Platyhelminthes of three species of shorebirds (Charadriiformes) in the Slovak Republic

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Summary

Twelve plathyhelminth parasites, digenetic trematodes and cestodes, were recovered from three species of charadrid shorebirds (Charadriiformes) in the Slovak Republic; namely ringed plover – Charadrius hiaticula (N=9), little ringed plover – Charadrius dubius (N=56) and golden plover – Pluvialis apricaria (N=14). New host records were registered for six helminth species: trematodes Tanaisia fedtschenkoi and Echinoparyphium recurvatum and tapeworms Aploparaksis pseudofilum and Megalacanthus guiaarti found in C. hiaticula and trematodes Brachylaima fuscatum and Himasthla sp. from P. apricaria and C. dubius, respectively. In plathyhelminths the new data about morphological variability of insufficiently described cestodes of the genus Anomotaenia and trematodes Brachylaima fuscatum and Leviseniella somateriae have been pointed out.

Key words: Platyhelminths; Charadriiformes; Charadrius dubius; Charadrius hiaticula; Pluvialis apricaria; new host records; Slovak Republic

Introduction

During the parasitological survey of free living birds of the Slovak Republic the two representatives of the genus Charadrius L., 1758, namely ringed plover – Charadrius hiaticula (L.) and little ringed plover – Charadrius dubius Scop., 1786, as well as the related bird species golden plover – Pluvialis apricaria (L.) were investigated. A breeding range of ringed plover extends around much of the Arctic. The little ringed plover nests in Europe from the Mediterranean up to southern Scandinavia and golden plover nests in northern Europe, north-western Siberia and on Iceland (Ferianc, 1977). All bird hosts examined belong to Pan-European endangered species. Partial data on helminths of these birds were previously published by Macko (1965). Most of the recent studies on shorebird parasites were carried out in North America and Australia (Canaris and Kinsella, 2000, 2001). Galkin (1987), Deblock (1990), Deblock and Canaris (1991), Galaktionov (1991), Bondarenko and Kontrimavichus (1999), Nikolov and Georgiev (2002) and others studied several taxonomically problematic parasite groups from these hosts. The aim of this paper was to summarise all data available on plathyhelminths of three charadriids in the Slovak Republic and to contribute to the so far known data on their morphology.

Material and Methods

The shorebirds (N=79) were collected from several localities of eastern and south-western parts of the Slovak Republic in the period of 1957 – 1969. A great part of investigated bird hosts (N=38) originated from Senné wetland, which recently was designated as an internationally important, so-called Ramsar locality. Senné fishponds lie on a water bird migration road and represent one of the most important breeding and resting sites of rare, endangered and vulnerable water birds in Slovakia. The other birds were obtained from localities Chmelnica near Prešov, water gate on the Topľa River near Bardejov, Turany above Ondava and Ostrov near Moča. Birds were shot and their internal organs and a body cavity were inspected within 3 hours. As many as 9 specimens of Charadrius hiaticula, 56 specimens of C. dubius and 14 individuals of Pluvialis apricaria were examined. Platyhelminths were fixed in alcohol-formaldehyde-acetic acid, stained in Semichon’s and Blazhin’s acetic carmine and mounted into Canada balsams. Helminths from ruff – Philomachus pugnax (L.) and lapwing – Vanellus vanellus (L.) (see Macko, 1959, 1963; Macko and Špakuľová, 1995) and type specimens of Taeinia (Anomotaenia) microhyncha (Krabbe, 1869) from Zoological Museum in Copenhagen, Denmark were used as a comparative material. Voucher specimens of helmin-
ths under consideration are deposited at the Parasitological Institute of the Slovak Academy of Sciences in Košice. Measurements are in micrometers except where indicated. The width of rostellar hooks was measured as shown on the Figure 20.

