

**DESCRIPTION OF MITES (ACARI) PHORETIC ON PHORIDAE (INSECTA: DIPTERA)
WITH DESCRIPTION OF FOUR NEW SPECIES OF THE GENUS *UROSEIUS*
BERLESE (PARASITIFORMES, UROPODINA, POLYASPIDIDAE)**

A. Fain

Institut royal des Sciences naturelles de Belgique, rue Vautier 29, B-1000 Bruxelles, Belgique.

ABSTRACT - A small collection of mites (Acari) phoretic on Phoridae (Insecta: Diptera) from different parts of the world (Africa, East Asia and Central America) was studied. It includes, among others, 4 new species of the genus *Uroseius* Berlese, 1888 (Uropodina), i.e. *Uroseius (Uroseius) disneyi* n. sp. ex. *Dohrniphora rostrata*, from Zimbabwe, *U. (U.) botswanensis* n. sp. ex. *Dohrniphora diminuens*, from Botswana, *U. (U.) phoridarum* n. sp. ex. *Dohrniphora vorax*, from Sulawesi and *U. (U.) costaricensis* n. sp. ex. *Dohrniphora divaricata*, from Costa Rica. All four new species are represented by their deutonymphal stages only.

Key words - Phoretic mites, insect associated mites, Acari, Polyaspididae, *Uroseius*, Costa Rica, Botswana, Sulawesi, Zimbabwe.

INTRODUCTION

The mites that are reported here were collected by Dr. Henry Disney from Phoridae (Diptera) from different parts of the world i.e., Southern Africa, Eastern Asia and Central America. This collection includes, among others, 4 new species of the genus *Uroseius* Berlese, 1888, only represented by their deutonymphal stages, phoretic on Phoridae (Diptera). These phorid flies belong to the genus *Dohrniphora* Dahl. that includes more than 100 species distributed in all parts of the tropics and subtropics, and is now also well established in England (Disney, 1983).

The genus *Uroseius* has been extensively studied by Hirschmann and Zirngiebl-Nicol (1965, 1967, 1969), Hirschmann and Wisniewski (1993) and Wisniewski (1979). A key to this genus has been given by Karg (1989). This genus has been divided into 2 subgenera, i.e., *Uroseius* s.str., Berlese, 1888 (type species: *U. acuminatus* (C.L. Koch, 1847)) and *Apionoseius* Berlese, 1904 (type species: *Apionoseius lagenaeformis* Berlese, 1904). *Uroseius (U.)* included until now, 13 species, among which 4 are only represented by females. Deutonymphs have been observed in 9 species and for 4 species, the deutonymph is the only known stage. The 4 new species described below belong to *Uroseius* s. str.

Until now, only 1 species, i.e. *U. acuminatus*, had been recorded from Phoridae (Hirschmann and Wisniewski, 1993, and Fain and Greenwood, 1991). The discovery of 4 new species of the genus *Uroseius (Uroseius)* from these hosts suggests that the fly family Phoridae is probably more closely associated with these mites than it was thought so far.

