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Redescription of *Skrjabinus skrjabini* and validity reassessment of selected species of *Skrjabinus* (Digenea, Dicrocoeliidae)

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Summary

Four specimens of *Skrjabinus skrjabini*, were isolated from two out of 93 red-backed shrikes (*Lanius collurio*) examined during 1962 – 2012. The species have been re-described and the generic diagnosis amended. Eight species of the genus have been validated: *S. aenigma*, *S. indicus*, *S. latus*, *S. pancreaticus*, *S. rarus*, *S. skrjabini*, *S. similis*, and *S. sp.* of Oshmarin (1970). Others have been reclassified as *Platynosomum* (*P. dicruri*, *P. gracile*, and *P. talischense* with synonyms *P. butei* and *S. sp.* of Oshmarin (1963)) and *Zonorchis* (*Z. francolini*, and *Z. petiolatus* with synonyms *S. biliosus*, *S. gvozdevi*, *S. popovi*). *Skrjabinus petrovi* is a synonym of *Brachydistomum ventricosum*. *Lubens lubens* determined by Bhuta & Khan (1975) is a synonym of *S. aenigma*.

Keywords: *Skrjabinus*; *Platynosomum*; *Zonorchis*; Dicrocoeliidae; Digenea; birds

Introduction

Skrjabinus skrjabini (Issaitschikow, 1920) Bhalerao, 1936 is a rare parasite of insectivorous passerine bird *Lanius collurio* Linnaeus, 1758 in Europe. The original description by Issaitschikow (1920) is incomplete; dimensions of the ventral sucker are missing. The species has not been found since, and the original material has been lost. At present, 19 species are placed in the genus *Skrjabinus* Bhalerao, 1936. A considerable number of them are misclassified due to the incomplete description of the type species. They are exclusively parasites of birds; species described from mammals do not possess typical characters of the genus. Pojmanska (2008) wrongly classified *Zonorchis* as a synonym of *Skrjabinus* and mistook the figure of *S. similis* Shtrom, 1940 (it does not correspond to the original figure). *Zonorchis* differs from *Skrjabinus* in elongated body shape, position of reproductive organs (testes nearly touch one another, and ovary is often touching tes-

tes, whereas in *Skrjabinus* testes are distant one from another and ovary is separated from testes by a large number of uterine coils). The main character is the ventral sucker – massive in *Zonorchis*, occupying the whole body width and thickness, while weakly developed in *Skrjabinus*, on body surface only.

The present study aims to redescribe the type species of *Skrjabinus*, amend the genus diagnosis and reassess the classification of selected species.

Material and methods

During the years 1962 – 2012, four specimens of *S. skrjabini* were found in two out of 93 *L. collurio* examined. Dead birds intended for museum collections were examined. Morphological variability was studied in living as well as fixed material (fixed by hot 70 % ethanol). After staining with borax carmine worms were mounted in Canada balsam. All dimensions are in µm.

Comparative morphological study was done using slides of the following species (in brackets number of specimens studied) deposited in the collection of the Comenius Museum in Přerov, Czech Republic: *Brachydistomum ventricosum* (Rudolphi, 1802) (358), *B. olssoni* (Railliet, 1900) (109), *Conspicuum acuminatum* (Nicoll, 1915) (1), *Euparadistomum falconi* Borgarenko, 1972 (9), *Lubens lubens* (Braun, 1901) (1), *Lutzrema attenuatum* (Dujardin, 1845) (501), *Lyperosomum alaudae* (Shtrom & Sondak, 1935) (7), *L. collurionis* (Skrjabin & Issaitschikow, 1927) (187), *L. longicauda* (Rudolphi, 1809) Looss, 1899 (5), *L. pawlowskyi* (Shtrom, 1928) (1), *Platynosomum alectoris* Nöller & Enigk, 1933 (1), *P. illiciens* (Braun, 1901) (46), *P. tenuensis* Krasnolobova & Timofeeva, 1968 (18), *Stromitrema koshewnikowi* (Skrjabin & Massino, 1925) (50), *Zonorchis clathratus* Deslongschamps, 1824 (106), *Z. petiolatus* (Railliet, 1900) (158). In addition, the following species were used: *Conspicuum conspicuum* Faria, 1912

