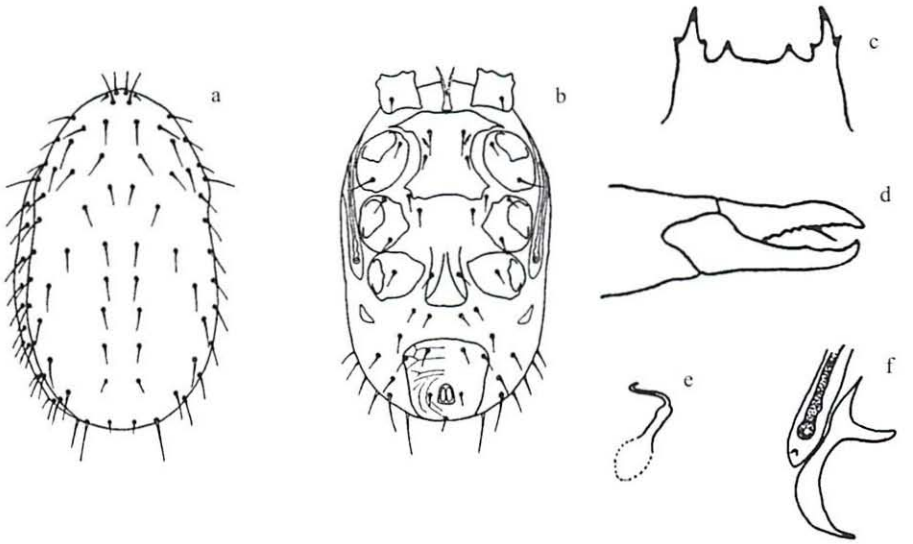

Fig. 1.1.1. **Female:** a dorsal, b ventral, c tectum, d chelicera, e spermatheca, f peritrema (a, b, d CHANT 1958; c, e, f CHANT 1963)

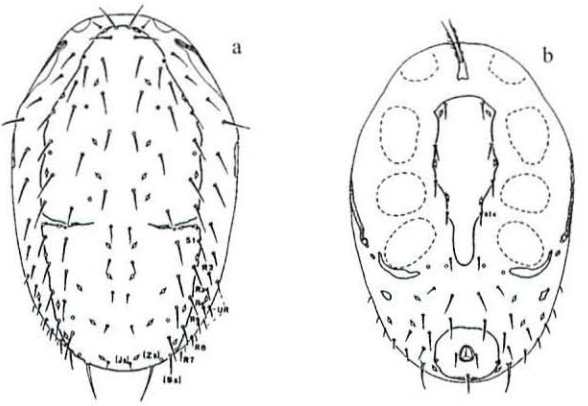

Fig. 1.1.2. **Deutonymph:** a dorsal, b ventral (a, b LINDQUIST & EVANS 1965)

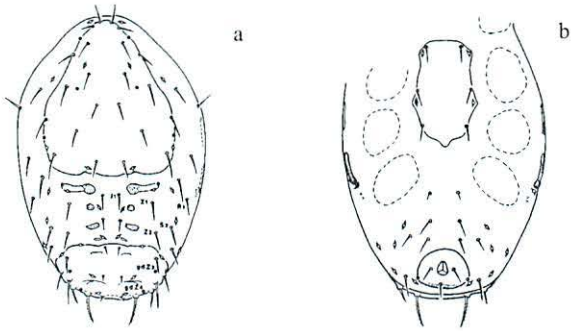

Fig. 1.1.3. **Protonymph:** a dorsal, b ventral (a, b LINDQUIST & EVANS 1965)

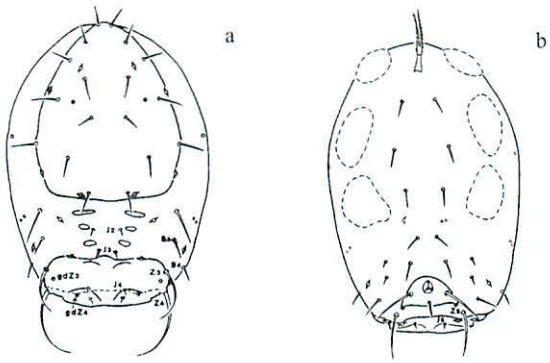

Fig. 1.1.4. **Larva:** a dorsal, b ventral (a, b LINDQUIST & EVANS 1965)

Lasioseius frontalis Evans & Sheals, 1959

(Fig. 1.2.)

EVANS, G. O. & J. G. SHEALS (1959): Three new mesostigmatic mites associated with millipedes in Indonesia. – Entomol. Ber. (Amsterdam) **19**: 107 – 111

Types: British Museum (Natural History), London (United Kingdom)

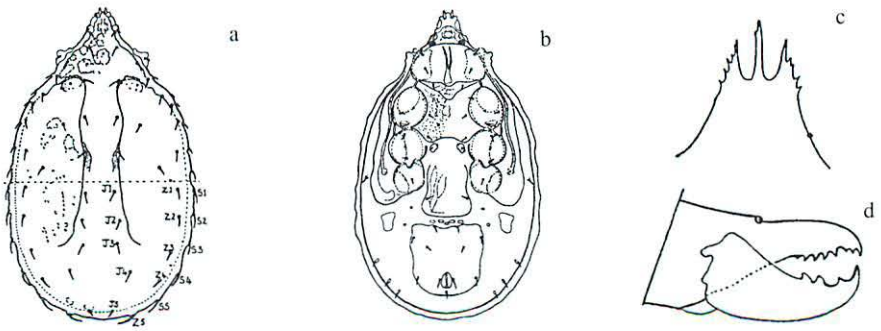

Fig. 1.2. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d EVANS & SHEALS 1959)

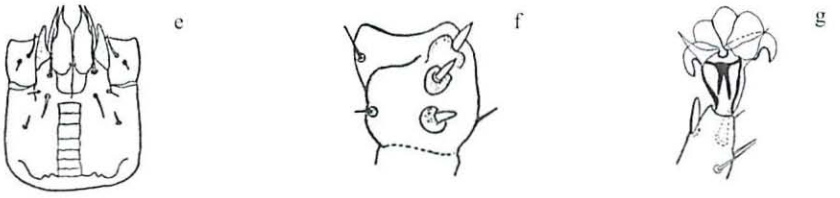

Fig. 1.2. (cont.) **Female:** e hypostome, f femur I, g tarsus II (e – g EVANS & SHEALS 1959)

Lasioseius polydesmophilus Evans & Sheals, 1959

(Fig. 1.3.)

EVANS, G. O. & J. G. SHEALS (1959): Three new mesostigmatic mites associated with millipedes in Indonesia. – Entomol. Ber. (Amsterdam) **19**: 107 – 111

Types: British Museum (Natural History), London (United Kingdom)

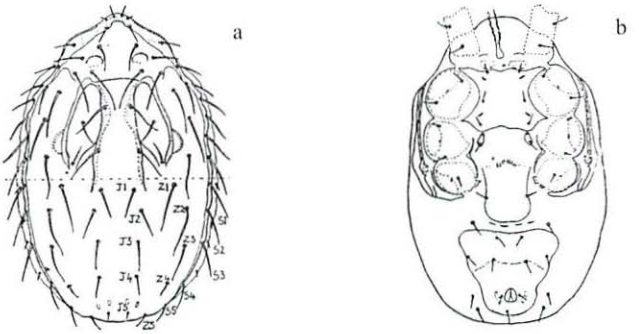

Fig. 1.3. **Female:** a dorsal, b ventral (a, b EVANS & SHEALS 1959)

Lasioseius sinensis Bei & Yin, 1995

(Fig. 1.4.)

BEI, N. & S. YIN (1995): A new species and two new records of the genus *Lasioseius* (Acari, Ascidae) from China. [Orig. Chin.] – Entomotaxonomia **17** (2): 152 – 154

Types: Department of Plant Protection, Shenyang Agricultural University (China)

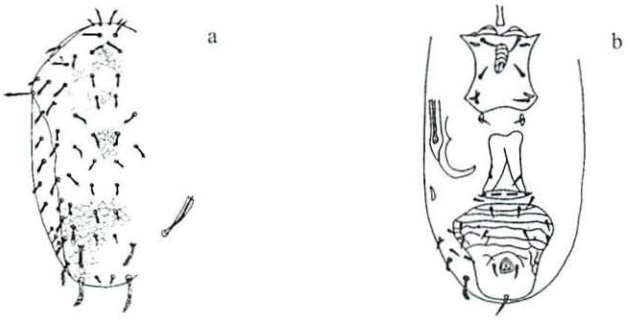

Fig. 1.4. **Female:** a dorsal, b ventral (a, b BEI & YIN 1995)

Lasioseius rühmi Hirschmann, 1972

(Fig. 1.5.)

HIRSCHMANN, W. (1972): Gangsystematik der Parasitiformes Teil 104. Von Dr. W. Rühm während seiner Tätigkeit an der Univ. Austral de Chile (Valdivia) gesammelte Araukarien-Milben aus Südchile u. Südbrasilien. – Acarologie **17**: 29 – 33

Types: Zoologische Staatssammlungen München (Germany)

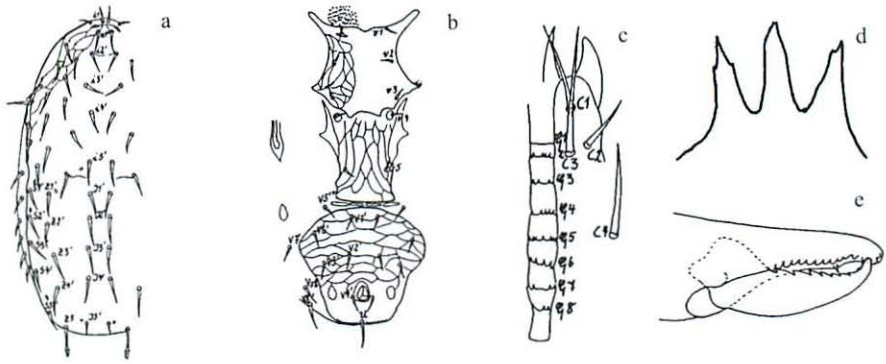

Fig. 1.5. **Female:** a dorsal, b ventral, c hypostome, d tectum, e chelicera (a – e HIRSCHMANN 1972)

Lasioseius carrisseensis Aswegen & Loots, 1969

(Fig. 1.6.)

ASWEGEN, P. I. M. VAN & G. C. LOOTS (1969): The genus *Lasioseius* (Mesostigmata, Acari) in the Ethiopian region. – Wetenskap. Bydraes van die P. U. vir C. H. O., Reeks B: Natuurwetenskappe **3**: 1 – 25

Holotype: Museu do Dundo-Luanda (Angola)

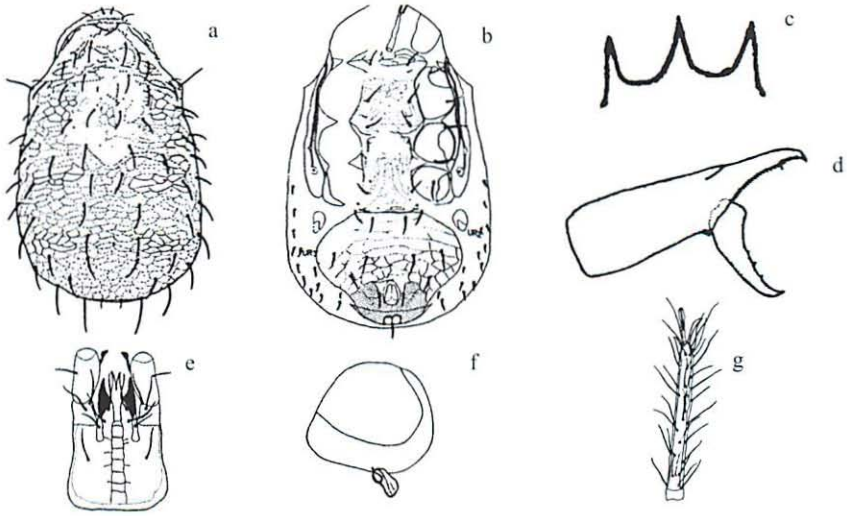

Fig. 1.6. **Female:** a dorsal, b ventral, c tectum, d chelicera, e hypostome, f spermatheca, g tarsus I (a – g ASWEGEN & LOOTS 1969)

Lasioseius qianensis Gu & Wang, 1990

(Fig. 1.7.)

