A systematic review of the feather mite genus

Bychowskia DUBININ (Analoideae: Avenzoariidae) with description of 11 new species

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ABSTRACT: The paper includes an improved diagnosis of the feather mite genus Bychowskia 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 Scolopacii): Bychowskia placid sp. n. from Charadrius placidus; B. abius sp. n. from Ch. abius; B. africanaus sp. n. from Ch. recticulatus; B. melanops sp. n. from Ch. melanops; B. vocifer sp. n. from Ch. vociferus; B. hypogaetii sp. n. from Actitis hypoleucus; B. macularius sp. n. from A. macularius; B. tricolor sp. n. from Vanellus tricolor; B. fullicauda sp. n. from Charadrius fullicauda; B. obscura sp. n. from Ch. obscura; and B. ehrenbergi sp. n. from Ch. modesta. 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: Acan, Avenzoariidae, bychowskia, new taxa, systematics, Charadriiformes, host-parasite relationships.

Introduction

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

The genus Bychowskia originally included six species: Bychowskia aquatorotae (Cанеxтрин, 1878), B. glareolii DUBININ, 1951 B. assecto DUBININ, 1951, B. sambhardri DUBININ, 1951, B. charadrii (Cанеxтрин, 1871), and B. pseudocharadrii DUBININ, 1951 (DUBININ, 1951: 1956). GEUDE (1972) had added one new species B. nudidorsa, and excluded B. glareoloi and B. assecto, which actually belonged to the genus Freyeanomorpha (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 Bychowskia have been described (MIRONOV, 1994a, 1994b, MIRONOV & DABERT, 1995). Meanwhile, a number of Bychowskia 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 Bychowskia 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 idiomorph chaetotaxy follows Galunzyte 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 parasite sexes are given only for an idiosomal size (length and width) and for certain discriminative characters. The BH2 2 Olympus light microscope with Nomarski 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 Wannburg, Germany - ZMH; Zoological Museum, University of Michigan (Ann Arbor, Michigan, USA) - ZMUM.

Results

Brychvyshevka Durnin, 1951

Type species, Dermatelas charadrii Canestrini, 1878.

Predorsal shield with extending posterior angles (Figs. 1, 11), or angles greatly reduced (Figs. 48, 64). Anterior angles of hysterosomal 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 ω may be present. Lateral setae ρ2 small hair-like. Ambulacr mat disc diameter smaller than respective tarsus length.

Male. Tips of epimeres I not connected with epimeres II. Opisthosomal loeoes variously shaped: triangular with rounded apex; tongue-like: short and wide, bluntly rounded; almost completely oblique, terminal cleft is also variable in shape: triangular with rounded bottom (Fig. 34), wide semicircular or almost rectanglar (Figs. 26, 43, 67), or very short V-shaped with rounded bottom (Figs. 1, 2). Interolbar membrane either wide, spreading along the cleft margin up to setae /3, or boaks like narrow band along posterior margin of opisthosoma (Figs. 6, 7). Setae /2 small hair-like; p2 lanceolate. Aedeagus small stilo-like, or incertain species modified into a big hook- or whip-like structure (d. pseudocharadrii, B. intermedius, B. chersbergeri, B. perforata). Epipodia usually absent, if present, pseudocharadrii group, formed as transversal bone-like sclere (Figs. 34, 35) or as several separated fragments (Fig. 33). Paragonal sclerites absent. Adanal shield either present and shaped usually as one or two pairs of transversal sclerites (Fig. 29), or absent. Setae p3 situated on adanal shields or out of them. Core of adanal discs with two bulges or teeth. Tarsi III and IV are equal in size. Setae / and 8 of tarsus IV short stick-like or button-like surrounded by thin pulvilia.

Female. Posterior part of hysterosotal shield uniformly doted, or sometimes with a pair of longitudinal lacnae (Fig. 38), or one non-paired lacna (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 wranged into five distinct species groups (subgenera?) as follows: charadrii, bidentatii, pseudocharadrii, modicorsa, 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.
This group includes 9 species being most typical in appearance for the genus Bychovskia. They are easily distinguished from other Bychovskia species by small rounded extensions on lateral margins of hysteromal 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 hysteromal shield with small rounded extensions. Lateral sclerite of epimeres IV acute. Epimeres III stick-like.


Female: Hysteromal shield with a pair of lacranae or without lacranae. Posterior margin of opisthosoma between setae 3a strongly sclerotized.
Buchvokustika chaturuii (Cnestreni, 1878)

(Figs. 3, 13, 14)

Material examined: 10 males, 12 females (ZISP 1543) from Charendras biaurica, Russia, Kaliningrad region, 13.05.1977, I. Buchvokustika, 5 males, 7 females (ZISP 1510), from the same host, Russia, Barents-See, Kharkov Isl., 18.06.1846, M. Voronov, 5 males, 6 females (ZISP 3882), same host, Kazakhstan, Kyzyl-Orda region, Sary-Su river, 23.09.1986, S. V. Moronov, 2 males, 4 females (ZISP 3998), same host, Kazakhstan, Atyrau region, Chely, 5.09.1985, S. V. Moronov.

This species, the type species of the genus, was originally described from Charendras biaurica in Europe. Subsequently, several species of the genera Charendras and Actis were reported as its common hosts (Dembin, 1956; Gaid, 1972, Vasyunina & Moronov, 1991). The present examination has shown that the Ringed Plover C. biaurica is the only true common host of B. chaturuii, while other species of the genera Charendras (C. platicaud, C. dailius and others) and Actis have close related out distinct species of the chaturui group.

Buchvokustika platicaud sp. n. (Figs. 1, 2, 11, 12)

Type data. Holotype male, paratypes 5 males, 6 females (ZMUM 64666) from Charendras platicauda (Charadridae: Charenda). Japan, Saga, 1401917, coll. unknown. Holotype - ZMUM; paratypes - ZMUM, ZISP, ZMUK.

Additional material: 3 males, 8 females (ZISP 4146) from the same host, Russia, Far East, Maritime Territory. Okino region, 990976, T. F. Vasyunina.