Coll. No: 36741 and *Ugandalubens banagei* Goodman, 1988 Coll. No: 76944 deposited in the USNM Helminthological Collection Beltsville, Washington, USA; *Zonorchis microrchis* Travassos, 1944, Coll. No 2.661 deposited in the Instituto Oswaldo Cruz, Rio de Janeiro, Brasil, and *Lyperosomum pawlowskyi* (Strom, 1928) (50) deposited in the Institute of Parasitology, Slovak Academy of Science, Košice, Slovak Republic. In addition, I studied trematodes of the family Dicrocoeliidae deposited in the Natural History Museum, University of Wrocław; Museum and Institute of Zoology, Polish Academy of Science, Warszawa, Poland; Institute of Parasitology, Russian Academy of Science, Moskva, Russia; Institute of Parasitology, Ukraine Academy of Science, Kiev, Ukraine; Institute of Parasitology, Czech Academy of Science, České Budějovice, Czech Republic, and in the Institute of Parasitology, Slovak Academy of Science, Košice, Slovak Republic. Unfortunately, these collections do not host any additional species of the subfamily Leipertrematinae Yamaguti, 1958 to those deposited in the Comenius Museum. Based on data in literature and on websites, specimens of *Skrjabinus* spp. parasitizing birds are not deposited in museum collections; therefore, I could only use published data for the revision. To complete the morphological observations, I also studied impact of various fixation methods on body shape of dicrocoeliids in *Brachydistomum ventricosum*, *Lutzrema attenuatum*, *Zonorchis clathratus*, *Z. petiolatus*, and *Platynosomum illiciens* (Sitko, 1995; Sitko & Okulewicz, 2002; Sitko *et al.*; 2000).

Results

Generic diagnosis of *Skrjabinus* Bhalerao, 1936

Dicrocoeliidae, Leipertrematinae.

Body widely lanceolate with pointed caudal extremity. Tegument unspined. Suckers located in first third of body, very close one to another, of the same length. Oral sucker subterminal, elongate-oval. Ventral sucker lenticular, rarely broadly oval, considerably wider than oral sucker, weakly developed. Pharynx well developed, situated at level of oral sucker or just posterior to it. Oesophagus very short. Intestinal bifurcation shortly posterior to pharynx; caeca relatively narrow, running alongside body edges, ending blindly near pointed posterior extremity. Testes smooth, oval, relatively small, located laterally at level of ventral sucker or slightly posterior to it. Cirrus-sac elongate-oval, running from caecal bifurcation to region of pharynx, where it opens through genital pore to body surface. Cirrus short, smooth. Ovary lateral, in large distance from testes, at end of second third of body. Uterus forming large number of coils and filling body behind reproductive organs as well as in region of ventral sucker. Vitelline bands very long, running from posterior margin of testes to $\frac{3}{4}$ of body length, composed of small follicles. Excretory system Y-shaped. Parasites of gall blader of passeriform birds of Asia and Europe, exceptionally found in Grui-formes and Galliformes in Asia.

Redescription of the type species *Skrjabinus skrjabini*

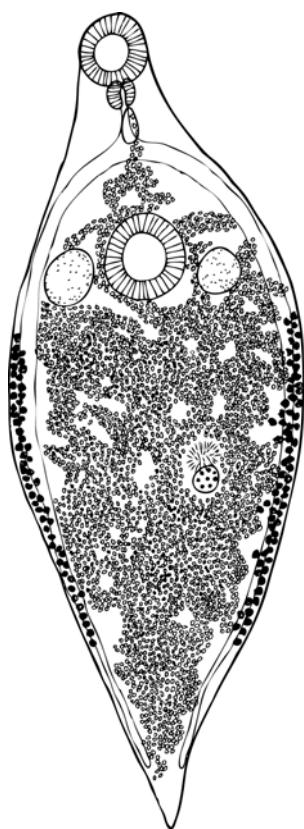


Fig. 1. *Skrjabinus skrjabini* Issaitschikow, 1920

(Issaitschikow, 1920) Shstrom, 1940 (Fig. 1).