**Results**

**TREMATODA**

Family: Eucotylidae Cohn, 1924

1. *Tanaisia fedtschenkoi* Skrjabin, 1924
   
   **Hosts:** *Charadrius dubius; C. hiaticula* – new host species.
   
   **Localities:** Senné, Bardejov, Chmelnica (eastern Slovakia).
   
   **Site of infection:** kidney.
   
   **Prevalence and intensity of infection:** *C. dubius 8.9% (5/56) and 2–11 specimens; C. hiaticula 11.1% (1/9) and 2 specimens.
   
   **Remarks:** *T. fedtschenkoi* is a widespread trematode parasitic in aquatic birds. Macko (1965) studied this parasite in detail, and pointed out a considerable variability of several taxonomically significant characters; especially those distinguishing *T. fedtschenkoi* from other related taxa. The morphology of specimens from a new host *C. hiaticula* was within a range of the variability previously stated for this taxon.

Family: Brachyliidae Joyeux et Foley, 1930

2. *Brachylaima fuscatum* (Rudophi, 1819)
   
   **Host:** *Pluvialis apricaria* - new host species.
   
   **Locality:** Senné (eastern Slovakia).
   
   **Site of infection:** small intestine.
   
   **Prevalence and intensity of infection:** 7.1% (1/14) and 6 specimens.
   
   Despite the fact that trematodes were recovered only from one host specimen, they differed from each other significantly particularly in the width of the body, ratio of oral and ventral sucker size, position of ventral sucker, position of uterus between suckers, position of vitellaria, opening of genital organs and other details (Tab.1). Special attention should be paid to the trematode of a size 5.6 x 0.6 mm (Fig. 1; Table 1, specimen No. 1). The oral sucker is bigger than ventral sucker and the distance between centres of the suckers is 1.1 mm, which comprises 19.6% of the body length (in comparison to another *B. fuscatum* specimens studied, ventral sucker is dislocated most to the anterior part of the body). In the other specimen (Fig. 3), the distance between suckers was 1.4 mm, which represents 25.9% of body length. Vitellaria extended from anterior margin of ventral sucker, whilst in previous specimen (Fig. 1) 200 – 234 behind ventral sucker.
   
   Specimen No. 2 (Fig. 2; Table 1) had more robust body 4.7 x 0.8 mm in size. Oral sucker smaller than ventral sucker, the distance between centres of suckers 1.1 mm, what represents 24.7% of the body length. Ventral sucker dislocated more to posterior part of the body and the distance between ventral sucker and anterior testis was shorter than in other *B. fuscatum* individuals. Vitelline fields of the specimen in Fig. 2 extend from ventral sucker to area 177 – 374 from anterior testis. In another trematode, vitellaria extend to anterior testis area (Fig. 5).
   
   Terminal part of male genitals (Figs. 4, 5) is formed by looped seminal vesicle, turning into unclear thin-walled muscular cirrus-sac, surrounded by prostatic glands. In some specimens, prostatic glands are visible also around seminal vesicle. Cirrus unarmed, more or less cylindrical (Figs. 4, 5) or pyriform (Fig. 3). Uterus ascending to various distance prior to ventral sucker, in one *B. fuscatum* specimen extending up to pharynx (Figs. 1 – 3). Lateral coils of uterus may overlap an internal margin of the intestine. The egg size varies considerably. In specimen No. 6, egg sizes were 26 – 29 x 17 – 20, in specimen No. 5 31 – 34 x 17 – 20.
   
   **Remarks:** The identification of species of the genus *Brachylaima* Dujardin, 1843 remains problematic as it was shown by revisions of *B. fuscatum* (Rudolph, 1819) and *B. mesostoma* (Rudolphi, 1803) (Braun, 1901, 1902 ex Skryabin, 1948). As the Rudolphi’s type material was in a very poor condition, the revisions of *B. fuscatum* and *B. mesostoma* were made on the basis of morphologically similar specimens later collected from other localities and hosts. The number of individuals studied by Braun was not sufficient and it did not allow determining of variability ranges in *B. fuscatum*, *B. mesostoma* and other species of the genus *Brachylaima* (see e.g. Skryabin, 1948; Freitas et al., 1967). With regards to the present knowledge, a new revision of these species seems to be necessary.
   