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

Male. Length of total body 363 mm, width of idiosoma 220 (paratypes 340-342 x 205-225). Proidential shield 64 x 110, with transversal striation; distance between setae se 71. Hysteromatostoma shield 260 x 199, lateral margins with small rounded extensions at level of setae cp. Setae c7 situated out of humeral shield. Opisthosomal lobes short, widely rounded, almost oblateated. Terminal cleft as short and wide V with rounded bottom, length 83, width 33, width (distance ps1-ps1) 70. Inserfibrilar membrane as narrow band along postoracic margin of opisthosoma, depth of incision 72. Genital organ at level of stichoteamen IV. Genital arc 27 x 29, aedagopus about one half of genital arc length. Posterior acetabula at level of genital arc apex. Setae 5u posterior to 3b, seta 4o slightly posterior to level of genital arc apex. Aedagula shield: absciss, setae ps1 on striated tegument. Diameter of adanal discs 24. Distance between setae: 8j-h-hj, 3a-g-36, 4g-36, 5g-43, 6p-43, 77. Setae j and x button-like. Female. Length of total body 405 mm, width of idiosoma 220 (paratypes 390-405 x 220-235). Proidential shield as in male, 87 x 110, with transversal striation, distance between setae se 71, hysteromatosternal shield 303 x 211, lateral margins with small rounded extensions at level of setae cp, surface dotted, with a pair of heavy scutelated longitudinal ridges. Setae e7 and h short, spine-like. Posterior margin of opisthosoma between setae ps1-ps1. Distance between setae: el-ej-ej, e-j-ej, el-ej-ej, e-j-ej. Setae ps1 situated on hysteromatosternal shield, anterior to el. Epigynum 46 x 68. Width of primary spermatocyst 5.5, internal spermatocyst asymmetrical. Width at base (paratypes 45.5 and 4.3-6 respectively). Lgna IV extending to posterior end of opisthosoma.

Differential diagnosis. Both sexes of Buchvokustika platicaud sp. n. differ easily from other species of the chaturui group by a transversal striation on the proidential shield (Figs 1, 2). Striated proidential shield have also B. falcidentica sp. n. and B. obraci 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 hysteromatosternal shield (Figs 53-60). In males of Buchvokustika platicaud the opisthosoma terminus with the very short incision, about 5-7, in females the hysterosternal shield with two sclerotized crests.
**Figs 3-6** Ventral view of male hysterosoma. 3 - Bychovskiana charadrii (Camerone); 4 - Bychovskiana sempinulnes Mmonov & Darret; 5 - Bychovskiana dubia sp. n.; 6 - Bychovskiana melanopsis sp. n.

*Bychovskiana dubia* sp. n.

(Figs 5, 19, 20)

**Type data.** Holotype male, paratypes 5 males, 6 females (ZISP 3884) from Charadrius dubius (Charadriidae: Charadriinae), Kzyl-Orda region, Sary-Su river, 9.08.1986, S. V. Mmonov. Holotype - ZISP, paratypes - ZISP, ZGH.

Additional material: 15 males, 21 females (ZISP 1563) from the same host, Russia, Kaliningrad region, Rybachiy, 25.04.1937, I. E. BYCHOVSKAYA.

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

**Male.** Length of idiosoma 30L, width of idiosoma 190 (305-320 x 190-200). Pre-dorsal shield 72 x 103, without ariation; distance between setae *x d* 65. Hysterosomal shield 210 x 160, lateral margins with small rounded extensions at level of setae *cp*. Setae *e* 3 on margin of humeral shield. OP*1* plesmal lobes widely rounded, almost
Figs 7–10 Ventral view of male hysterosoma. 7 - Byskovskiana africana sp. n.; 8 - Byskovskiana reifferi sp. n.; 9 - Byskovskiana hypoleuci sp. n.; 10 - Byskovskiana munclovis sp. n.

Obliterated. Terminal cleft as very short and wide V with rounded bottom, length 22, width (distance ps1-3st) 53. Introbital membrane as narrow band along posterior margin of opisthosoma, depth of incision 5.5. Genital organs at level of roshaters 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 to genital arc apex. Adanal shields absent, setae ps1-3 situated on stunted segment. Diameter of adanal discs 19. Distance between setae: h1/h3 73, s6-g3 63, 4a-g1 19, g-ps3 50, ps3-ps5 57. Setae d an 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: sc72. Hysterosomal shield 264 x 190, lateral margins with small rounded extensions at level of setae cp; surface
dotted, without lacunae. Setae el and hl as microchaetae. Posterior margin of opisthosoma between setae h2 with heavily sclerotized membrane. Distance between setae: h2-h3 58, el-el 41, hl-hl 30, el-hl 34. Setae ps1 situated on shield, slightly anterior to setae h3. Epigastrum 43 x 72. Width of primary spermatocyst 4.8, internal spermatocyst asymmetrical: 4.5 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 Bychovskia dubia sp. n. are similar to B. charadriae, B. africanae sp. n., and B. melanopsi sp. n. Males of Bychovskia dubia are significantly smaller than remaining three species. Its idiosoma is always shorter than 320, and the aedeagus 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. africanae by the size, general shape of idiosoma and form of setae el and hl, however this species has wider primary spermatocyst, 4.0-4.8 (Figs. 19, 20) versus 2.4-3.6 (Fig. 24) in B. africanae.
Type tata. Holotype male, paratypes 6 males, 7 females (ZM&M 130335) from Charadrius tricolor (Charadriidae: Charadriinae), Knyza, Archers Post, N. Gwaza Nyiro, 5-30.1930. A. B. Fuller. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH. Additional material: 2 males, 2 females (NU 3111) from the same host. S Africa. Cape Town, Rondevlei Bird Sanctuary, 30.06.1955. E. Monlewis.

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

Male. Length of idiosoma 332, width of idiosoma 204 (325-335 x 190-205). Pro-dorsal shield 84 x 115, without atria; distance between setae sp 72. Hysterontial shield 224 x 172, lateral margins with small rounded extensions at level of setae sp. Setae e3 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 p3/p1) 55. Interlobar membrane as narrow slightly concave band along posterior margin of opisthosoma, depth of incision 72. Genital organ at level of trochanters IV. Genital arm 26 x 28, aedeagus short stiletto-like, about a half of genital arc length. Posterior acetabulum at level of genital arc apex. Setae p.4 posterior to 3h, setae 4z slightly anterior to base of genital arc. Adanal shields absent, setae ps3 situated on triturated tegument. Diameter of adanal discs 22. Distance between setae: h3-h7 77, 2a-g 62, 4a-g 36, g-z1 55, p3/p1 57. Setae d and e. button-like.

Female. Length of idiosoma 396, width of idiosoma 215 (365-425 x 215-225).