Body length 3.486 – 4.633 mm, lanceolate or leaf-like, widening from oral to ventral sucker. Widest at level of anterior margin of vitelline bands (1.514 – 1.857 mm), tapering posteriorly; posterior extremity pointed, creating appendage. Body smooth, unspined. Suckers in anterior third of body, very close one to another. Oral sucker subterminal, mostly elongate-oval (377 – 464 × 348 – 406). Ventral sucker very weakly developed, on body surface. Suckers of equal length, ventral sucker remarkably wider, lenticular, 368 – 536 × 493 – 536. Ratio of sucker lengths 0.93 – 1.23, widths 1.21 – 1.45. Pharynx in region of oral sucker, broadly oval, 128 – 139 × 157 – 186. Praepharynx not formed. Oesophagus very short. Caeca relatively narrow, very distant from each other, ending blindly near the pointed posterior extremity. Testes small, smooth, oval or spherical, located laterally at level of ventral sucker or just posterior to it, but not reaching region of ventral sucker, separated from it by large number of uterine coils. Left testis 184 – 264 × 184 – 261, right testis 184 – 302 × 184 – 290. Cirrus-sac elongate-oval, 209 – 350 × 92 – 128, beginning usually in region of intestinal bifurcation. Genital opening in region of pharynx. Cirrus short, smooth. Ovary smooth, spherical or broadly oval, lateral, most often in second third of body, 184 – 232 × 230 – 252, separated from testes by many uterine coils. Mehlis' gland spherical or broadly oval, very well developed, often slightly larger than ovary, 145 – 184 × 157 – 203. Located close to ovary, both organs often slightly overlap. Vitelline bands lateral,

Table 1. Comparison of the measurements of *Lubens lubens* (Braun, 1901), *L. lubens* sensu Bhutta & Khan, 1975 and *Skrjabinus aenigma* Gvozdev, 1956

	<i>Lubens lubens</i> Travassos (1944)	Bhutta & Khan (1975)	<i>Skrjabinus aenigma</i> Gvozdev (1956)
Body length	7.600 – 8.300	1.908 – 2.424	4.600 – 5.700
width	3.900 – 4.300	757 – 1.363	1.700 – 2.100
Oral sucker	780 × 780	313 – 392 × 294 – 343	480 – 520 × 480 – 520
Pharynx	200 – 240 × 240 – 280	88 – 117 × 117 – 147	200 × 220 – 240
Ventral sucker	830 × 830	323 – 382 × 352 – 421	480 – 520 × 480 – 520
Ratio of suckers	1 – 1.2	–	–
Vitellarium longer	4.300	–	3.000
shorter	3.640	–	1.700
Ovary	280 – 370 × 280 – 410	107 – 127 × 137 – 186	280 – 400 × 360 – 480
Testes left	280 × 280	176 – 215 × 137 – 156	220 – 280 × 220 – 320
Testes right	240 × 410	137 – 196 × 176 – 225	220 – 280 × 220 – 320
Cirrus pouch	280 – 330 × 120	71 – 102 × 25 – 30	280 × 120
Mehlis gland	240 × 240	–	140 – 240 × 140 – 240
Eggs	30 – 35 × 22 – 25	25 – 30 × 13 – 20	30 – 34 × 17 – 20

from posterior margin of testes to $\frac{3}{4}$ of body length, occupying nearly half of body length: longer branch 1.543 – 1.943, shorter branch 1.257 – 1.714. Their ducts connect at posterior margin of ovary and form small vitelline sac. Vitelline bands composed of many follicles that are most often broadly oval or spherical and placed in 2 – 4 rows behind each other. Most follicles extraacaeal, very well developed. Uterine coils progress from ovary to pointed posterior extremity, then back to ovary. Space around ovary and Mehlis' gland remains empty. Biggest part of uterus located among ovary, testes and vitelline bands, where eggs fill the whole space. Eggs also fill space between testes and intestinal bifurcation and obscure ventral sucker. Particular uterine coils reach posterior margins of testes but do not cover them. Uterine coils end in region of intestinal bifurcation; the only branch continues from here, ending in region of pharynx by female genital opening. Excretory system Y-shaped. Eggs small, brown-black with thick shell, 32 – 36 × 22 – 25.

Remarks: Ventral sucker is well visible in living trematodes (in young specimens with an underdeveloped uterus or in very old specimens with only few eggs left) and in fixed specimens in reflected light of the stereomicroscope as long as the trematodes are in ethanol. After transfer into xylene and Canada balsam ventral sucker disappears and can be poorly distinguishable on a mount. Ventral sucker can also be poorly visible due to being obscured by uterine coils filled with eggs.

Taxonomic summary

Type host: *Lanius collurio* Linnaeus, 1758. Type locality: Záhlinice, 6770, (49°17'06"N/17°28'41"E), Czech Republic. Site of infection: gall bladder. Prevalence 2.0 %, intensity of infection 2, mean intensity 2, abundance 0.05. Voucher specimen deposited in Comenius Museum in Přerov, Czech Republic, accession number P-P-1859/21.