   Specimens included into the present study have been identified as *B. fuscatum*, even though they are bigger than those reported by Braun from *Columba palumbus* L. (see Skryabin, 1948; present results – Table 1). Our observations as well as data provided by Rutkowski (1973) and Sito (2001) demonstrate that the size of these trematodes varies considerably. A location of the uterus seems to be an important discriminative feature, *B. fuscatum* possesses an inter-caecal uterus, in *B. mesostoma* uterine branches overlap intestine and extend up to the lateral body margin (Witenberg ex Skryabin, 1948). This feature, however, is not clearly depicted in *B. mesostoma* figures (cfr. Skryabin, 1948 Fig. 71; Bykhovskaya-Pavlovskaya, 1955 Fig. 14; Bykhovskaya-Pavlovskaya, 1962 Fig. 50; Machalska, 1980 Fig. 1c). If the topography of the uterus and intestine caeca was similar to that shown on above *B. mesostoma* figures, or the same as in our trematodes (sometimes overlapping the intestine), it could be presume that *B. fuscatum* and *B. mesostoma* represent the same species and *B. fuscatum* should be considered just a junior synonym of *B. mesostoma*.

Family: Echinostomatidae Dietz, 1909

3. *Echinoparyphium recurvatum* (Linstow, 1873)
   
   **Host:** *Charadrius hiaticula* – new host species.
   
   **Locality:** Turany above Ondava (eastern Slovakia).
<table>
<thead>
<tr>
<th>Species</th>
<th>B. fascatum</th>
<th>B. mesostoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Body length (mm)</td>
<td>5.63</td>
<td>4.65</td>
</tr>
<tr>
<td>Body width</td>
<td>616</td>
<td>817</td>
</tr>
<tr>
<td>Oral sucker</td>
<td>343×249</td>
<td>328×277</td>
</tr>
<tr>
<td>Pharynx</td>
<td>151×168</td>
<td>156×183</td>
</tr>
<tr>
<td>Distance 1* (mm)</td>
<td>1.15</td>
<td>1.16</td>
</tr>
<tr>
<td>Distance 2** (mm)</td>
<td>1.10</td>
<td>1.15</td>
</tr>
<tr>
<td>Anterior testis</td>
<td>359×347</td>
<td>438×429</td>
</tr>
<tr>
<td>Cirrus – sac</td>
<td>276×62</td>
<td>234×124</td>
</tr>
<tr>
<td>Ovary</td>
<td>210×226</td>
<td>250×257</td>
</tr>
</tbody>
</table>

* Distance 1 – distance between ventral sucker and anterior extremity of the body; **distance 2 – distance between centres of oral and ventral suckers
Site of infection: small intestine.
Prevalence and intensity: 22.2% (2/9) and 4 and 12 specimens.
Remarks: *E. recurvatum* is relatively widespread in waterbirds. Morphology and variability of investigated trematodes corresponded with data recorded in available keys and monographs (Skryabin and Baschkirova, 1956; Yamaguti, 1971; Sitko, 1993).

