

A systematic review of the feather mite genus *Bychovskiata* DUBININ (Analgoidea: Avenzoariidae) with description of 11 new species

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ABSTRACT: The paper includes an improved diagnosis of the feather mite genus *Bychovskiata* DUBININ, 1951, brief comments on a taxonomy and host-parasite associations to species formerly described, and formal descriptions of 11 new species from waders (Charadrii and Scolopaci): *Bychovskiata placidi* sp. n. from *Charadrius placidus*, *B. dubia* sp. n. from *Ch. dubius*, *B. africanera* sp. n. from *Ch. tricollaris*, *B. melanopsi* sp. n. from *Ch. melanops*, *B. vociferi* sp. n. from *Ch. vociferus*, *B. hypoleuci* sp. n. from *Actitis hypoleucos*, *B. macularii* sp. n. from *A. macularia*, *B. tricolor* sp. n. from *Vanellus tricolor*, *B. falclandica* sp. n. from *Charadrius falclandicus*, *B. obscura* sp. n. from *Ch. obscurus*, and *B. ehrnsbergeri* sp. n. from *Ch. modestus*. The systematics of the genus and relationships of certain species and species groups are briefly discussed. A key to all the species of the genus is presented.

KEYWORDS: Acari, Avenzoariidae, *Bychovskiata*, new taxa, systematics, Charadriiformes, host-parasite relationships.

Introduction

The feather mites of the genus *Bychovskiata* DUBININ, 1951 (Avenzoariidae: Avenzoariinae) are associated with certain bird families of the order Charadriiformes, mainly with plovers (Charadriidae) and related families of waders (Haematopodidae, Recurvirostridae, Ibidorhynchidae) and also with two sandpipers of the genus *Actitis* (Scolopacidae).

The genus *Bychovskiata* originally included six species: *Bychovskiata squatorolae* (CANESTRINI, 1878), *B. glareoli* DUBININ, 1951, *B. asuctio* DUBININ, 1951, *B. subcharadrii* DUBININ, 1951, *B. charadrii* (CANESTRINI, 1878), and *B. pseudocharadrii* DUBININ, 1951 (DUBININ, 1951; 1956). GAUD (1972) had added one new species *B. nudidora*, and excluded *B. glareoli* and *B. asuctio*, which actually belonged to the genus *Freyanomorpha* (Freyanoidea: Freyanidae). Further, CHIROV and MIRONOV (1985) had described one more species, *B. intermedia*.

In the frames of the general taxonomic and phylogenetic study of the feather mite family Avenzoariidae being carried out during several past years eight new species of the genus *Bychovskiata* have been described (MIRONOV, 1994a, 1994b, MIRONOV & DABERT, 1995). Meanwhile, a number of *Bychovskiata* species were recognized, but still not described. The present paper gives an improved diagnosis of the genus, descriptions of 11 new species, brief comments on a taxonomy and host associations of all *Bychovskiata* species formerly described, and a key to all species.

Material and Methods

The materials used in the present study was obtained from the feather mite collections of the University of Georgia (Athens, Georgia, USA), University of Michigan (Ann Arbor, Michigan, USA), Zoological Institute, Russian Academy of Sciences (St. Petersburg, Russia), A. Mickiewicz University (Poznan, Poland), Royal Museum of Central Africa (Tervuren, Belgium).

The descriptions of new species are given according to standard scheme, the nomenclature of the idiosomal chaetotaxy follows GRIFFITHS *et al.*, 1990. All measurements are given in micrometers. The description of holotype (male) and one allotype (female) are provided with a full set of measurements. Observed limits of measured characters in all paratype series are given only for an idiosomal size (length and width) and for certain discriminative characters. The BH-2 Olympus light microscope with NOMARSKY interference contrast for morphological analysis was used.

The type materials of new species are deposited at: US National Museum of Natural History (Washington, USA) - USNM; Zoological Institute, Russian Academy of Sciences (St. Petersburg, Russia) - ZISP; Zoological Museum Hamburg, (Germany) - ZMH; Zoological Museum, University of Michigan (Ann Arbor, Michigan, USA) - ZMUM.

Results

Bychovskiata DUBININ, 1951

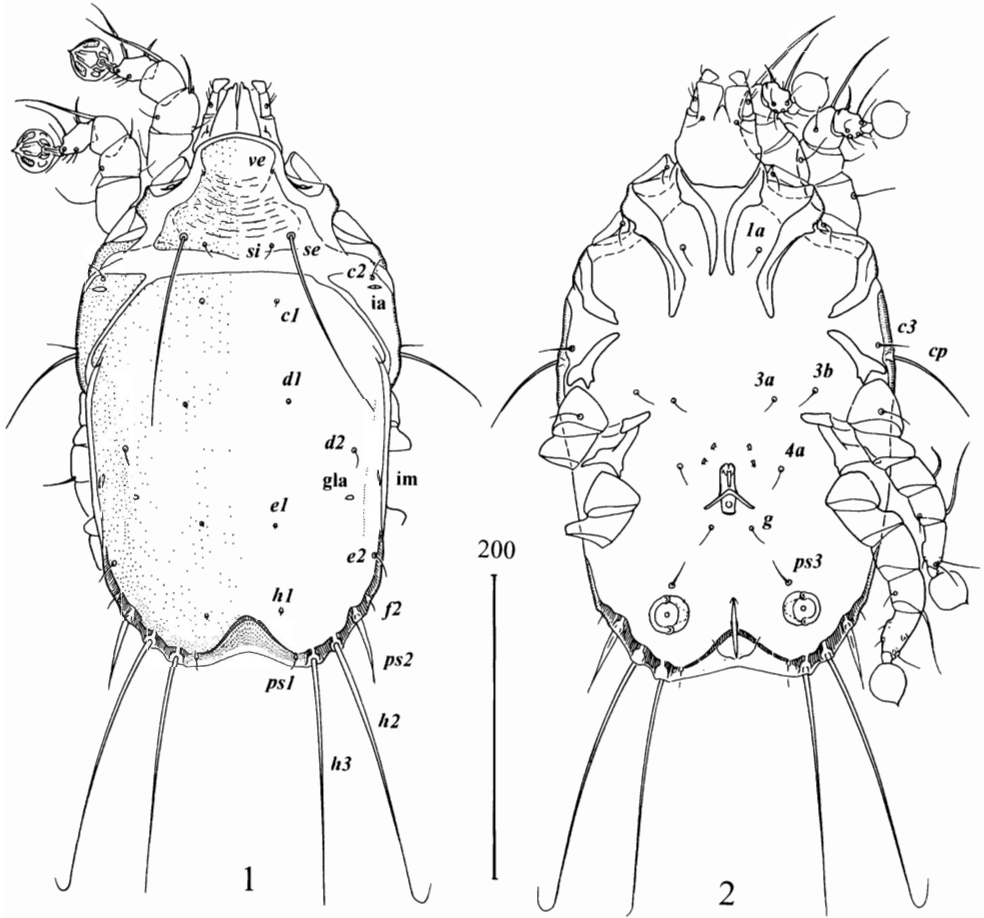
Type species: *Dermaleichus charadrii* CANESTRINI, 1878.

Prodorsal shield with extending posterior angles (Figs. 1, 11), or angles greatly reduced (Figs. 48, 64). Anterior angles of hysteronotal shield widely rounded. Epimeres I free. Bases of epimeres I and II connected by wide, heavy sclerotized bulk. Tips of epimeres III simple stick-like or T-shaped. Rudimentary setae *ve* may be present. Lateral setae *e2* small hair-like. Ambulacral disc diameter smaller than respective tarsus length.

Males. Tips of epimeres I not connected with epimeres II. Opisthosomal lobes variously shaped: triangular with rounded apex; tongue-like: short and wide, bluntly rounded; almost completely obliterated. Terminal cleft is also variable in shape: triangular with rounded bottom (Fig. 54), wide semicircular or almost rectangular (Figs. 26, 43, 67), or very short V-shaped with rounded bottom (Figs. 1, 2). Interlobar membrane either wide, spreading along all the cleft margin up to setae *h3*, or looks like narrow band along posterior margin of opisthosoma (Figs. 6, 7). Setae *f2* small hair-like; *ps2* lanceolate. Aedeagus small stiletto-like, or in certain species modified into a big hook- or whip-like structure (*B. pseudocharadrii*, *B. intermedia*, *B. ehrnsbergeri*, *B. perforata*). Epiandrum usually absent, if present (*pseudocharadrii* group), formed as transversal bone-like sclerite (Figs. 34, 35) or as several separated fragments (Fig. 33). Paragenital sclerites absent. Adanal shields either present and shaped usually as one or two pairs of transversal sclerites (Fig. 29), or absent. Setae *ps3* situated on adanal shields or out of them. Corolla of adanal discs with two bulges or teeth. Legs III and IV are equal in size. Setae *d* and *e* of tarsus IV short stick-like or button-like surrounded by thin pulvillus.

Female. Posterior part of hysteronotal shield uniformly dotted, or sometimes with a pair of longitudinal lacunae (Fig. 38), or one non-paired lacuna (Figs. 44-46), or rarely some other pattern. Posterior end of opisthosoma widely rounded. Epigynum thick, semicircular.

The genus includes recently 25 species. Twenty species could be arranged into five distinct species groups (subgenera?) as follows: *charadrii*, *bidentata*, *pseudocharadrii*, *nudidorsa*, *subcharadrii*. Main diagnostic characters are given below. The rest five species (not grouped species) occupy rather independent position within the genus and could be considered as separate groups.



Figs 1-2 *Bychovskiata placidi* sp. n., male. 1 - dorsal view; 2 - ventral view.

charadrii species group

This group includes 9 species being most typical in appearance for the genus *Bychovskiata*. They are easily distinguished from other *Bychovskiata* species by small rounded extensions on lateral margins of hysteronotal shield in both sexes and widely rounded opisthosomal lobes in male. The group is distributed on plovers of the genus *Charadrius* (Charadriidae) and on sandpipers of the genus *Actitis* (Scolopacidae).

Both sexes: Lateral margin of hysteronotal shield with small rounded extensions. Lateral sclerite of epimeres IV acute. Epimeres III stick-like.

Male: Opisthosomal lobes short, widely rounded. Aedeagus small stiletto-like. Epiandrium absent. Setae *3a* posterior to *3b*. Setae *4a* at level of midlength of genital arc.

Female: Hysteronotal shield with a pair of lacunae or without lacunae. Posterior margin of opisthosoma between setae *h3* strongly sclerotized.

Bychovskiata charadrii (CANESTRINI, 1878)

(Figs 3, 13, 14)

Material examined: 10 males, 12 females (ZISP 1543) from *Charadrius hiaticula*, Russia, Kaliningrad region, 13.05.1957, I. BYKHOVSKAYA; 5 males, 7 females (ZISP 1539), from the same host, Russia, Barents Sea, Kharlov Isl., 18.06.1948, M. VOLKOVA; 2 males, 6 females (ZISP 3882), same host, Kazakhstan, Kyzyl-Orda region, Sary-Su river, 23.08.1986, S. V. MIRONOV; 2 males, 4 females (ZISP 3998), same host, Kazakhstan, Aktubinsk region, Chelkar, 5.09.1985, S. V. MIRONOV.

This species, the type species of the genus, was originally described from *Charadrius hiaticula* in Europe. Subsequently, several species of the genera *Charadrius* and *Actitis* were reported as its common hosts (DUBININ, 1956; GAUD, 1972, VASYUKOVA & MIRONOV, 1991). The present examination has shown that the Ringed Plover *C. hiaticula* is actually the only true common host of *B. charadrii*, while other species of the genera *Charadrius* (*C. placidus*, *C. dubius* and others) and *Actitis* have close related but distinct species of the *charadrii* group.

Bychovskiata placidi sp. n.

(Figs 1, 2, 11, 12)

Type data. Holotype male, paratypes 5 males, 6 females (ZMUM 64466) from *Charadrius placidus* (Charadriidae: Charadriinae), Central Japan, Sagami, 14.01.1917, coll. unknown. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH.

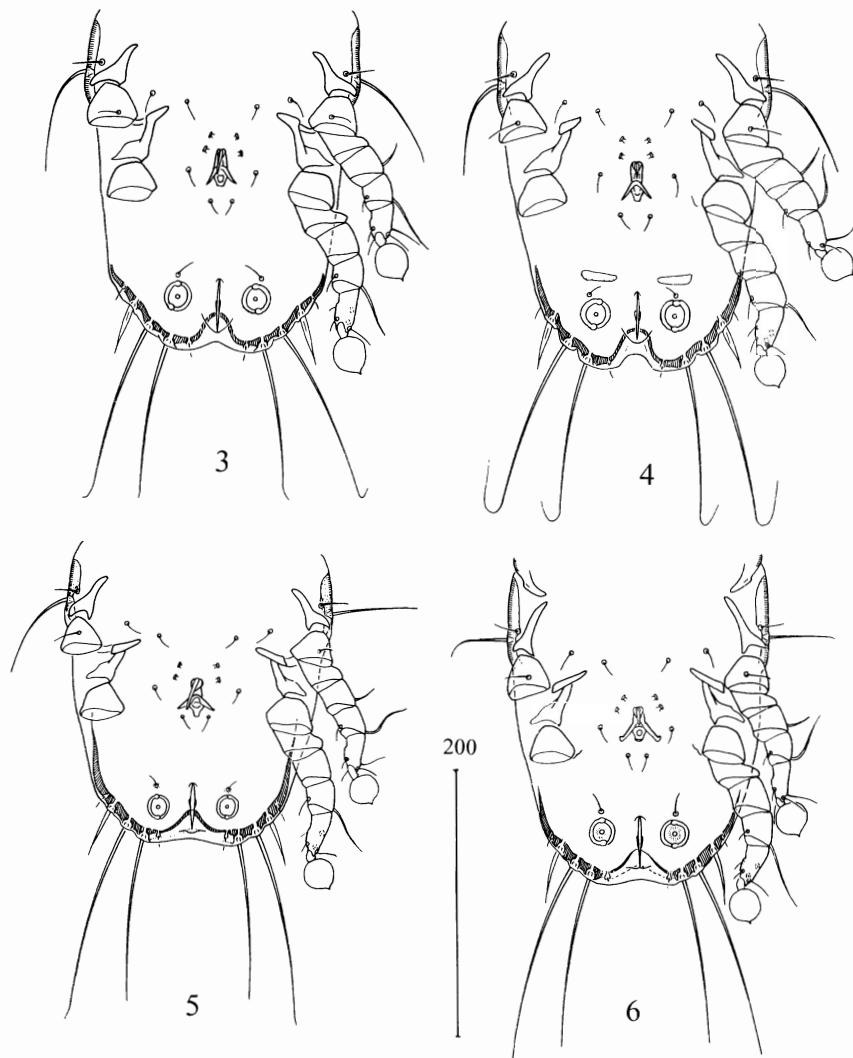
Additional material. 3 males, 8 females (ZISP 4146) from the same host, Russia, Far East, Maritime Territory, Olgino region, 9.05.1978, T. T. VASYUKOVA.

Etymology. The name "*placidi*" is derived from the specific host name.