Discussion

Species composition of the genus is revised based on stu-

dies published in books and journals. Species list published on <https://insects.tamu.edu/research/collection/hallan/test/Platyhelminthes/Family/Dicrocoeliidae.txt> is mechanically based on the work by Pojmanska (2008), without knowledge of specialist literature and without detailed evaluation of the species of the family Dicrocoeliidae; therefore, I do not accept it. The authors use many synonyms, transfer species from one genus to another without any explanation, and there are mistakes in species names. For these reasons, this list is of limited use only.

Skrjabinus aenigma Gvozdev, 1956, *S. indicus* Jaiswal, 1957, *S. latus* Shtrom, 1940, *S. pancreaticus* Oshmarin, 1971, *S. rarus* Shtrom, 1940, *S. similis* Shtrom, 1940, and *S. sp.* of Oshmarin (1970) are characterised by lanceolate body shape, suckers of approximately equal size close to each other, small testes in region of ventral sucker, ovary separated from testes by multiple uterine coils, and by long vitelline bands beginning at level of ventral sucker and reaching two-thirds of body length. These characteristics correspond to the genus *Skrjabinus*.

Lubens lubens (Braun, 1901) sensu Bhutta & Khan (1975) is not deposited in museum collections. After having studied *L. lubens* in the Comenius Museum collection I found out that the assignation of the above finding is incorrect. The species was originally described from South America; it is a large species with elongate-oval body and large ventral sucker. Testes are located posterior to ventral sucker, uterus posterior to ovary forms many coils that fill $\frac{3}{4}$ of body length. However, the finding described by Bhutta and Khan (1975) has lanceolate body, suckers of approximately equal size, close to each other; small testes in region of ventral sucker, and relatively short uterus. All these characters correspond to *Skrjabinus aenigma* described by Gvozdev (1956) from the same host in Kazakhstan. *Lubens lubens* determined by Bhuta & Khan (1975) is therefore a synonym of *S. aenigma*. Comparison of the measurements of *L. lubens* (Braun, 1901), *L. lubens* (Braun, 1901) sensu Bhutta & Khan, 1975 and *S. aenigma* Gvozdev, 1956 is in Table 1.

Skrjabinus biliosus Shtrom, 1940, *S. gvozdevi* Panin, 1977,

Table 2. Comparison of the measurements of *Zonorchis petiolatus* (Railliet, 1900), *Skrjabinus biliosus* Shtrom, 1940, *S. gvozdevi* Panin, 1977, *S. popovi* Kasimov, 1952

	<i>S. biliosus</i> Shtrom (1940)	<i>S. gvozdevi</i> Panin (1977)	<i>S. popovi</i> Kasimov (1952)	<i>Z. petiolatus</i> , own material n = 40
Body length	5.400	4.800	4.300	4.576 – 8.867
width	1.640	1.500	1.050	1.120 – 2.000
Oral sucker	470 × 560	330 – 350 × 260 – 400	280 × 310	220 – 476 × 302 – 551
Pharynx	170 × 160	176 × 192	105 × 105	110 – 203 × 128 – 232
Ventral sucker	560 × 530	620 – 650 × 620 – 650	520 × 520	492 – 920 × 460 – 920
Ratio of suckers	–	1:1.60 – 1.80	–	1:1.32 – 2.34
Vitellarium longer	–	1.120 – 1.560	1.570	1.371 – 3.804
shorter	–	976 – 1.080	1.150	1.029 – 3.432
Ovary	280 × 310	200 – 220 × 220 – 240	168 × 230	174 – 331 × 174 – 432
Testes left	510 × 400	300 – 400 × 240 – 350	0.126 × 0.210	276 – 662 × 202 – 644
Testes right	510 × 340	320 – 380 × 400	178 × 241	276 – 643 × 202 – 653
Cirrus pouch	310 × 110	560 × 140	210 × 168	406 – 828 × 70 – 230
Mehlis gland	–	145 – 184 × 157 – 203	–	87 – 258 × 92 – 322
Eggs	28 – 32 × 17 – 22	40 × 23	31 × 21	28 – 30 × 20 – 22

and *S. popovi* Kasimov, 1952 are not deposited in museum collections, thus can be evaluated based on literary data only. These species do not possess characters corresponding to the generic diagnosis of *Skrjabinus*. They differ in elongated body shape, large, well developed ventral sucker located in large distance from oral sucker, testes placed posterior to ventral sucker, ovary located just next to testes. During evaluation of the morphometric characters of *S. biliosus*, *S. gvozdevi* and *S. popovi* and their comparison with my own numerous specimens of *Zonorchis petiolatus* (frequent parasite of passeriforms of the families Corvidae, Sturnidae and Turdidae in the Palaearctic Region), I did not find any differences; therefore, I consider *S. biliosus*, *S. gvozdevi* and *S. popovi* synonyms of *Z. petiolatus*. Sadykhov (1970) reported *S. popovi* also from *Alauda arvensis* L. and *Porzana paykullii* Ljungh. After having studied my findings from *Alauda arvensis* and *Porzana* sp.