Figs 15-18 Dorsal view of female hysterosoma (up) and spermatheca (below). 15. 16 - Bychovskiiata melanopsi sp. n.; 17, 18 - Bychovskiiata vociferi sp. n.
Prodorsal shield in male, 95 x 124, distance between setae se 82. Hysterosternal 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-h3 28. Setae ps1 situated on hysterofostral shield anterior to h3. Epigynum 48 x 77. Width of primary spermatoduct 3.0, internal spermatoduct 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.

Differentiel diagnosis. Males of B. africanaer sp. n. are most similar to B. melanopsii sp. n. but they have the wider opisthosoma (distance h3-h3 about 75-80), and the hysterofostral shields scarcely extending to basis of epimeres III (Fig. 7). In males of B. menziesii the distance h1-h1 is about 65-72, and the tumeral shields extending posterior to basis of epimeres III (Fig. 6). Females of B. africanaer are most similar to B. dubia and differ from this species by the narrow primary spermatoduct only, 2.4-3.0 in width (Fig. 24) versus 4.0-4.8 (Fig. 20) in B. dubia.

Bychowskii melanospi sp. n. (Figs 6, 15, 16)

Type data. Holotype male, paratypes: 7 males, 4 females (ZMUM 216639) from Charadridae melanopsii (Charadridae: Charadriidae), Australia, Victoria, Lake Purgilgalie, 8 mi NW of Calico, 2.10.1968, R. W. Syzdek, Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMHE. Additional material: 5 males, 5 females (UGA 9225) from the same host, NW Australia, Brookong Spring, 29.09, 1976, F. S. LUCOULS.

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

Mature Length of diasoma 332 width of idiosoma 192-300 (347). Prodorsal shield 71 x 115, without striations; distance between setae se 79. Hysterosternal shield 239 x 173, lateral margins with small rounded edge at level of setae cp, setae e1 on ventral margin of hysterofostral shield. Opisthosomal lobes short, widely rounded, almost obiterated. Terminal cleft as short and wide V with rounded bottom, length 22, width (distance ps1-ps1) 47. Sierolobar 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, aedegus short gillet-like, about a half of genital arc length. Posterior acetabula situated at level of genital arc apex. Setae 3a posterior to 3b, setae 4a at level of midlength of genital arc. Adanal shields ansqo. setae ps3 on striated tegument. Diameter of anal duc 21. Distance between setae: h3-h3 65, s4a 7, 4a 22, g-g 46, ps3-ps3 55. Setae e and d button-like.

Female. Length of idiosoma 310, width of idiosoma 216 (390-405 x 215-225). Prodorsal shield in male, as 84 x 87, distance between setae se 84. Hysterosternal 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 spiny-like. Posterior margin of opisthosoma between setae h3 as heavily sclerotized membrane. Distance between: h3-h3 70, e1-e1 34, h1-h1 36, e1-h1 37. Setae ps1 on hysterofostral shield, Epigynum 46 x 62. Width of primary spermatoduct 4.8, internal spermatoduct asymmetrical, 4.8 in width at base (4.5-5.0 and 4.5-5.2 respectively). Legs IV extending to posterior end of opisthosoma.

Differentiel diagnosis. B. melanopsii sp. n. is most closely related to B. dubia sp. n. and B. africanaer 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. melanopsii differ from females of both remaining species by small spine-like setae h1 (Fig. 15). In B. dubia and B. africanaer these setae are microchaetae as e1 (Fig. 19).
Figs 19-25 Dorsal view of female bychovskiana (up) and spermaticox (below). 19, 20 - Bychovskiana dahu sp. n.; 21, 22 - Bychovskiana bujakesui sp. n.; 23 - Bychovskiana maculata sp. n.; 24 - Bychovskiana africana sp. n.; 25 - Bychovskiana semipalmata Michalov & Darby.

Bychovskiana vociferi sp. n. (Figs 8, 17, 16)

Type data. Holotype male, paratypes 7 males, 5 females (BMOC82-0416-1) from Charadrius vociferus (Charadriidae: Charadriinae), USA, Michigan, Monroe Co.; Point Montleeu Stack Game Area, 16.04.1982, S. M. Goodwin. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH. Additional material. 2 males, 2 females (NU 8803, EKSM 317231) from the same host Hatt, Feti-Trou-de-Nippes, 9.04.1930, W. M. Parrott.

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

Male. Length of idiosoma. 352 width of idiosoma 204 (34-356 x 194-210). Prosternal shield 96 x 115, without situation; distance between setae n 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 obiterated. Terminal c left as short and wide V with rounded bottom, length 31.
width (distance ps1-ps3) 77. Interlobar membrane as narrow band along posterior margin of opisthosoma, depth of incision 10. Genital organ a-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 Je posterior to 3b, setae 4a situated approximately at middle of genital arc. Adanal shields absent, setae ps1 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, p3-ps3 72. Setae d and e button-like.

Female. Length of idi osoma 410, width of idi osoma 234 (390-410 x 210-234). Prodorsal shield as in male, 96 x 120, distance between setae 82. Hysterosternal 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 h1 with heavily sclerotized membrane. Distance between setae: h3-h3 70, e1-e1 58, h1-h1 64, e1-h1 40. Setae ps1 situated on hysterosternal shield anterior to setae h3. Epigynum 41 x 77. Width of primary spermatoduct 6.0, internal spermatoduct 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. viscerci sp. n. is most closely related to B. placidi sp. n. by a relatively broad opisthosoma with an almost straight terminal in miles (Fig. 2, B). Males of B. viscerci 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 spermatoduct (Figs 17, 18). In males of B. placidi the prodorsal shield is transversally situated (Fig. 1), in females the opisthosoma carries a pair of sclerotized crests, and the primary spermatoduct is not widened near its proximal end (Figs. 11, 12).

Type data. Holotype male, para types 36 males, 47 females (ZISP 1562) from Actia hypoleucos (Scopoliaceae: Trogidae), Russia, Kaliningrad region, Rybachy, 0.65, 1957, M. N. Novikova. Holotype - ZISP, para types - ZISP, PMNH.

Additional material: 3 males, 4 females (ZISP 3173) from the same host, Kirghizia, Issyk-Kal Lake, Chon-Upulsty, 18.08.1984. S. V. Massow.

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

Male. Length of idi osoma 352, width of idi osoma 205 (330-355 x 190-205). Prodorsal shield 82 x 98, without situation, distance between setae 36-60. Hysterosternal 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 as, with rounded bottom, 22, width ps1-ps3 52. Interlobar membrane as narrow band along terminal end of opisthosoma, depth of incision 4.8. Genital organ a-level of trochanters IV. Genital arc 22 x 24, aedeagus short stiletto-like, about a half of genital arc. Posteri or 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 ps1 situated on this shield. Diameter of adanal discs 22. Distance between setae: h3-h3 74, 3a-g 65, 4a-g 19, g-ps3 60, p3-ps3 55. Setae d and e button-like.