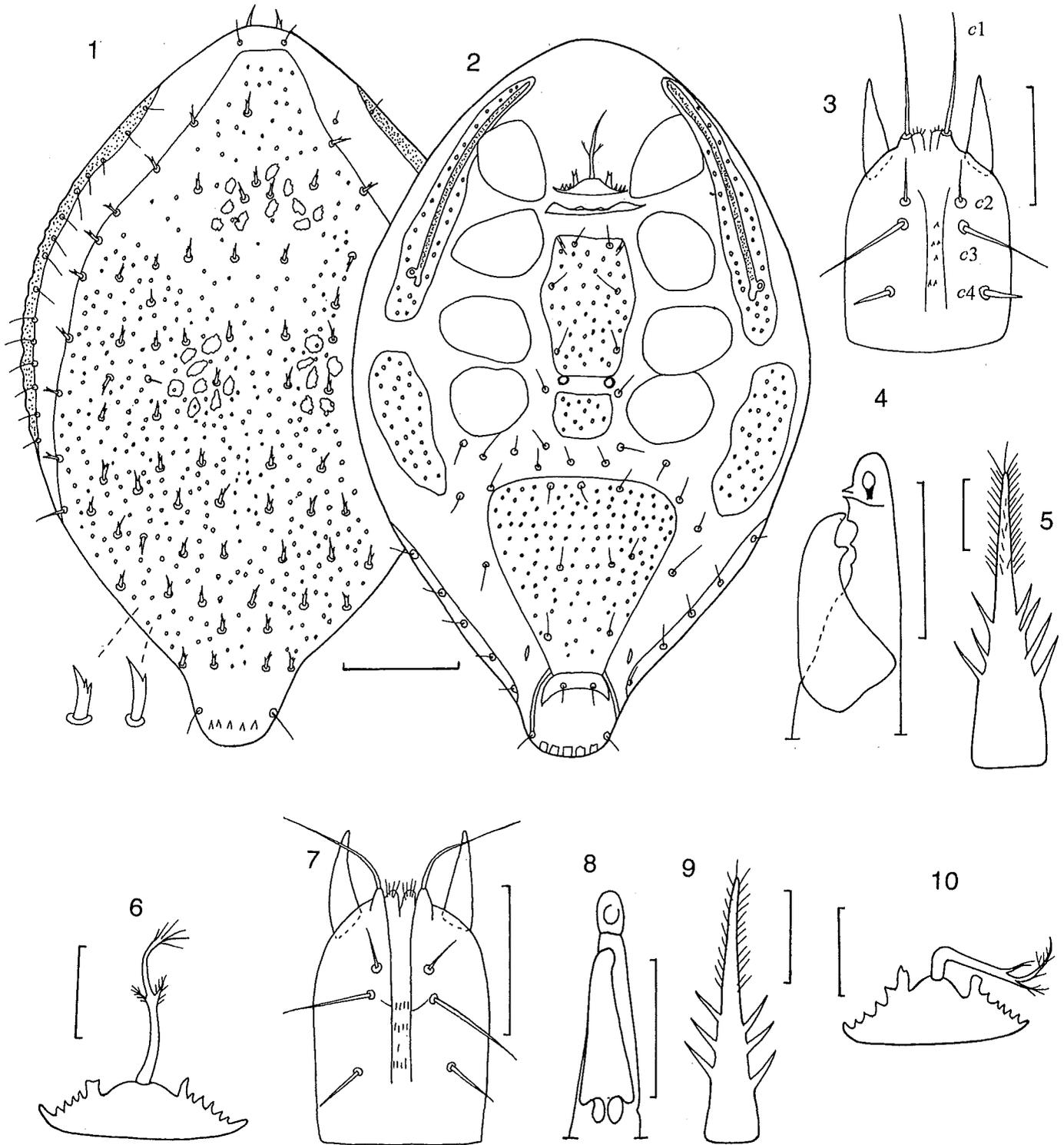
All measurements are in micrometers (μm). Abbreviations used are: IRSNB = Institut royal des Sciences naturelles de Belgique.

MESOSTIGMATA: UROPODINA
Family POLYASPIDIDAE Berlese, 1917
Genus *Uroseius (Uroseius)* Berlese, 1888

***Uroseius (Uroseius) disneyi* n. sp.**
(Figs. 1-6)

This new species is named for Dr. R.H.L. Disney, University of Cambridge, England, who collected the mites.

Deutonymph, holotype (Figs. 1-6) - Idiosoma pear-shaped, 630 long, 390 wide (paratype 638 \times 405). *Dorsum*: With a very large shield carrying approximately 50 pairs of short (8-12 long) curved setae; these setae inflated



Figs. 1-6. *Uroseius (U.) disneyi* n. sp. (Deutonymph) - 1. dorsum, 2. venter (scale lines -100 μ m), 3. gnathosoma, 4. cheliceral digits, 5. epistome, 6. tritosternum (scale lines, Fig. 3 - 50 μ m; Figs. 4, 5, 6 - 25 μ m). Figs 7-10. *Uroseius (U.) botswanensis* n. sp. (Deutonymph) - 7. gnathosoma, 8. cheliceral digits, 9. epistome, 10. tritosternum (scale lines, Fig. 7 - 50 μ m, Figs. 8, 9, 10 - 25 μ m).

at base, bearing 1 (rarely 2) small tooth in median part. Shield finely punctate, bearing numerous small, rounded pits, completely devoid of lines or reticulations except for few, poorly developed, muscular attachment sites (sigillae). Lateral margins of dorsum with a narrow sclerotized band carrying about 15 pairs of thin, short needle-shaped setae. *Venter* (Fig. 2): A transverse sclerite separates tritosternum from sternal region. Sternal shield divided into an anterior part, 135 long, 80 wide, bearing 3 pairs of small setae, a pair of lyrifissures, posterior part 42 long, 40 wide. Both parts pitted as in dorsal shield, two parts of shield connected by a poorly sclerotized non-pitted area carrying a pair of small pores surrounded by thick sclerotized rings. Ventrianal shield trapezoidal, 165 long, 152 wide (maximum width), bearing 10 short, thin setae. Metapodal shields (= inguinale) ellipsoidal, about three times as long as wide. Peritremes 210 long, located on relatively narrow shields. All ventral shields densely covered with small to very small rounded pits. *Gnathosoma* (Figs. 3-4): Corniculi strong, 40 long; laciniae (= internal malae) short, with short setules; lengths of setae *c*1, *c*2, *c*3, *c*4: 42, 15, 30, 15, basal third of *c*1 slightly inflated and *c*4 spinous, all setae smooth. Deutosternum with 4 transverse rows of 1-2-1-2 denticles. Chelicerae 210 long, movable digit 30, with a strong tooth. Epistome (Fig. 5) (= tectum) 84 long, basal half with 3 and 4 strong spine-like projections, apical third setulose. Palp trochanter with 2 smooth, very unequal setae (13 and 55 long, respectively). Tritosternum (Fig. 6) very wide (50), anterior border with 9-10 triangular teeth and 1 pair of longer, blunt projections; laciniae 50 long, bearing a little beyond its median part, 2 short setulose branches and apically 5 to 6 setules.