GU, Y. M., J. S. WANG & C. A. HUANG (1990): Six new species of the genus *Lasioseius* (Acari, Aceosejidae). [Orig. Chin.] – Acta Zootaxon. Sin. **15** (2): 174 – 184

Holo- and paratypes: Department of Parasitology, Guiyang Medical College (China)

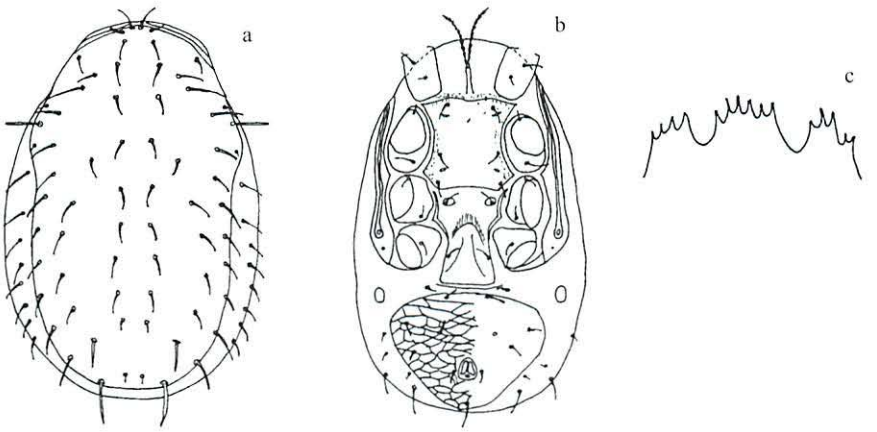

Fig. 1.7. **Female:** a dorsal, b ventral, c tectum (a – c modified after GU & WANG 1990)

Lasioseius imitans (Berlese, 1910)

(Fig. 1.8.)

BERLESE, A. (1910): Brevi diagnosi gi generi e specie nuovi di Acari. – Redia **6**: 346 – 388

Types: Berlese Acaroteca, Experimental Institute of Agricultural Zoology, Florence (Italy)

Synonym: *Ameroseius imitans* Berlese, 1910

Brevi diagnosi gi generi e specie nuovi di Acari. – Redia **6**: 346 – 388

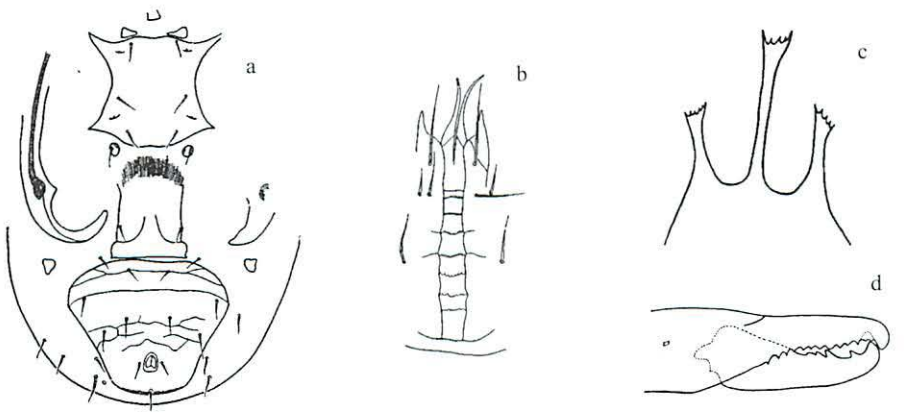

Fig. 1.8. **Female:** a ventral, b hypostome, c tectum, d chelicera (a – d WESTERBOER 1963)

Lasioseius trifurcipilus Gu & Guo, 1996

(Fig. 1.9.)

Gu, Y. M. & X. G. Guo (1996): A new species and a new record of *Lasioseius* from China (Acari, Aceosejidae). [Orig. Chin.] – Acta Zootaxon. Sin. **21** (1): 39 – 44

Holotype: Department of Parasitology, Medical College, Nanjing University (China)

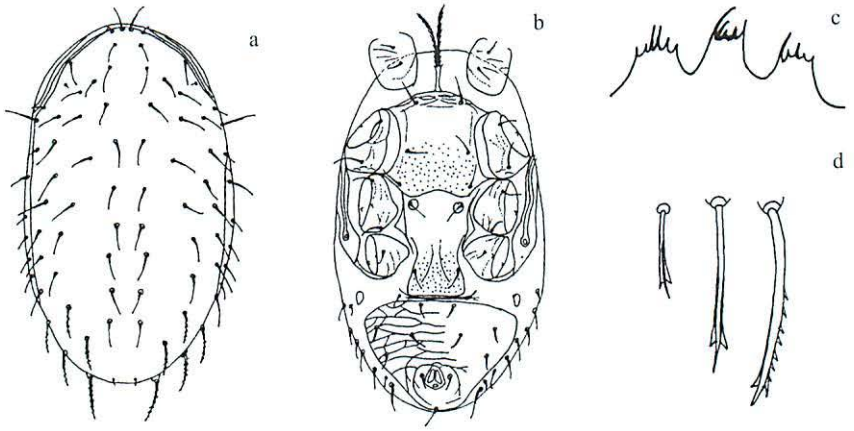

Fig. 1.9. **Female:** a dorsal, b ventral, c tectum, d dorsal setae (a – d modified after Gu & Guo 1996)

Lasioseius kirai Ishikawa, 1976

(Figs 1.10.1. – 1.10.2.)

Ishikawa, K. (1976): Taxonomic investigation on mesostigmatid mites (Acarina) from Pasoh Forest Reserve, Malay Peninsula. – Nature and Life in Southeast Asia **7**: 231 – 252

Holo- and paratypes: Biological Laboratory, Matsuyama Shinomone Junior College (Japan)

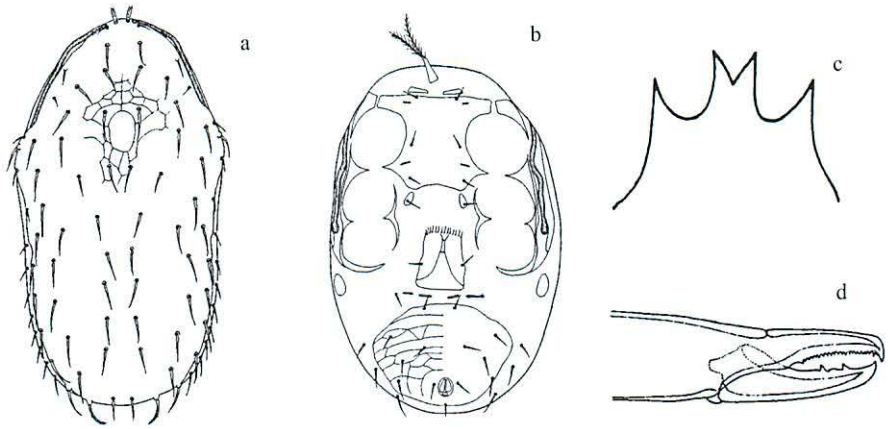

Fig. 1.10.1. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d Ishikawa 1976)

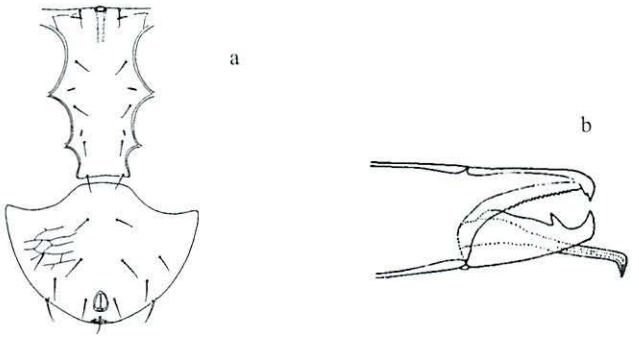

Fig. 1.10.2. **Male:** a ventral, b chelicera (a, b ISHIKAWA 1976)

Lasioseius kshamae Bhattacharyya, 2003

(Figs 1.11.1. – 1.11.2.)

BHATTACHARYYA, A. K. (2003): Two new species of Ascidae (Acarina, Mesostigmata) from India. – Zootaxa **189**: 1 – 10

Holo- and paratypes: National Zoological Collection, Zoological Survey of India, Calcutta (India)

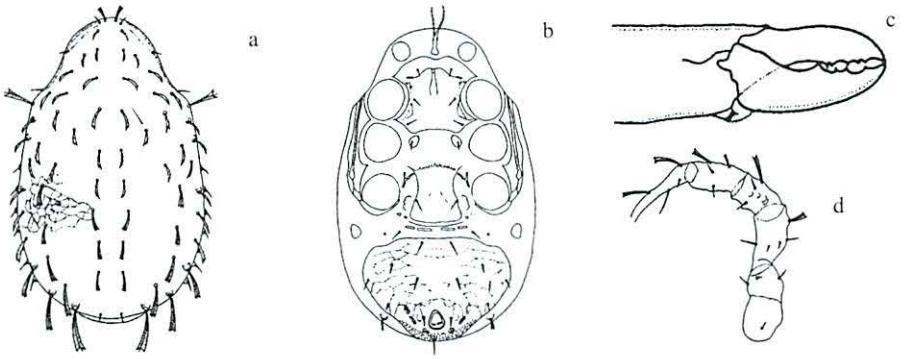

Fig. 1.11.1. **Female:** a dorsal, b ventral, c chelicera, d leg IV (a – d BHATTACHARYYA 2003)

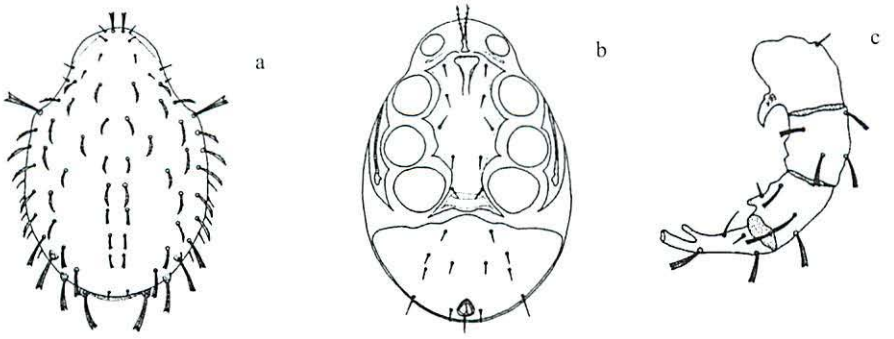

Fig. 1.11.2. **Male:** a dorsal, b ventral, c leg IV (a – c BHATTACHARYYA 2003)

Lasioseius epicrioides (Krantz, 1962)

(Fig. 1.12.)

KRANTZ, G. W. (1962): Acari. Free-living Mesostigmata. II. – Family Aceosejidae. – Parc National De La Garamba-Mission H. De Saeger **34**: 3 – 29

Holotype: Institute of National Parks of the Congo and Ruanda-Urundi, Brussels (Belgium)

Paratypes: United States National Museum, Washington D. C. (USA), British Museum (Natural History), London (United Kingdom), Potchefstroom University, Potchefstroom (South Africa)

Synonym: *Hyattella epicrioides* Krantz, 1962
Acari. Free-living Mesostigmata. II. – Family Aceosejidae. – Parc National De La Garamba-Mission H. De Saeger **34**: 3 – 29

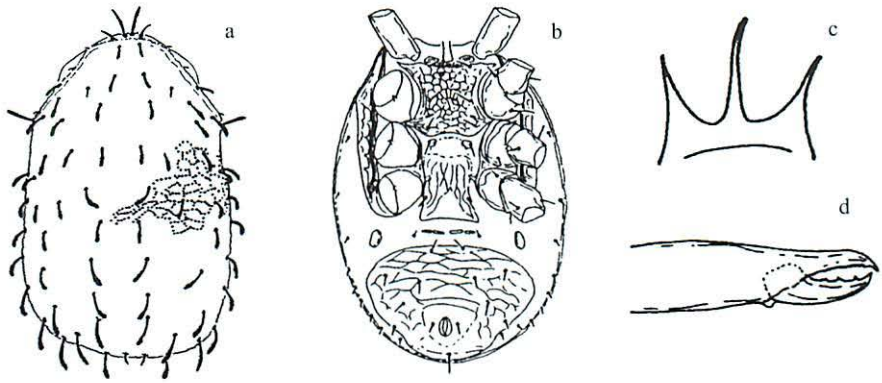

Fig. 1.12. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d KRANTZ 1962)

Lasioseius punctatus Gu & Huang, 1990

(Fig. 1.13.)