Male. Length of holotype idiosoma 356, width of idiosoma 220 (paratypes 340-362 x 205-223). Prodorsal shield 84 x 110, with transversal striation; distance between setae *se* 71. Hysteronotal shield 250 x 199, lateral margins with small rounded extensions at level of setae *cp*. Setae *c3* situated out of humeral shield. Opisthosomal lobes short, widely rounded, almost obliterated. Terminal cleft as short and wide V with rounded bottom, length of cleft 33, width (distance *ps1-ps1*) 70. Interlobar membrane as narrow band along posterior margin of opisthosoma, depth of incision 7.2. Genital organ at level of trochanters IV. Genital arc 27 x 29, aedeagus about one half of genital arc length. Posterior acetabulae at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* slightly posterior to level of genital arc apex. Adanal shields absent, setae *ps3* on striated tegument. Diameter of adanal discs 24. Distance between setae: *h3-h3* 91, *3a-g* 80, *4a-g* 36, *g-ps3* 43, *ps3-ps3* 77. Setae *d* and *e* button-like.

Female. Length of allotype idiosoma 405, width of idiosoma 220 (paratypes 390-405 x 220-235) Prodorsal shield as in male, 87 x 110, with transversal striation, distance between setae *se* 71. Hysteronotal shield 303 x 211, lateral margins with small rounded extensions at level of setae *cp*, surface dotted, with a pair of heavy sclerotized longitudinal ridges. Setae *e1* and *h1* short, spine-like. Posterior margin of opisthosoma between setae *h3* with heavy sclerotized membrane. Distance between setae: *h3-h3* 72, *e1-e1* 48, *h1-h1* 58, *e1-h1* 34. Setae *ps1* situated on hysteronotal shield, anterior to *h3*. Epigynum 46 x 68. Width of primary spermaduct 5.0, internal spermaduct asymmetrical, 9.6 in width at base (paratypes 4.8-5.2 and 8.4-9.6 respectively). Legs IV extending to posterior end of opisthosoma.

Differential diagnosis. Both sexes of *Bychovskiata placidi* sp. n. easily differ from other species of the *charadrii* group by a transversal striation on the prodorsal shield (Figs 1, 2). Striated prodorsal shield have also *B. falclandica* sp. n. and *B. obscura* sp. n. However, males of these two species have a distinct terminal cleft (Figs 54 - 57) and females have another pattern in the opisthosomal part of hysteronotal shield (Figs 58, 60). In males of *Bychovskiata placidi* the opisthosoma terminus with the very short incision, about 5-7; in females the hysteronotal shield with two sclerotized crests.



Figs 3-6 Ventral view of male hysterosoma. **3** - *Bychovskiata charadrui* (CANESTRINI); **4** - *Bychovskiata semipalmati* MIRONOV & DABERT; **5** - *Bychovskiata dubia* sp. n.; **6** - *Bychovskiata melanopsi* sp. n.

Bychovskiata dubia sp. n.

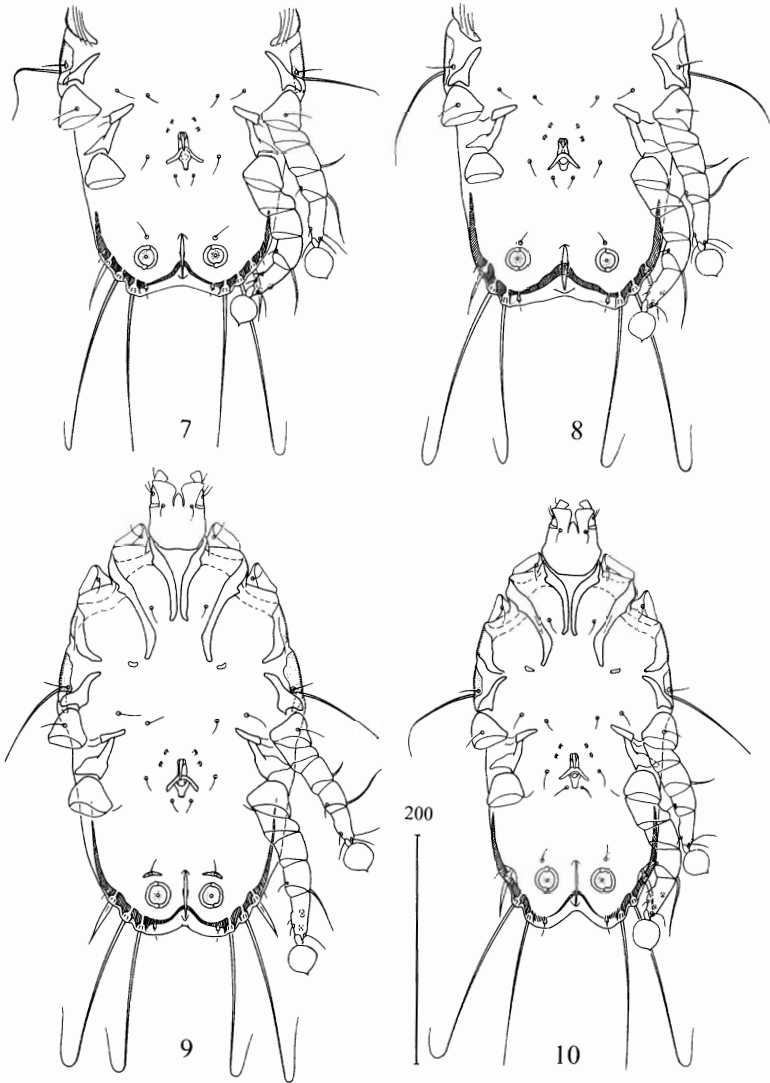
(Figs 5, 19, 20)

Type data. Holotype male, paratypes 5 males, 6 females (ZISP 3884) from *Charadrius dubius* (Charadriidae: Charadriinae), Kazakhstan, Kyzyl-Orda region, Sary-Su river, 19.08.1986, S. V. MIRONOV. Holotype - ZISP, paratypes - ZISP, ZMH.

Additional material. 15 males, 22 females (ZISP 1563) from the same host, Russia, Kaliningrad region, Rybachii, 25.04.1957, I. E. BYKHOVSKAYA.

Etymology. The name "*dubia*" is derived from the specific host name.

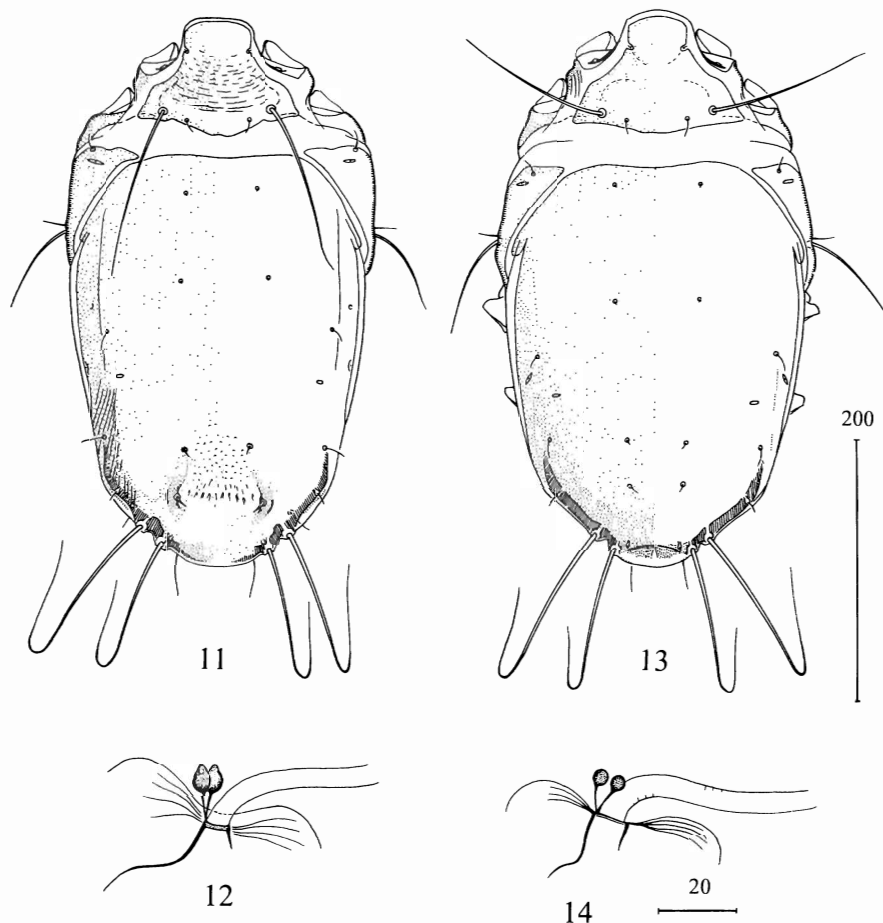
Male. Length of idiosoma 308, width of idiosoma 190 (305-320 x 190-200). Prodorsal shield 72 x 103, without striation; distance between setae *se* 65. Hysteronotal shield 210 x 160, lateral margins with small rounded extensions at level of setae *cp*. Setae *c3* on margin of humeral shield. Opisthosomal lobes widely rounded, almost



Figs 7-10 Ventral view of male hysterosoma. **7** - *Bychovskiata africanera* sp. n.; **8** - *Bychovskiata vociferi* sp. n.; **9** - *Bychovskiata hypoleuci* sp. n.; **10** - *Bychovskiata macularii* sp. n.

obliterated. Terminal cleft as very short and wide V with rounded bottom; length 22, width (distance *ps1-ps1*) 53. Interlobar membrane as narrow band along posterior margin of opisthosoma, depth of incision 5.5. Genital organ at level of trochanters IV. Genital arc 22 x 26, aedeagus small stiletto-like, extending to base of genital arc. Posterior acetabulae at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* slightly posterior genital arc apex. Adanal shields absent, setae *ps3* situated on striated tegument. Diameter of adanal discs 19. Distance between setae: *h3-h3* 73, *3a-g* 63, *4a-g* 19, *g-ps3* 50, *ps3-ps3* 57. Setae *d* and *e* button-like.

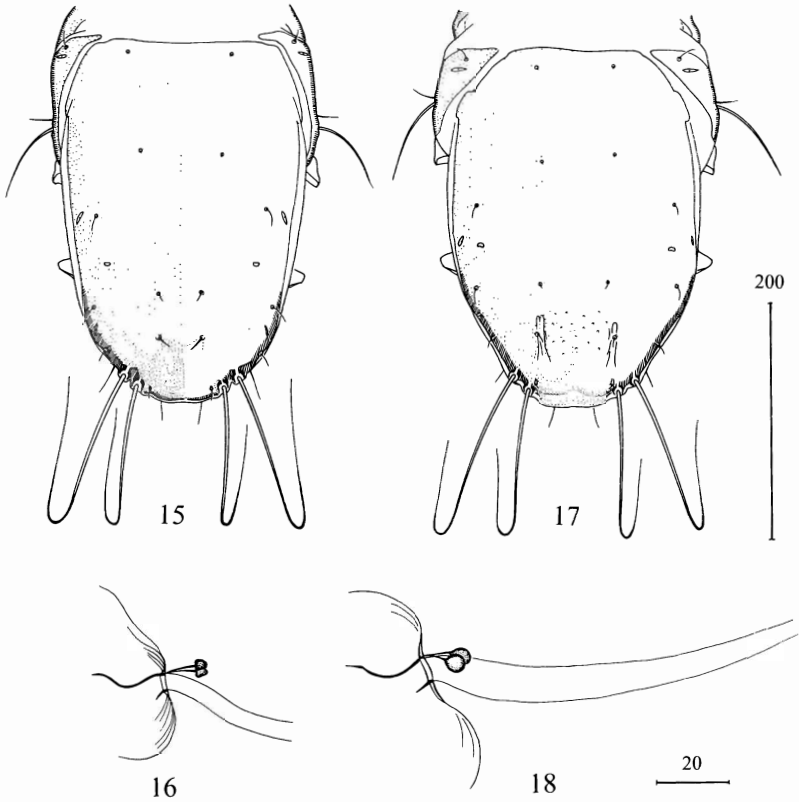
Female. Length of idiosoma 376, width of idiosoma 220 (370-400 x 220-225). Prodorsal shield as in male, 74 x 117, distance between setae *se* 72. Hysteronotal shield 264 x 190, lateral margins with small rounded extensions at level of setae *cp*; surface



Figs 11-14 Dorsal view of female (up) and spermatheca (below). **11, 12** - *Bychovskiata placidi* sp. n.; **13, 14** - *Bychovskiata charadrii* (CANESTRINI).

dotted, without lacunae. Setae *e1* and *h1* as microchaetae. Posterior margin of opisthosoma between setae *h3* with heavily sclerotized membrane. Distance between setae: *h3-h3* 58, *e1-e1* 41, *h1-h1* 30, *e1-h1* 34. Setae *ps1* situated on shield, slightly anterior to setae *h3*. Epigynum 43 x 72. Width of primary spermaduct 4.8, internal spermaduct asymmetrical, 4.8 in width at base (4.0-4.8 and 4.5-5.0 respectively). Legs IV extending slightly beyond posterior end of body.

Differential diagnosis. Males of *Bychovskiata dubia* sp. n. are similar to *B. charadrii*, *B. africanera* sp. n., and *B. melanopsi* sp. n. Males of *Bychovskiata dubia* are significantly smaller than remaining three species. Its idiosoma is always shorter than 320, and the aedeagus is usually extended to the basis of genital arch (Fig. 5). In remaining three species the length of male idiosoma is longer than 330, and the aedeagus is not extended to the base of genital arch. Females of *B. dubia* are similar to females of *B. africanera* by the size, general shape of idiosoma and form of setae *e1* and *h1*, however this species has wider primary spermaduct, 4.0-4.8 (Figs. 19, 20) versus 2.4-3.6 (Fig. 24) in *B. africanera*.



Figs 15-18 Dorsal view of female hysterosoma (up) and spermatheca (below). **15, 16** - *Bychovskiata melanopsi* sp. n.; **17, 18** - *Bychovskiata vociferi* sp. n.

Bychovskiata africanera sp. n.

(Figs 7, 24)

Type data. Holotype male, paratypes 6 males, 7 females (ZMUM 130335) from *Charadrius tricollaris* (Charadriidae: Charadriinae), Kenya, Archers Post, N. Gvaso Nyiro, 5.03.1930, A. B. FULLER. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH.

Additional material. 2 males, 2 females (NU 3811) from the same host, S Africa, Cape Town, Rondevlei Bird Sanctuary, 30.04.1955, E. MIDDLEWISS.

Etymology. The name "*africanera*" refers to one of the host collecting places.

Male. Length of idiosoma 332, width of idiosoma 204 (325-335 x 190-205). Prodorsal shield 84 x 115, without striation; distance between setae *se* 72. Hysteronotal shield 224 x 172, lateral margins with small rounded extensions at level of setae *cp*. Setae *c3* on ventral margin of humeral shield. Opisthosomal lobes short, widely rounded, almost obliterated. Terminal cleft as short and wide V with rounded bottom, length 26, width (distance *ps1-ps1*) 55. Interlobar membrane as narrow slightly concave band along posterior margin of opisthosoma, depth of incision 7.2. Genital organ at level of trochanters IV. Genital arc 26 x 28, aedeagus short stiletto-like, about a half of genital arc length. Posterior acetabulae at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* slightly anterior to base of genital arc. Adanal shields absent, setae *ps3* situated on striated tegument. Diameter of adanal discs 22. Distance between setae: *h3-h3* 77, *3a-g* 67, *4a-g* 16, *g-ps3* 55, *ps3-ps3* 57. Setae *d* and *e* button-like.