Host and locality: The holotype and paratype (both deutonymphs) were attached to the abdomen of *Dohrniphora rostrata* (female) (Diptera: Phoridae), 7 miles from Mt Selinda, Chipinga, Zimbabwe, coll. R. Disney, 16 April 1970 (T.29302004, N° 26-10), holotype and paratype in the IRSNB.

Remarks - The differences between this species and the other members of the subgenus *Uroseius* are summarized in the key.

***Uroseius (Uroseius) botswanensis* n. sp.**
(Figs. 7-12)

Deutonymph, holotype (Figs. 7-12) - Idiosoma pear-shaped, 660 long, 438 wide. *Dorsum*: With large shield covering almost entire dorsum, bearing very numerous small pits, except on anterior quarter, posterior fifth devoid of pits. Shield bearing about 60 to 70 pairs of short, non-toothed setae (8 to 16 long), most slightly inflated basally, except very thin setae situated on shield margins.

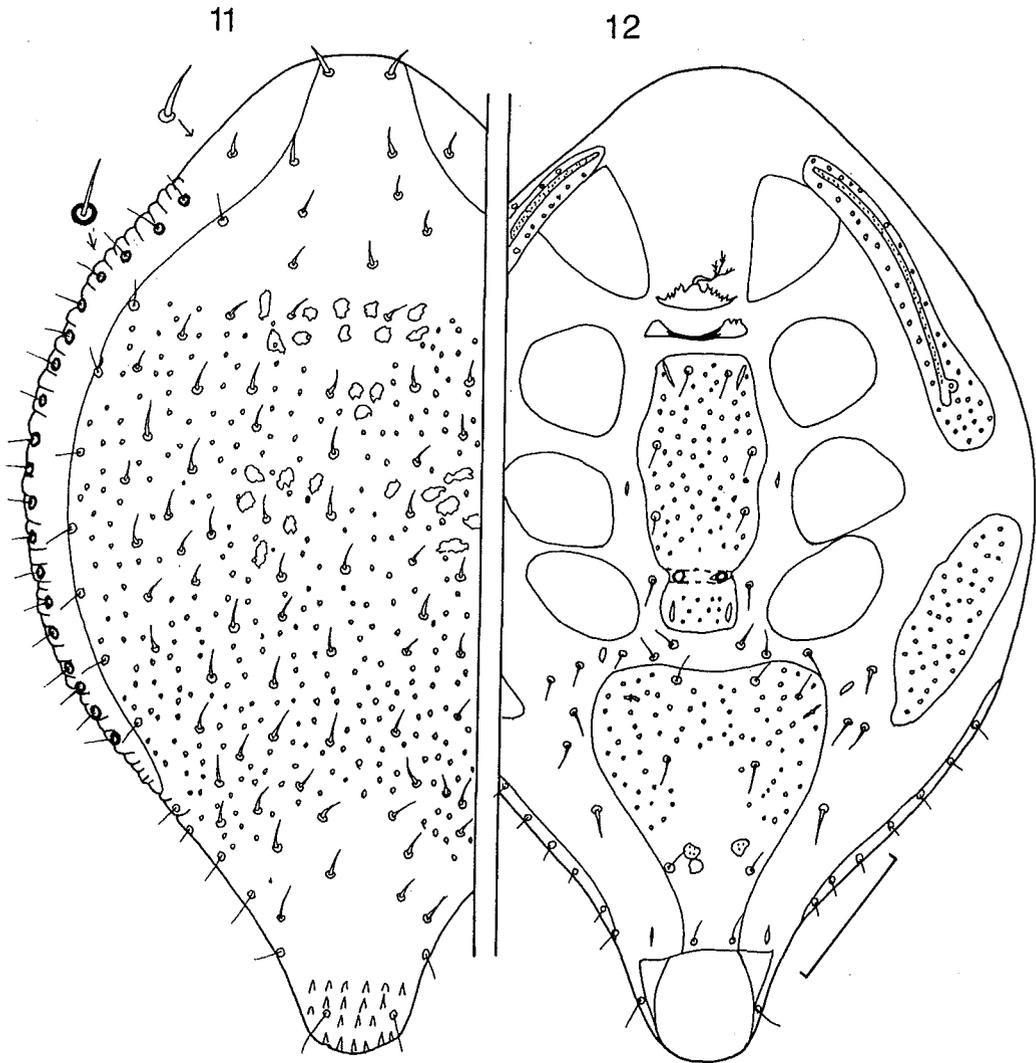
Surface of shield without pattern of lines or reticulum. Lateral margins of dorsum, outside shield with a longitudinal row of about 20 thin setae inserted on small, sclerotized rounded shields. A marginal sclerotized band absent. *Venter*: A transverse sclerite, inflated at both extremities, separates tritosternum from sternal shield. Sternal shield 189 long, 93 wide (maximum width), bearing 3 pairs of thin setae, posterior 1 pair of pores surrounded by thick strongly sclerotized rings. Ventrianal shield trapezoidal, 210 long, 159 wide (maximum width), bearing 9 thin setae 12-15 long. Metapodal shields much longer than wide. Peritremes 220 long, peritrematal shields poorly distinct. All ventral shields with numerous small pits, except posterior ventrianal shield where pits are absent. *Gnathosoma* (Figs. 7-8): Corniculi strong, 36 long; laciniae short, with setules; setae *c*1, *c*2, *c*3, *c*4 smooth, 43, 16, 34 and 15 long respectively. Deutosternum with 5 rows of 5-4-1-4 denticles. Epistome 60 long, basal half with 3 pairs of strong lateral spine-like projections. Chelicerae 220 long, movable digit 28 long. Palptrochanter with 2 smooth and unequal (12 and 50 long) setae. Tritosternum (Fig. 10) 45 wide, with 9 triangular teeth, and 1 pair of blunt projections. Lacinia as in *U. disneyi*.