4. *Himasthla* sp.
Host: *Charadrius dubius* – new host species.
Locality: Senné (eastern Slovakia).
Site of infection: small intestine.
Prevalence and intensity of infection: 1.8% (1/56) and fragments of 2 specimens.
Fragments of 2 trematodes 2.3 – 2.4 × 0.3 mm. Anterior part of the body missing. Body margins fluted, tegument armed with transverse rows of spines. Testes and ovary tandem, situated in posterior part of the body. Ovary rounded, pre-testicular, 245 × 146 and 248 × 106 in size. Vitellaria in lateral fields, in better-preserved specimen extending to testicular region (Fig. 6). Eggs 76 × 55 in size.
Remarks: By morphology and size of organs in fragments, a total length of these trematodes was estimated to approximately 4 mm. Number of spines in head collar and another characters of the anterior part of the fluke fragments was not determined. However, the topography of organs and armament of the tegument tallies with the diagnosis of the genus *Himasthla* Dietz, 1909. The egg size and proportions of fragments refers to smaller form of *H. militaris* (Rudolphi, 1802), described in charadriids from western and southern Europe. Sitko (1993) presents more recent morphological data on *H. militaris*. *C. dubius* is a new host species for trematodes of the genus *Himasthla*.

Family: *Microphallidae* Travassos, 1920

5. *Levinseniella somatiae* Kulachkova, 1958
Host: *Pluvialis apricaria* – new host species.
Locality: Senné (eastern Slovakia).
Site of infection: small intestine.
Prevalence and intensity of infection: 7.1% (1/14) and > 100 specimens.
posteriorly to testes (Figs. 7 and 8). Ventral sucker rounded 20 – 24 in diameter, situated between testes (Fig. 7), or anterior to them, on the boundary between the second and last third of the body (rarely in the hindbody). The distal margin of ventral sucker situated at 60 – 80 % of the total length of the trematode (measured from the anterior extremity of the body). Genital organs posterior to intestinal branches; their topography and position in relation to the intestine is variable, depending - among others – on the location of ventral sucker and overall shape of the hindbody. Testes mostly rounded, 41 – 58 in diameter, rarely oval 55 × 37; symmetrical, postovarian. Testes with gentle indentations were found in one particular specimen. Spermatozoa anterior to ventral sucker between ceca. Genital pore on the left side, lateral to ventral sucker. Ovary oval, or irregularly triangle-shaped, located on the right to the ventral sucker. Vitellaria grouped in two lateral fields in the region of testes; in two specimens the two fields of vitelline follicles unite in hindbody. Eggs less numerous, 20 – 22 × 12 – 14 in size.

Remarks: Microphallids investigated resemble Leviensiel-la minuta Price, 1934, but this species is characterised by complex structure of the genital atrium, likewise Atriotrema lecitholaterale Belopolskaja, 1958, which is much larger, measuring 374 – 431. Our specimens, however, are most similar to the species described by Kulachkova as LeviensIEL-la somasteriae with the body size 127 – 167 × 92 – 136, small genital atrium and well developed prostatic glands. Nevertheless, the identity of L. somasteriae has often been questioned before (see Belopolskaya, 1963; Deblock, 1980). Galaktionov (1991) in his study on morphogenesis of the hermaphroditic generation of MicrophalIus pirum (Afanassiyev, 1941) stated that L. somasteriae is only a synonym of M. pirum. Because answering these questions goes beyond the scope of this study, we adopted the system by Belopolskaya (1963) and designated the trematode LeviensIEL-la somasteriae Kulachkova, 1958. A finding of L. somasteriae is of great interest, as it a typical representative of the littoral helminth fauna within the continental Europe. P. apricaria represents a new host record.

CESTODA

Family: Hymenolepididae Fuhrman, 1906

6. Aploparaksis brachyphallois (Krabbe, 1869)
Host: Charadrius hiaticula.
Locality: Chmelnica (eastern Slovakia).
Site of infection: small intestine.
Prevalence and intensity: 22.2 % (2/9) and 3 specimens (immature).
Immature tapeworms with immature genitals. Scolexes deformed. Rostellum with 10 aploparaksoi hooks, 21 – 22 in length (Fig. 9). Blade 9, root 17, guard 8 – 9. Width of the hook 11.