Female. Length of idiosoma 396, width of idiosoma 215 (365-405 x 215-225).

Prodorsal shield as in male, 96 x 124, distance between setae *se* 82. Hysteronotal shield 288 x 189, lateral margins with small rounded extensions at level of setae *cp*, surface dotted, without lacunae. Setae *e1* and *h1* microchaetae. Posterior margin of opisthosoma between setae *h3* with heavily sclerotized membrane. Distance between setae: *h3-h3* 60, *e1-e1* 48, *h1-h1* 40, *e1-h1* 28. Setae *ps1* situated on hysteronotal shield anterior to *h3*. Epigynum 48 x 77. Width of primary spermaduct 3.0, internal spermaduct asymmetrical, 5.0 in width at base (2.4-3.6 and 4.0-5.0 respectively). Legs IV extending to posterior end of opisthosoma.

Differential diagnosis. Males of *B. africanera* sp. n. are most similar to *B. melanopsi* sp. n. but they have the wider opisthosoma (distance *h3 - h3* about 75-80), and the humeral shields scarcely extending to basis of epimeres III (Fig. 7). In males of *B. melanopsi* the distance *h3 - h3* is about 65-72 and the humeral shields extending posterior to basis of epimeres III (Fig. 6). Females of *B. africanera* are most similar to *B. dubia* and differ from this species by the narrow primary spermaduct only, 2.4-3.6 in width (Fig. 24) versus 4.0-4.8 (Fig. 20) in *B. dubia*.

Bychovskiata melanopsi sp. n.

(Figs 6, 15, 16)

Type data. Holotype male, paratypes 7 males, 4 females (ZMUM 216639) from *Charadrius melanops* (Charadriidae: Charadriinae), Australia, Victoria, Lake Purdigulae, 8 mi NW of Caloc, 2.10.1968, R. W. STORER. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH.

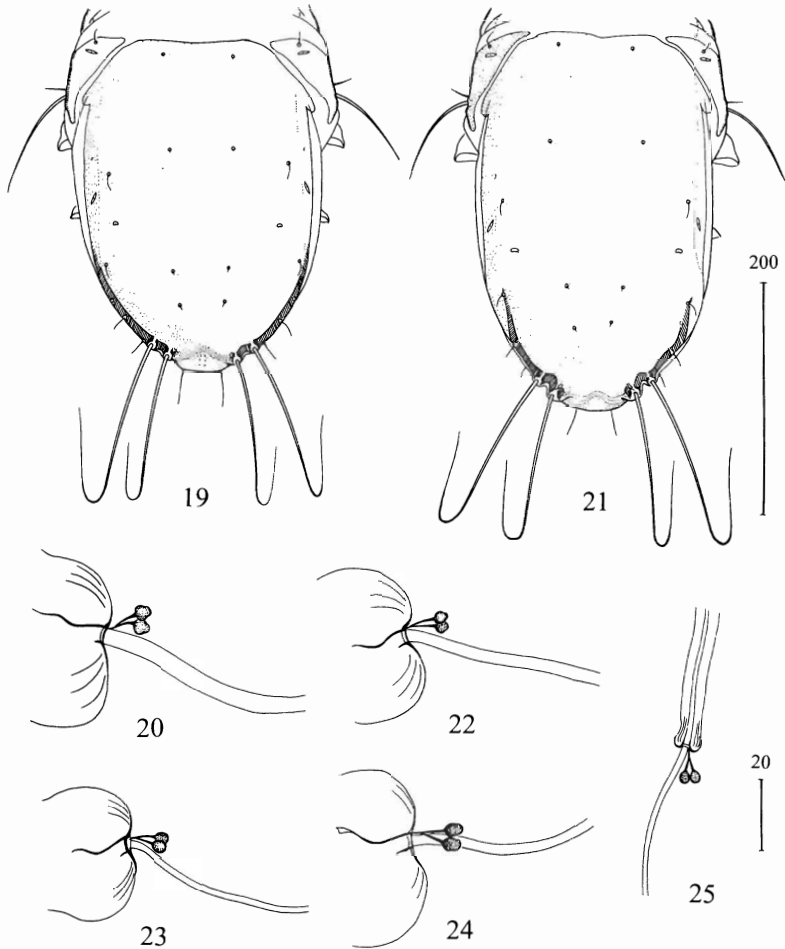
Additional material. 5 males, 5 females (UGA 9225) from the same host, NW Australia, Brooking Spring, 29.09.1976, F.S. LUKOSCHUS.

Etymology. The name "*melanopsi*" is derived from the specific host name.

Male. Length of idiosoma 332 width of idiosoma 192 (330-347). Prodorsal shield 77 x 115, without striation; distance between setae *se* 79. Hysteronotal shield 239 x 173, lateral margins with small rounded ledge at level of setae *cp*. Setae *c3* on ventral margin of humeral shield. Opisthosomal lobes short, widely rounded, almost obliterated. Terminal cleft as short and wide V with rounded bottom, length 22, width (distance *ps1-ps1*) 47. Interlobar membrane as narrow band along posterior end of opisthosoma, depth of incision 4.8. Genital organ at level of trochanters IV. Genital arc 26 x 26, aedeagus short stiletto-like, about a half of genital arc length. Posterior acetabulae situated at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* at level of midlength of genital arc. Adanal shields absent, setae *ps3* on striated tegument. Diameter of adanal discs 21. Distance between setae: *h3-h3* 65, *3a-g* 72, *4a-g* 22, *g-ps3* 46, *ps3-ps3* 55. Setae *e* and *d* button-like.

Female. Length of idiosoma 396, width of idiosoma 216 (390-405 x 215-225). Prodorsal shield as in male, 84 x 87, distance between setae *se* 84. Hysteronotal shield 298 x 196, lateral margins with small rounded extensions at level of setae *cp*, surface dotted, without any lacunae. Setae *e1* little needle-like, setae *h1* small spine-like. Posterior margin of opisthosoma between setae *h3* as heavily sclerotized membrane. Distance between setae: *h3-h3* 70, *e1-e1* 34, *h1-h1* 36, *e1-h1* 37. Setae *ps1* on hysteronotal shield. Epigynum 46 x 62. Width of primary spermaduct 4.8, internal spermaduct asymmetrical, 4.8 in width at base (4.5-5.0 and 4.8-5.2 respectively). Legs IV extending to posterior end of opisthosoma.

Differential diagnosis. *B. melanopsi* sp. n. is most closely related to *B. dubia* sp. n. and *B. africanera* sp. n. Males of this species differ from both remaining ones by the humeral shields extending posterior to basis of epimeres III (Fig. 6). In two remaining males the humeral shields are not extended posterior to bases of epimeres III. Females of *B. melanopsi* differ from females of both remaining species by small spine-like setae *h1* (Fig. 15). In *B. dubia* and *B. africanera* these setae are microchaetae as *e1* (Fig. 19).



Figs 19-25 Dorsal view of female hysterosoma (up) and spermatheca (below). **19, 20** - *Bychovskiata dubia* sp. n.; **21, 22** - *Bychovskiata hypoleuci* sp. n.; **23** - *Bychovskiata macularii* sp. n.; **24** - *Bychovskiata africanera* sp. n.; **25** - *Bychovskiata semipalmati* MIRONOV & DABERT.

Bychovskiata vociferi sp. n.

(Figs 8, 17, 18)

Type data. Holotype male, paratypes 7 males, 8 females (BMOC 82-0416-1) from *Charadrius vociferus* (Charadriidae: Charadriinae), USA, Michigan, Monroe Co., Point Mouillee State Game Area, 16.04.1982, S. M. GOODMAN. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH. Additional material. 2 males, 2 females (NU 8803, USNM 317231) from the same host Haiti, Petit-Trou-de-Nippes, 9.04.1930, W. M. PERRIGO.

Etymology. The name "vociferi" is derived from the specific host name.

Male. Length of idiosoma, 352 width of idiosoma 204 (340-356 x 194-210). Pro-dorsal shield 96 x 115, without striation; distance between setae *se* 77. Hysteronotal shield 244 x 172, lateral margins with small bluntly rounded extensions at level of setae *cp*. Setae *c3* situated out of humeral shield. Opisthosomal lobes short, widely rounded, almost obliterated. Terminal cleft as short and wide V with rounded bottom, length 31,

width (distance *ps1-ps1*) 77. Interlobar membrane as narrow band along posterior margin of opisthosoma, depth of incision 10. Genital organ at level of trochanter IV. Genital arc 24 x 31, aedeagus short stiletto-like, about one-third of genital arc length. Posterior acetabulae situated at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* situated approximately at midlength of genital arc. Adanal shields absent, setae *ps3* on striated tegument or surrounded by little sclerotized ring. Diameter of adanal discs 24. Distance between setae: *h3-h3* 96, *3a-g* 69, *4a-g* 12, *g-ps3* 58, *ps3-ps3* 72. Setae *d* and *e* button-like.

Female. Length of idiosoma 410, width of idiosoma 234 (390-410 x 210-234). Prodorsal shield as in male, 96 x 120, distance between setae *se* 82. Hysteronotal shield 288 x 195, lateral margins with small blunt extensions at level of setae *cp*. Surface dotted, posterior part of this shield with a pair of narrow longitudinal lacunae with indistinct borders. Setae *e1* as microchaetae; setae *h1* short, needle-like, situated in lacunae. Posterior margin of opisthosoma between setae *h3* with heavily sclerotized membrane. Distance between setae: *h3-h3* 70, *e1-e1* 58, *h1-h1* 64, *e1-h1* 40. Setae *ps1* situated on hysteronotal shield anterior to setae *h3*. Epigynum 41 x 77. Width of primary spermaduct 6.0, internal spermaduct asymmetrical, 4.8 in width at base (in other paratypes 6.0-8.0 and 4.8-7.0 respectively). Legs IV extending to posterior end of opisthosoma.

Differential diagnosis. *B. vociferi* sp. n. is most closely related to *B. placidi* sp. n. by a relatively broad opisthosoma with an almost straight terminus in males (Fig. 2, 8). Males of *B. vociferi* species differ from males of *B. placidi* by the uniformly dotted prodorsal shield, and females differ by the pair of narrow opisthosomal lacunae and strongly inflated proximal part of primary spermaduct (Figs 17, 18). In males of *B. placidi* the prodorsal shield is transversally striated (Fig. 1); in females the opisthosoma carries a pair of sclerotized crests, and the primary spermaduct is not widened near its proximal end (Figs. 11, 12).

Bychovskiata hypoleuci sp. n.

(Figs 9, 21, 22)

Type data. Holotype male, paratypes 36 males, 47 females (ZISP 1562) from *Actitis hypoleucos* (Scolopacidae: Tringinae), Russia, Kaliningrad region, Rybachii, 6.05.1957, M. N. DUBININA. Holotype - ZISP, paratypes - ZISP, ZMH.

Additional material. 3 males, 4 females (ZISP 3173) from the same host, Kirghizia, Issyk-Kul Lake, Chon-Urukty, 18.08.1984, S. V. MIRONOV.

Etymology. The name "*hypoleuci*" is derived from the specific host name.

Male. Length of idiosoma 352, width of idiosoma 205 (330-355 x 190-205). Prodorsal shield 82 x 98, without striation, distance between setae *se* 60. Hysteronotal shield 244 x 172, lateral margins with small rounded extensions at level of setae *cp*. Setae *c3* situated on ventral margin of humeral shield. Opisthosomal lobes short, widely rounded. Terminal cleft as short and wide V with rounded bottom, length 22, width (*ps1-ps1*) 52. Interlobar membrane as narrow band along terminal end of opisthosoma, depth of incision 4.8. Genital organ at level of trochanters IV. Genital arc 22 x 24, aedeagus short stiletto-like, about a half of genital arc. Posterior acetabulae situated at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* at level of midlength of genital arc. Adanal shields as small stick-like transversal sclerites, setae *ps3* situated on this shield. Diameter of adanal discs 22. Distance between setae: *h3-h3* 74, *3a-g* 65, *4a-g* 19, *g-ps3* 60, *ps3-ps3* 55. Setae *d* and *e* button-like.

Female. Length of idiosoma 410, width of idiosoma 220 (390-412 x 200-225). Prodorsal shield as in male, 84 x 112, distance between setae *se* 66. Hysteronotal shield 308 x 192, lateral margins with small rounded extensions at level of setae *cp*, surface dotted without lacunae. Setae *e1* and *h1* as microchaetae. Posterior end of opisthosoma

between setae *h3* as heavily sclerotized membrane. Distance between setae: *h3-h3* 67, *e1-e1* 47, *h1-h1* 31, *e1-h1* 34. Setae *ps1* situated on hysteronotal shield anterior to *h3*. Epigynum 45 x 67. Width of primary spermaduct 3.6, internal spermaduct asymmetrical, 4.0 in width (3.6-3.8 and 3.8-4.8 respectively). Legs IV extending to posterior end of opisthosoma.

Differential diagnosis. *Bychovskiata hypoleuci* sp. n. is closely related to *B. dubia* sp. n. (Figs 5, 19, 20) and especially to *B. macularii* sp. n. (Fig. 10, 23). Males of *B. hypoleuci* (Fig. 9) differ from *B. dubia* by the relatively elongated idiosoma (ratio of length to width more than 1.7), from *B. macularii* by the idiosoma longer than 330, shorter terminal cleft (20-24) and by presence of small adanal shields. Females of *B. hypoleuci* differ from females of both closely related species by the width of primary spermaduct, 3.6-3.8 (Fig. 22) versus 4.0-4.8 (Fig. 20) in *B. dubia* and 2.4-3.0 (Fig. 23) in *B. macularii*.

Bychovskiata macularii sp. n.

(Figs 10, 23)

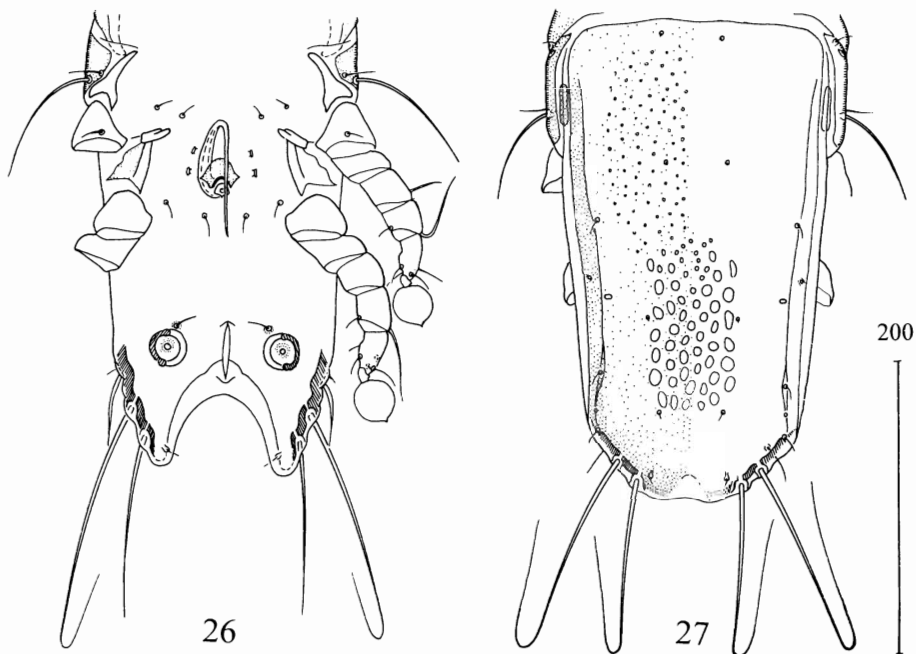
Type data. Holotype male, paratypes 3 males, 4 females (BMOC 82-0514-2, ZMUM 231575) from *Actitis macularia* (Scolopacidae: Tringinae), USA, Michigan, Monroe Co., Point Mouillee State Game Area, 14.05.1982, S. M. GOODMAN. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH.