I believe that the determination is incorrect. The author probably determined two different species of the genus *Lyperosomum* Looss, 1899 as *S. popovi*. He did not give description or depiction of his findings, and the material has not been preserved, though; therefore, it is not possible to perform a re-determination. However, for the above-mentioned reasons, *Alauda arvensis* and *P. paykullii* cannot be listed among the host species of *Z. petiolatus*. Comparison of the measurements of *S. biliosus* Shtrom, 1940, *S. gvozdevi* Panin, 1977, *S. popovi* Kasimov, 1952 and *Z. petiolatus* (Railliet, 1900) is in Table 2.

Skrjabinus francoini Karyakarte, 1970 is characterised by elongated body, large, strongly developed ventral sucker much larger than oral sucker, suckers very far from each other, testes placed posterior to ventral sucker, small distance between ovary and testes, and by very long vitelline bands. These are characters of the genus *Zonorchis*; there-

Table 3. Comparison of the measurements of *Platynosomum talischense* (Kasimov, Vaidova & Feyzullaev, 1959), *Skrjabinus* sp. of Oshmarin, 1963 and *Platynosomum butei* Zhelyazkova-Paspaleva, 1962

	<i>P. butei</i> Zhelyazkova-Paspaleva (1962)	<i>P. talischense</i> Kasimov et al. (1959)	<i>Skrjabinus</i> sp. of Oshmarin (1963)
Body length	5.000 – 6.000	3.000 – 5.000	2.250
width	1.500 – 1.800	1.200 – 2.100	1.520
Oral sucker	450 × 230	300 – 450 × 260 – 510	260 × 320
Pharynx	130 × 150	120 – 140 × 150	110 × 100
Ventral sucker	600 × 500	600 – 660 × 720 – 780	–
Ratio of suckers	–	1:1.60 – 1.70	–
Vitellarium longer	850	–	–
shorter	550	–	–
Ovary	380 × 220	130 – 300 × 150 – 480	–
Testes left	250 × 170	240 – 540 × 300 – 420	–
Testes right	200 × 140	240 – 540 × 300 – 420	–
Cirrus-sac	250 × 100	390 × 140	–
Cirrus pouch	–	145 – 184 × 157 – 203	–
Eggs	40 × 20	42 – 51 × 24 – 30	28 – 40 × 20 – 22

Table 4. Comparison of the measurements of *Brachydistomum ventricosum* Rudolphi, 1809 and *Skrjabinus petrovi* Ayupov, 1951

	<i>S. petrovi</i> Ayupov (1951)	<i>B. ventricosum</i> , own material, n = 40
Body length	4.590 – 6.239	1.943 – 6.006
width	1.156 – 1.649	0.314 – 1.114
Oral sucker	221 – 442 × 221 – 408	180 – 422 × 60 – 144
Pharynx	102 – 170 × 102 – 136	128 – 139 × 60 – 132
Ventral sucker	510 – 629 × 578 – 765	210 – 540 × 252 – 600
Ratio of suckers	–	1:0.89 – 3.36
Vitellarium longer	680 – 1.309	210 – 1.200
shorter	663 – 1.258	210 – 914
Ovary	187 × 376	120 – 301 × 150 – 390
Testes left	599 – 1.190 × 510 – 748	180 – 867 × 240 – 1.108
Testes right	595 – 1.105 × 459 – 799	168 – 663 × 180 – 1.060
Cirrus pouch	289 – 476 × 153 – 0.221	120 – 422 × 90 – 216
Mehlis gland	–	0.102 – 0.132 × 0.108 – 0.222
Eggs	34 – 63 × 26 – 45	51 – 54 × 31 – 38

fore, I remove this species from *Skrjabinus* and transfer it to *Zonorchis* as *Z. francolini* (Karyakarte, 1970) n. comb.