Host and locality - The holotype deutonymph is the only known specimen, and was attached to the abdomen of *Dohrniphora diminuens* (female) (Phoridae), from Kugana (woodland), 19°04'S, 23°03'E, Botswana. Fly collected by B. Lamoral (19/24 November 1980), from Malaise Trap (5-112), holotype in IRSNB

Remarks - This species is close to *U. (U.) disneyi*. However, it differs from the latter by the following characters: Setae on dorsal shield smooth, teeth absent, marginal setae of dorsum off shield not on sclerotized band but on small rounded sclerotized shields, sternal shield entire (see the key).

***Uroseius (Uroseius) phoridarum* n. sp.**
(Figs. 13-18)

Deutonymph, holotype (Figs. 13-18) - Idiosoma broadly ovoid, 570 long, 450 wide, slightly narrowed at about 100 µm from posterior extremity. Paratype: 558 long, 435 wide. *Dorsum*: With very large finely punctate shield carrying very numerous rounded pits larger on lateral parts of shield than on median part. Lines or reticulum absent except on anterior part of shield, bearing 3 pairs of lateral lines. Muscular insertion sites (sigillae) poorly developed. Shield with about 60 pairs of short setae (12 to 20 long), slightly dilated basally, but not toothed. Marginal setae of shield set on shield and not on sclerotized band. Outside shield body margins bearing a row of about 20 setae (at both sides of body) similar to scutal setae but inserted on small individual shields. *Venter*: Transverse



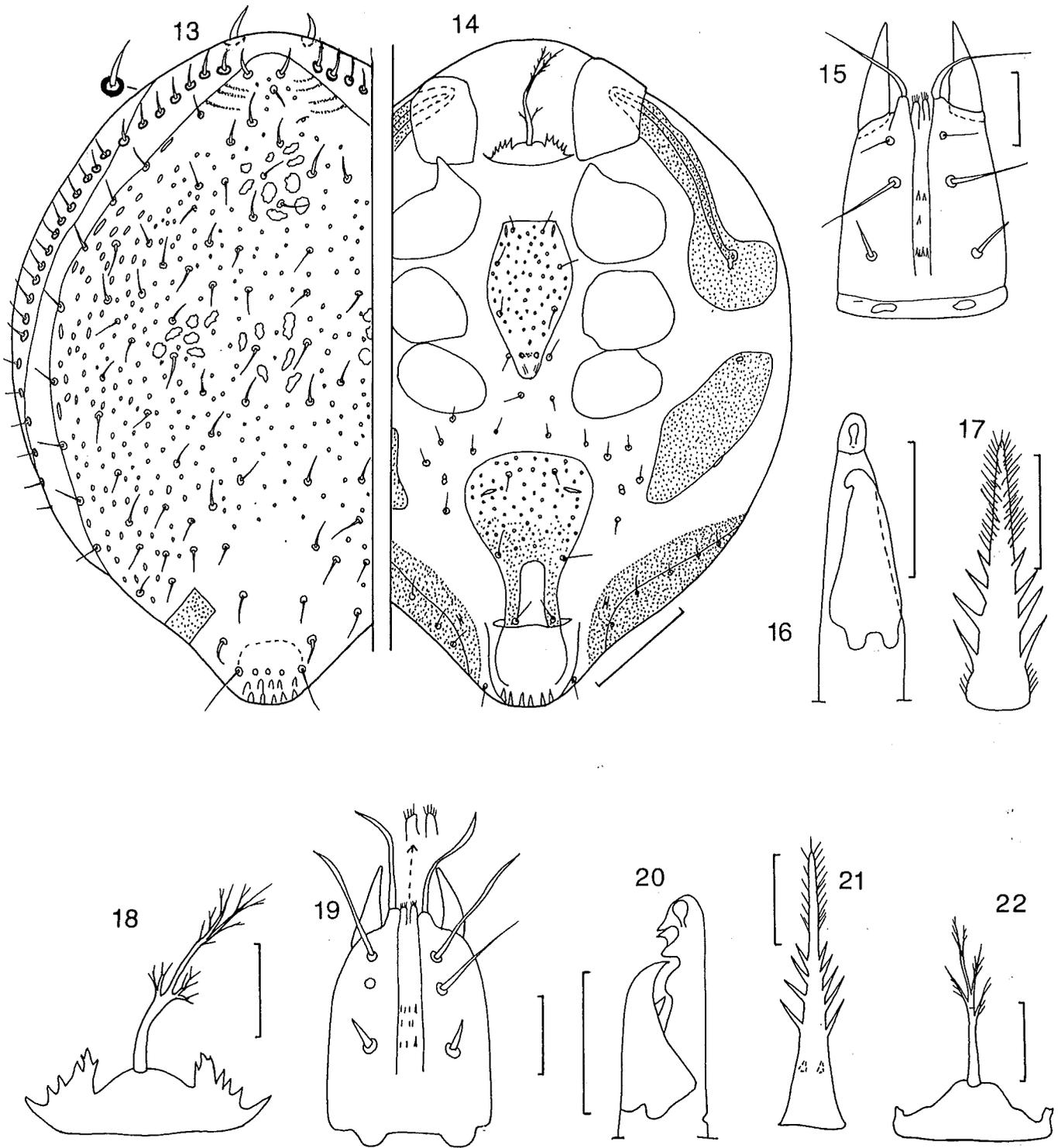
Figs. 11-12. *Uroseius (U.) botswanensis* n. sp. (Deutonymph) - 11. dorsum, 12. venter (scale line - 100 μ m).