Etymology. The name "*macularii*" is derived from the specific host name.

Male. Length of idiosoma 322 width of idiosoma 170 (320-335 x 170-180). Prodorsal shield 77 x 93, without striation, distance between setae *se* 62. Hysteronotal shield 234 x 146, lateral margins with small rounded extensions at level of setae *cp*. Setae *c3* situated on ventral part of humeral shield. Opisthosomal lobes short, widely rounded. Terminal cleft as short and wide V with rounded bottom, length 29, width (distance *ps1-ps1*) 53. Interlobar membrane as narrow band along margin of terminal cleft; incision in membrane in a form of rounded blunt angle, depth of incision 14. Genital organ at level of trochanters IV. Genital arc 22 x 24, aedeagus short stiletto-like, about a half of genital arc length. Posterior acetabulae situated at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* at level of midlength of genital arc. Adanal shields absent, setae *ps3* situated on striated tegument. Diameter of adanal discs 22. Distance between setae: *h3-h3* 77, *3a-g* 57, *4a-g* 12, *g-ps3* 60, *ps3-ps3* 53. Setae *d* and *e* button-like.

Female. Length of idiosoma 400, width of idiosoma 211 (395-400 x 195-215). Prodorsal shield as in male, 89 x 108, distance between setae *se* 70. Hysteronotal shield 284 x 173, lateral margins with small rounded extensions at level of setae *cp*. Surface dotted, without any lacunae. Setae *e1* and *h1* as microchaetae. Posterior end of opisthosoma between setae *h3* as heavily sclerotized membrane. Distance between setae: *h3-h3* 62, *e1-e1* 48, *h1-h1* 27, *e1-h1* 43. Setae *ps1* situated on hysteronotal shield. Epigynum 47 x 72. Width of primary spermaduct 3.0, internal spermaduct asymmetrical, 4.5 in width at base (in other paratypes 2.4-3.0 and 4.0-4.8 respectively). Legs IV extending to posterior end of opisthosoma.

Differential diagnosis. *Bychovskiata macularii* sp. n. is closely related to *B. hypoleuci* sp. n. Males of *B. macularii* differ from *B. hypoleuci* by the idiosoma shorter than 330, idiosomal proportions (ratio of length to width 1.85-1.90), by the longer terminal cleft, 28-35, and an absence of adanal shields (Fig. 10). Females of *B. macularii* could be distinguished well by very thin primary spermaduct 2.4-3.0 (Fig. 23) and by the proportion of hysteronotal shield (ratio of length to width more than 1.60). In males of *B. hypoleuci* the length of idiosoma is more than 330, its proportions 1.70-1.80, length of terminal cleft 20-24, and small adanal shields (Fig. 9). In females of this species the primary spermaduct is wider, 3.6-3.8, the proportion of hysteronotal shield is less than 1.60 (Figs. 21, 22).



Figs 26-27 *Bychovskiata perforata* MIRONOV. **26** - male, ventral view of hysterosoma; **27** - female, dorsal view.

Bychovskiata semipalmati MIRONOV & DABERT, 1995
(Figs 4, 25)

Material examined. Holotype male, paratypes 13 males, 14 females (BMOC 82-0806-1) from *C. semipalmatus*, Michigan, Monroe Co., Point Mouille State, Game Area, 6.08.1982, S. M. GOODMAN. 8 males, 6 females (ZMUM 83478) from *C. melodus*, USA, Michigan, Huron Co., Sand Point, 24.05.1936, T. D. HINSHAW.

Originally described from the Semipalmated Plover *Charadrius semipalmatus* (Charadriidae) (MIRONOV & DABERT, 1995). It also occurs on closely related allopatric species the Piping Plover *C. melodus* (NEW HOST).

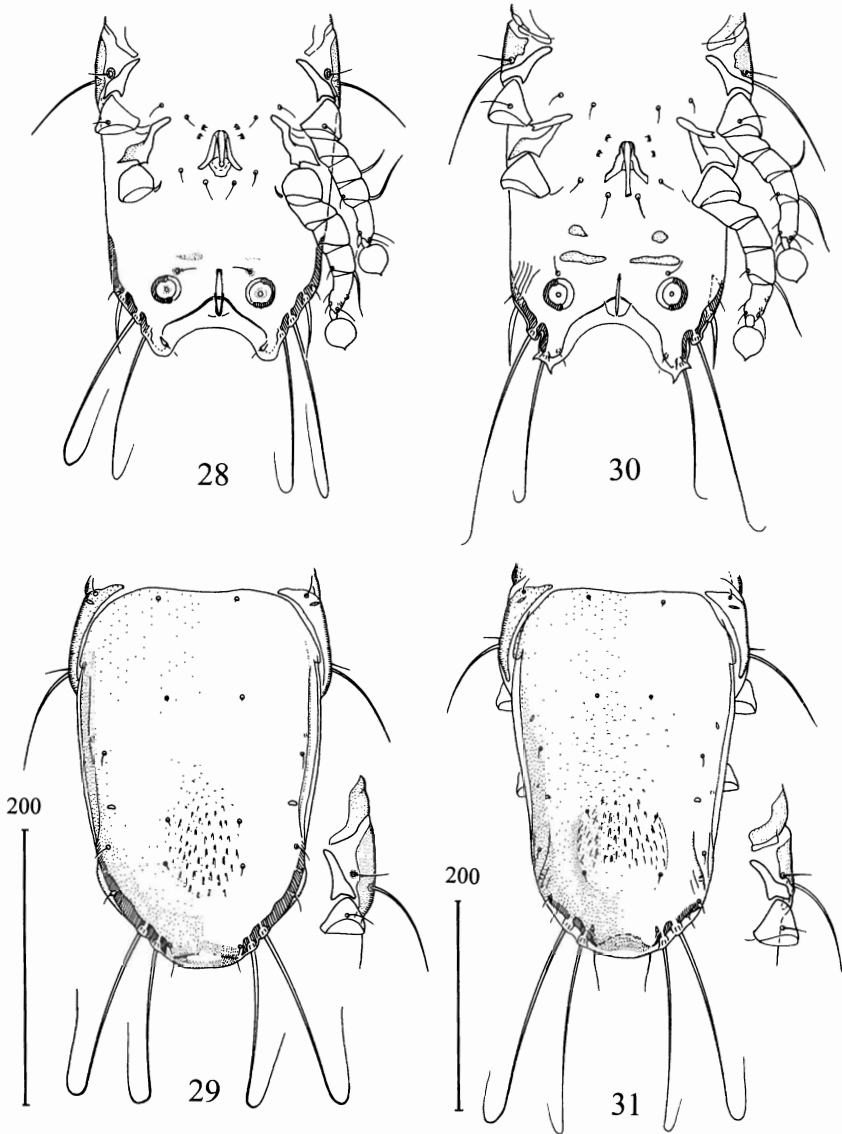
bidentata species group

This group is closely related to previous one. Its members as well are characterized by the small rounded extensions on lateral margins of hysteronotal shield, but males have distinct triangular opisthosomal lobes with rounded apex. This group includes three species associated with certain plovers distributed in Australia and New Zealand and belonging to the genera *Erythrogynus*, *Thinornis*, and *Charadrius*.

Both sexes. Lateral sclerite of epimeres IV acute. Lateral margin of hysteronotal shield with small rounded extensions. Epimeres III stick-like.

Male. Opisthosomal lobes triangular, with rounded apices. Aedeagus small stiletto-like. Epiandrium absent. Setae *3a* posterior to *3b*. Setae *4a* posterior or at level of genital arc basis.

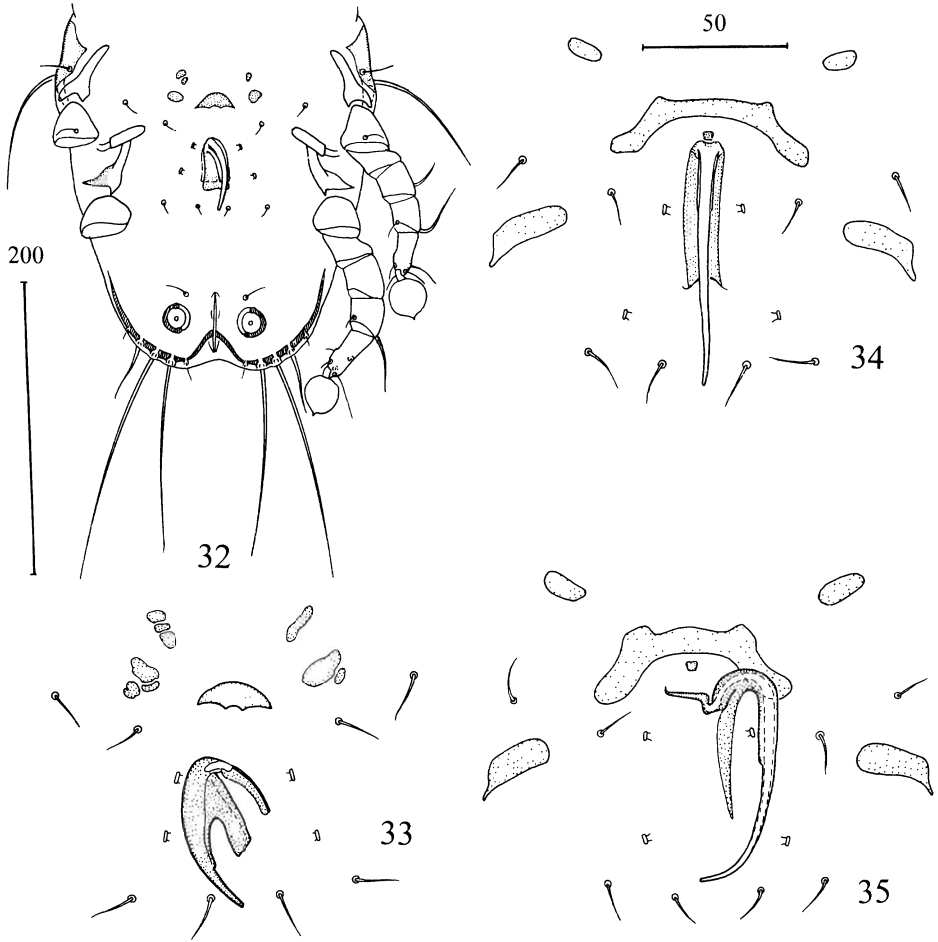
Female. Hysteronotal shield without a pair of longitudinal lacunae. Posterior margin between setae *h3* heavily sclerotized.



Figs 28-31 Ventral view of male hysterosoma (up) and dorsal view of female hysteronotum with ventral view of humeral shield (below). **28, 29** - *Bychovskia thinorni* MIRONOV; **30, 31** - *Bychovskia bidentata* MIRONOV.

Bychovskia perforata MIRONOV, 1994
(Figs 26, 27)

Material examined. Holotype male, paratypes 10 males, 12 females (NU 8827, USNM 405657) from *E. cinctus*, Australia, Northern Territory, Oenpelli, 5.10.1948, D. G. DEIGNAN. This species is a monoxenous parasite of the Red-kneed Dotterel *Erythrogynus cinctus*.



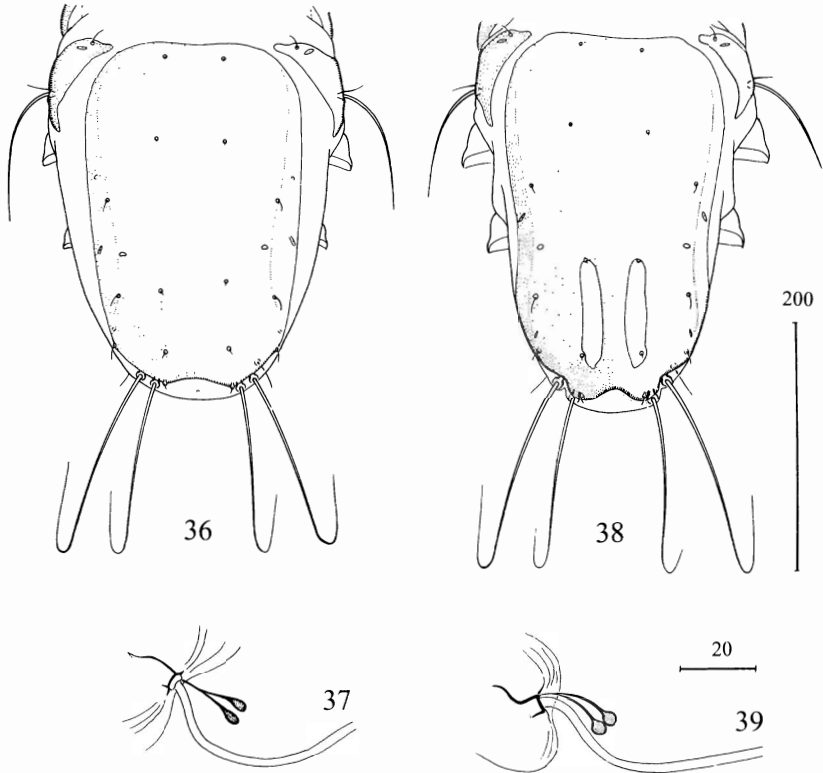
Figs 32-35 Ventral view of male hysterosoma and male genital apparatus. **32, 33** - *Bychovskiata intermedia* CHIROV and MIRONOV; **34** - *Bychovskiata pseudocharadrii* DUBININ, frontal view of genital apparatus; **35** - same species, lateral view of genital apparatus.

Bychovskiata bidentata MIRONOV, 1994
(Figs 30, 31)

Material examined. Holotype male, paratypes 4 males, 1 female (ZMUM 214 409) from *C. rubricollis*, Australia, Western Australia, Walpole, 10 mi N, 7.06.1967, C. C. FISHER. This species is a specific parasite of the Hooded Dotterel *Charadrius rubricollis*.

Bychovskiata thinorni MIRONOV, 1994
(Figs 28, 29)

Material examined. Holotype male, paratypes 2 males, 6 females (ZMUM 208189) from *T. novaeseelandiae*, Chatham Isls., Mangre Isl., 1982, W. HAWKINS; 1 male, 1 female (NU 9489, USNM 151113), Chatham Isls., April 1893, coll. unknown. This species is a specific parasite of the Shore Plover *Thinornis novaseelandiae*.