7. Aploparaksis crassirostris (Krabbe, 1869) sensu Spassky (1963)
Host: Charadrius hiaticula.
Locality: Chmelnica (eastern Slovakia).
Site of infection: small intestine.
Prevalence and intensity: 11.1 % (1/9) and 2 specimens (immature).
Remarks: A. crassirolis was considered being a parasite of several charadiids. Krabbe (1869) described this species from several snipes and sandpipers, namely from Scolopax gallinago L., S. major (Latham, 1787), S. media (Latham, 1787), S. rusticola L. and Totanus stagnalis (Bechstein, 1803). Recently, lots of them were re-classified and are members of genera Gallinago and Tringa (Ferianc, 1977). A. crassirolis was reported from many other charadrid species; Spassky (1963), for instance, quoted 24 host records, including Charadrius hiatricu. Bondarenko et al. (2002) and Bondarenko and Kontrimavichus (2003) re-described A. crassirolis on the basis of the type material and stated that A. crassirolis is a specific parasite of common snipe, Gallinago gallinago (L.). Tapeworms from C. hiatricu investigated in present paper were immature, hence their reliable determination was difficult. The size of rostellar hooks, their measurements and other characteristics correspond to A. crassirolis from North America (Bondarenko et al., 2002).

8. Aploparaksis pseudofilum (Clerc, 1902) sensu Bondarenko (1990)
Host: Charadrius hiatricu - the new host species.
Locality: Chmlene (eastern Slovakia).
Site of infection: small intestine.
Prevalence and intensity: 11.1 % (1/9) and 3 strobila without scolex.
Hermaphroditic proglottides with only one testis. Protruding cirrus 38 – 44 long and in the middle 17 – 18 wide. The surface of cirrus is typically armed (Fig. 12). Measurements of strobilar characters are within the wide range of variability of this species (Bondarenko, 1990).

Host: Charadrius hiatricu.
Locality: Chmlene (eastern Slovakia).
Site of infection: small intestine.
Prevalence and intensity: 11.1 % (1/9) and 2 specimens (immature).
Tapeworms up to 15.0 x 0.3 mm, genital organs poorly developed. Scolecic deformed, with 10 hooks, 27 – 29 in length (Fig. 11). Blade 14 – 17 root 18 – 21, guard 9 – 10, handle 45. Hook width 12. Primordium of cirrus-sac extends into the middle of proglottis. Testis oval. Distal part of cirrus narrow, with bulbous enlargement of the base, 7 in diameter.
Remarks: Measurements of hooks and the shape of the basal part of cirrus most correspond to Aploparaksis andrei Spassky, 1966, recorded from bird hosts of the genus Tringa from Kamchatka (Spasskaya, 1966).

Family: Dilepididae Railliet et Henry, 1909

10. Anomotaenia spp.
Host: Charadrius dubius.
Locality: Senné, Chmlene, Bardejov (eastern Slovakia).
Site of infection: small intestine.

Prevalence: C. dubius - (Anomotaenia sp. 1) 3.6 % (2/56) and (Anomotaenia sp. 2) 35.7 % (20/56).
The two morphologically similar forms of Anomotaenia were found in C. dubius. In Anomotaenia sp. 1, rostellar hooks are 12 – 14 long (Fig. 14) and in shape, they are similar to type material of A. microrhyncha (Krabbe, 1869), (Fig. 13) from Charadrius hiatricu. In Anomotaenia sp. 2, hooks are 16 – 18 in length (Fig. 15) and by shape they resemble hooks of A. tringae (Burt, 1940), (Fig. 16). However, Anomotaenia sp. 2 differs from the latter taxon in greater number of testes. Both forms are difficult distinguishable from both A. microrhyncha and A. tringae as well as from A. microphillos (Krabbe, 1869) (Fig. 17).
Remarks: A deeper taxonomic research of these tapeworms performed on newly collected material seems to be necessary, but it goes beyond the scope of present faunistic study. Data on A. microrhyncha from P. pugnax were previously presented by Macko (1963).