GU, Y. M., J. S. WANG & C. A. HUANG (1990): Six new species of the genus *Lasioseius* (Acari, Aceosejidae). [Orig. Chin.] – Acta Zootaxon. Sin. **15** (2): 174 – 184

Holo- and paratypes: Health and Anti-Epidemic Station of Shanxi Province (China)

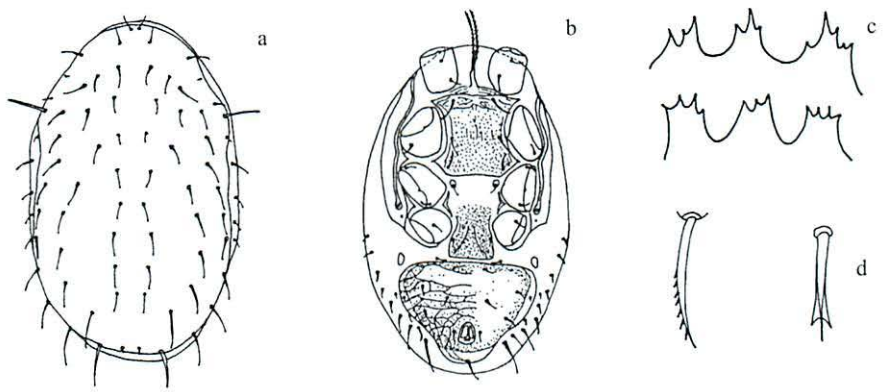

Fig. 1.13. **Female:** a dorsal, b ventral, c tectum, d dorsal setae (a – d modified after GU & HUANG 1990)

Lasioseius annandalei Bhattacharyya & Bhattacharyya, 2001

(Fig. 1.14.)

BHATTACHARYYA, A. K. & S. K. BHATTACHARYYA (2001): A new species of the genus *Lasioseius* Berlese (Acari, Gamasida, Ascidae). – Rec. zool. Surv. India **99** (1 – 4): 23 – 26

Holo- and paratypes: Zoological Survey of India, Calcutta (India)

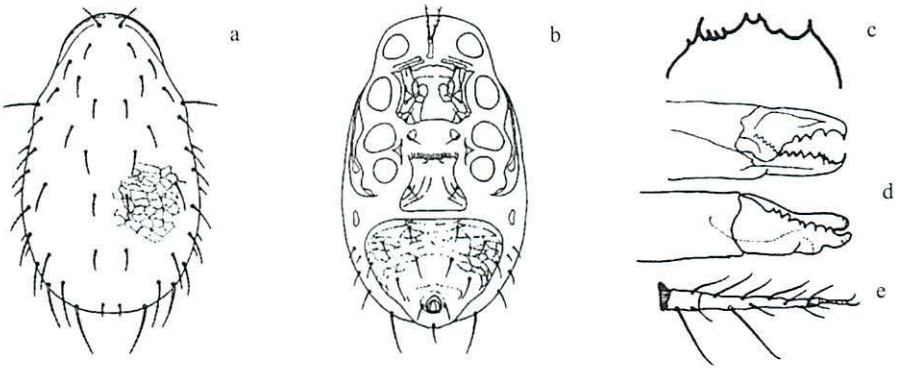

Fig. 1.14. **Female:** a dorsal, b ventral, c tectum, d chelicera, e tarsus IV (a – e BHATTACHARYYA & BHATTACHARYYA 2001)

Lasioseius berlesei (Oudemans, 1938)

(Figs 1.15.1. – 1.15.3.)

OUDEMANS, A. C. (1938): Wetenschappelijke Mededeelingen. – Tijdschr. Entomol. **81**: 2 – 57

Types: deposition unknown to the authors

Synonyms: *Seius muricatus* Berlese ex Koch, 1887

Acari, Myriapoda & Scorpiones hucusque in Italia Reperta. – Padova **5** (41): 1 – 10

Typhlodromus berlesei Oudemans, 1938

Wetenschappelijke Mededeelingen. – Tijdschr. Entomol. **81**: 2 – 57

Lasioseius aba Baker & Wharton, 1952

An introduction to Acarology. – Macmillan Co, New York: 1 – 465

Lasioseius sylvestris Pinchuk, 1972

Neue Arten gamasider Milben (Parasitiformes, Gamasoidea). [Orig. Russ.] – Izv. Akad. Nauk Moldav. SSR, Ser. biol. i chem. nauki **3**: 60 – 71

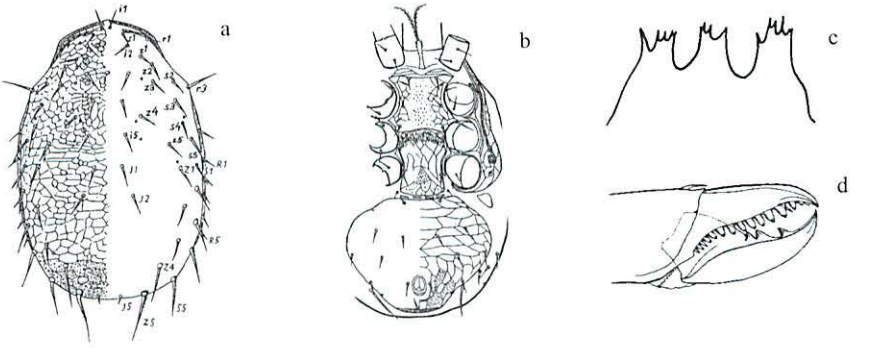

Fig. 1.15.1. **Female:** a dorsal, b ventral, c tectum, d chelicera (a, b, d KARG 1962; c KARG 1993)

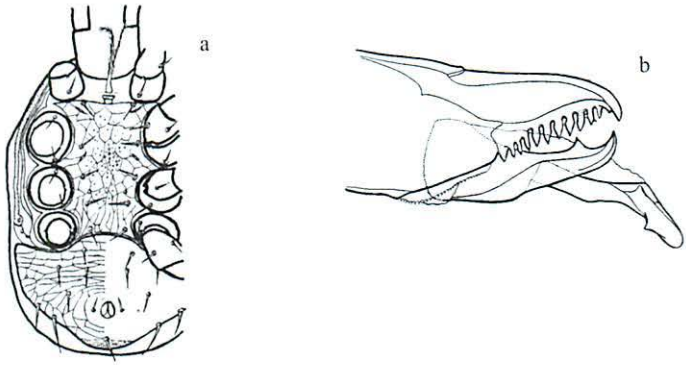

Fig. 1.15.2. **Male:** a ventral, b chelicera (a, b KARG 1962)

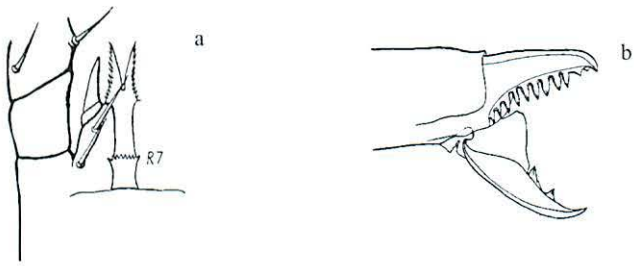

Fig. 1.15.3. **Larva:** a hypostome, b chelicera (a, b KARG 1962)

Lasioseius parberlesei Bhattacharyya, 1968

(Figs 1.16.1. – 1.16.2.)

BHATTACHARYYA, S. K. (1968): Studies in Indian mites (Acarina, Mesostigmata). 6. Six records and descriptions of nine new species. – Acarologia **10** (4): 527 – 549

Holo- and paratypes: Zoological Survey of India, Calcutta (India)

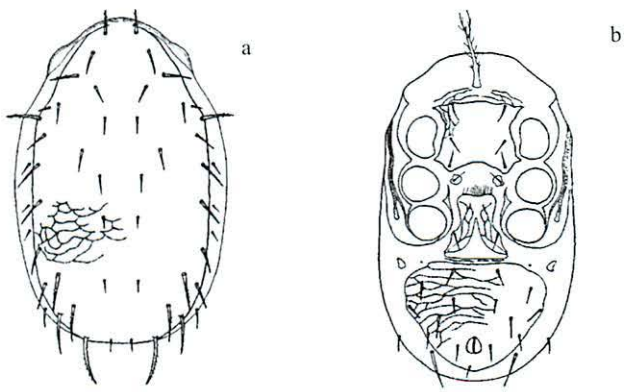

Fig. 1.16.1. **Female:** a dorsal, b ventral (a, b BHATTACHARYYA 1968)

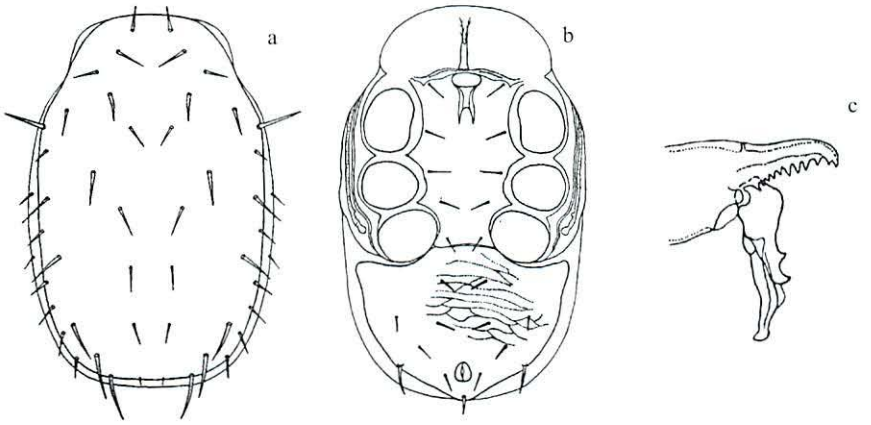

Fig. 1.16.2. **Male:** a dorsal, b ventral, c chelicera (a – c BHATTACHARYYA 1968)

Lasioseius paucispathus Gu & Wang, 1990

(Fig. 1.17.)

GU, Y. M., J. S. WANG & C. A. HUANG (1990): Six new species of the genus *Lasioseius* (Acari, Aceosejidae). [Orig. Chin.] – Acta Zootaxon. Sin. **15** (2): 174 – 184

Holo- and paratypes: Department of Parasitology, Guiyang Medical College (China)

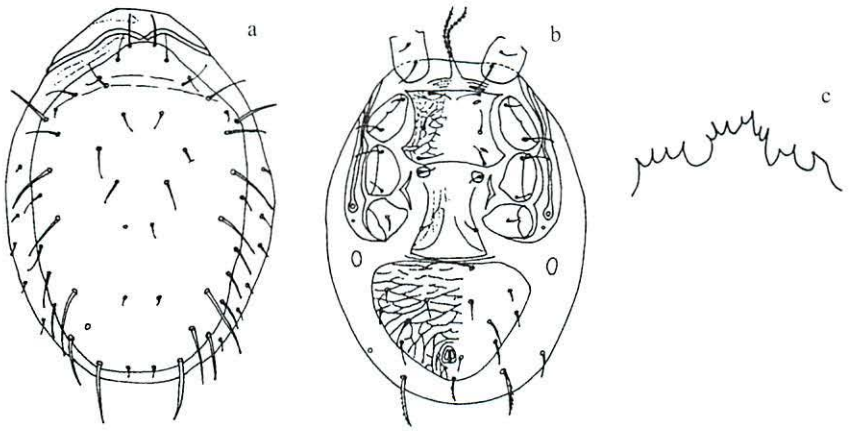

Fig. 1.17. **Female:** a dorsal, b ventral, c tectum (a – c modified after GU & WANG 1990)

Lasioseius schizopilus Gu & Huang, 1990

(Fig. 1.18.)