Figs 36-39 Dorsal view of female hysterosoma (up) and spermatheca (below). **36, 37** - *Bychovskiata intermedia* CHIROV and MIRONOV; **38** - *Bychovskiata pseudocharadrii* DUBININ.

pseudocharadrii species group

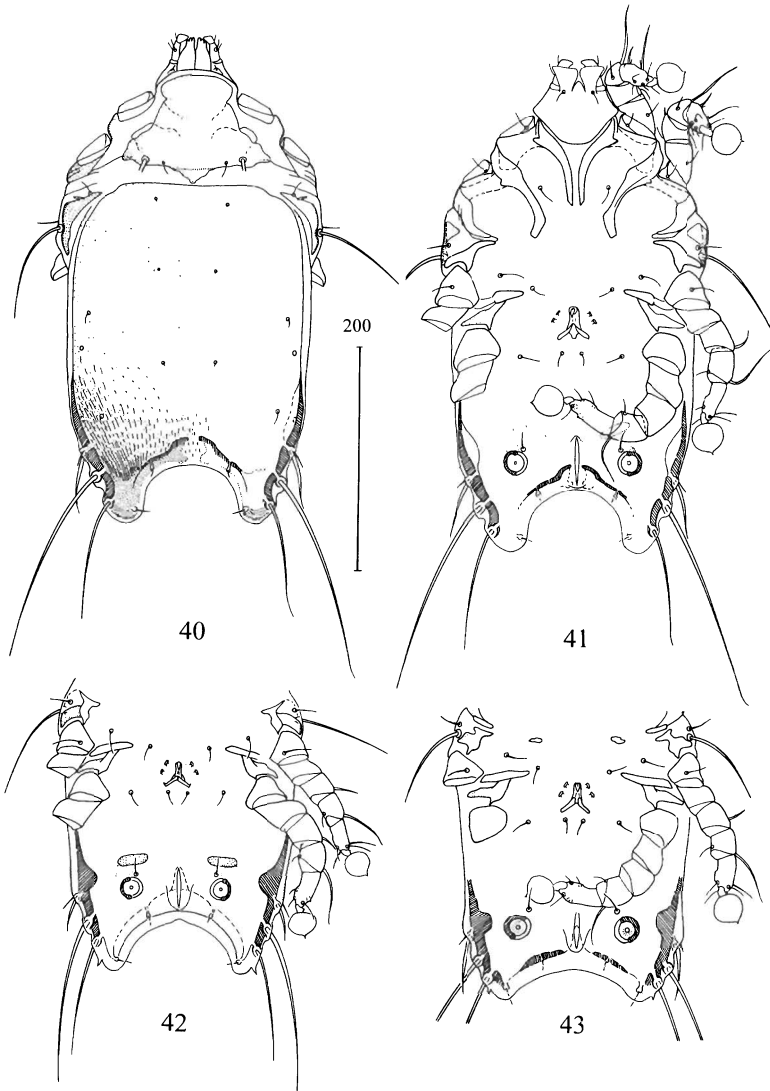
This group includes two species only. It is well defined by such unique characters as the presence of bone like or fragmented epiandrum and hook-like aedeagus in males. Both sexes. Lateral sclerite of epimeres IV acute. Lateral margin of hysteronotal shield without extensions. Epimeres III stick-like.

Male. Opisthosomal lobes short rounded. Aedeagus thick, hook-like. Epiandrum present. Setae *3a* posterior to *3b*. Setae *4a* posterior to genital arc

Female. Hysteronotal shield with a pair of longitudinal lacunae or without them. Posterior margin of opisthosoma between *h3* weakly sclerotized.

Bychovskiata pseudocharadrii DUBININ, 1951 (Figs 34, 35, 38,39)

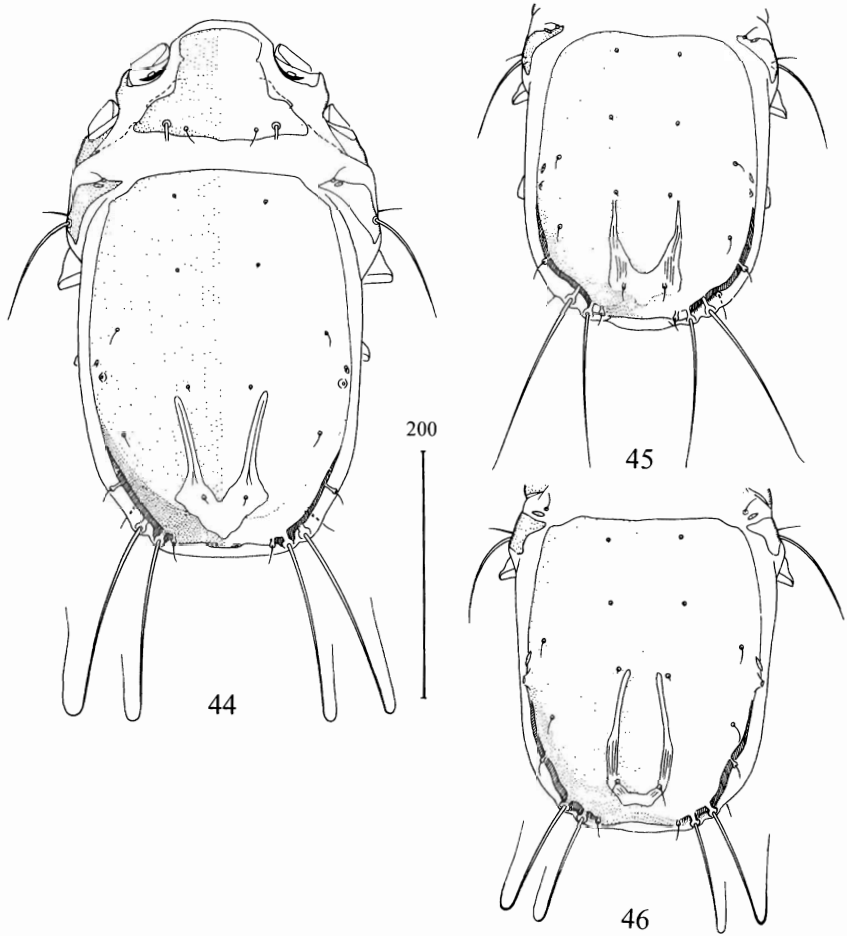
Material examined. Lectotype male, paralectotypes 15 males, 25 females (ZISP 108-114) from *C. mongolus*, Russia, Far East, Maritime Territory, Sudzukhin reserve, 3.08.1945, M. N. VOLKOVA; 1 male, 1 female (NU 9767) from the same host, Calatagan, Batangas, P. I., USA Med. Res. Unit, 26.09.1964, coll. unknown; 4 males, 4 females (ZMUM 64385) from *C. mongolus mongolus*, Japan, Sagami, Baniu River, 2.06.1981, coll. unknown; 6 males, 6 females (ZMUM 72545) from *C. m. atrifrons*, Siam, Mekong, 6.05.1929, C. J. AAGARD; 10 males, 15 females (ZISP 4059) from *C. alexandrinus*, Ukraine, Nikolaev region, Tiligul Lake, 5.05.1991, D. A. KIVGANOV; 2 males, 5 females (ZISP 4036) from the same host, Uzbekistan, Kara-Kalpakia,



Figs 40-43 Males of *nudidora* species group. *Bychovskiata tricolor* sp. n., dorsal (40) and ventral (41) views; 42 - *Bychovskiata chilensis* MIRONOV and DABERT, ventral view of hysterosoma; 43 - *Bychovskiata nudidora* GAUD and MOUCHET, ventral view of hysterosoma.

Karateren Lake, 19.5.1988, S. V. MIRONOV, 3 males, 10 females (ZISP 225-8) from the same host, W. Turkmenia, Ghasan-Kule Reserve, 2.07.1961, A. SHCHERBININA; 3 males, 4 females (ZISP 4147) from the same host, Russia, Far East, Maritime Territory, Amur Bay, 24.05.1975, T. T. VASYUKOVA.

Originally described from several species of the genus *Charadrius*, namely: *C. hiaticula*, *C. placidus*, *C. mongolus mongolus*, *C. alexandrinus* (DUBININ, 1951; 1956). As far as the type host was not declared in the original description, it is most reasonable to design *C. mongolus mongolus* as the type host, because it commonly occurs on this plover and



Figs 44-46 Females of *nudidorsa* species group. **44** - *Bychovskiata tricolor* sp. n., dorsal view; **45** - *Bychovskiata chilensis* MIRONOV and DABERT, dorsal view of hysterosoma; **46** - *Bychovskiata nudidorsa* GAUD and MOUCHET, dorsal view of hysterosoma.

it was not recorded later from *C. hiaticula* and *C. placidus*. It is quite possible, that records of *B. pseudocharadrii* on two latter species is a result of an accidental contamination.

Bychovskiata intermedia CHIROV & MIRONOV, 1985
(Figs 32, 33, 36, 37)

Material examined. Holotype male, paratypes 30 males, 31 females (ZISP 1039) from *C. mongolus pamirensis*, E. Kirghizia, Jetimbel Ridge, 10.07.1978, P. A. CHIROV; 4 males, 4 females (ZISP 4008) from the same host, SE Kirghizia, Ak-Sai Valley, 10.07.1990, S. V. MIRONOV; 1 male, 1 female (NU 8812, USNM 181754) from *C. leschenaulti*, E. Borneo, Karang Tigan, 13.08.1912, H. C. RAVEN; 8 males, 6 females (ZMUM: SMG 1169) from the same host, Egypt, Faijum Gout, S. of Birket Quram 13.05.1984, S. M. GOODMAN; 2 males, 3 females (ZISP TTV-82) from the same host, Russia, SE of Altai Mountains, 1977, coll. unknown; 2 males, 12

females (ZISP 38-402-1) from the same host, Turkmenia, Imam-Baba, 9.03.1975, GAISIN. Originally described from *C. mongolus pamirensis* from Tian-Shan (CHIROV & MIRONOV, 1985). It is distributed only on this subspecies of *C. mongolus* and on *C. leschenaulti* (NEW HOST).

nudidorsa species group

This distinctly separated group includes recently three species, which are well characterized by unique structure of epimeres III in both sexes, by form of lobes in males and form of lacunae in females. This group is restricted to the lapwings (Charadriidae: Vanellinae).

Both sexes. Lateral sclerite of epimeres IV acute. Lateral margins of hysteronotal shield without extensions. Epimeres III T-shaped (except *B. tricolor*).

Male. Opisthosomal lobes widely separated, tongue-like. Aedeagus short, styletto-like. Epiandrum absent. Setae *3a* posterior to *3b*. Setae *4a* posterior to genital arc.

Female. Hysteronotal shield with one U-shaped lacuna. Posterior margin of opisthosoma between *h3* weakly sclerotized.

Bychovskiata nudidora GAUD & MOUCHET, 1959
(Figs 43, 46)

Material examined. Paratypes 1 male and 1 female (Mus. Roy. Afr. Centr. 147 379) from *V. albiceps*, Cameroon, Yaounde, 23.02.1959, J. MOUCHET.

This species was originally described from the *Vanellus albiceps*.

Bychovskiata chilensis MIRONOV & DABERT, 1995
(Figs 42, 45)

Material examined. Holotype male, paratypes 16 males, 20 females (SMG 2459, ZMUM 226451) from *V. chilensis*, Paraguay, E Bank Rio Paraguay, 1.5 km of S Puerto Riso, 18.09.1988, S. M. GOODMAN.

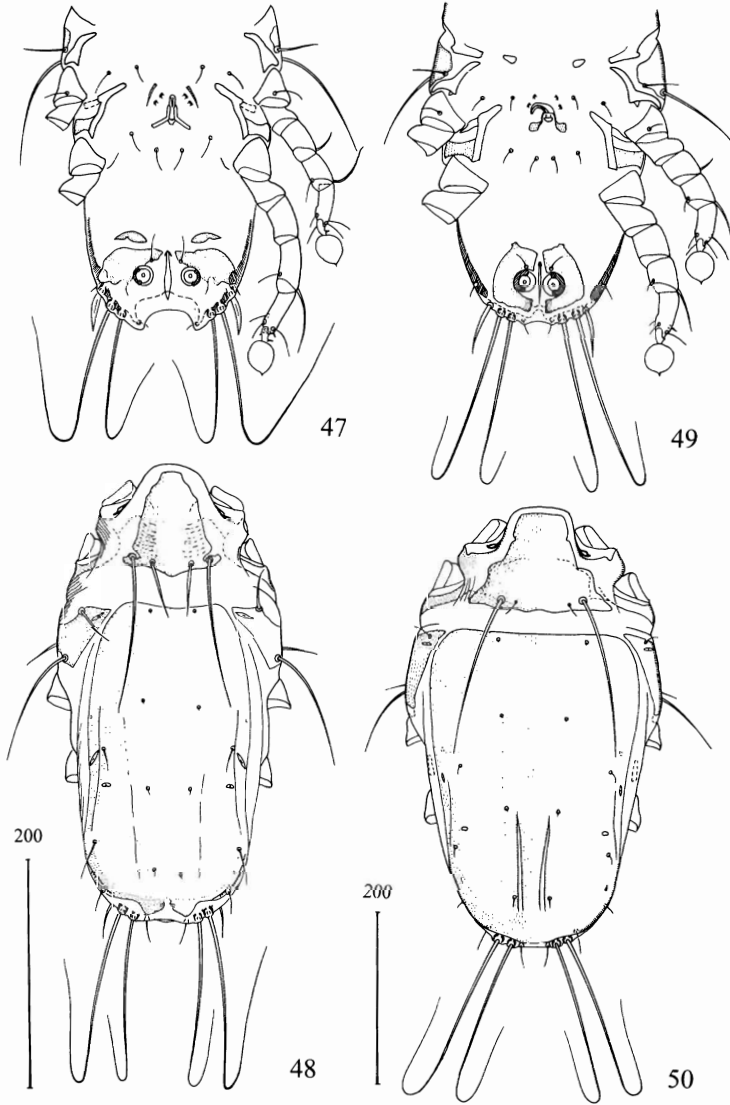
This species is known only from *Vanellus chilensis* in South America (MIRONOV and DABERT, 1995).

Bychovskiata tricolor sp. n.
(Figs 40, 41, 44)

Type data. Holotype male, paratypes 1 male, 2 females (NU 8724, USNM 71641) from *Vanellus tricolor* (Charadriidae: Vanellinae), Australia, Victoria, no other data. Holotype - USNM, paratypes USNM, ZMH.

Etymology. The name "*tricolor*" is derived from the specific host name.

Male. Length of idiosoma 405, width of idiosoma 240 (396 x 225). Prodorsal shield 96 x 144, without striation; distance between setae *se* 88. Hysteronotal shield 293 x 195, lateral margins without extensions. Opisthosomal lobes widely separated, tongue-like. Terminal cleft wide semicircular, length 74, width (distance *ps1-ps1*) 94. Interlobar membrane as narrow band along margin of terminal cleft and apices of lobes, depth of incision in interlobar membrane 48. Genital organ slightly anterior to level of trochanters IV. Genital arc 26 x 26, aedeagus small and stiletto-like, about quarter of genital arc length. Anterior acetabulae slightly posterior to genital arc apex. Setae *3a* posterior to *3b*, setae *4a* posterior to base of genital arc, at the same level as setae *g*. Adanal shields represented by two pairs of small weakly sclerotized transversal sclerites, setae *ps3* situated on posterior pair of adanal shields. Diameter of adanal discs 24. Distance between setae: *h3-h3* 156, *3a-g* 56, *4a-g* 5, *g-ps3* 85, *ps3-ps3* 88. Setae *d* and *e* button-like.



Figs 47-50 *Bychovskiatia tibetana* MIRONOV (left) and *Bychovskiatia bisulcata* MIRONOV (right). **47, 49** - male, ventral view of hysterosoma; **48, 50** - female, dorsal view.