Female. Length of idi osoma 410, width of idi osoma 220 (390-412 x 200-225). Prodorsal shield as in male, 84 x 112, distance between setae 66. Hysterosternal 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 k3 as heavily sclerotized membrane. Distance between setae: k3-l3 67, r1-r2 47, n1-n2 31, r1-r3 34. Setae ps situated on hysteronotal shield anterior to k3. Epigynum 45 x 67. Width of primary spermatodact 3.6, internal spermatodact 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. Bychvskiaia hypolocalis sp. n. is closely related to B. dabia sp. n. (Fig. 15, 19, 20) and especially to B. maculari sp. n. (Fig. 10, 23). Males of B. hypolocalis (Fig. 9) differ from B. dabia by the relatively elongated idiosoma (ratio of length to width more than 1:7). From B. maculari by the idiosoma longer than 330, shorter terminal cleft (20-24) and by presence of small adanal shield, Females of B. hypolocalis differ from females of both closely related species by the width of primary spermatodact 3.6-3.8 (Fig. 22) versus 4.0-4.8 (Fig. 20) in B. dabia and 2.4-3.0 (Fig. 23) in B. maculari.

 Bychvskiaia maculari sp. n.

 (Figs. 10, 23)

 Type data Holotype male, paratypes 3 males, 4 females (BMOC 82-0514-2, ZMUM 231575).

 Known Actinidae Scolopendridae: Tringites), USA, Michigan, Monroe Co., Point Mouillee State Game Area, 14.05. 1982, M. G. Goodson. Holotype: ZMUM, paratypes: ZMUM ZSP, ZMH.

 Eymology. The name "maculari" is derived from the specific host name.

 Male. Length of idiosoma 322 width of idiosoma 170 (220-335 x 170-180). Predorsal shield 77 x 93, without striae, distance between setae 62. Hysteronotal shield 234 x 146, lateral margins with small rounded extensions at level of setae cp. Setae c3 situated on ventral pars of humeral shield. Opisthosomal lobes short, widely rounded. Terminal cleft as short as wide V with rounded bottom, length 29, width (distance ps1-ps1) 53. Interlabial membrane as narrow band along margin of terminal cleft: incision is membrane in 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 acetabula situated at level of genital arc apex. Setae 9 to posterior by 16, setae 14 at level of middle of genitalic arc. Adanal shield, absent, setae ps3 situated on striated tegument. Diameter of adanal discs 22. Distance between setae: k3-k3 77, 3a-g 57, 4a-g 12, g-p1 60, p1-p3 53. Setae of d and e button.

 Female. Length of idiosoma 400, width of idiosoma 211 (395-400 x 195-215). Predorsal shield as in male, 89 x 108, distance between setae 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 microaculei. Posterior end of opisthosoma between setae k3 as heavily sclerotized membrane. Distance between setae: h1-h1 62, e1-e1 48, h1-h1 27, e1-e1 43. Setae ps1 situated on hysteronotal shield. Epigynum 47 x 72. Width of primary spermatodact 3.0, interna spermatodact asymmetrical, 4.5 in width at base (in other paratypes 2.4-3.0 and 4.0-4.0 respectively). Legs IV extending to posterior end of opisthosoma.

 Differential diagnosis. Bychvskiaia maculari sp. n. is closely related to B. hypolocali sp. n. Males of B. maculari differ from B. hypolocalis 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. maculari could be distinguished well by very thin primary spermatodact 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. hypolocalis 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 spermatodact is wider, 3:6-3:8, the proportion of hysteronotal shield is less than 7:60 (Figs. 21, 22).
**Brychoskliata semipalmata** Mikonov & Deserti, 1995

(Figs 4, 25)

*Material examined.* Holotype male, paratypes 13 males, 14 females (BMOC R2-0806-1) from *C. semipalmatus*, Michigan, Monroe Co., Point Nokomis State, Game Area, 6.08.1982, S. M. Cussenov. 8 males, 6 females (ZMUC R5378) from *C. melodus*, USA, Michigan, Huron Co., Sand Point, 24.05.1936, T. D. Henson.

Originally described from the Semipalmated Plovers *Charadrius semipalmatus* (Charadriidae) (Mikonov & Deserti, 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 margin of hysterosomal 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 *Erythrogonus*, *Thinornis*, and *Charadrius*.

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

**Male.** Opisthosomal lobes triangular, with rounded apices. Aedeagus small stiletto-like. Epiandrum absent. Setae 5a posterior to 3b. Setae 4a posterior or at level of genital arc basis.

**Female.** Hysterosomal 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 - Bychowskia tibicrona MIKONOV; 30, 31 - Bychowskia bidentata MIKONOV.

Bychowskia perforata MIKONOV, 1994
(Figs. 26, 27)

Material examined. Holotype male, paratypes 10 males, 12 females (NU 4827, USNM 465657) from E cinctus, Australia, Northern Territory, Oenpelli, 5.10.1948, D. O. DOKE.

This species is a monoxenous parasite of the Red-kneed Dotterel Erythropilus cinctus.
Figs 32-38 Ventral view of male hysterosoma and male genital apparatus. 32, 33 - Bychovskiana intermediar Cusov and Minov, 34 - Bychovskiana pseudocharadrii Donsor, frontal view of genital apparatus; 35 - same species, lateral view of genital apparatus.

Bychovskiana bidentata Minov, 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. Foote. This species is a specific parasite of the Hooded Dotterel Charadrius rubricollis.

Bychovskiana thynorni Minov, 1994
(Figs 28, 29)

Material examined. Holotype male, paratypes 2 males, 6 females (ZMUM 208189) from T. novaseelandiae, Chatham Isls., Mangre Isl., 1982, W. Hawkings; 1 male, 1 female (NU 9489, USNM 151113), Chatham Isls., April 1893, colt. unknown. This species is a specific parasite of the Shore Plover Thinornis novaseelandiae.
This group includes two species only. It is well defined by such unique characters as the presence of bone like or fragmented epipandrum and hook-like aedeagus in males. Both sexes lateral sclerite of epipenes IV acute. Lateral margin of hysteronal shield without extensions. Epimeres III stick-like. Male, Opisthosomal lobes short rounded. Aedeagus thick, hook-like. Epipandrum present, Setae 3e posterior to 3b, Setae 4a posterior to genital arc. Female, Hysteronal shield with a pair of longitudinal lacunae or without them. Posterior margin of opisthosoma between 6f weakly sclerotized.