GU, Y. M., J. S. WANG & C. A. HUANG (1990): Six new species of the genus *Lasioseius* (Acari, Aceosejidae). [Orig. Chin.] – Acta Zootaxon. Sin. **15** (2): 174 – 184

Holo- and paratypes: Health and Anti-Epidemic Station of Shanxi Province (China)

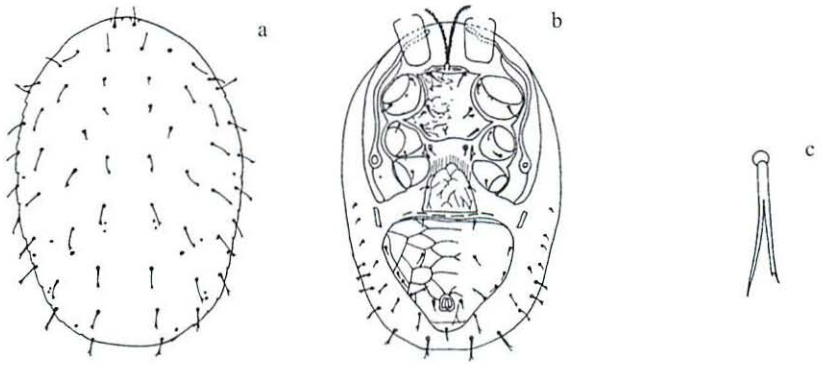

Fig. 1.18. **Female:** a dorsal, b ventral, c dorsal seta (a – c modified after GU & HUANG 1990)

Lasioseius dundoensis Aswegen & Loots, 1969

(Fig. 1.19.)

ASWEGEN, P. I. M. VAN & G. C. LOOTS (1969): The genus *Lasioseius* (Mesostigmata, Acari) in the Ethiopian region. – Wetenskaplike Bydraes van die P. U. vir C. H. O., Reeks B: Natuurwetenskappe **3**: 1 – 25

Holotype: Museu do Dundo-Luanda (Angola)

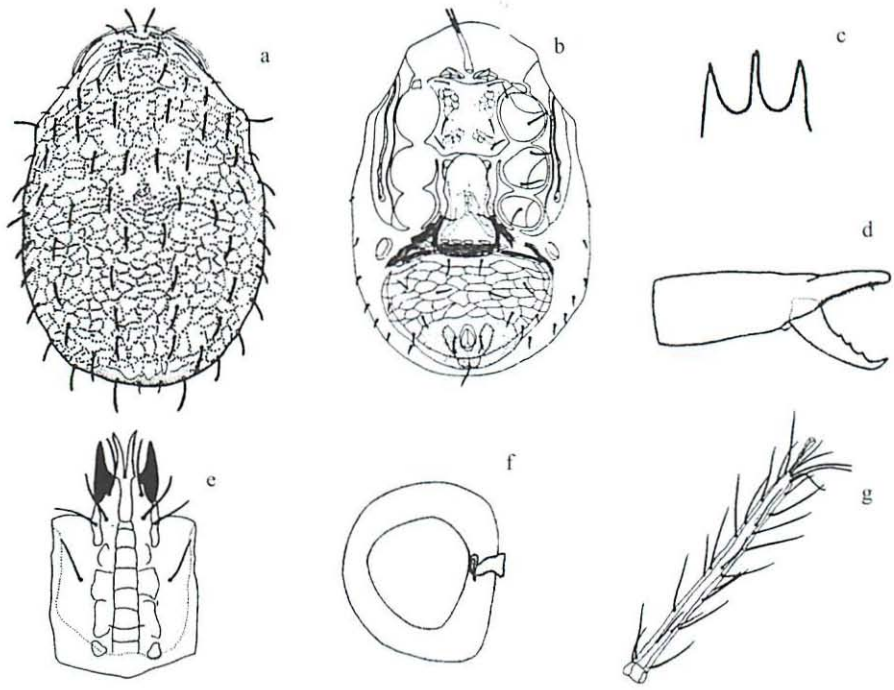

Fig. 1.19. **Female:** a dorsal, b ventral, c tectum, d chelicera, e hypostome, f spermatheca, g tarsus I (a – g ASWEGEN & LOOTS 1969)

Lasioseius miscellus n. sp.

(Fig. 1.20.)

Holotype: ♀ Ecuador 1989, prov. Pichinca, 13 km from Quito, 3100 m a.s.l., couch grass and soil

Paratypes: 4 ♀

Deposition of types: Staatliches Museum für Naturkunde Görlitz (Germany)

Characterised by a remarkably wide ventra bearing 7 pairs of setae, long trispinate ds and te with 3 branches.

Ids ♀ 500 x 300, dorsum reticulate, ds relatively long, most setae reaching the next seta of the series, mostly trispinate, i1 = 33, i2 = 36, i3 = 30, i4 = 25, I2 = 35, I3 = 37, I4 = 35, Z4 = 55, Z5 = 65, r3 = 42, ds S2 to S5 and Z4, Z5 pectinate. Sternal shield medially smooth, lineate along lateral margins, 2 pairs of pores, presternal area without structures, surface of ventra reticulate, behind the anus punctate, metapodal plates nearly circularly; ventral setae mostly 20 long, however V7 and V8 very short (= 7) and ps = 30, diameter anus = 30. Digitus fixus of chelicera with 16 – 18 teeth, middle branch of te slender and split terminally, lateral branches broader with a marginal point. Legs: I = 480, II = 380, III = 350, IV = 510.

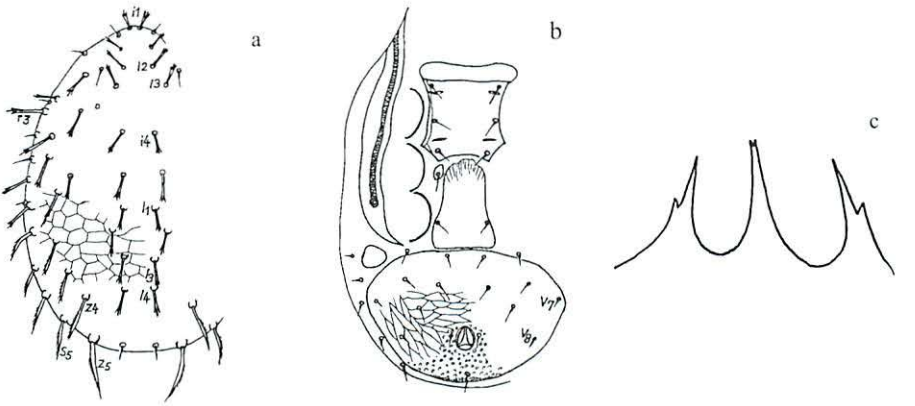

Fig. 1.20. **Female:** a dorsal, b ventral, c tectum (a – c original drawings by the authors)

Lasioseius camudembelensis Aswegen & Loots, 1969

(Fig. 1.21.)

ASWEGEN, P. I. M. VAN & G. C. LOOTS (1969): The genus *Lasioseius* (Mesostigmata, Acari) in the Ethiopian region. – Wetenskaplike Bydraes van die P. U. vir C. H. O., Reeks B: Natuurwetenskappe **3**: 1 – 25

Holotype: Museu do Dundo-Luanda (Angola)

Paratypes: Institute for Zoological Research, Potchefstroom University (South Africa)

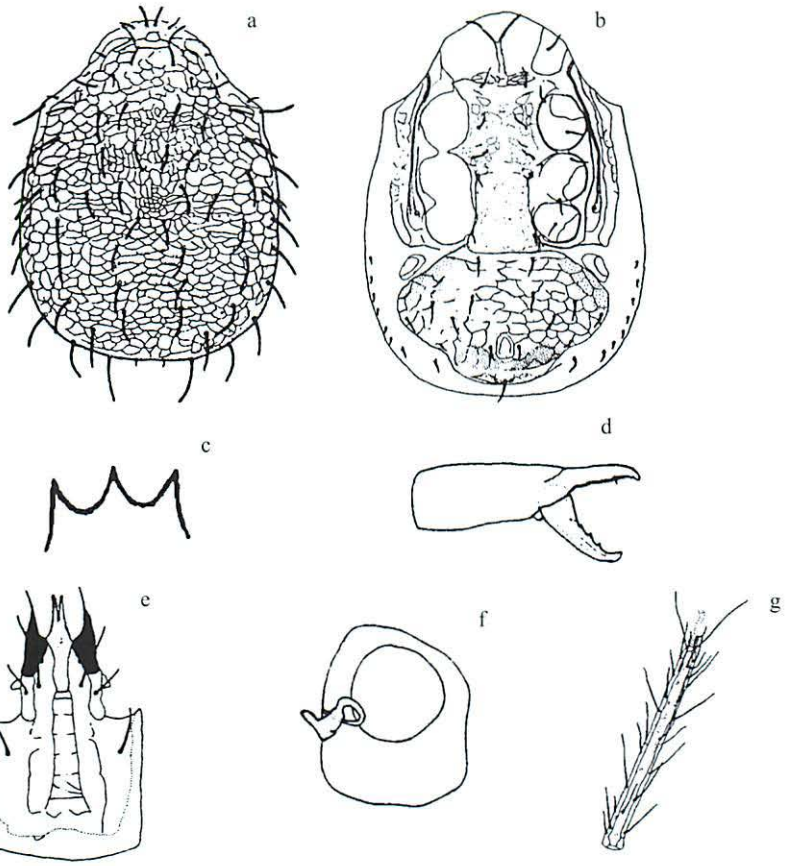

Fig. 1.21. **Female:** a dorsal, b ventral, c tectum, d chelicera, e hypostome, f spermatheca, g tarsus I (a – g ASWEGEN & LOOTS 1969)

Lasioseius lawrencei (Evans, 1958)

(Fig. 1.22.)

EVANS, G. O. (1958): A revision of the British Aceosejinae (Acarina, Mesostigmata). – Proc. zool. Soc. Lond. **131** (2): 177 – 229

Types: British Museum (Natural History), London (United Kingdom)

Synonyms: *Proctolaelaps* (*Neojordensia*) *lawrencei* Evans, 1958

A revision of the British Aceosejinae (Acarina, Mesostigmata). – Proc. zool. Soc. Lond. **131** (2): 177 – 229

Lasioseius frondeus Karg, 1965

Larvalsystematische und phylogenetische Untersuchung sowie Revision des Systems der Gamasina Leach, 1915 (Acarina, Parasitiformes). – Mitt. Zool. Mus. Berl. **41** (2): 193 – 340

Lasioseius berlesei sensu WESTERBOER, 1963

Die Familie Podocinidae Berlese, 1916. – In: STAMMER, H. J. (ed.): Beiträge zur Systematik und Ökologie mitteleuropäischer Acarina, Band II, Mesostigmata 1. Akad. Verlagsgesellschaft, Leipzig: 179 – 450

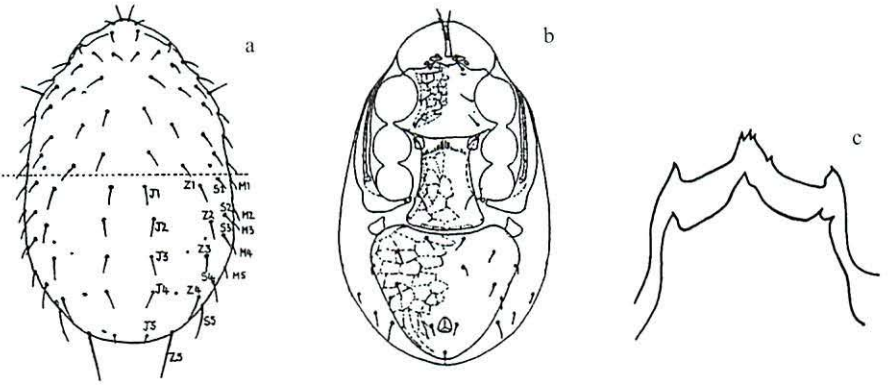

Fig. 1.22. **Female:** a dorsal, b ventral, c tectum (a, b EVANS 1958; c KARG 1993)

Lasioseius diffindatus n. nom. pro *L. kargi* Christian, 1990
(Fig. 1.23.)