Female. Length of idiosoma 425, width of idiosoma 250 (420 x 234). Prodorsal shield as in male, 84 x 136, distance between setae *se* 87. Hysteronotal shield 288 x 205, lateral margins without extensions, surface dotted, posterior part with one big U-shaped lacuna, its anterior branches slightly divergent. Setae *e1* and *h1* microchaetae, setae *h1* situated in posterior part of lacuna. Posterior margin of opisthosoma between setae *h3* weakly sclerotized. Distance between setae: *h3-h3* 103, *e1-e1* 48, *h1-h1* 36, *e1-h1* 87. Setae *ps1* situated on margin of hysteronotal shield. Epigynum 43 x 84. Width of primary spermaduct 2.4, internal spermaduct absent. Legs IV extending to posterior end of the body.

Differential diagnosis. Both sexes of *Bychovskiata tricolor* sp. n. differ from two other species of the *nudidorsa* group, *B. nudidorsa* and *B. chilensis*, by simple anterior tips of epimeres III, by rounded opisthosomal lobes, without lateral tooth in males (Fig. 40, 41), divergent anterior ends of U-shaped opisthosomal lacuna in females (Fig. 44). In two remaining species the tips of epimeres III are T-shaped, in males the opisthosomal lobes with small lateral tooth (Figs. 42, 43), in females the anterior ends of U-shaped lacuna are parallel-sided (Fig. 45) or slightly convergent (Fig. 46).

subcharadrii species group

This group includes three rather diversiform species. However, this group clearly differs from all other species of the genus *Bychovskiata* by unusual structure of epimeres IV. Both sexes. Lateral sclerite of epimeres IV with blunt rounded apex. Lateral margin of hysteronotal shield without extension. Epimeres III stick-like.

Male. Opisthosomal lobes small triangular or short widely rounded. Aedeagus small stiletto-like. Epiandrium absent. Setae *3a* anterior to *3b* (except *B. subcharadrii*). Setae *4a* posterior or at level of genital arc basis.

Female. Hysteronotal shield without lacunae or with a pair of longitudinal furrow-like lacunae (*B. bisulcata*). Posterior margin of opisthosoma between *h3* weakly sclerotized.

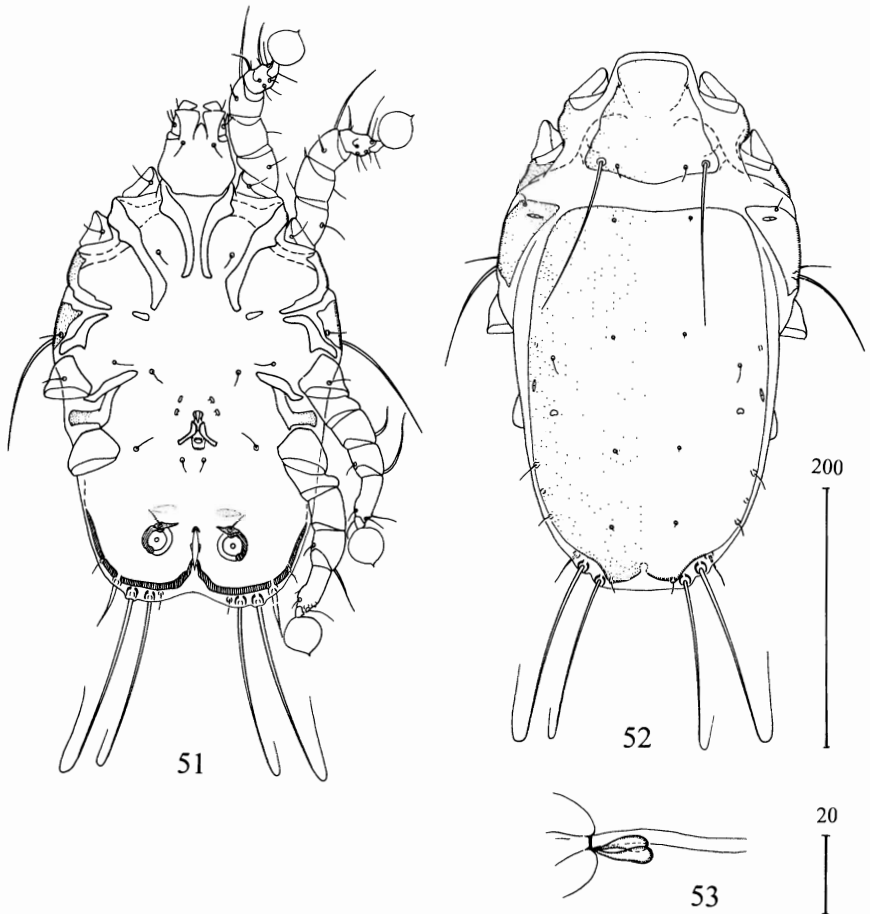
Bychovskiata subcharadrii DUBININ, 1951
(Figs 51-53)

Material examined. 6 males, 6 females from *Himantopus himantopus*, Kazakhstan, Kyzyl-Orda region, Sary-Su River, 13.08.1986, S. V. MIRONOV; 1 male, 1 female (NU 9185, USNM 286064) from *H. melanurus* (NEW HOST), Argentina, Buenos Aires, Guamini, 6.03.1921, A. WETMORE; 2 males, 2 females (NU 9172, USNM 250675) from *H. leucocephalus* (NEW HOST), Celebes, Rano Lindoe, 16.03.1917, R. C. RAVEN; 2 males, 2 females (NU 9168, USNM 457816) from *H. meridionalis* (NEW HOST), Mozambique, Bela Vista, 28.01.1954, D. W. LAMM; 1 male, 1 female (NU 9194, USNM 176858) from *H. mexicanus* (NEW HOST), USA, Florida, Osceda Co., Lake Kissimmee, 1901, E. A. MEARN; 1 male, 1 female (NU 9188, USNM 375 864) from *H. ceylonensis* (NEW HOST), Ceylon, Southern Prov., Hambantota, 1944, S. D. RIPLEY; 10 males, 10 females (ZMUM: B-1170) from *H. novaeseelandiae* (NEW HOST), New Zealand, no other data; 1 male, 1 female (UGA 5965, AMNH 207876) from *Recurvirostra avocetta*, N Kenya, Koroli, 26.07.1923, K. CALDWELL; 1 male, 1 female (NU 9183, USNM 152760) from the same host, Egypt, Helonan, 14.01.1895, A. FENYES; 2 males, 1 female (UGA 5966, AMNH 357 660) from *R. americana* (NEW HOST), Canada, Alberta, Shepherd, 8.07.1906, J. DWIGHT; 2 males, 1 female (NU 1111) from the same host, USA, Texas, Lake Dallas, 5.09.1947, coll. unknown; 1 male, 1 female (UGA 5973, AMNH 743 129) from *R. andina* (NEW HOST), Bolivia, Oruro dept., Sajama, 28.06.1897, G. GARLEPP.

Originally described from *Himantopus himantopus* (DUBININ, 1951). It is distributed on almost all species of stilts and avocets, the genera *Himantopus* and *Recurvirostra* (Recurvirostridae). *B. subcharadrii* is similar in superficial appearance to species of the *charadrii* group, however it clearly differs from them by structure of lateral sclerite of epimeres IV in both sexes, posterior position of setae *4a* in males, symmetrical internal spermatheca and weakly sclerotized posterior end of opisthosoma in females.

Bychovskiata bisulcata MIRONOV, 1994
(Figs 49, 50)

Material examined. Holotype male and paratypes 1 male, 2 females (NU 9574, MichSU 4262) from *Haematopus ostralegus* (sic!), Mexico, Sinaloa, Mazatlan, 12.07.1963, J. B. DANAHEUE; 2 males, 2 females (NU 1686) from *H. palliatus* (NEW HOST), USA, Tex., Aransas



Figs 51-53 *Bychovskiata subcharadrii* DUBININ. **51** - male, ventral view of hysterosoma; **52** - female, dorsal view; **53** - spermatheca.

Co., Aransas Bay, Deadman Island, 12.05.1960, W. B. DAVIS; 1 male, 1 female (NU 8679, USNM 212052) from *Haematopus ater* (NEW HOST), Peru, Chincha Islands, North Island, 11.06.1907, R. E. COKER.

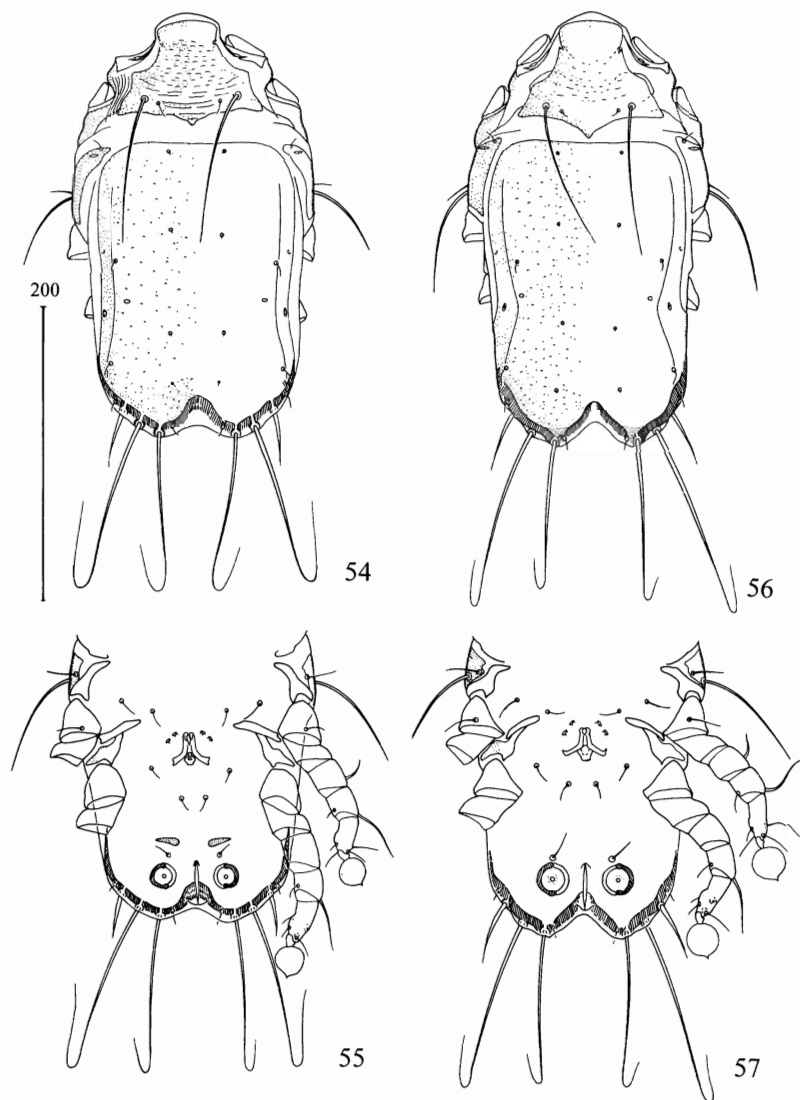
Originally described from "*Haematopus ostralegus*" (possible erroneous host identification, perhaps real type host was *H. palliatus*) from Mexico (MIRONOV, 1994a). It is specific to oystercatchers of the genus *Haematopus* (Haematopodidae).

Bychovskiata tibetana MIRONOV, 1994

(Figs 47, 48)

Material examined. Holotype male, paratypes 5 males, 6 females (NU 9179, USNM 192 464) from *I. strutersi*, China, W. Hopeh Prov., Fuping, 20.01.1904, E. BACKWELDER; 1 male, 2 females (ZMUM 43871) from the same host, China, "E. Torub forest", 23.01.1925, coll. unknown.

This species is a specific parasite of the Ibis-bill *Ibidorhyncha strutersi* (Ibidorhynchidae) (MIRONOV, 1994).



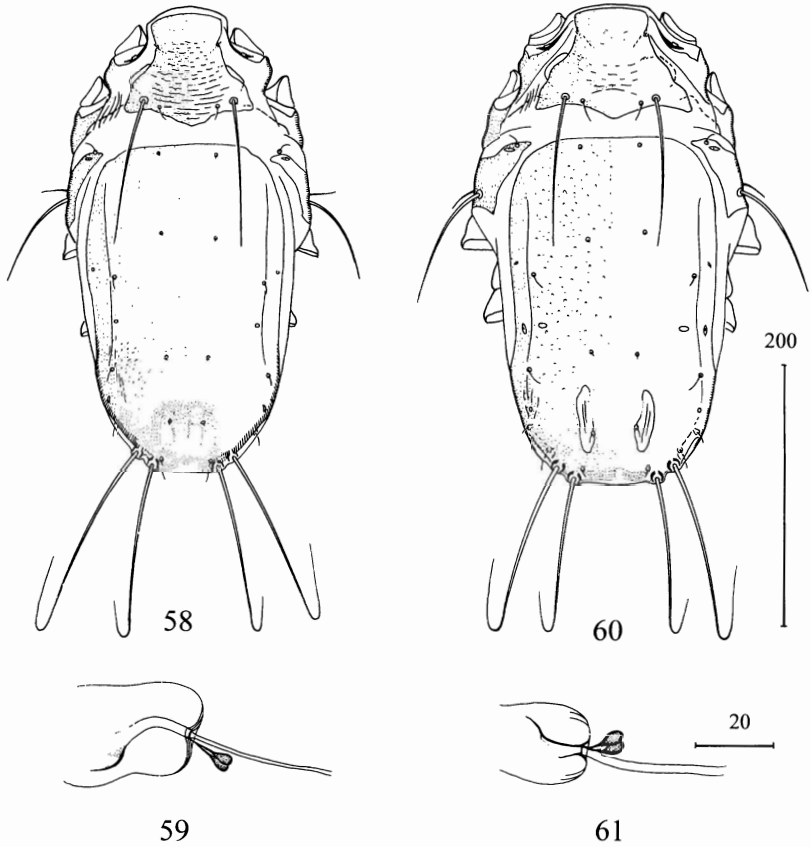
Figs 54-57 Males of *Bychovskiata falclandica* sp. n. (left) and *Bychovskiata obscura* sp. n. (right). **54, 56** - dorsal view; **55, 57** - ventral view of hysterosoma.

Species not grouped

Bychovskiata falclandica sp. n. (Figs 54, 55, 58, 59)

Type data. Holotype male, paratypes 5 males, 6 females (ZMUM 64411) from *Charadrius falclandicus* (Charadriidae: Charadriinae), Argentina, Rio Galagos, 1.09.1915, R. H. Beck. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH.