sclerite between tritosternum and sternal shield absent. Sternal shield 138 long, 75 wide (maximum width), bearing 3 pairs of sternal setae and 2 pairs of lyrifissures. Posterior extremity of shield strongly narrowed. A pair of pores surrounded by strongly sclerotized rings present at level of sternal 3. Ventrianal shield 150 long, 108 wide (maximum), bearing 3 pairs of short and thin setae. Metapodal shields longer than wide, with a pore on posterior border. Dorsal shield reflected on ventral surface in posterior region of body. Peritreme 186 long, with a peritrematal shield. Sternal and ventrianal shields strongly pitted, while metapodal and peritrematal very finely punctate. *Gnathosoma* (Figs. 15-16): Corniculi 42 long, laciniae short, setulose, setae *c*1, *c*2, *c*3, *c*4 45, 16, 42 and 16 long respectively. Deutosternal teeth on 3 transverse rows of 2-1-4 denticles. Epistome (Fig. 17) 70 long, with 4 pairs lateral, strong spine-like projections on its basal half.

Chelicerae 210 long, movable digit 30 long, with a triangular tooth. Tritosternum (Fig. 18): Base 60 wide, bearing 3 to 4 pairs triangular teeth anteriorly and a more internal pair long, blunt projections; lacinia 65 long, bearing 2 setulose branches on basal third, and 3 setulose branches on apical third. Palptrochanter with 2 ventral setae, 12 and 54 long respectively.

Host and locality - Holotype and 1 paratype (both deutonymphs) from *Dohrniphora vorax* (male) (Diptera: phoridae) (attached to the abdomen) from Utara, Dumogaone, N.P., Torant Forest (56), Sulawesi. Project Wallace, 20 January 1985 (coll. H.H. Disney) (16-92), types in IRSNB.

Remarks - This species is well separated from the other species in the subgenus by the characters listed in the key.



Figs. 13-18. *Uroseius (U.) phoridarum* n. sp. (Deutonymph) - 13. dorsum, 14. venter (scale lines - 100 μ m), 15. gnathosoma, 16. cheliceral digits, 17. epistome, 18. tritosternum (scale lines - 25 μ m). Figs. 19-22. *Uroseius (U.) costaricensis* n.sp. (Deutonymph) - 19. gnathosoma, 20. cheliceral digits, 21. epistome, 22. tritosternum (scale lines - 25 μ m).