Bychowskiaia pseudocharadrii Dubinin, 1951

(Figs 34, 35, 38, 39)

Material examined. Lectotype male, paralectotypes (5 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 (ND 976) from the same host, Calafatg, Batanes, P. L., USA Med. Res. Unit, 26.09.1964, coll. inkinova; 4 males, 4 females (ZMUM 64385) from C. mongolus mongolus, Japan, Sagami, Eni Civ. Reserve, 2.06.1981, coll. unknown; 6 males, 6 females (ZMUM 72545) from C. arietifrons, Siam, Mekong, 6.05.1929, C. J. A. GARD; 10 males, 15 females (ZISP 4059) from C. arietifrons, Ukraine, Nikolaev region, Tuligul Lake, 5.05.1991, D. A. Kovgan; 2 males, 5 females (ZISP 4036) from the same host, Uzbekistan, Kara-Kalpakia,
Figs 40–43 Males of nudidorsa species group. **Bychovskiiata tricolor** sp. n., dorsal (40) and ventral (41) views; **42-43** Bychovskiiata chilensis Moureov and Deanton, ventral view of hysterosoma, **43** Bychovskiiata nudidorsa Gaed and Moucfft, ventral view of hysterosoma.

Karategov Lake, 19.5.1988, S. V. Mourov, 3 males, 10 females (ZISP 225-8) from the same host, W. Turkmenia, Ghusan-Kule Reserve, 2.07.1961, A. Smirnov, 3 males, 4 females (ZISP 4147) from the same host, Russia, Far East, Maritime Territory, Amur Bay, 24.05.1975, T. T. Vassilov.

Originally described from several species of the genus Charadrius, namely: *C. hiaticula*, *C. placidus*, *C. mongolus mongolus*, *C. alexandrius* (Debinsk, 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 Female of nudidorsa species group, 44 - Bychovskaia ruzonov sp. n., dorsal view; 45 - Bychovskaia tchakaei Mironov and Dabert, dorsal view of hysterostoma; 46 - Bychovskaia nudidorsa Gau and Noucourt, dorsal view of hysterooma.

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

Bychovskaia intermedia Chirov & Mironov, 1985
(Figs. 32, 33, 36, 37)

Material examined. Holotype male, paratypes: 30 males, 51 females (ZISP 1039) from C. morgolus pantirensis, E. Kirghizia. Jetimbel Ridge, 10.07.1978, P. A. Chirov; 4 males, 4 females (ZISP 4038) from the same host, IE Kirghizia, Ak-Sai Valley, 10.07.1998, S. V. Mironov; 1 male, 1 female (NU 8812, USNM 181754) from C. lechkerowskii, E. Borneo, Kurang Tigan, 13.08.912, H. C. Rien; 8 males, 6 females (ZUMM: SMG 1489) from the same host, Egypt, Faijua Gout, S. of Yerka Qareem (3.05.1984, S. M. Guzavnoi: 2 males, 3 females (ZISP TTV-82) from the same host, Russia, S5 of Altai Mountains, 1977, coll. unknown; 7 males, 12
females (ZISP 38-402-1) from the same host, Turkmenia, Imam-Baba, 9.03.1975. GASH. Originally described from C. mongolus pamirensis from Tian-Shan (Cosov & Minovov, 1985). It is distributed only on this subspecies of C. mongolus and on C. leschenaultii (NEW HOST).

**nadidorsa 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 lacuna in females. This group is restricted to the lapwings (Charadriidae: Vanellinae).

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


**Bychowskia nadidorsa GAUD & MOUCHET, 1959**

(Figs 43, 46)


This species was originally described from the Vanellus albiceps.

**Bychowskia chilensis MIKOV & DAZAR, 1995**

(Figs 42, 45)

*Material examined.* Holotype male, paratypes 16 males, 20 females (SMG 2459, ZMUM 220451) from Y. chilensis, Paraguay, E Bank Rio Paraguay, 1.5 km of S Puerto Rosso, 18.09.1988, S. M. GOODMAN.

This species is known only from Vanellus chilensis in South America (Mikov and Danar, 1995).

**Bychowskia 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, ZMHH.

*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 88. Hysteronal shield 293 x 195, lateral margins without extensions. Opisthosomal lobes widely separated, tongue-like. Terminal cleft wide semicircular, length 74, width (distance ps1 ps3) 194. 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 small-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 158, 3a-g 56, 4a-g 5, g-ps3 85, ps3-ps3 88. Setae d and r button-like.
Female. Length of idiosoma 425, width of idiosoma 250 (420 x 234). Proventriculus shield as in male, 84 x 136, distance between setae se 87. Hysteronotid shield 288 x 205, lateral margins without extensions, surface dotted, posterior part with one big U-shaped lacuna, its anterior branches slightly divergent. Setae e' and h' microchaetae, setae h' situated in posterior part of lacuna; Posterior margin of opisthosoma between setae h.3 weakly sclerotized. Distance between setae: h3-h3 103, e1-e1 48, h1-h1 36, e1-h1 87. Setae p1 situated on margin of hysteronotal shield. Epigynum 43 x 84. Width of primary spermatoduct 2-4, internal spermatoduct absent. Legs IV extending to posterior end of the body.
Differential diagnosis. Both sexes of Bychvokiaha tricolor sp. n. differ from two other species of the subgenus B. headsi, the female 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).

subcharadri: species group

This group includes three rather diverseiform species. However, this group clear differs from all other species of the genus Bychvokiaha by unusual structure of epimeres IV. Both sexes lateral scierete 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. Epandrium absent. Setae 3a anterior to J6 (except B. subcharadri). Setae 4q at or 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.