CHRISTIAN, A. (1990): Zur Kenntnis der Raubmilbengattung *Lasioseius* Berlese 1916, Beschreibung einer neuen Art (Acarina, Mesostigmata). – Abh. Ber. Naturkundemus. Görlitz **63** (11): 31 – 34

Holotype: Staatliches Museum für Naturkunde Görlitz (Germany)

Synonym: *Lasioseius kargi* Christian, 1990
Zur Kenntnis der Raubmilbengattung *Lasioseius* Berlese 1916, Beschreibung einer neuen Art (Acarina, Mesostigmata). – Abh. Ber. Naturkundemus. Görlitz **63** (11): 31 – 34

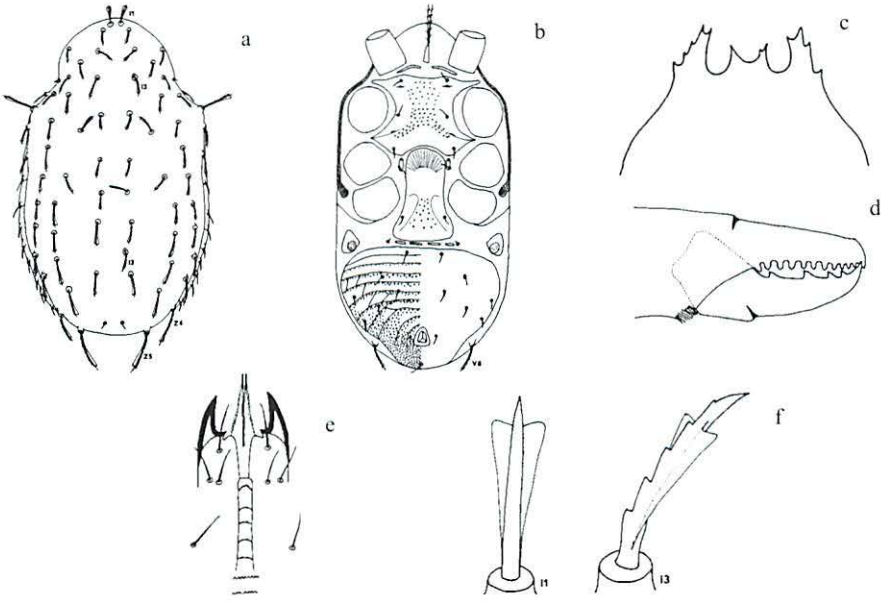

Fig. 1.23. **Female:** a dorsal, b ventral, c tectum, d chelicera, e hypostome, f dorsal setae i1, i3 (a – f CHRISTIAN 1990)

Lasioseius bispinosus Evans, 1958

(Fig. 1.24.)

EVANS, G. O. (1958): A revision of the British Aceosejinae (Acarina, Mesostigmata). – Proc. zool. Soc. Lond. **131** (2): 177 – 229

Holotype: British Museum (Natural History), London (United Kingdom)

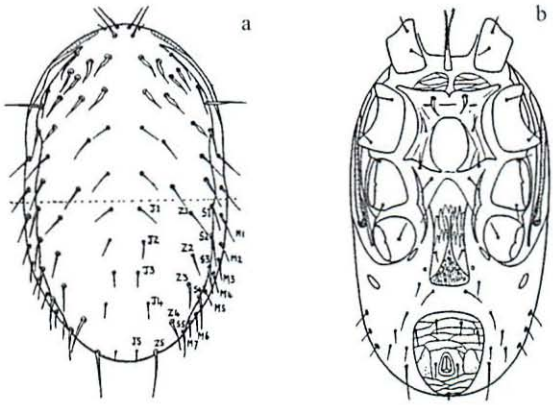

Fig. 1.24. **Female:** a dorsal, b ventral (a, b EVANS 1958)

Lasioseius parabispinosus Kandil, 1980

(Fig. 1.25.)

KANDIL, M. M. (1980): Three new *Lasioseius* species from Hungary (Acari, Mesostigmata, Podocinidae). – Fol. Entomol. Hung. **61** (33): 75 – 86

Holotype: Hungarian Natural History Museum, Budapest (Hungary)

Paratypes: Hungarian Natural History Museum, Budapest (Hungary), Faculty of Agricultural Sciences at Moshtorhor, Kalyobiah University (Egypt)

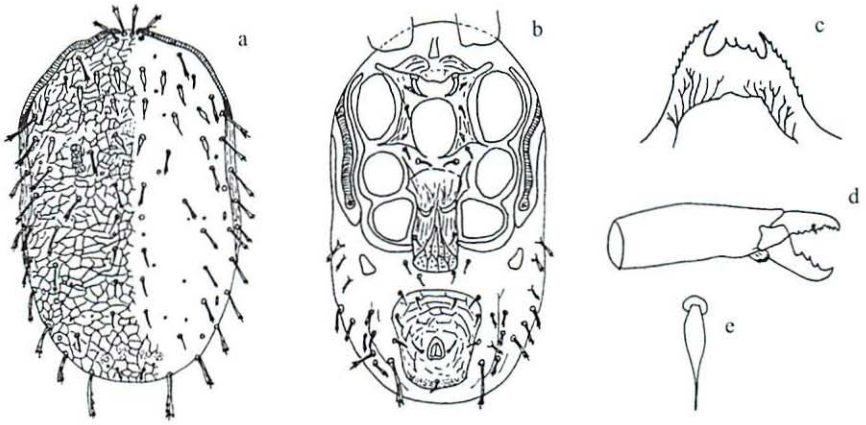

Fig. 1.25. **Female:** a dorsal, b ventral, c tectum, d chelicera, e dorsal seta (a – e modified after KANDIL 1980)

Lasioseius zicsii Kandil, 1980

(Fig. 1.26.)

KANDIL, M. M. (1980): Three new *Lasioseius* species from Hungary (Acari, Mesostigmata, Podocinidae). – Fol. Entomol. Hung. **61** (33): 75 – 86

Holotype: Hungarian Natural History Museum, Budapest (Hungary)

Paratypes: Hungarian Natural History Museum, Budapest (Hungary), Faculty of Agricultural Sciences at Moshtorhor, Kalyobiah University (Egypt)

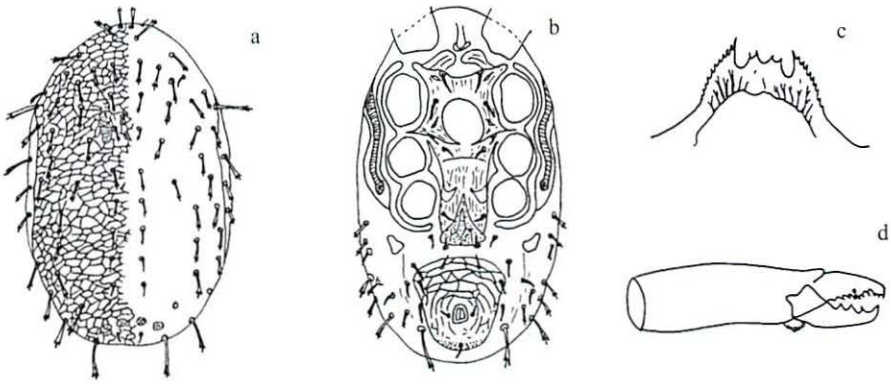

Fig. 1.26. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d modified after KANDIL 1980)

Key 2: The known species of the *Lasioseius-inguinalis*-complex (including a new species from Ecuador)

1(8) Ventra bearing 5 – 6 pairs of setae.

2(7) Ventra with 5 pairs of setae.

3(6) Ventra remarkably wide, length : width = 4 : 6 to 4 : 7.

4(5) Ds long, most ds longer than the distances to the next ds of the series, te with 3 terminally split branches, ids = 535 – 590 (Fig. 2.1.):

L. quinisetosus Lindquist & Karg, n. nom. pro *Cheiroseius inguinalis* Karg, 1977

– Chile, near Santiago, between roots and algae.

5(4) Ds shorter, no ds reaching the next ds of the series, te with 3 points, ids = 451 (Fig. 2.2.):

L. uluguruensis Aswegen & Loots, 1969

– Africa, Tanganyica from forest soil.

6(3) Length : width of ventra = 4 : 5, margin of te minutely denticulate, ids = 525 (Fig. 2.3.):

L. americanus Chant, 1963

– Ecuador, on bananas.

7(2) Ventra with 6 pairs of setae, length : width = 2 : 3, te with 3 short processes, ids = 451 (Fig. 2.4.):

L. musunguensis Aswegen & Loots, 1969

– Africa, near Luna de Carvalho from forest soil.

8(1) Ventra bearing 7 – 8 pairs of setae.

9(10) Ventra with 8 pairs of setae, margin of te truncate, denticulate, ds mostly barbed and tricarinate, ids = 490 – 500 (Fig. 2.5.):

L. zaluckii Walter & Lindquist, 1997

– Australia, Queensland, from *Pyrethrum*, tropical rain forest.

10(9) Ventra with 7 pairs of setae.

11(14) Metapodal plates reticulate.

12(13) Length of ds i4 = distance i4 – i5, te with 3 very short processes, ids = 385 – 394 (Fig. 2.6.):

L. longisetus Aswegen & Loots, 1969

– Africa.

13(12) Length of ds i4 = ½ the distance i4 – i5, te with 3 tongue-like branches, ids = 560 (Fig. 2.7.):

L. inguinalis Karg, 1976

– South America.

14(11) Metapodal plates not reticulate.

15(16) Metapodal plates dotted in the centre, ds i4 = ⅓ the distance i4 – i5, te with 3 long pointed processes, ids = 550 (Fig. 2.8.):

L. punctocentralis n. sp.

– Ecuador.

16(15) Surface of metapodal plates smooth, ds i4 = ½ the distance i4 – i5, te with 3 short points, ids = 540 (Fig. 2.9.):

L. carvalhoi Aswegen & Loots, 1969

– Africa.

Subgenus *Lasioseius* Berlese, 1916 s. str.

Lasioseius-inguinalis-complex

Lasioseius quinisetosus Lindquist & Karg n. nom. pro *Ch. inguinalis* Karg, 1977

(Fig. 2.1.)

KARG, W. (1977): Neue Arten der Raubmilbenfamilie Ascidae Oudemans, 1905 (Acarina, Parasitiformes) aus Chile. – Mitt. Zool. Mus. Berl. **53** (2): 285 – 302

Types: Hungarian Natural History Museum, Budapest (Hungary)

Synonym: *Cheiroseius inguinalis* Karg, 1977

Neue Arten der Raubmilbenfamilie Ascidae Oudemans, 1905 (Acarina, Parasitiformes) aus Chile. – Mitt. Zool. Mus. Berl. **53** (2): 285 – 302

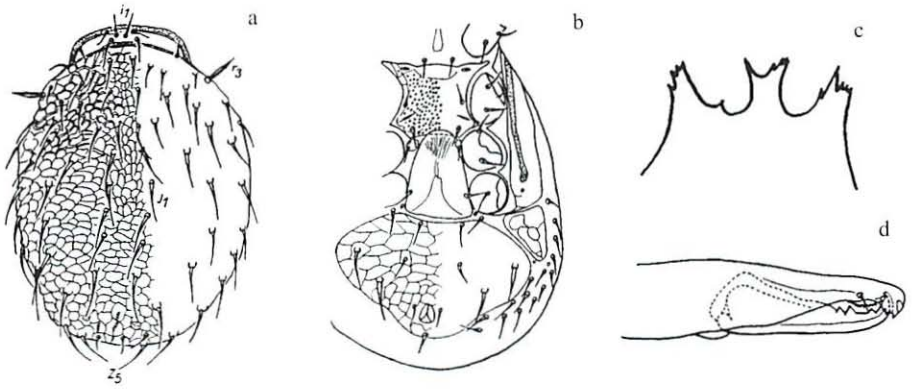

Fig. 2.1. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d KARG 1977)

Lasioseius uluguruensis Aswegen & Loots, 1969

(Fig. 2.2.)