***Uroseius (Uroseius) costaricensis* n. sp.**
(Figs. 19-24)

Deutonymph, holotype (Figs. 19-24) - Idiosoma pear-shaped, 710 long, 490 wide. *Dorsum*: With large shield devoid of line pattern, with very small pits distributed along 9 longitudinal well-defined lines, with 45-50 pairs of acicular setae, 15 to 30 long. Shield separated from margins of dorsum by a broad, scaly, sclerotized band bearing at each side about 12 pairs short acicular setae. Lateral margins of idiosoma with 35-40 pairs of thin, short acicular setae inserted on round, sclerotized, individual ringlets. *Venter*: All ventral shields densely covered with relatively large pits. A well-developed sclerotized, pitted band (20 long, 105 wide) separates tritosternum from sternal shield, latter 165 long, 82 wide (maximum width), with 4 pairs thin setae. Ventrianal shield trapezoidal, 228 long, 174 wide (maximum width), bearing 4 pairs thin setae; posterior shield incomplete. Metapodal shields reniform. Peritreme slightly curved, with large peritrematal shield. *Gnathosoma* (Figs. 19-20): Corniculi 35 long. Setae *c1*, *c2*, *c3* and *c4* smooth, 36, 42, 27, and 13 long respectively; *c1* and *c2* narrowly foliate in apical half. Chelicerae 225 long, movable digit 25 long, with one strong tooth. Deutosternum with 3 transverse rows of 4-3-3 unequal denticles. Epistome 72 long, with 3 lateral pairs of strong spine-like projections on basal two thirds. Palp-trochanters with 2 unequal setae, 12 and 55 long. Base of tritosternum 48 wide, with pair of short, blunt, lateral projections, lacinia 44 long, ending into 5 poorly setulose branches.

Host and locality - The holotype, the only known specimen, was attached to the abdomen of a female fly, *Dohrniphora divaricata*, collected by Dr. H. Disney (6 January 1990), in the nest of *Nasutitermes ephratae* at Salsipaldes, Costa Rica (n° T2305-05758) (26-13), type deposited in IRSNB.

Remarks - This new species is the closest to *U. (U.) vitzthumi* Hirschmann and Zirngiebel-Nicol, 1969, from unknown origin. It differs clearly from this species by several important characters which are detailed in the key.

**Key to the species of the genus *Uroseius (Uroseius)*
(Deutonymphs)**

1. Setae *c2* short, not reaching bases of *c1* and generally very thin.....3
Setae *c2* stronger and much longer than distance between bases of *c1* and *c2*.....2
2. Setae *c2* distinctly shorter than *c1*, both setae with apical half finely attenuated and not foliate. Sternal shield strongly narrowed posteriorly, ratio length/ width = 3.4 : 1. Peritreme bent in its anterior third, stigmata

at level of anterior border of coxa III. Dorsal shield completely covering dorsum. Marginal setae on a sclerotized band. Dorsal longitudinal rows of pits poorly defined. Base of tritosternum with a pair of anterior triangular projections removed from lateral extremities. Locality and host : unknown.....

...*U. vitzthumi* Hirschmann & Zirngiebel-Nicol, 1969

Setae *c2* longer (42) than *c1* (36), both foliate in their distal half. Sternal shield broadly rounded posteriorly, ratio length/ width = 2 : 1. Peritremes almost straight, stigmata at level of posterior border of coxa II. Dorsal shield narrower, separated from body margins by large scaly-like band bearing a row of 12 thin setae. Margins of body at both sides with a row of about 35-40 acicular setae inserted into round sclerotized ringlets, surface of shield with 9 well-defined longitudinal rows of pits. Tritosternum with a pair of short blunt lateral projections. From *Dohrniphora divaricata*, Costa Rica.....

.....*U. costaricensis* n. sp.