Bychvokiaha subcharadri Denisin, 1951
(Figs 51-53)

Material examined. 6 males, 6 females from Himantopus himantopus; Kazakhstan, Kyzyl-Orda region, Saty-Su River, 13.08.1986, S. V. Mirov; 1 male, 1 female (NU 9185, USNM 286064) from H. melanocephalus (NEW HOST), Argentina, Buetes Aires, Guarni, 6.03.1921, A. Werner; 2 males, 2 females (NU 9172, USNM 250675) from H. leucocephalus (NEW HOST), Celebes, Rano Lindoe, 16.03.1917, R. C. Raven; 7 males, 2 females (NU 9168, USNM 457816) from H. ruficollis (NEW HOST), Mozambique, Bele Viso, 28.01.1954, D. W. Lusk; 1 male, 1 female (NU 9194, USNM 176658) from H. mexicanus and B. virgistris, USA, Florida, Osceda Co., Lake Kissimmee, 1901, E. A. Means; 1 male, 1 female (NU 9188, USNM 375 846) from H. ceylonensis (NEW HOST), Ceylon, Southern Prov., Hanabunta, 1944, S. D. Rickett; 10 males, 10 females (ZMUK: B-1170) from H. novaczeckiiae (NEW HOST), New Zealand, no other data; 1 male, 1 female (UGA 5965, AMNH 207864) from Recurvirostra avosetta, N Kenya, Koroili, 26.07.1923, E. C. Howell; 1 male, 1 female (NU 9183, USNM 157260) from the same host, Egypt, Helous, 14.01.1895, A. Fewel; 2 males, 2 females (UGA 5966, AMNH 357 660) from R. americana (NEW HOST) Canada, Alberta, Shepard, 9-07.1896, I. D. Wasell; 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. smithii (NEW HOST), Bolivia, Oruro dept. Sajama, 28-06.1897, G. Galley.

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

Bychvokiaha bisulcata Mirov, 1994
(Figs 49, 50)

Material examined. Holotype male and paratypes 1 male, 2 females (NI 9574, MichiSU 4262) from Haemastus aequuleus (sctic). Mexico, Sinaloa, Mazatlan, 12-07.1963, J. B. Danaher; 2 males, 2 females (NU 1686) from H. palliatus (NEW HOST), USA, Tex., Aransas
Figs 51-53 *Bychowskiiota subcharadrii* Durbin. 51 - male, ventral view of hysterosoma; 52 - female, dorsal view; 53 - spermatheca.

Co., Atmano Isy, Dendran Island. 12.05.1969. W. B. Davis: 1 male, 1 female (SU 8679, USNM 212052) from *Haematopus ater* (NEW GOFF), Peru, Chuchu Islands, North Island. 11.06.1970, R. E. Corx. Originally described from “*Haematopus ostralegus*” (possibly incorrect host or identification, perhaps real type host is *H. palliatus*) from Mexico (Mironov, 1994a). It is specific to oystercatchers of the genus *Haematopus* (Haematopodidae).

*Bychowskiiota tibetana* Mironov, 1994 (Figs 47, 48)


This species is a specific parasite of the Ibis-bill (*Bidorhynchus strateri*) (Bidorhynchidae) (Mironov, 1994).
Figs 54-57  Males of Bychovskiana falciandica sp. n. (left) and Bychovskiana obsoleta sp. n. (right). 54, 56 - dorsal view; 55, 57 - ventral view of hysterosoma.

Species not grouped

Bychovskiana falciandica sp. n.

(Figs. 54, 55, 58, 59)

Type data. Holotype male, paratypes 5 males, 6 females (ZMUM 64441) from Charadrius falciandicus (Charadriidae: Charadriinae), Argentina, Rio Galagos, 1.09.1915, R. H. Bux. Holotype - ZMUM, paratypes - ZMUM, ZINP, ZMH.

Etymology. The name “falciandica” is derived from the specific host name.
Male. Length of idiosoma 283, width of idiosoma 166 (280-295 x 160-166). Prodorsal shield 70 x 91, with transversa striation distance between setae 60. Hysteronotal shield 190 x 132 lateral margins without extensions. Setae c1 situated on ventral margin of hameral 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 6-6. Genital organ at level of epimeres IV. Genital arc 22 x 4, aedeagus short, atiletto-like, about one quarter of genital arc length. Anterior acetabulae at level of genital arc apex. Setae 5a posterior to 8b, setae 4a slightly posterior to genital arc base. Anal shields as small stick-like transversal scrotites, setae ps3 situated posterior to these shields. Diameter of anal disc 19. Distance between setae: h-1-h’ 50 (48-40), 3a-g 57, 4a-g 19, g-ps1 39, ps3-ps1 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 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 e’ and h1 microchaetae, setae h1 situated in this zone, setae e’ far anterior to it. Posterior margin of opisthosoma between setae h1 as heavily sclerotized membrane. Distance between setae h3-h3 48, e-1 29, h1-h1 24, e-l 145. Setae ps1 situated on hysteronotal shield.
anterior to setae h.1. Epignyum 63 x 68. Width of primary sperm duct 2.0, internal sperm duct 2.4 in width at base. Legs IV extending slightly beyond the posterior end of the body.

Differential diagnosis. Bychovskata falcandica sp. n. (Fig. 54, 58) is similar to B. placidii sp. n. (Figs 1, 11) and to B. obscura sp. n. (Figs 56, 57, 68, 61) by the striated proventral shield in both sexes. B. falcandica and B. obscura have no small rounded extensions in lateral margins of azygosomal shield, while in B. placidii and remaining species of the charadrii group these extensions are well developed. Males
of *B. falcandica* differ from ones of *B. obturata* by small anal shields anterior to setae *ps1* (Fig. 55), females differ by the weakly sclerotized patch of irregular form around setae *k1* (Fig. 55). In males of *B. obturata* the anal shields absent (Fig. 57), in females the posterior end of hysteronotal shield with a pair of short longitudinal lacunae (Fig. 60).

*Bychovskiiata obturata* sp. n.
(Figs. 56, 57, 60, 61)

*Type data*. Holotype male, paratypes: 5 males, 6 females (ZMUM B1197a) from *Charadrus obturatus* (Charadriniidae: Charadriniidae), New Zealand, no other data. Holotype - ZMUM, paratypes - ZMUM, ZISP, ZMH.

*Additional material*. 4 males, 4 females (ZMUM 221905) from *Charadrus bicinctus* (Charadriniidae: Charadriniidae), New Zealand, 1967, no other data; 2 males, 3 females (NU 9488, USNM 199 173) from *Anarthrus frontalis* (Charadriniidae: Charadriniidae), New Zealand, Manskas harbor, 23.07.1885. colt, 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 hysteronal shield. Opisthosomal lobes wide triangular, with rounded apex. Terminal cleft as wide V with rounded bottom, length 34, width (distance *ps1*)
psf 40. Interlobar membrane as narrow deeply concave band along terminal v4v5 margin, depth of incision 14. Genital organ at level of epimeres IV. Genital arc 22 x 24, aedeagus-short stilletto-like, about a quarter of genital arc length. Anterior acetabulae slightly anterior to level of genital arc apex. Setae 4a posterior to 3b, setae 4e posterior to genital arc. Adanal shields absent, setae ps1 situated on striated tegument. Diameter of adanal discs 20. Distance between setae: h3-h3 60, 3a-g 58, 4a-j 19, g-ps3 43, ps3-ps5 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 extension; 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: h1-h3 55, e1-e1 34, h1-j1 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 3.6in width at base. Legs IV extending slightly beyond posterior end of the body.