ASWEGEN, P. I. M. VAN & G. C. LOOTS (1969): The genus *Lasioseius* (Mesostigmata, Acari) in the Ethiopian region. – Wetenskaplike Bydraes van die P. U. vir C. H. O., Reeks B: Natuurwetenskappe **3**: 1 – 25

Holotype: Museé Royal l' Afrique Centrale, Tervuren (Belgium)

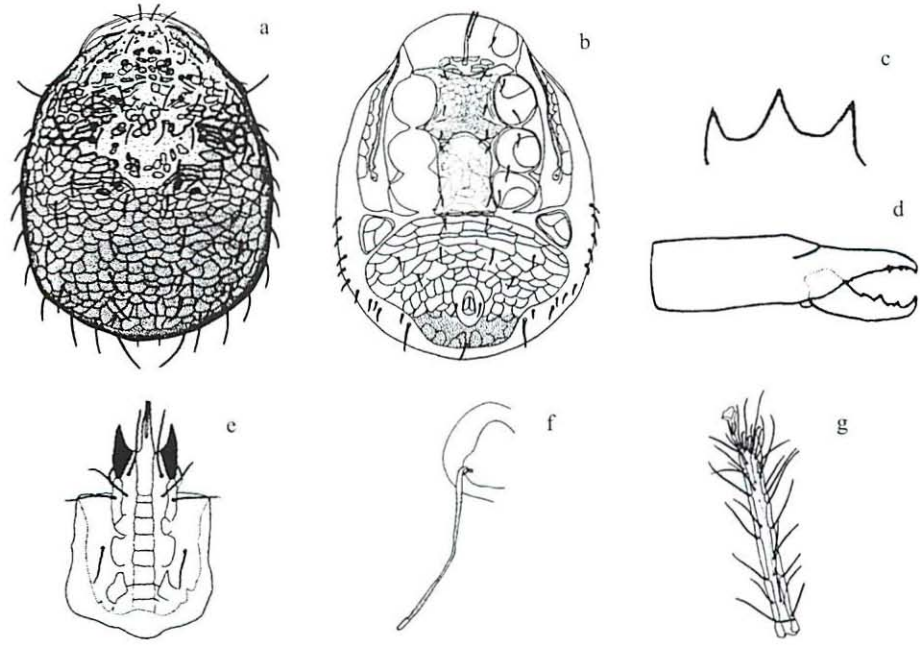

Fig. 2.2. **Female:** a dorsal, b ventral, c tectum, d chelicera, e hypostome, f spermatheca, g tarsus I (a – g ASWEGEN & LOOTS 1969)

Lasioseius americanus Chant, 1963

(Fig. 2.3.)

CHANT, D. A. (1963): The subfamily Blattisocinae Garman (= Aceosejinae Evans) (Acarina, Blattisocidae Garman) (= Aceosejidae Baker & Wharton) in North America, with descriptions of new species. – Can. J. Zool. **41**: 243 – 305

Types: United States National Museum, Washington D. C. (USA)

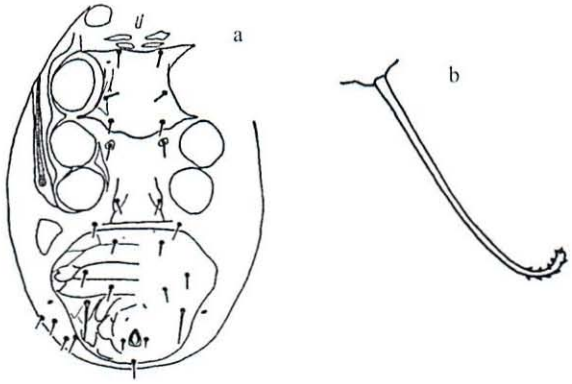

Fig. 2.3. **Female:** a ventral, b dorsal seta Z5 (a, b CHANT 1963)

Lasioseius musunguensis Aswegen & Loots, 1969

(Fig. 2.4.)

ASWEGEN, P. I. M. VAN & G. C. LOOTS (1969): The genus *Lasioseius* (Mesostigmata, Acari) in the Ethiopian region. – Wetenskaplike Bydraes van die P. U. vir C. H. O., Reeks B: Natuurwetenskappe **3**: 1 – 25

Holotype: Museu do Dundo-Luanda (Angola)

Paratypes: Institute for Zoological Research, Potchefstroom University (South Africa)

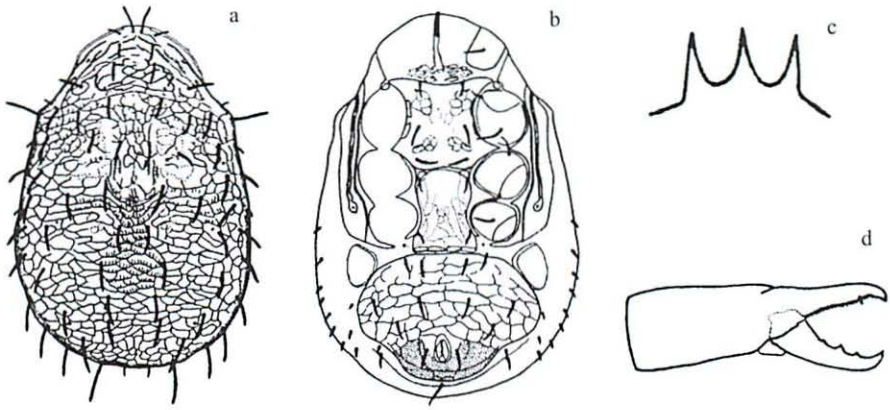

Fig. 2.4. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d ASWEGEN & LOOTS 1969)

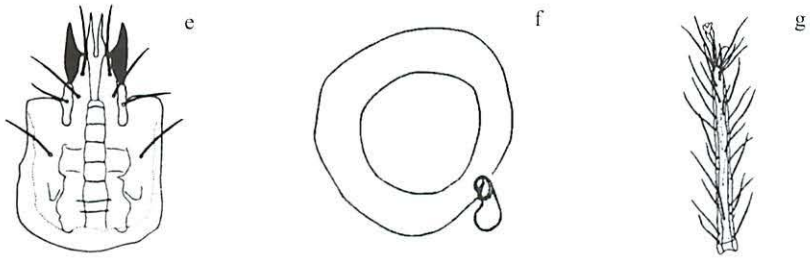

Fig. 2.4. (cont.) **Female:** e hypostome, f spermatheca, g tarsus I (e – g ASWEGEN & LOOTS 1969)

Lasioseius zaluckii Walter & Lindquist, 1997

(Fig. 2.5.)

WALTER, D. E. & E. E. LINDQUIST (1997): Australian species of *Lasioseius* (Acari, Mesostigmata, Ascidae): The *porulosus* group and other species from rainforest canopies. – Invertebr. Taxon. **11**: 525 – 547

Holotype: Queensland Museum, South Brisbane (Australia)

Paratypes: Department of Entomology, University of Queensland, St. Lucia (Australia), Canadian National Collection, Ottawa (Canada)

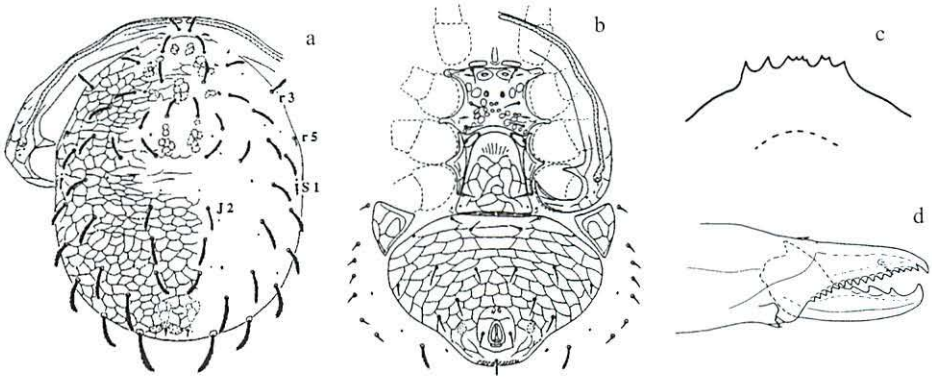

Fig. 2.5. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d WALTER & LINDQUIST 1997)

Lasioseius longisetus Aswegen & Loots, 1969

(Fig. 2.6.)

ASWEGEN, P. I. M. VAN & G. C. LOOTS (1969): The genus *Lasioseius* (Mesostigmata, Acari) in the Ethiopian region. – Wetenskaplike Bydraes van die P. U. vir C. H. O., Reeks B: Natuurwetenskappe **3**: 1 – 25

Holotype: Museu do Dundo-Luanda (Angola)

Paratype: Institute for Zoological Research, Potchefstroom University, South Africa

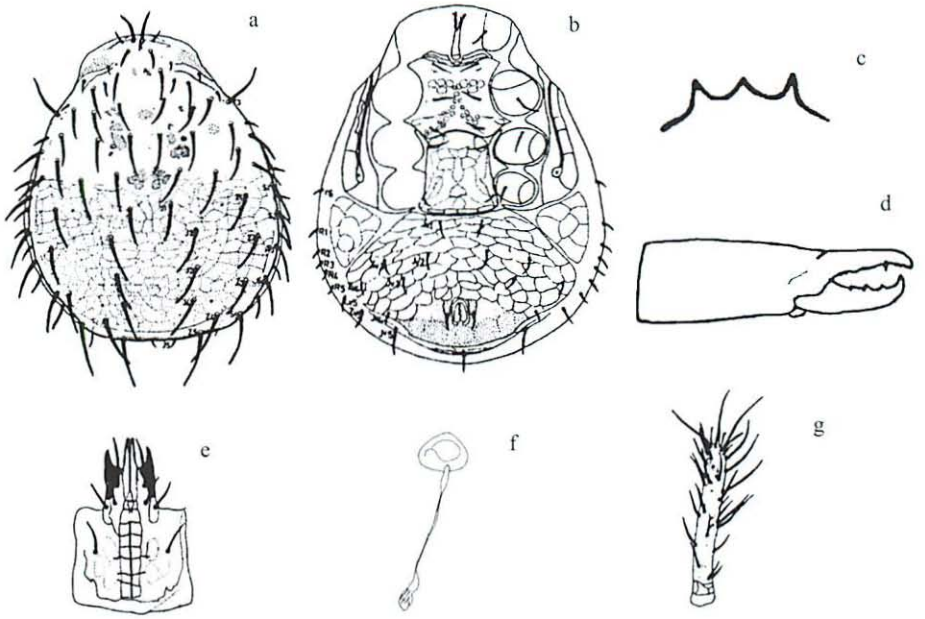

Fig. 2.6. **Female:** a dorsal, b ventral, c tectum, d chelicera, e hypostome, f spermatheca, g tarsus I (a – g ASWEGEN & LOOTS 1969)

Lasioseius inguinalis Karg, 1976

(Fig. 2.7.)

KARG, W. (1976): Zur Kenntnis der Überfamilie Phytoseioidea Karg, 1965. – Zool. Jb. Syst. **103**: 505 – 546
Holotype: Hungarian Natural History Museum, Budapest (Hungary)

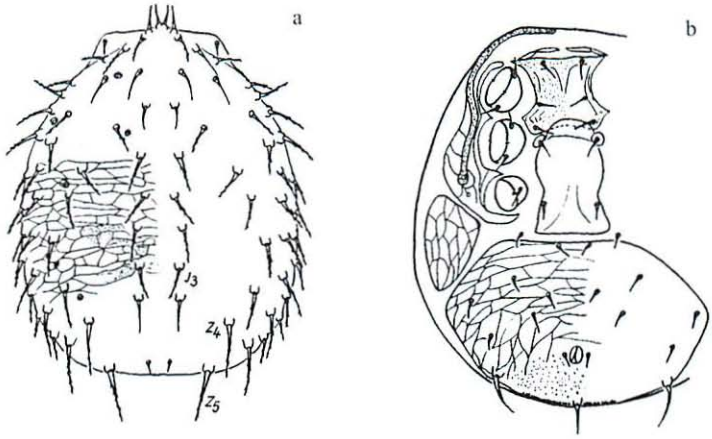

Fig. 2.7. **Female:** a dorsal, b ventral (a – b KARG 1976)

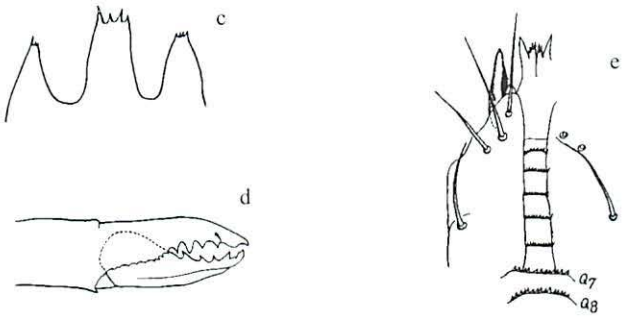

Fig. 2.7. (cont.) **Female:** c tectum, d chelicera, e hypostome (c – e KARG 1976)

Lasioseius punctocentralis n. sp.