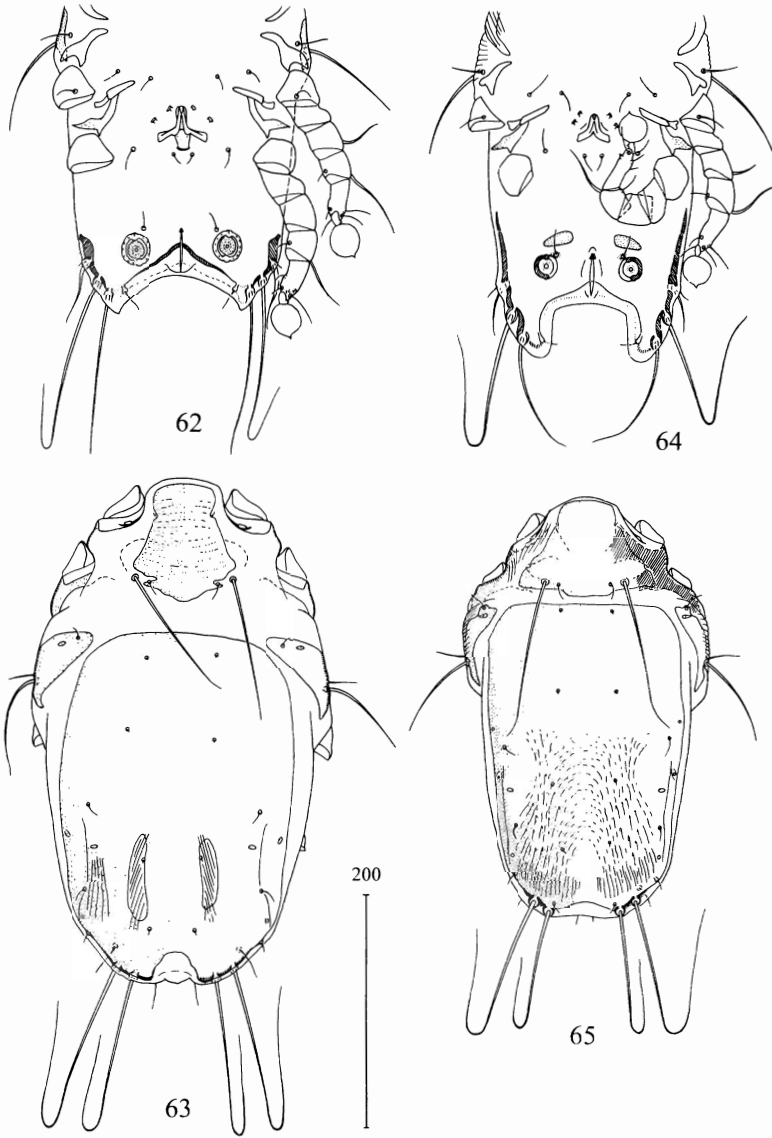
Etymology. The name "*falclandica*" is derived from the specific host name.



Figs 58-61 Females of *Bychovskiata falclandica* sp. n. (left) and *Bychovskiata obscura* sp.n. (right). **58, 60** - dorsal view; **59, 61** - spermatheca.

Male. Length of idiosoma 283, width of idiosoma 166 (280-295 x 160-166). Prodorsal shield 70 x 91, with transversal striation distance between setae *se* 60. Hysteronotal shield 190 x 132 lateral margins without extensions. Setae *c3* situated on ventral margin of humeral shield. Opisthosomal lobes wide and short, with widely rounded apex. Terminal cleft as wide V with rounded bottom, length 27, width (distance *ps1-ps1*) 35. Interlobar membrane as narrow concave band along terminal cleft, depth of incision 9.6. Genital organ at level of epimeres IV. Genital arc 22 x 4, aedeagus short, stiletto-like, about one quarter of genital arc length. Anterior acetabulae at level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* slightly posterior to genital arc base. Adanal shields as small stick-like transversal sclerites, setae *ps3* situated posterior to these shields. Diameter of adanal discs 19. Distance between setae: *h3-h3* 50 (48-40), *3a-g* 57, *4a-g* 19, *g-ps3* 39, *ps3-ps3* 36 (35-40). Setae *d* and *e* button-like.

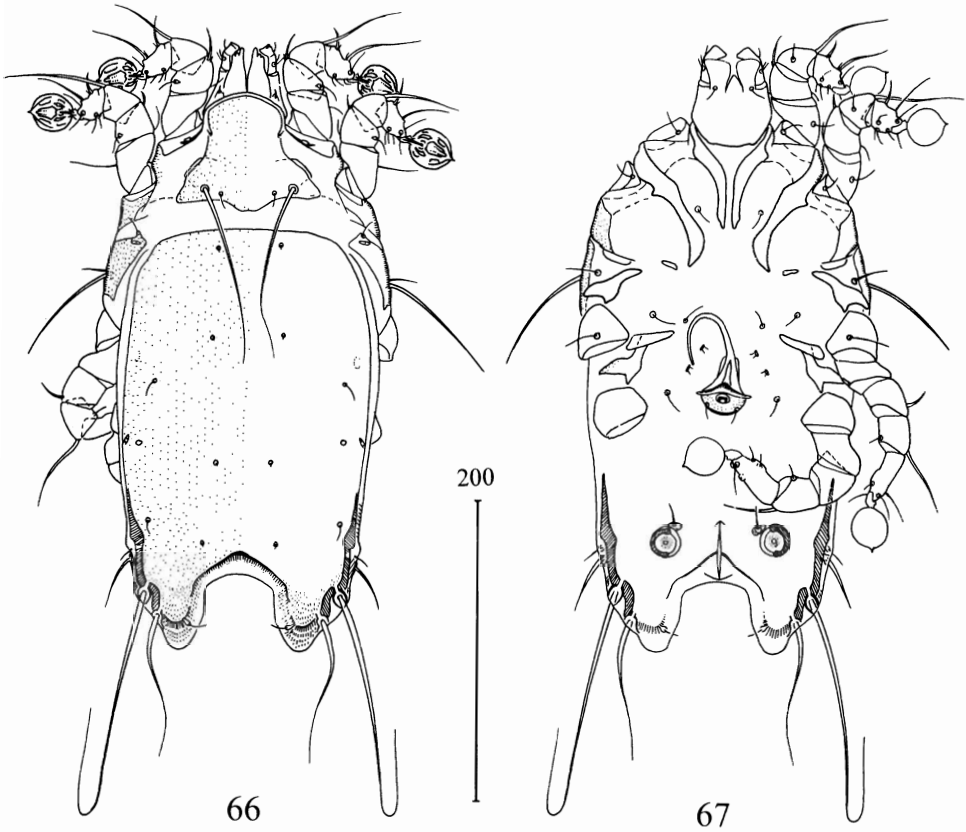
Female. Length of idiosoma 347, width of idiosoma 188 (345-355 x 185-192). Prodorsal shield as in male, 84 x 96, distance between setae *se* 67. Hysteronotal shield 239 x 146, lateral margins without extensions; surface dotted, with numerous little pits, posterior part of this shield with square weakly sclerotized zone. Setae *e1* and *h1* microchaetae, setae *h1* situated in this zone, setae *e1* far anterior to it. Posterior margin of opisthosoma between setae *h3* as heavily sclerotized membrane. Distance between setae *h3-h3* 48, *e1-e1* 29, *h1-h1* 24, *e1-h1* 45. Setae *ps1* situated on hysteronotal shield



Figs 62-65 *Bychovskiata squatorolae* (CANESTRINI) (left) and *Bychovskiata phegorini* MIRONOV (right). **62, 64** - male, ventral view of hysterosoma; **63, 65** - female, dorsal view.

anterior to setae *h3*. Epigynum 43 x 68. Width of primary spermaduct 2.0, internal spermaduct 2.4 in width at base. Legs IV extending slightly beyond the posterior end of the body.

Differential diagnosis. *Bychovskiata falclandica* sp. n. (Fig. 54, 58) is similar to *B. placidi* sp. n. (Figs 1, 11) and to *B. obscura* sp. n. (Figs 56, 57, 60, 61) by the striated prodorsal shield in both sexes. *B. falclandica* and *B. obscura* have no small rounded extensions in lateral margins of hysteronotal shield, while in *B. placidi* and remaining species of the *charadrii* group these extensions are well developed. Males



Figs 66-67 Male of *Bychovskiata ehrnsbergeri* sp. n. **66** - dorsal view; **67** - ventral view.

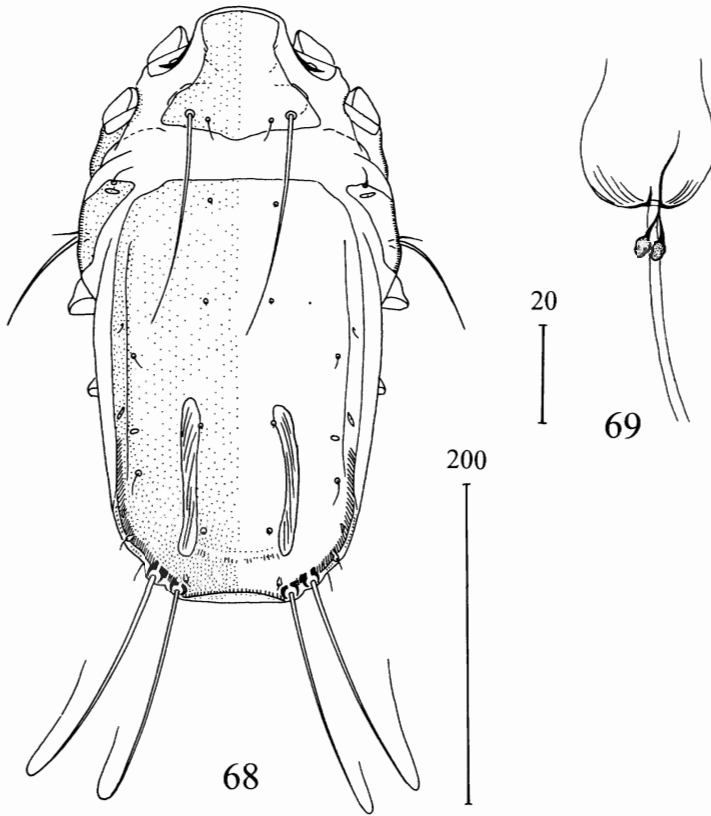
of *B. falclandica* differ from ones of *B. obscura* by small adanal shields anterior to setae *ps3* (Fig. 55), females differ by the weakly sclerotized patch of irregular form around setae *h1* (Fig. 58). In males of *B. obscura* the adanal shields absent (Fig. 57), in females the posterior end of hysteronotal shield with a pair of short longitudinal lacunae (Fig. 60).

Bychovskiata obscura sp. n.
(Figs 56, 57, 60, 61)

Type data. Holotype male, paratypes 5 males, 6 females (ZMUM B1197a) from *Charadrius obscurus* (Charadriidae: Charadriinae), New Zealand, no other data. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH.

Additional material. 4 males, 4 females (ZMUM 221505) from *Charadrius bicinctus* (Charadriidae: Charadriinae), New Zealand, 1967, no other data; 2 males, 3 females (NU 9488, USNM 109 173) from *Anarhynchus frontalis* (Charadriidae: Charadriinae), New Zealand, Manukan harbor, 23.07.1885, coll. unknown.

Male. Length of idiosoma 293, width of idiosoma 177 (283-295 x 163-177). Pro-dorsal shield 72 x 98, with weak transversal striation; distance between setae *se* 62. Hysteronotal shield 195 x 132, lateral margins without extensions. Setae *c3* situated on ventral margin of humeral shield. Opisthosomal lobes wide triangular, with rounded apex. Terminal cleft as wide V with rounded bottom, length 34, width (distance *ps1*-



Figs 68-69 Female of *Bychovskiata ehrnsbergeri* sp. n. **68** - dorsal view; **69** - spermatheca.

ps1) 40. Interlobar membrane as narrow deeply concave band along terminal cleft margin, depth of incision 14. Genital organ at level of epimeres IV. Genital arc 22 x 24, aedeagus short stiletto-like, about a quarter of genital arc length. Anterior acetabulae slightly anterior to level of genital arc apex. Setae *3a* posterior to *3b*, setae *4a* posterior to genital arc. Adanal shields absent, setae *ps3* situated on striated tegument. Diameter of adanal discs 20. Distance between setae: *h3-h3* 60, *3a-g* 58, *4a-g* 19, *g-ps3* 43, *ps3-ps3* 40. Setae *d* and *e* button-like.

Female. Length of idiosoma 337, width of idiosoma 185 (335-371 x 185-204). Prodorsal shield as in male, 84 x 108, distance between setae *se* 67. Hysteronotal shield 235 x 144, lateral margins without extensions; surface dotted with numerous little pits, posterior end of the shield with a pair of longitudinal lacunae. Setae *e1* and *h1* as microchaetae, setae *h1* situated on margins of lacunae, *e1* anterior to them. Posterior margin of opisthosoma between setae *h3* as well sclerotized membrane. Distance between setae: *h3-h3* 55, *e1-e1* 34, *h1-h1* 29, *e1-h1* 52. Setae *ps1* situated on hysteronotal shield anterior to *h3*. Epigynum 46 x 67. Width of primary spermaduct 2.4, internal spermaduct asymmetrical 3.6 in width at base. Legs IV extending slightly beyond posterior end of the body.

Differential diagnosis. *Bychovskiata obscura* sp. n. is closely related to *B. falclandica* sp. n. Males of *B. falclandica* have the adanal shields situated anterior to setae *ps3*

(Fig. 55); in *B. obscura* these shields are absent (Fig. 57). Females of *B. obscura* have a pair of small longitudinal lacunae in posterior part of hysteronotal shield (Fig. 60). Females of *B. falclandica* have weakly sclerotized patch of irregular form instead of these lacunae (Fig. 58).

Systematic remark. This species and previous one represent a pair of closely related species, which are probably related to *pseudocharadrii* group but are more plesiomorphic.

Bychovskiata squatorolae (CANESTRINI, 1878)
(Figs 62, 63)

Material examined. 15 males, 17 females (ZISP 1565) from *Pluvialis squatorola*, Russia, Kaliningrad region, Rybachii, 24.09.1956, V. YIGIS; 5 males (ZISP 3833) from the same host Kazakhstan, Kyzyl-Orda region, Sary-Su river, 28.08.1986, S. V. MIRONOV; 4 males, 5 females (ZISP 4160) from the same host, Turkmenia, Ghasan-Kuli Reserve, 13.04.1967, ZHITNIKOVA; 8 males, 15 females (ZISP 130) from the same host, Russia, Far East, Maritime Territory, Sudzukhin reserve, 4.05.1945, M. VOLKOVA; 4 males, 20 females (ZISP 131), same host, NE Russia, Wrangel Isl. 29.06.1939, Portenko; 3 males, 3 females (UAM 00769/1) from the same host, Poland, Vistula estuary, 8.09.1985, M. GIERTYCH; 3 males, 3 females (UAM 01234/3) from *Pluvialis dominica*, North America, 1870, no other data.

Originally described from *Pluvialis squatorola* from Europe (CANESTRINI, 1878). This species is associated with plovers of the genus *Pluvialis*.

Bychovskiata phegorni MIRONOV, 1994
(Figs 64, 65)

Material examined. Holotype male, paratypes 2 males, 2 females (ZMUM 217 627) from *P. mitchellii*, Chile, Sanborozo Prov., Valle Rio Yeso, H=2.690 m, no date, S. PARREN and E. BERNOTH.

This species is a specific parasite of the Diademed Sandpiper-plover *Phegornis mitchellii* (Charadriidae, Charadriinae) (MIRONOV, 1994b).

Bychovskiata ehrnsbergeri sp. n.
(Figs 66-69)

Type data. Holotype male, paratypes 4 males, 6 females (ZMUM 64421) from *Charadrius modestus* (Charadriidae: Charadriinae), Argentina, Rio Galagos, 24.08.1915, R. H. BECK. Holotype - ZMUM, paratypes - ZMUM, ZMH.

Etymology. This species is dedicated to Prof. Dr. RAINER EHRSBERGER a German acarologist and our friend.