Skrjabinus lanciformis Oshmarin, 1952 – after having studied my own material from the birds of prey and the original description (Oshmarin (1952) in Skrjabin & Evranova (1952)) that states: “Trematodes have long oval body, large ventral sucker that is massively developed and much larger than oral sucker, testes are posterior to ventral sucker, ovary is in the proximity of testes, vitelline bands are strongly developed,” I agree with the opinion of Odening (1964) and Yamaguti (1971) to place the taxon in the genus *Zonorchis* as *Z. lanciformis*.

Skrjabinus dicroruri Nguyen Thi Le, 1968 and *S. gracilis* Nguyen Thi Le, 1968 are distinguished by long, oval body, suckers of nearly equal size, large oval testes occupying whole body width behind ventral sucker, ovary touching testes, and by very short vitelline bands beginning at posterior margin of testes. These are characters of the genus *Platynosomum*; therefore, I transfer the species to this genus as *Platynosomum dicroruri* (Nguyen Thi Le, 1968) n. comb. and *P. gracile* (Nguyen Thi Le, 1968) n. comb.

Skrjabinus talischensis Kasimov, Vajdova & Feyzullaev, 1959 (syn. *Concinnum talischensis* Kasimov, Vajdova & Feyzullaev, 1959, *S. talischensis* sensu Panin (1984); *Concinnum butei* Zhelyazkova-Paspaleva, 1962; *Skrjabinus* sp. of Oshmarin (1963)) is not deposited in collections, therefore the findings cannot be revised. After comparison with my findings of *Platynosomum illiciens* from *Falco tinnunculus* fixed by various methods I classify the species in the genus *Platynosomum* as *P. talischense* (Kasimov, Vajdova & Feyzullaev, 1959) n. comb. This species is characterised by large number of uterine coils posterior to the ventral sucker. Based on my study of the influence of the fixation method on body shape in *P. illiciens* I assume that the authors described old specimens fixed alive using disproportionately strong pressure and thus changing the body

shape from elongate-oval to broadly oval. Comparison of the measurements of *P. talischense* (Kasimov, Vajdova & Feyzullaev, 1959), *S. sp.* of Oshmarin (1963) and *P. butei* Zhelyazkova-Paspaleva, 1962 is in Table 3.

Skrjabinus kalmikensis Skrjabin & Issaitschikow, 1927 is characterised by broadly oval body, large, well developed ventral sucker, reproductive organs located close to each other, and by long vitelline bands. I agree with the opinion of Yamaguti (1971) that it should be placed as a valid taxon in the genus *Conspicuum* Bhalerao, 1936. Classification of this species in the genus *Lyperosomum* by Odening (1964) or in the genus *Skrjabinus* by Panin (1984) is incorrect.

With regard to the species *S. lanceatus* Shtrom 1940 I agree with the view of Odening (1964) and Yamaguti (1971) to place it in the genus *Conspicuum*.

Skrjabinus petrovi Ayupov, 1951 is not deposited in museum collections and the finding therefore cannot be revised. It has elongate-oval body, lentiform ventral sucker, large testes occupying whole body width, considerably smaller ovary placed medially, vitelline bands very short, beginning posterior to ovary, and uterus in two formations: in region of ventral sucker and posterior to ovary. Based on these characters and after having studied my own material of several hundreds of specimens of *Brachydistomum ventricosum* (Rudolphi, 1809) I came to the conclusion that these taxa are conspecific morphologically and in dimensions. Therefore, I assess *S. petrovi* as a synonym of *B. ventricosum*. The species has been reported from many host species, particularly birds of the orders Passeriformes and Galliformes from the Holarctic Region (Sitko & Okulewicz 2002). Comparison of the measurements of *B. ventricosum* Rudolphi, 1809 and *S. petrovi* Ayupov is in Table 4.

Conclusion

Body shape of the Dicrocoeliidae considerably changes

depending on age of the individual, and on method and speed of fixation. The trematodes live for very long time, longer than six months (I found *Stromitrema koshevnikowi* that does not develop in Europe in *Hirundo rustica* in September, i.e. six months after possible infection). During such a long lifespan the shape of the body, and thus also the position of the reproductive organs, changes. During the fixation of living worms the body contracts and is much wider than in worms fixed after dissection of frozen birds. In trematodes of other families the changes in body shape are not so distinctive. This lack of knowledge and missing description of ventral sucker in the type species caused problems in the systematics of the family and incorrect determinations. In addition, *Skrjabinus* is rarely brought from the wintering sites (prevalence lower than 5%). Descriptions of some species are based on findings of several specimens that are not deposited in museum collections; therefore, it was not possible to comment in detail on the species composition of the genus.

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