(Fig. 2.8.)

Holotype: ♀ Ecuador 1989, prov. Pichinca, lava flow of Antisanilla, moss from flat, horizontal stones

Deposition of types: Staatliches Museum für Naturkunde Görlitz (Germany)

Characterised by metapodal plates that are 3 times as large as the anus and dotted in the centre, by a ventra bearing 7 pairs of setae and a te with 3 long branches.

Ids ♀ 550 x 360, dorsum distinctly reticulate, most ds acicular, only i1, I2, r3 and I4 trispinate, ds S4, S5, i5 and Z5 pectinate, most ds relatively short, Z5 lengthened, i1 = 35, i2 = 35, i3 = 30, i4 = 25, i5 = 30, I1, I2, I3, I4 = 30 – 32, I5 = 15, r3 = 45, Z5 = 50, setae of venter mostly = 25. Sternal shield smooth, presternal with only two projections, ventra large and broad, 190 long, 290 wide. Digitus fixus of the chelicera with 16 teeth, middle branch of te remarkably sharpened, lateral branches distally serrate. Legs: I = 430, II = 410, III = 370, IV = 520.

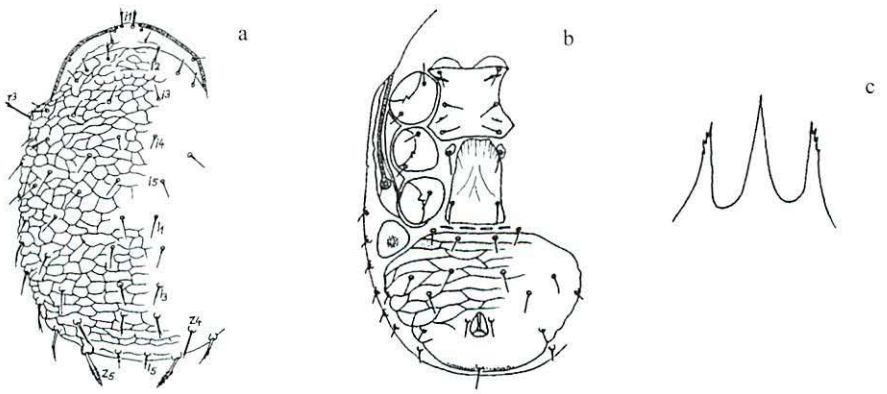

Fig. 2.8. **Female:** a dorsal, b ventral, c tectum (a – c original drawings by the authors)

Lasioseius carvalhoi Aswegen & Loots, 1969

(Fig. 2.9.)

Aswegen, P. I. M. van & G. C. Loots (1969): The genus *Lasioseius* (Mesostigmata, Acari) in the Ethiopian region. – Wetenskaplike Bydraes van die P. U. vir C. H. O., Reeks B: Natuurwetenskappe **3**: 1 – 25

Holotype: Museu do Dundo-Luanda (Angola)

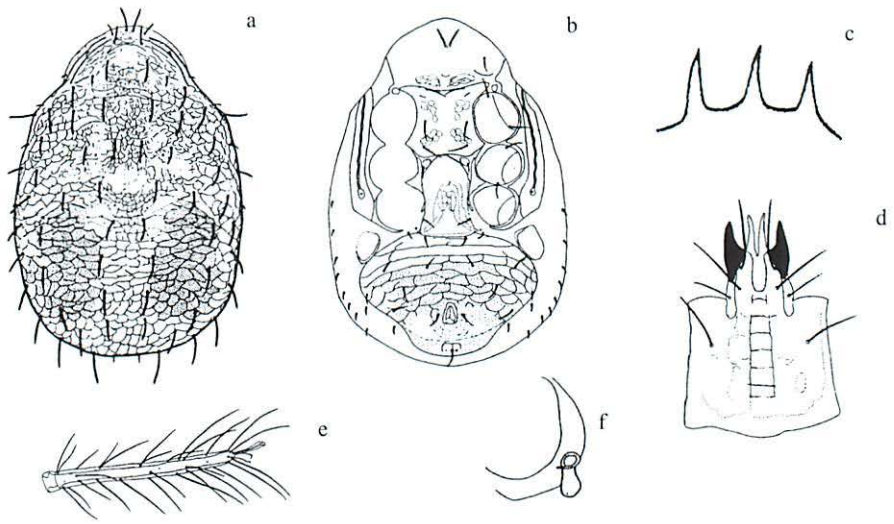

Fig. 2.9. **Female:** a dorsal, b ventral, c tectum, d hypostome, e tarsus I, f spermatheca (a – f Aswegen & Loots 1969)

Subgenus *Endopodalius* n. subgen.

Type species: *Lasioseius* (*Zygoseius*) *alter* Vitzthum, 1925

The subgenus includes species having extraordinarily wide endopodal plates of coxae III and IV, a digitus mobilis of the chelicerae with 5 teeth and a long and terminally split median branch of the tectum.

Key 3: The known species of *Endopodalius* n. subgen.

1(10) One pair of metapodal plates developed, ventra nearly quadrangular or hexagonal.

2(5) Ds relatively long: i5 = the distance i5 – I1 or longer.

3(4) Lateral processes of te smooth, length of ds Z5 = I3, ids = 546 (Fig. 3.1.):
L. convexus Krantz, 1962
– Africa, Garamba.

4(3) Lateral processes of te serrate, ds Z5 = ⅔ the length of I3, ids = 460 (Figs 3.2.1. – 3.2.2.):
L. araucariae Hirschmann, 1972
– South Brazil.

5(2) Ds shorter, i5 = about ½ the distance i5 – I1.

6(7) Metapodal plates nearly circular, postanal seta and setae V3 longer than the anus, ids = 600 – 685 (Fig. 3.3.):

L. humberti Athias-Henriot, 1959
– Africa, Algeria.

7(6) Metapodal plates oval, postanal seta and V3 = about as long as the anus.

8(9) Ds I1, I2 and I3 reaching the next seta of the series, 3 pairs of praeendopodal plates, ids = 487 – 525 (Figs 3.4.1. – 3.4.2.):

L. vitzthumi Westerboer, 1963
– locality not known.

9(8) Ds I1, I2 and I3 shorter than the distances between them, 2 pairs of praeendopodal plates, ids = 540 – 581 (Fig. 3.5.):

L. tectus (Hyatt, 1964)
syn.: *Zygoseius tectus* Hyatt, 1964
– Venezuela.

10(1) No metapodal plates developed, ventra triangular.

11(14) Ids = 580 – 600 long, leg I relatively short (= 485 – 420).

12(13) Ventra bearing 5 pairs of setae, one pair of praeendopodal shields present, poststigmatal extension of the peritrematal shield prolonged around coxae IV and reaching the endopodal shield, ds I1 and I2 longer than their distances, ds Z5 longer than Z4, ids = 580 (Fig. 3.6.):

L. hirschmanni n. nom.* pro *Zygoseius alter* sensu BHATTACHARYYA, 1969
– India.

13(12) Ventra with 7 pairs of setae, two pairs of praeendopodal shields present, poststigmal extension of peritrematal shield not surrounding coxae IV, ds I1 and I2 shorter than their distance, ds Z5 shorter than Z4, ids = 590 (Fig. 3.7.):

L. alter Vitzthum, 1925
– Sumatra.

14(11) Ids = 700 long, leg I as long as the ids, ventra nearly twice as broad as long (Fig. 3.8.):

L. scutalis (Banks, 1914)**
syn.: *Hypoaspis scutalis* Banks, 1914
– Brazil, on Scarabaeidae.

* We devote the species to Dr Werner Hirschmann († Oct. 1993). He investigated the type of *Lasioseius* (*Zygoseius*) *alter* Vitzthum exactly and in detail. Discussing systematic problems in connection with previous studies of the genus *Lasioseius*, he drew our attention to the different features of the species: *L. alter* Vitzthum is not identical with *Z. alter* sensu BHATTACHARYYA.

** Our classification of *Lasioseius scutalis* is based on LINDQUIST & EVANS (1965), who pointed out that *Hypoaspis scutalis* belongs to the *Lasioseius alter* group. The line beside the genital shield in Banks' drawing indeed shows the widely developed endopodal plate.

Subgenus *Endopodalius* n. subgen.

Lasioseius convexus Krantz, 1962

(Fig. 3.1.)

KRANTZ, G. W. (1962): Acari. Free-living Mesostigmata. II. Family Aceosejidae. – Parc National De La Garamba, Mission H. De Saeger **34**: 3 – 29

Holotype: Institute of National Parks of the Congo and Ruanda-Urundi, Brussels (Belgium)

Paratypes: United States National Museum, Washington D. C. (USA), British Museum (Natural History), London (United Kingdom)

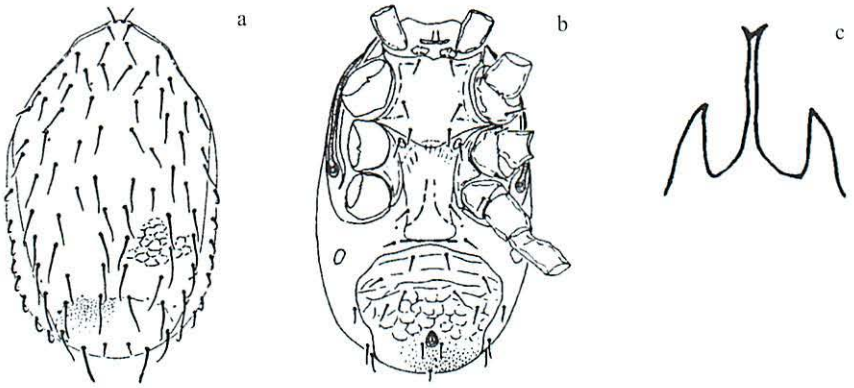

Fig. 3.1. **Female:** a dorsal, b ventral, c tectum (a – c KRANTZ 1962)

Lasioseius araucariae Hirschmann, 1972

(Figs 3.2.1. – 3.2.2.)

HIRSCHMANN, W. (1972): Gangsystematik der Parasitiformes Teil 104. Von Dr. W. Rühm während seiner Tätigkeit an der Univ. Austral de Chile (Valdivia) gesammelte Araukarien-Milben aus Südchile u. Südbrasilien. – Acarologie **17**: 29 – 33

Types: Zoologische Staatssammlungen München (Germany)

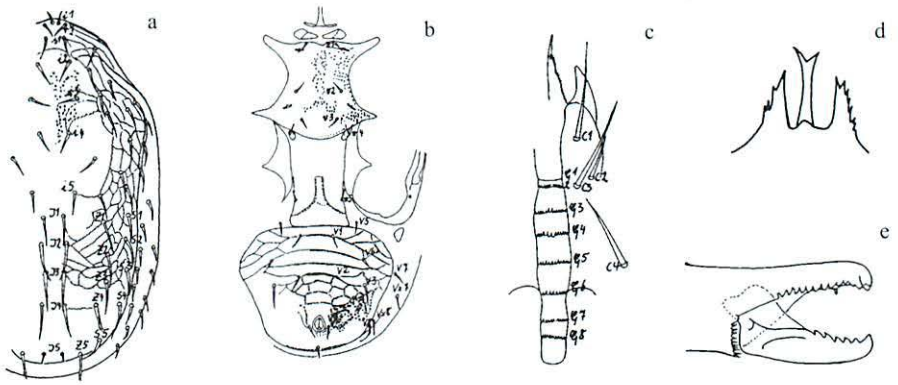

Fig. 3.2.1. **Female:** a dorsal, b ventral, c hypostome, d tectum, e chelicera (a – e HIRSCHMANN 1972)

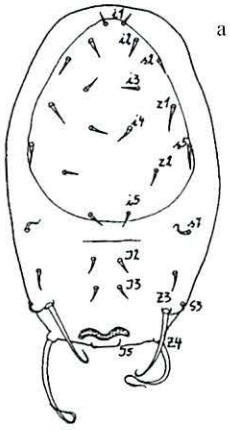

Fig. 3.2.2. **Larva:** a ventral (a HIRSCHMANN 1972)

Lasioseius humberti Athias-Henriot, 1959

(Fig. 3.3.)