Differential diagnosis. Bychovskiaia obscura sp. n. is closely related to B. falciandra sp. n. Males of B. falciandrae have the adanal shields situated anterior to setae ps3.
Material examined: 15 males, 17 females (ZISP 1565) from Pluvialis squatarola, Russia, Kaliningrad region, Rybachii, 24.09.1956, V. YURIN: 5 males (ZISP 3833) from the same box, Kazakhstan, Kyzyl-Orda region, Sary-Su river, 28.08.1986, S. V. MIKOV; 4 males, 5 females (ZISP 4060) from the same box, Turkmenia, Chiswan-Kali Reserve, 13.04.1967, ZHITNOVA; 8 males, 15 females (ZISP 150) from the same host, Russia, Far East, Maritime Territory, Sudakinh reserve, 4.05.1945, M. VOKROV; 4 males, 20 females (ZISP 131), same host, NE Russia, Wrangel Isl, 29.06.1939, Portnoik, 3 males, 3 females (UAM 00176/1) from the same host, Poland, Vistula estuary, 8.09.1985, M. GEBYR; 3 males, 3 females (UAM 0123/4) from Pluvialis dominica, North America, 1870, no other data. Originally described from Pluvialis squatarola from Europe (CARESTRI, 1878). This species is associated with plovers of the genus Pluvialis.

Material examined: Holotype male, paratypes 2 males, 2 females (ZMUM 2:7627) from P. malaecolli, Cuile, Sanborone Prov., Valle Rio Yeso, 65.2690 m, no date, S. PARKIN and E. BERNOTT. This species is a specific parasite of the Diadenos Sandpiper-plover Phegornis michelii (Charadriidae, Charadriinae) (MIKOV, 1994b).

Type sata: Holotype male, paratypes 4 males, 6 females (ZMUM 64221) from Charadrius modestus (Charadriidae: Charadriinae), Argentina, Rio Galagos, 24.98.1915, K. H. BECC. Holotype - ZMUM, paratypes - ZMUM, ZMH.

Etymology. This species is dedicated to Prof. Dr. RAINER EHRENSBERGER a German entomologist and our friend.

Male. Length of idiosoma 356, width of idiosoma 187 (332-366 x 180-197). Prodermal shield 72 x 36, without striae; distance between setae sr 58. Hysteronotal shield 264 x 148, lateral margins without extensions. Setae cs situated out of hemeral shields. Ophistosomal lobes tongue-like, widely separated from one another. Terminal cleft semi-ovoid, length 63, width (diameter pc1-pc1) 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 orfrontal level of trochanters IV. Proper genital arc 24 x 36, areolagus as long and thin hook, about 2 times longer than genital arc. Anterior acetabula situated slightly anterior to level of genital arc apex. Setae 3a situated slightly posterior to 3b, setae 4a at level of genital arc base. Aanal shields as very small sclerites around setae pc1 bases. Diameter of analis disc 22. Distance between setae: h1-h2 106, s3-g 53, 4a-g 10, g-pc1 82, pc3-pc3 35. Setae d and e button-like.

Female. Length of idiosoma 361, width of idiosoma 199 (355-372 x 192-206). Prodermal shield as male, 44 x 100, distance between setae sr 62. Hysteronotal shield
259 \( \times \) 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 \( e_1 \). Setae \( e_1 \) and \( h_1 \) microchaetae, situated near internal margins of lacunae. Posterior margin of opisthosoma between setae \( h_3 \) rather weakly sclerotized. Distance between setae \( h_3 \)-\( h_6, e_1-\)\( e_3, h_1-\)\( h_4, e_1-\)\( h_6 \). Setae \( h_1 \) situated on hyosternon, shield anterior to \( h_3 \). Epigynum 43 \( \times \) 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.** Bychoxovkia ehrensbergeri 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. pegrei* (Fig. 64). Males of *B. ehrensbergeri* differ from all known species of the genus *Bychoxovkia* by the genital apparatus with the big and thin hook-like aedeagus (Fig. 67). Among the *Bychoxovkia* species with females having a pair of longitudinal lacunae on the hyosternal shield, this species is most similar to *B. pseudolocularis*. In females of *B. ehrensbergeri* these lacunae are long and extended anteriorly to the level of setae \( e_1 \) (Fig. 65); in females of *B. pseudolocularis* lacunae rarely reach the setae \( e_1 \) (Fig. 38).

**Key to species**

**Males**

1. Setae \( s_i \) lanceolate. Adanal shields big, surrounding anal field from anterior and partly from lateral sides (Fig. 47) .................................................. *B. libidinosa* Mironov
   - Setae \( s_i \) thin bar-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). Prosternal shield without extending posterior angles, its lateral margin incised anterior to setae \( s_5 \) ........................................ *B. squamitor (Canestrini)*
   - Membrane generally rounded on apices of opisthosomal lobes, however may carry small lateral spines. Prosternal shield with extending posterior angles, lateral margin not incised ........................................ 4
4. Setae \( h_1 \) situated on sclerotized margin of stenoseicular terminal clift (Fig. 40) ................. 5
   - Setae \( h_1 \) 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 clift as transversal oval, length of terminal clift more 75 (Fig. 42) ................................. *B. chlorus* Mironov \& Deshet
   - Terminal clift shallow concave, length of terminal clift less .50 (Fig. 43) .............................. *B. naudiora* Gvoz \& Mosquito
7. Membrane of lobar apex with two spines, lateral and terminal (Fig. 30) ................................. *B. bidennata* 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 reverted Y, aedeagus small slitlet-like ...... 10
9. Setae \( h_1 \) situated posterior to base of terminal clift. A small elongated sclerite between humeral and hyosternal shields is present (Fig. 27) .............................................................. *B. perforata* Mironov
10. Setae \( h_1 \) situated anterior to base of terminal clift. A small elongated sclerite between humeral and hyosternal shields is absent (Fig. 38) ................................................ *B. perforata* Mironov
10. Terminal cleft almost rectangular, opisthosomal lobes tongue-like. Lateral margin of hyposomal shield without any extensions at level of setae cp (Fig. 64).