11. Megalacanthus guiari (Tseng-Shen, 1932)
Hosts: Charadrius dubius; C. hiatrica – the new host species.
Locality: Senné, Bardejov, Chmlene, Ostrov near Moča (eastern and south-western Slovakia).
Site of infection: small intestine.
Prevalence and intensity of infection: C. dubius 10.7 % (6/56) and 1 – 9 specimens; C. hiatrica 22.2 % (2/9) and 1 and 5 specimens.
Tapeworms 47 – 84 mm long and 1.6 – 1.9 mm wide. Scolex in natural state 561 – 655 mm wide, suckers 171 – 210 in diameter; scolex in permanent slides 612 – 912, suckers 188 – 226. Rostellar hooks (Fig. 20) 30 – 32 in number, spaced in two circles. Longer hooks 85 – 103, blade 38 – 46, root 52 – 55, width 17 – 19. Shorter hooks 81 – 91 in length, blade 41 – 48, root 38 – 48, width 14 – 16. Genital pores alternate irregularly. Number of testes varies in individual strobila (13 – 17; 14 – 16; 14 – 18; 18 – 21, rarely 18 – 24). Cirrus-sac in mature and postmature proglottides 183 – 328 x 27 – 35. Slightly spiny cirrus protruding at the most up to 74 – 82. Basal enlargement of cirrus 13 – 14, distal narrowing from 9 to 7 (Fig. 21). Ovary 265 – 295 in longer diameter. In premature proglottides ovary compact, more or less rounded. In mature proglottides, rarely slightly lobed (in C. dubius, Fig. 22) or lobed (in C. hiatrica, Fig. 23). Vitellarium circular or transversely oval, compact, or slightly lobed, rarely lobed, 93 – 156 in diameter. Uterus reticulate. Monovular capsules 117 – 156 or up to 210 in diameter in gravid proglottides. Eggs 41 – 59 x 38 – 51 in size. Oncosphere 34 x 38. Central embryonic hooks 34 – 38; lateral hooks of unequal thickness, 22 – 25 long.
Remarks: Present data contribute to the knowledge on morphometric characters of strobila and hooks of M. guiari. Matevosyan (1963), according to Tseng-Shen (1932), reported the size of this tapeworm being 17.0 x 0.68 mm, the number of hooks 30 and their size 84 – 96, however, measurements of parts of individual hooks are not given. The different number of testes (24) was found in present
tapeworm material in comparison to literature–based data (20). The size and morphology of ovary and vitellarium have been specified. Dubinina (1953) reported 30 – 31 of rostellar hooks 82 – 98 long and testis number 12 – 20 in *M. guiarti*. Baer (1959) described a new subspecies *Monopylidium guiarti africanaum* from long-toed lapwing – *Hemiparra crassirostris* on the basis of larger rostellar hooks measuring 114 – 127 and 116 – 130.

Family: Progynotaeniidae Fuhrman, 1936

12. *Progynotaenia dougi* Sandeman, 1959

Host: *Pluvialis apricaria*.

Locality: Senné (eastern Slovakia).

Site of infection: small intestine.

Prevalence and intensity of infection: 7.1% (1/14) and 1 specimen.

A not preserved tapeworm 2.0 × 1.0 mm in size, with 8 proglottides, the two additional proglottides (postmature and gravid) were separated from the strobila. Scolex width 386, suckers rounded, 137 in diameter. Rostellum with 2 circles of hooks, after staining hooks fell off, only one small hook, 14 in length was saved. Male gonads typical of the genus *Progynotaenia*. The size of cirrus-sac and testis number increases in maturing proglottides; cirrus-sac in the last proglottis 310 × 120 in size. Fully protruded cirrus 269 long, armed with spines. Proximal part of cirrus enlarged, 52 in diameter, its distal part cylindrical, 34 in width. Uterus lobbed. Testes are located in two groups alongside uterus, 19 and 16 in number (total number 35). In separated proglottis 880 × 707 cirrus-sac measured 467 × 148, testes in two groups 18 a 22 (40). Eggs 38 – 58 × 24