ATHIAS-HENRIOT, C. (1959): Phytoseiidae et Aceosejidae (Acarina, Gamasina) d' Algérie. III. Contribution au Aceosejinae. – Bull. Soc. Hist. Nat. Afr. N. **50**: 158 – 195

Syntypes: Laboratoire d'Acarologie de l'Ecole Pratique des Hautes Etudes, Paris (France)

Paratypes: Laboratoire de Zoologie Agricole de l'Ecole Nationale d'Agriculture d'Alger porte l'indication (Egypt)

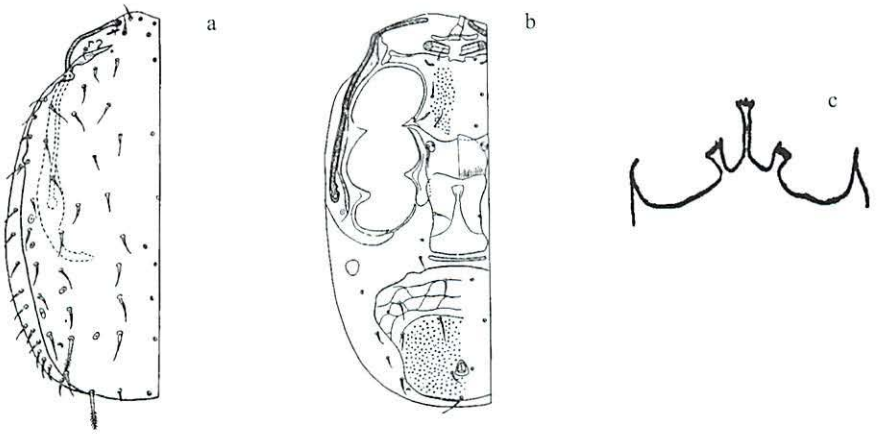

Fig. 3.3. **Female:** a dorsal, b ventral, c tectum (a – c ATHIAS-HENRIOT 1959)

Lasioseius vitzthumi Westerboer, 1963

(Figs 3.4.1. – 3.4.2.)

WESTERBOER, I. (1963): Die Familie Podocinidae Berlese, 1916. – In: STAMMER, H. J. (ed.), Beiträge zur Systematik und Ökologie mitteleuropäischer Acarina, Band II, Mesostigmata 1. Akad. Verlagsgesellschaft, Leipzig: 179 – 450

Types: deposition unknown to the authors

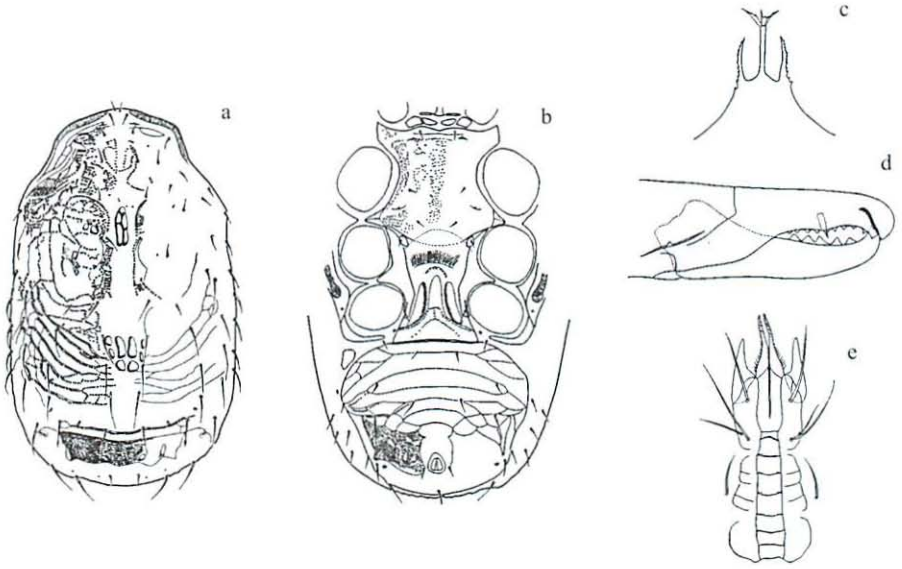

Fig. 3.4.1. **Female:** a dorsal, b ventral, c tectum, d chelicera, e hypostome (a – e WESTERBOER 1963)

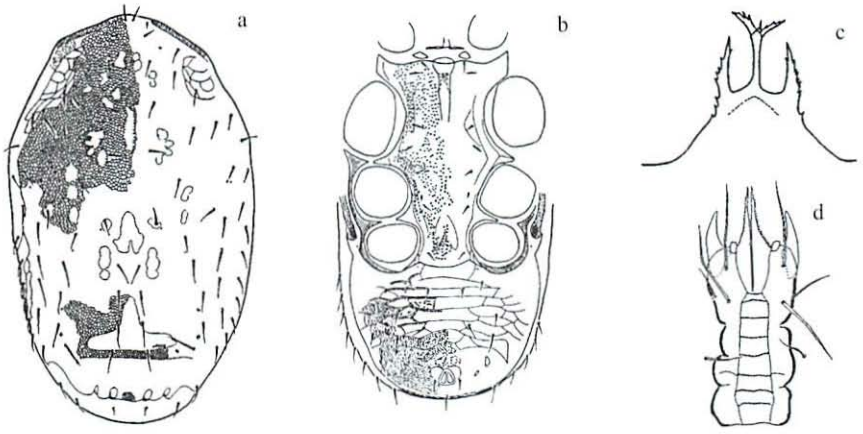

Fig. 3.4.2. **Male:** a dorsal, b ventral, c tectum, d hypostome (a – d WESTERBOER 1963)

Lasioseius tectus (Hyatt, 1964)

(Fig. 3.5.)

HYATT, K. H. (1964): A collection of Mesostigmata (Acari) associated with Coleoptera and Hemiptera in Venezuela. – Bull. Br. Mus. nat. Hist. (Zool.) **11** (7): 465 – 509

Holo- and paratypes: British Museum (Natural History), London (United Kingdom)

Synonym: *Zygoseius tectus* Hyatt, 1964

A collection of Mesostigmata (Acari) associated with Coleoptera and Hemiptera in Venezuela. – Bull. Br. Mus. nat. Hist. (Zool.) **11** (7): 465 – 509

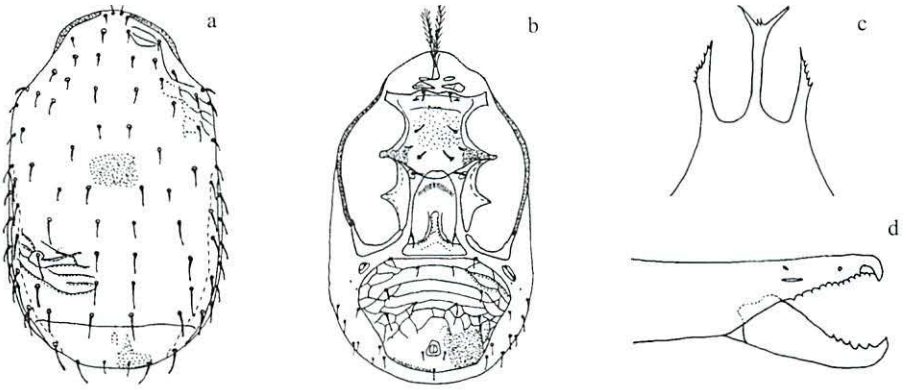

Fig. 3.5. **Female:** a dorsal, b ventral, c tectum, d chelicera (a – d modified after HYATT 1964)

Lasioseius hirschmanni n. nom. pro *Z. alter* sensu BHATTACHARYYA, 1969

(Fig. 3.6.)

BHATTACHARYYA, S. K. (1969): Studies on Indian mites (Acarina, Mesostigmata). 7. Six species found under bark in North East Frontier Agency. – Zool. Jb. Syst. **96** (1): 69 – 80

Types: deposition unknown to the authors

Synonym: *Zygoseius alter* sensu BHATTACHARYYA, 1969

Studies on Indian mites (Acarina, Mesostigmata). 7. Six species found under bark in North East Frontier Agency. – Zool. Jb. Syst. **96** (1): 69 – 80

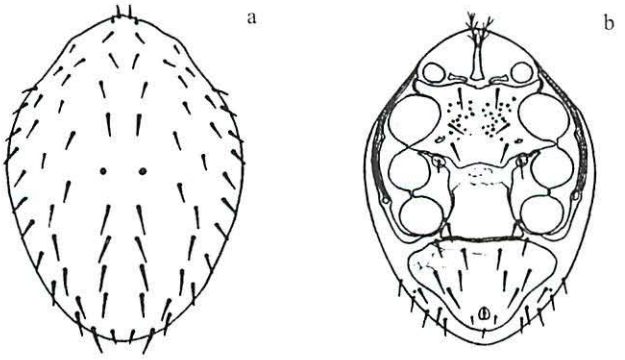

Fig. 3.6. **Female:** a dorsal, b ventral (a – b BHATTACHARYYA 1969)

Lasioseius alter Vitzthum, 1925

(Fig. 3.7.)

VITZTHUM, H. (1925): Fauna sumatrensis, Beitrag Nr. 5: Acarinae. – Suppl. Entomol. **11**: 1 – 78
Types: deposition unknown to the authors

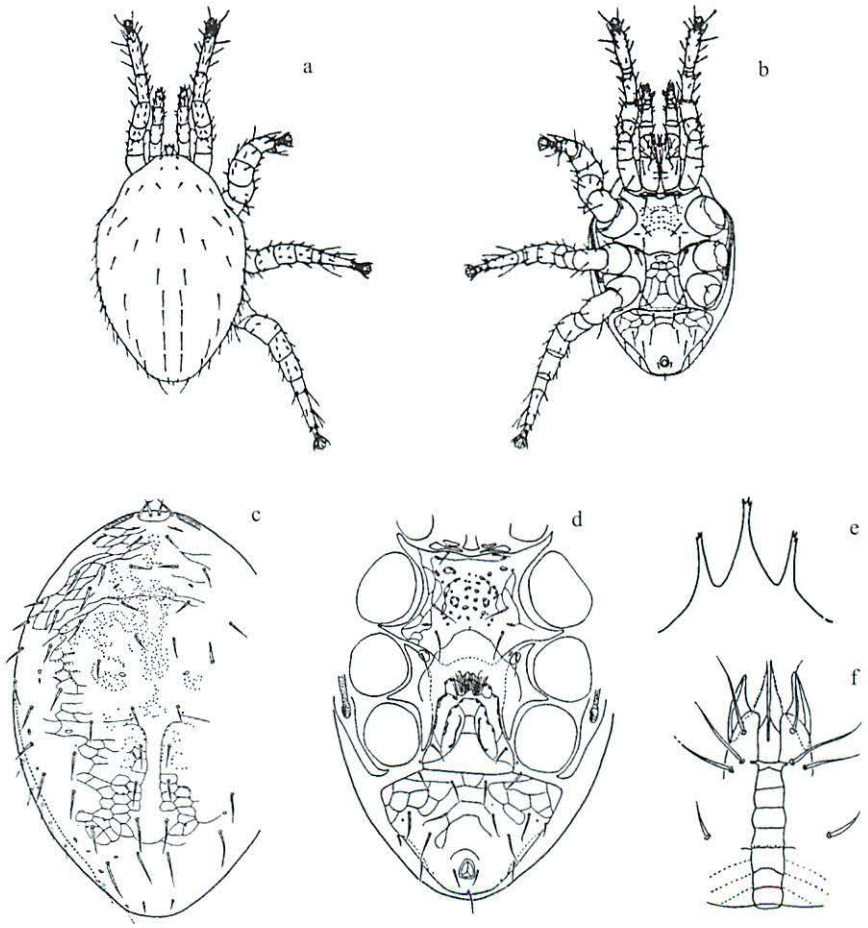

Fig. 3.7. **Female:** a dorsal, b ventral, c dorsal, d ventral, e tectum, f hypostome (a, b VITZTHUM 1925; c – f WESTERBOER 1963)

Lasioseius scutalis (Banks, 1914)

(Fig. 3.8.)

BANKS, N. (1914): The Stanford Expedition to Brazil, 1911. Acarians from Brazil. – Psyche **21** (5): 160 – 162
Types: deposition unknown to the authors
Synonym: *Hypoaspis scutalis* Banks, 1914
The Stanford Expedition to Brazil, 1911. Acarians from Brazil. – Psyche **21** (5): 160 – 162