11. Setae bp situated anterior to bottom of terminal cleft. Sclerite between humeral and hyposomal shields absent (Figs. 66, 67).

12. Epiphragm as big transversal sclerite in a form of thigh-bone (Figs. 34, 35).

13. B. pseudochaudrii Dobrovs.

14. Epiphragm represented by small semicircular sclerite and 1-2 lateral pores of small ovoid sclerites (Figs. 32, 33).

15. Setae c2 distinctly situated out of posterior margin of hyposomal shield (Fig. 48).

16. Setae c2 and c3 distinctly situated out of posterior margin of hyosomal shield.

17. Adanal discs close to anal slit. Adanal shields as big C-shaped sclerites completely surrounding anal field (Fig. 49). Capsules in positioned external to setae c2.

18. Adanal discs positioned far from anal slit. Adanal shield as two pairs of small, transversal sclerites, anterior pair weakly sclerotized (Fig. 51). Capsules in media to setae c2.

19. Lateral margins of hyposomal shield with small rounded extensions or short blunt projection (Fig. 1) at level of setae cp. Prodorsal shield with extension or without extension.

20. Prodorsal shield without any transversal interruption.

21. Prodorsal shield with weak transversal interrupted extension (Fig. 1).


23. Length of setae bp 55-65, width of prodorsal shield less than 100, ratio of idiosoma length to width more than 1.7.

24. Length of idiosoma more than 330, small adanal shields carrying setae p3 present (Fig. 9). Ratio of idiosoma length to width 1.70-1.80. Length of terminal cleft 20-24.
- Length of idiosoma less than 330, adnal shields absent (Fig. 10). Ratio of idiosoma length to width 1.85:1.90. Length of terminal cleft 28.25. R. maculatus sp. n.

23. Aedeagus extending to basis of genital arc (Fig. 5). Length of idiosoma less than 320

- Aedeagus not extending to basis of genital arc. Length of idiosoma more than 330

24. Humeral shield short, scarcely extending to basis of epimeres III only (Fig. 7). Distance between setae h3 more than 75. R. africanus sp. n.

- Humeral shield relatively long, extend beyond basis of epimeres III (Fig. 6). Distance between setae h3 less than 75. B. melanopus sp. n.

**Females**

1. Setae si lanceolate (Fig. 48) B. tibetana MÖRNÖ

- Setae si simple hair-like

2. Lateral sclerites of epimeres IV with wide blunt apex

- Lateral sclerites of epimeres IV with acute apex

3. Posteriel angles of prodrsal shield short rounded. Capules is situated medial to setae c2. Dorsal surface of hysteronotal shield uniformly dotted (Fig. 52).

- Posteriel angles of prodrsal shield elongated. Capules is situated external to setae c2. Dorsal surface of hysteronotal shield with two longitudinal furrows close to one another (Fig. 50).

4. Opisthosomal part of hysteronotal shields with a pair of longitudinal laminae or with one big U-shaped lamina

- Opisthosomal part of hysteronotal shield with another pattern or uniformly dotted

5. Opisthosoma with one U-shaped lamina (Figs. 44-46)

- Opisthosoma with a pair of longitudinal laminae

6. Anterior ends of laminae closer to one another than setae e1 (Fig. 46).

- Anterior ends of laminae more distant from one another than setae e1

7. Anterior branches of laminae divergent (Fig. 44). Length of idiosoma 420 or more

- Anterior branches of laminae parallel-sided (Fig. 45). Length of idiosoma less than 420

8. Prodorsal shield without extending posterior angles. Setae se situated out of this shield at touch only the shield margin (Fig. 63).

- Prodorsal shield with well developed posterior angles, setae se situated on shield.

9. Lacunae on hysteronotal shield short and narrow, with weak borders. Lateral margins of hysteronotal shield with short blunt extensions at level of setae c1 (Fig. 17)

- Lacunae relatively long, with distinct margins. Lateral margins of hysteronotal shield without extensions. Width of primary spermatoduct 6.0-8.0

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 c2

- Prodorsal shield without striation. Hysteronotal shield uniformly dotted with lacunae extending anteriorly at least to level of setae e1

11. Lacunae of hysteronotum long, extending anteriorly to level of setae e1. Setae h1 situated near medial margins of these lacunae (Fig. 68)
12. Posterior part of hysteronal shield with medial area of small circle and avoid small lacunae (Fig. 27)................. B. peregra B. Mikonov

13. Hysteronal shield of posterior part with another pattern

14. Prodrusial shield with transversal striation

15. Posterior part of hysteronal shield with a pair of longitudinal heavy sclerotized crests (Fig. 11). Lateral margins of hysteronal shield with 2 small rounded extensions at level of setae cp

16. Posterior margin of opisthosoma between setae c3 slightly sclerotized; setae cp situated on posterior margin of hysteronal shield. Lateral margins of hysteronal shield without extensions (Fig. 36)....................... B. intermedia B. Cimino & B. Mikonov

17. Posterior part of hysteronal shield between setae c1 and h1 with numerous little slit-like lacunae

18. Posterior part of hysteronal shield uniformly dusted

19. Spermatheca narrow tube-like with rounded apex; internal spermatocyst small tube-like, weakly sclerotized (Fig. 25)....................... B. semipalmata B. Mikonov & Dabert

20. Spermatheca big sac-like; internal spermatocyst asymptomatic, heavily sclerotized

21. Setae c1 and h1 small spine-like (Fig. 15)....................... B. melanopsis sp. n.

22. Setae c1 and h1 microchaetae, rarely setae h1 thin, needle-like

23. Width of internal spermatocyst 7.0-8.0; width of primary spermatocyst about 5.0-6.5 (Fig. 14)....................... B. onychi B. Caneveni

24. Width of internal spermatocyst 1.0-5.0, width of primary spermatocyst about 2.5-4.8

25. Ratio of length to width of hysteronal shield about 1.35-1.50

26. Ratio of length to width of hysteronal shield about 1.55-1.75

27. Width of primary spermatocyst 3.6-3.8 (Fig. 22). Ratio of length to width of hysteronal shield usually less than 1.60. Legs IV extending beyond posterior margin of opisthosoma

28. Width of primary spermatocyst 2.4-3.0 (Fig. 23). Ratio of length to width of hysteronal shield more than 1.60. Legs IV extending beyond posterior margin of opisthosoma by ambulacral disc

29. Width of primary spermatocyst 4.0-4.5 (Fig. 20). B. dubia sp. n.

30. Width of primary spermatocyst 2.4-3.6 (Fig. 24). B. aficenicra sp. n.
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