Male. Length of idiosoma 356, width of idiosoma 187 (352-366 x 180-197). Prodorsal shield 72 x 96, without striation; distance between setae *se* 58. Hysteronotal shield 264 x 148, lateral margins without extensions. Setae *c3* situated out of humeral shields. Opisthosomal lobes tongue-like, widely separated from one another. Terminal cleft semi-ovoid, length 63, width (distance *ps1-ps1*) 65. Interlobar membrane narrow in anterior part of the cleft, widened and rounded on apices of lobes, depth of incision (from membrane apex level to bottom of incision) 46. Base of genital organ at level of trochanters IV. Properly genital arc 24 x 36, aedeagus as long and thin hook, about 2 times longer than genital arc. Anterior acetabulae situated slightly anterior to level of genital arc apex. Setae *3a* situated slightly posterior to *3b*, setae *4a* at level of genital arc base. Adanal shields as very small sclerites around setae *ps3* bases. Diameter of adanal discs 22. Distance between setae: *h3-h3* 108, *3a-g* 53, *4a-g* 10, *g-ps3* 82, *ps3-ps3* 55. Setae *d* and *e* button-like.

Female. Length of idiosoma 361, width of idiosoma 199 (355-372 x 192-206) Prodorsal shield as in male, 84 x 100, distance between setae *se* 62. Hysteronotal shield

259 x 163, lateral margins without extensions; surface dotted, posterior part of this shield with a pair of long and narrow longitudinal lacunae extending anterior beyond setae *e1*. Setae *e1* and *h1* microchaetae, situated near internal margins of lacunae. Posterior margin of opisthosoma between setae *h3* rather weakly sclerotized. Distance between setae *h3-h3* 68, *e1-e1* 48, *h1-h1* 40, *e1-h1* 60. Setae *ps1* situated on hysteronotal shield, anterior to *h3*. Epigynum 43 x 74. Width of primary spermaduct 2.4, internal spermaduct asymmetrical, 2.5 in width at base. Legs IV extending slightly beyond the posterior end of the body.

Differential diagnosis. *Bychovskiata ehrnsbergeri* sp. n. is a unique species within the genus. The general shape and structure of opisthosomal lobes in males (Fig. 66) resemble that of *B. phegorni* (Fig. 64). Males of *B. ehrnsbergeri* differ from all known species of the genus *Bychovskiata* by the genital apparatus with the big and thin hook-like aedeagus (Fig. 67). Among the *Bychovskiata* species with females having a pair of longitudinal lacunae on the hysteronotal shield, this species is most similar to *B. pseudocharadrii*. In females of *B. ehrnsbergeri* these lacunae are long and extended anteriorly to the level of setae *e1* (Fig. 68); in females of *B. pseudocharadrii* lacunae rarely reach the setae *e1* (Fig. 38).

Key to species

Males

1. Setae *si* lanceolate. Adanal shields big, surrounding anal field from anterior and partly from lateral sides (Fig. 47) *B. tibetana* MIRONOV
- Setae *si* thin hair-like. Adanal shield has another shape or absent 2
2. Opisthosoma with well developed opisthosomal lobes, triangular or tongue-shaped.. (Figs. 28, 62, 66) 3
- Opisthosomal lobes short and wide, bluntly rounded (Figs. 1, 54) 11
3. Membrane on apices of opisthosomal lobes more or less acute (Fig. 62). Prodorsal shield without extending posterior angles, its lateral margin incised anterior to setae *se* *B. squatorolae* (CANESTRINI)
- Membrane generally rounded on apices of opisthosomal lobes, however may carry small lateral spines. Prodorsal shield with extending posterior angles, lateral margin not incised 4
4. Setae *h1* situated on sclerotized margin of semicircular terminal cleft (Fig. 40) 5
- Setae *h1* situated on properly idiosoma or on dorsal surface of opisthosomal lobes.. 7
5. Membrane on apices of lobes with small lateral spine 6
- Membrane of apices of lobes rounded, without spines (Figs. 40, 41) *B. tricolor* sp. n.
6. Terminal cleft as transversal oval, length of terminal cleft more 75 (Fig. 42) *B. chilensis* MIRONOV & DABERT
- Terminal cleft shallow concave, length of terminal cleft less 60 (Fig. 43) *B. nudidorsa* GAUD & MOUCHET
7. Membrane of lobar apex with two spines, lateral and terminal (Fig. 30) *B. bidentata* MIRONOV
- Membrane of lobar apex rounded, without any spines 8
8. Genital apparatus modified, aedeagus hook- or whip-shaped 9
- Genital apparatus of typical form, with genital arc as inverted Y, aedeagus small stiletto-like 10
9. Setae *h1* situated posterior to bottom of terminal cleft. A small elongated sclerite between humeral and hysteronotal shields is present (Fig. 27) *B. perforata* MIRONOV

- Setae *h1* situated anterior to bottom of terminal cleft. Sclerite between humeral and hysteronotal shield absent (Figs. 66, 67) *B. ehrnsbergi* sp. n.
- 10. Terminal cleft almost rectangular, opisthosomal lobes tongue-like. Lateral margin of hysteronotal shield without any extensions at level of setae *cp* (Fig. 64) *B. phegorni* MIRONOV
 - Terminal cleft wide triangular with rounded bottom, opisthosomal lobes triangular, with rounded apex (Fig. 28). Lateral margin of hysteronotal shield with small rounded extensions at level of setae *cp* *B. thinorni* MIRONOV
- 11. Genital apparatus with epiandrum, aedeagus big hook-shaped 12
 - Genital apparatus without epiandrum, aedeagus simple, stick- or stiletto-like 13
- 12. Epiandrum as big transversal sclerite in a form of thigh-bone (Figs. 34, 35) *B. pseudocharadrii* DUBININ
 - Epiandrum represented by small semicircular sclerite and 1-2 lateral pairs of small ovoid sclerites (Figs. 32, 33) *B. intermedia* CHIROV & MIRONOV
- 13. Lateral sclerite of epimeres IV with widened blunt apex (Fig. 51). Setae *h2* and *h3* distinctly situated out of posterior margin of hysteronotal shield (Fig. 48) 14
 - Lateral sclerite of epimeres IV with acute apex. Setae *h2* and *h3* on posterior margin of hysteronotal shield 15
- 14. Adanal discs close to anal slit. Adanal shields as big C-shaped sclerites completely surrounding anal field (Fig. 49). Cupules *ia* positioned external to setae *c2* *B. bisulcata* MIRONOV
 - Adanal discs positioned far from anal slit. Adanal shield as two pairs of small, transversal sclerites, anterior pair weakly sclerotized (Fig. 51). Cupules *ia* media to setae *c2* *B. subcharadrii* DUBININ
- 15. Lateral margins of hysteronotal shield with small rounded extension or short blunt projection (Fig. 1) at level of setae *cp*. Prodorsal shield with striation or without striation 17
 - Lateral margins of hysteronotal shield without any extensions or projection. Prodorsal shield always with transversal interrupted striation 16
- 16. Small transversal adanal shields situated anterior to setae *ps3* (Fig. 55) *B. falclandica* sp. n.
 - Adanal shields absent (Fig. 57) *B. obscura* sp. n.
- 17. Opisthosoma wide, with almost straight posterior margin between setae *h3* Distance between setae *ps3* more than 85 18
 - Opisthosoma with more or less recognizable lobes, posterior margin between *h3* distinctly concave. Distance between setae *ps3* less than 80 19
- 18. Prodorsal shield with weak transversal interrupted striation (Fig. 1)... *B. placidi* sp. n.
 - Prodorsal shield without any striation *B. vociferi* sp. n.
- 19. Setae *c3* on ventral margin of humeral shield 21
 - Setae *c3* distinctly out of humeral shield (Figs. 3, 4) 20
- 20. One pair of adanal shields anterior to setae *ps3* (Fig. 4). Margin of interlobar membrane with distinct incision about 10-15 in length *B. semipalmati* MIRONOV and DABERT
 - Adanal shields absent (Fig. 3). Margin of interlobar membrane weakly concave, length of incision about 5-8 *B. charadrii* (CANESTRINI)
- 21. Distance between setae *se* 55-65, width of prodorsal shield less than 100, ratio of idiosoma length to width more than 1.7 22
 - Distance between setae *se* 65-85, width of prodorsal shield more than 100, ratio of idiosoma length to width usually less than 1.7. 23
- 22. Length of idiosoma more than 330, small adanal shields carrying setae *ps3* present (Fig. 9). Ratio of idiosoma length to width 1.70-1.80. Length of terminal cleft 20-24 *B. hypoleuci* sp. n.

- Length of idiosoma less than 330 , adanal shields absent (Fig. 10). Ratio of idiosoma length to width 1.85-1.90. Length of terminal cleft 28-35 *B. macularii* sp. n.
- 23. Aedeagus extending to basis of genital arc (Fig. 5). Length of idiosoma less than 320 *B. dubia* sp. n.
- Aedeagus not extending to basis of genital arc. Length of idiosoma more than 330 24
- 24. Humeral shield short, scarcely extending to the basis of epimeres III only (Fig. 7). Distance between setae *h3* more than 75 *B. africanera* sp. n.
- Humeral shield relatively long, extending beyond the basis of epimeres III (Fig. 6). Distance between setae *h3* less than 75 *B. melanopsi* sp. n.

Females

- 1. Setae *si* lanceolate (Fig. 48) *B. tibetana* MIRONOV
- Setae *si* simple hair-like 2
- 2. Lateral sclerites of epimeres IV with wide blunt apex 3
- Lateral sclerite of epimeres IV with acute apex 4
- 3. Posterior angles of prodorsal shield short rounded. Cupules *ia* situated medial to setae *c2*. Dorsal surface of hysteronotal shield uniformly dotted (Fig. 52) *B. subcharadrii* DUBININ
- Posterior angles of prodorsal shield elongated. Cupules *ia* situated external to setae *c2*. Opisthosomal part of hysteronotal shield with two longitudinal furrows close to one another (Fig. 50) *B. bisulcata* MIRONOV
- 4. Opisthosomal part of hysteronotal shields with a pair of longitudinal lacunae or with one big U-shaped lacuna 5
- Opisthosomal part of hysteronotal shield with another pattern or uniformly dotted 12
- 5. Opisthosoma with one U-shaped lacuna (Figs. 44-46)..... 6
- Opisthosoma with a pair of longitudinal lacunae 8
- 6. Anterior ends of lacunae closer to one another than setae *e1* (Fig. 46) *B. nudidorsa* GAUD & MOUCHET
- Anterior ends of lacunae more distant from one another than setae *e1* 7
- 7. Anterior branches of lacuna divergent (Fig. 44). Length of idiosoma 420 or more *B. tricolor* sp. n.
- Anterior branches of lacuna parallel-sided (Fig. 45). Length of idiosoma less than 420 *B. chilensis* MIRONOV & DABERT
- 8. Prodorsal shield without extending posterior angles, setae *se* situated out of this shield or touch only the shield margin (Fig. 63) *B. squatorolae* (CANESTRINI)
- Prodorsal shield with well developed posterior angles, setae *se* situated on shield.... 9
- 9. Lacunae on hysteronotal shield short and narrow, with weak borders. Lateral margins of hysteronotal shield with short blunt extensions at level of setae *cp* (Fig. 17 Width of primary spermaduct 6.0-8.0) *B. vociferi* sp. n.
- Lacunae relatively long, with distinct margins. Lateral margins of hysteronotal shield without extensions. Width of primary spermaduct less than 5.0 10
- 10. Prodorsal shield with transversal striation (Fig. 60). Hysteronotal shield with numerous little pits. Lacunae on the shield usually not extending anteriorly to level of setae *e2* *B. obscura* sp. n.
- Prodorsal shield without striation. Hysteronotal shield uniformly dotted with lacunae extending anteriorly at least to level of setae *e1* 11
- 11. Lacunae of hysteronotum long, extending anteriorly to level of setae *e1*. Setae *hl* situated near medial margins of these lacunae (Fig. 68) *B. ehrensbergeri* sp. n.

- Lacunae usually extending to level setae *el* only. Setae *h1* situated on lateral margins of lacunae or in lacunae (Fig. 38)..... *B. pseudocharadrii* DUBININ
- 12. Posterior part of hysteronotal shield with medial area of small circle and ovoid small lacunae (Fig. 27)..... *B. perforata* MIRONOV
 - Posterior part of hysteronotal shield with another pattern..... 13
- 13. Posterior half of hysteronotal shield with interrupted longitudinal and bow-like striation (Fig. 65)..... *B. phegorni* MIRONOV
 - Posterior part of hysteronotal shield with another pattern..... 14
- 14. Prodorsal shield with transversal striation 15
 - Prodorsal shield without striation 16
- 15. Posterior end of hysteronotal shield with big weakly sclerotized patch of irregular form (Fig. 58). Lateral margins of hysteronotal shield without lateral extensions at level of setae *cp* *B. falclandica* sp. n.
 - Posterior end of hysteronotal shield with a pair of longitudinal heavy sclerotized crests (Fig. 11). Lateral margins of hysteronotal shield with small rounded extensions at level of setae *cp* *B. placidi* sp. n.
- 16. Posterior margin of opisthosoma between setae *h3* weakly sclerotized; setae *ps1* situated on posterior margin of hysteronotal shield. Lateral margins of hysteronotal shield without extensions (Fig. 36) *B. intermedia* CHIROV & MIRONOV
 - Posterior margin of opisthosoma between setae *h3* as heavily sclerotized convex membrane. Setae *ps1* situated anterior to setae *h3*, far from posterior margin of hysteronotal shield. Lateral margins of hysteronotal shield with little rounded extensions at level of setae *cp* 17
- 17. Posterior part of hysteronotal shield between setae *el* and *h1* with numerous little slit-like lacunae 18
 - Posterior part of hysteronotal shield uniformly dotted 19
- 18. Setae *c3* situated out of humeral shield (Fig. 29) *B. thinorni* MIRONOV
 - Setae *c3* situated on ventral margin of humeral shield (Fig. 31) *B. bidentata* MIRONOV
- 19. Spermatheca narrow tube-like with rounded apex; internal spermaduct thin tube-like, weakly sclerotized (Fig. 25)..... *B. semipalmati* MIRONOV & DABERT
 - Spermatheca big sac-like; internal spermaduct asymmetrical, heavily sclerotized (Fig. 14) 20
- 20. Setae *el* and *h1* small spine-like (Fig. 15) *B. melanopsi* sp. n.
 - Setae *el* and *h1* microchaetae, rarely setae *h1* thin, needle-like 21
- 21. Width of internal spermaduct 7.0-8.0, width of primary spermaduct about 5.0-6.5 (Fig. 14) *B. charadrii* (CANESTRINI)
 - Width of internal spermaduct 3.0-5.0, width of primary spermaduct about 2.5-4.8 22
- 22. Ratio of length to width of hysteronotal shield about 1.35-1.50 23
 - Ratio of length to width of hysteronotal shield about 1.55-1.75 24
- 23. Width of primary spermaduct 3.6-3.8 (Fig. 22). Ratio of length to width of hysteronotal shield usually less than 1.60. Legs IV not extending beyond posterior margin of opisthosoma *B. hypoleuci* sp. n.
 - Width of primary spermaduct 2.4-3.0 (Fig. 23). Ratio of length to width of hysteronotal shield more than 1.60. Legs IV extending beyond posterior margin of opisthosoma by ambulacral disc *B. macularii* sp. n.
- 24. Width of primary spermaduct 4.0-4.8 (Fig. 20) *B. dubia* sp. n.
 - Width of primary spermaduct 2.4-3.6 (Fig. 24) *B. africanera* sp. n.

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