Figs. 9 – 19. Rostellar hooks of different tapeworms and the cirrus of *Aploparaxis pseudofilum* (Clerc, 1902). 9 – *Aploparaxis brachyphallos* (Krabbe, 1869) from *Charadrius hiaticula*; 10 – *Aploparaxis crassirostris* (Krabbe, 1869) from *C. hiaticula*; 11 – *Aploparaxis* sp. (cf. *A. andrei* Spassky, 1966) from *C. hiaticula*. Scale-bar: (Figs. 9 – 11): 20 μm; 12 – Cirrus of *Aploparaxis pseudofilum* from *Charadrius hiaticula*. Scale-bar: 20 μm; 13 – *Anomotaenia microcrina* (Krabbe, 1869) from *Philomachus pugnax*; 14 – *Anomotaenia* sp. 1 from *Charadrius dubius*; 15 – *Anomotaenia* sp. 2 from *C. dubius*; 16 – *Anomotaenia tringae* Burt, 1940 from sandpipers of the genus *Tringa* (by Dubinina, 1953); 17 – *Anomotaenia microphallos* (Krabbe, 1869) from *Vanellus vanellus* (orig). Scale-bars (Figs. 13 – 17): 10 μm; 18 – Dilepididae gen. sp. from *Charadrius dubius*; 19 – *Protherogynotaenia dougi* Sandeman, 1959 from *Philomachus pugnax*. Scale-bars (Figs. 18 and 19): 20 μm.

– 28. Embryophore 61 x 30 and oncosphere 19 – 28 x 24 – 28. Embryonic hooks 14 – 16. Remarks: During investigations of P. dougi coming from various bird hosts and the same locality (Senné), a cestode of size 2.6 x 1.3 mm was found in Phylomachus pugnax (Macko and Špakulová, 1995). Strobila comprised of 9 proglottides, scolex 288, suckers unclear, about 86 in diameter. Rostellum width 117, 10 and 5 hooks measured 38 and 14, respectively (Fig. 19). Spiny cirrus protruded, 218. A finding of P. dougi in P. pugnax represented a new host record.

13. Dilepididae gen. sp.
Host: Charadrius dubius.
Locality: Bardejov (eastern Slovakia).
Site of infection: small intestine.
Prevalence and intensity: 1.8 % (1/56) and 3 specimens (immature).
Tapeworms 3.0 – 3.5 x 0.39 – 0.41 mm in size, still without differentiated gonads. Scolex width 250 – 305. Suckers rounded, without armature. Deformed rostellum with approximately 38 – 40 hooks in two circles. Length of smaller hooks 30 – 32, blade 12 – 14, root 17 – 18. Hook width 8.5 (Fig. 18).

Conclusion
The following new information on platyhelminths of shorebirds has been gained through the present study:
1) seven new host-parasite combination were recorded for European fauna;
2) the study has revealed a high degree of phenotypical variability of the trematode Brachylaima fuscatum. Problems concerning the systematic status and validity of this taxon have been pointed out;
3) of great interest is a finding of the trematode Levinseniella somatertiae (Microphallidae), a typical representative of the littoral helmhitn fauna, within the continental Europe;
4) the two new morphological forms of the tapeworm Anomoetaenia sp. have been described in Charadrius dubius;
5) the study contributed significantly to the knowledge about morphology and morphometry of helmhitn parasites of shorebirds in the Slovak Republic.

Acknowledgements
The authors are indebted to Prof. R. Kristensen, Zoological Museum Copenhagen, Denmark for a loan of type material of Anomoetaenia microrhyncha and A. microphallos and to Prof. S. Debloc for kind providing of relevant literature. This study was supported by the grant of the Scientific Grant Agency of the Slovak Republic (VEGA), project No. 2/4177/04.

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Acta Parasitol., 47: 121 – 130

Received February 4, 2004

Accepted April 21, 2004