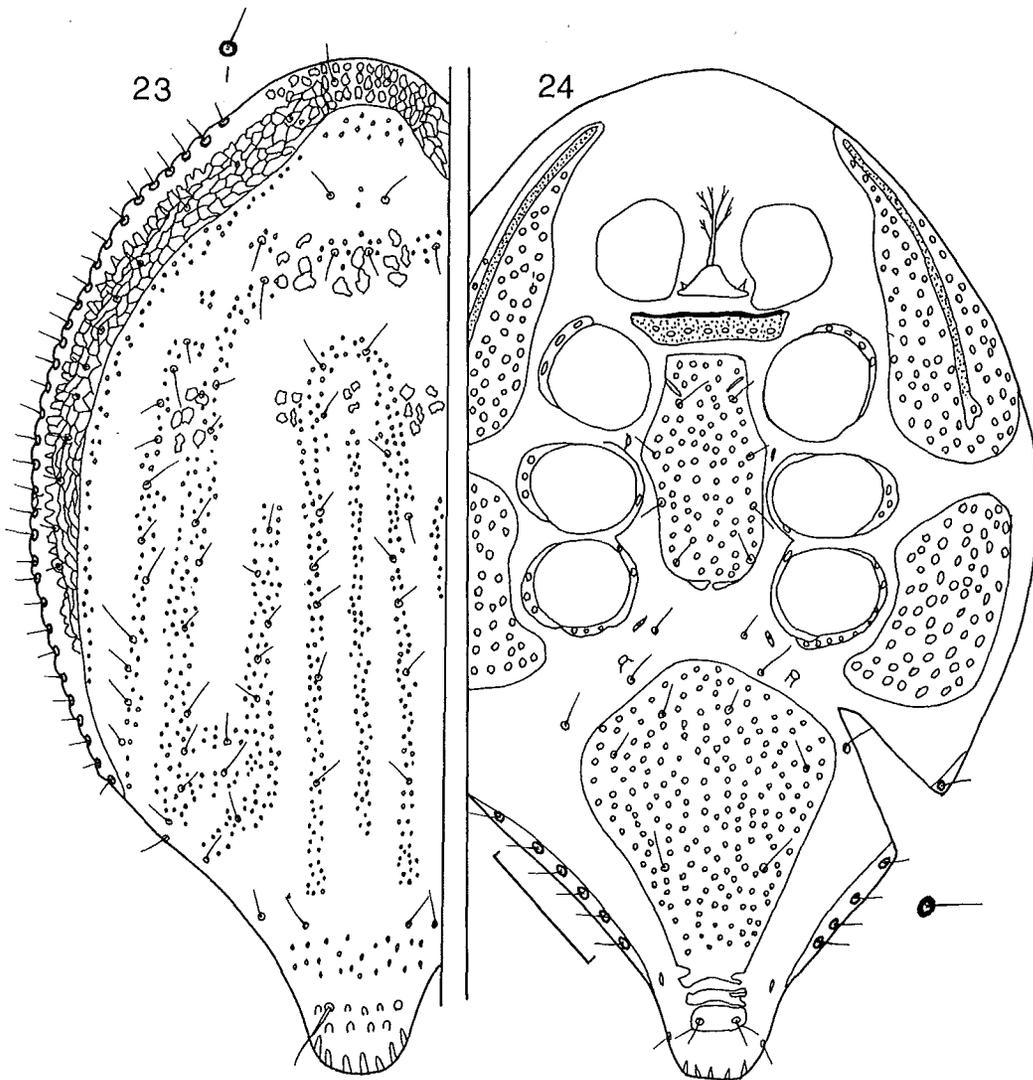
3. Dorsal shield with only smooth setae, variable length, either acicular or thickened bases.....6

Dorsal shield with short setae, apical half with 1 or several small teeth.....4

4. Dorsal shield without pattern of lines, bearing numerous small pits and slightly curved setae; with a thick base, and tapering apically, apical half with 1 or 2 small teeth. Margins of dorsum with a sclerotized band, bearing 15 pairs of acicular setae. Sternal shield divided into two parts, a long anterior and a short posterior portion. Ventrianal shield large and trapezoidal. A transverse sclerite present in front of sternal shield. All ventral shields with numerous small pits. Base of tritosternum with 9 triangular teeth and 2 larger blunt projections. From *Dohrniphora rostrata*, Zimbabwe.....*U. disneyi* n. sp.

Dorsal shield with network of lines, devoid of pits. Setae of dorsal shield very small, either brush-shaped and bifid apically or spindle-shaped with a preapical tooth. Sternal shield entire. Ventrianal shield either trapezoidal or with anterior part very wide and ellipsoidal.....5

5. Dorsal shield with sclerotized pattern formed of very small rounded cells and bearing brush-shaped bifid setae. Few cylindrico-conical, short, setulose setae present on posterior and front of shield. Most lateral brush-shaped setae inserted on apparently unsclerotized band, divided into rectangular platelets and removed from borders of body. Ventrianal shield with anterior part very wide, ellipsoidal; posterior part very small and excavated posteriorly (From Hirschmann & Zirngiebel, 1965, Fig. 127 and



Figs. 23-24. *Uroseius (U.) costaricensis* n. sp. (Deutonymph) - 23. dorsum, 24. venter (scale lines - 100 µm).

1969, Fig. 108). From Europe.....
*U. hunzikeri* Schweizer, 1922
 Dorsal shield with sclerotized network of lines formed of elongate cells bearing numerous, very small spindle-shaped setae, with a small preapical tooth. Dorsum without setulose setae, with about 40 pairs of marginal setae inserted on soft cuticle. Ventrianal shield trapezoidal, bearing 7 pairs of setae. Setae *c*1 short, with narrow spines. In nests of Formicidae, Poland*U. koehleri* Wisniewski, 1979
 6. Dorsal and marginal setae short, not stalked.....7
 Dorsal shield with numerous long, flexible setae (about 60 long). Body margins with about 50 pairs of setae, longer and much thicker than former and pedunculate. From Ecuador.....
*U. tuberosus* Hirschmann & Hiramatsu, 1971

7. Dorsal shield with a network of mostly longitudinal lines resulting in formation of small elongate cells. Dorsal setae acicular. Base of tritosternum with only 2 anterior triangular projections, laciniae with 4 or 6 branches. Ventrianal shield trapezoidal. Peritremes short..... 9
 Dorsal shield without a network of lines but with numerous small pits. Dorsal setae either with slightly inflated bases or acicular. Margins of dorsum without a lateral band but with numerous setae inserted on soft cuticle into thick sclerotized individual ringlets. Base of tritosternum with 8-10 triangular projections. A presternal transverse sclerite present or absent.....8

8. Presternal transverse sclerite present. Sternal plate divided into two parts, set close together, anterior longer and wider than posterior one. Metapodal and peritrematal shields pitted. From *Dohrniphora diminuens*, Botswana.....*U. botswanensis* n. sp.
- Presternal transverse sclerite absent. Sternal plate entire but strongly narrowed posteriorly. Metapodal and peritrematal shields punctate without pits. From *Dohrniphora vorax*, Sulawesi.....
.....*U. phoridarum* n. sp.
9. Ventrianal shield with 4 pairs of setae. Lacinia of tritosternum with 6 branches. Dorsum with marginal setae inserted on a sclerotized band (outside dorsal shield). Setae *c*1 very short spines, as long as *c*2 but thicker. From Europe and Africa.....
.....*U. acuminatus* (C.L.Koch, 1847)
- Ventrianal shield with 5 pairs of setae. Lacinia of tritosternum with 4 branches. Marginal setae of dorsum variable.....10
10. Dorsal marginal setae (outside shield) inserted on a sclerotized band. Metapodal shields short, oval, twice as long as wide. Setae *c*1, *c*2 short, subequal in length; *c*1 slightly more dilated basally. From Europe and N. Africa.....
U. traegardhi Hirschmann & Zirngiebl-Nicol, 1969
- Dorsal marginal setae inserted on soft cuticle. Metapodal shields elongate, about 3 to 3.5 times as long as wide.....11
11. Bases of marginal setae not surrounded by small individual sclerotized shields. Setae *c*1 small spines, *c*2 a very thin and short seta.....
.....*U. myrmecophilus* Wisniewski, 1979
- Bases of marginal setae surrounded by small oval individual sclerotized shields. Setae *c*1 much thicker, twice as long as *c*2.....
.....*U. degeneratus* Oudemans, 1913

GAMASINA

Family LAELAPIDAE Berlese, 1892

Genus *Hypoaspis* Canestrini, 1885

Hypoaspis sp.

Two deutonymphs, tentatively assigned to the genus *Hypoaspis*, were found attached to *Ecitophora breviptera* Disney, in the nest of *Eciton burchellii* in the Puntarenas

Province, Monteverde Biological Reserve, 1700 m. (1 January 1991), Costa Rica (5773) (Kistner, 26-18).

ASTIGMATA

Family HISTIOSTOMATIDAE Berlese, 1897

Histiostoma feroniarum Dufour, 1839

This cosmopolitan species is represented in our collection by a single deutonymph collected from *Megaselia pulicaria* (female), from Dinton Pastures, Becks, 5 September 1993, England (n° 41/7772).

REFERENCES

- Disney, R.H.L. 1983. Scuttle flies, Diptera, Phoridae (except *Megaselia*). Handbk. ident. Brit. Insects, 10 (6): 1-81.
- Fain, A. and M.T. Greenwood. 1991. Notes on a small collection of mites (Acari), phoretic on Diptera, mainly Phoridae, from the British Isles. Bull. Inst. r. Sci. nat. Belg., Ent., 61: 193-197.
- Hirschmann, W. and J. Wisniewski. 1993. Acari Parasitiformes Supercohors Atrichopygidiina. Die Uropodiden der Erde. Acarologie, Schriftenreihe für Vergleichende Milbenkunde, Folge 40: 1-466. Hirschmann. Verlag Nürnberg.
- Hirschmann, W. and I. Zirngiebl-Nicol. 1965. Gangsystematik der Parasitiformes, Uropodiden Bestimmungstabellen von 300 Uropodiden-Arten. Acarologie Folge 8, Teil 9, Seite 12-14, Tafel 5-6.
- Hirschmann, W. and I. Zirngiebl-Nicol. 1967. Gangsystematik der Parasitiformes, Die Gattung *Uroseius* Berlese, 1888. Folge 10, Teil 18, Seite 6-7.
- Hirschmann, W. and I. Zirngiebl-Nicol. 1969. Gangsystematik der Parasitiformes, Folge 12, Teil 41, Seite 35-36, Tafel 3-4 und Teil 56, Typus der Gattung *Uroseius* Berlese, 1888, Seite 72-76, Tafel 14-15.
- Karg, W. 1989. Acari (Acarina), Milben Unterordnung Parasitiformes (Anactinochaeta) Uropodina Kramer, Schilkrötenmilben). Die Tierwelt Deutschlands 67, Teil. Ed. Gustav Fisher, Verlag Jena: 1-203.
- Wisniewski, J. 1979. Gangsystematik der Parasitiformes. Studien von 2 neuen *Uroseius* (*Uroseius*) Arten aus Ameisennestern Polens. Folge 25, Teil 316, Seite 43-46, Tafel 6, Abb. 40-41.