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A peculiar finding of trematodes of the genus *Dicrocoelium* (D i c r o c o e l i d a e, Trematoda) from *Turdus pilaris* L. (Passeriformes) in Slovakia

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Summary

Data are presented on eighteen trematodes *Dicrocoelium dendriticum* (Rudolphi, 1819) ? from the host *Turdus pilaris* L. in eastern Slovakia. The trematodes are 4.94—8.55 x 1.36—1.76 mm large. Oral sucker is up to 312—406 x 292—381 µm and acetabulum 292—465 x 358—530 µm. Testes situated aslant in juxtaposition or tandem. Genital opening in the area of intestinal bifurcation or anterior to the intestine. Follicles of vitelline branches commence in the mid-portion of posterior testis or as far as behind the ovary. Within the organophenote available, a specimen was detected having intestines abnormally connected to form an intestinal arch in the posterior portion of the body.

The discussion postulates the question of *D. dendriticum* as a possible parasite of birds and deals with the taxonomy of some species of the genus *Dicrocoelium* Dujardin, 1845 parasitizing this group of hosts.

Key words: *Dicrocoelium dendriticum* (Rud. 1819) ?; *Dicrocoelium* from *Turdus pilaris*

Introduction

A study on avian helminths in the migration area of eastern Slovakia has yielded a fairly large organophenote[1] of helminths of the genus *Dicrocoelium* Dujardin, 1845. These trematodes are relatively rare in this group of hosts (S k r y a b i n and E v r a m o v a, 1952; S k r y a b i n, 1970; Y a m a g u t i, 1971; P a n i n, 1984) and these findings are therefore interesting in terms of both systematics and ecology.

This paper presents data on the variability of dicrocoeliids listed under the name of *D. dendriticum* (Rudolphi, 1819) ? including their taxonomy and comments on *D. macrostomum* Odhner. 1911, *D. petrovi* Kassimov. 1952 etc.

Material and Methods

Eighteen dicrocoeliids, isolated from the liver of *Turdus pilaris* shot at Senné on April 11, 1967, were fixed under cover glass in alcohol-formol-acetic acid, stained with Semichon's carmine and mounted by routine procedures in Canada balsam. Following morphological and biometrical evaluation the specimens were deposited at Parasitological Institute in Košice as *D. dendriticum* ? under registration numbers 260/67a—260/67d.

Results

Dicrocoelium dendriticum (Rudolphi, 1819) ?

H o s t: *Turdus pilaris* L.
S i t e: liver
L o c a l i t y: Senné (eastern Slovakia)
P r e v a l e n c e: One infected host in 21 examined, e. i. 4.7 %
I n f e c t i o n i n t e n s i t y: 18 specimens

Trematodes 4.94—8.55 x1.36—1.76 mm (Fig. 1). Subterminal oral sucker 312—406 x 292—381, in 14 cases longitudinally and in 3 cases transversally oval. Acetabulum 292—465 x 358—530, situated 851—1427 from body anterior margin. Sucker centers up to 880—1441 apart. In 12 specimens acetabulum transversaly oval, in 5 longitudinally oval and in 1 round. For the

[1] Organophenote is an intrapopulational community of helminths in a certain organ, tissue or cavity of the (definitive) host where the representatives of the organophenote complete their life cycles and reproduce: their propagative elements must get into the outer environment or another host to realize a new life cycle of the helminth (M a c k o, 1961, 1985).

most part, it is larger than oral sucker. The maximum difference in size was found between oral sucker of 313 x 297 and acetabulum of 453 x 372. The ratio of sucker longitudinal and transverse means was 1 : 1.45 and 1 : 1.25, respectively. There were also specimens with oral sucker 386 x 349 and acetabulum 351.5 x 372. Their ratio of sucker longitudinal and transverse means was 1 : 0.91 and 1 : 1.06, respectively. In another specimen this ratio of sucker was 1 : 0.80 and 1 : 1.10. These ratios were more or less variable.

Pharynx 88—136 x 85—132, transversely or longitudinally oval, in one specimen round. Oesophagus 158—376. Intestinal branches generally terminate either at the same or at different level 919—1410 from body posterior margin. One specimen had intestine abnormally connected, forming an intestinal arch in body mid-portion (Fig. 1D). A certain tendency of intestine to dilate at its posterior blind end was also observed in another specimen.

Testes variable in shape and size, with non-indented margin (Fig. 1A) or lobed to a various degree (Figs. 1B, C, D). Fixation apparently changes the inner structure of testes, since mounts often show it separated from the surface membrane, which appears as less lobed (Fig. 1B). Testes situated either aslant or in juxtaposition (Fig. 1A) or almost tandem (Fig. 1B). A series of transitions exist between these positions. Anterior testis 416—620 x 484—757, posterior testis 430—719 x 419—759. Bursa cirri 239—572 x 73—177, lying anterior to acetabulum (Fig. 1D) or extends at various degree beyond its anterior margin (Fig. 1A). Seminal vesicle coiled. Cirrus unarmed, conical, in one specimen protruding to 181 µm. Cirrus at base 102 wide, at end tapering to 68 µm. Genital opening usually in the region of intestinal bifurcation, seldom proximally shifted to posterior third of oesophagus.

Ovary generally transversally oval, full-edged to slightly lobed, 156—295 x 238—339 in size, adjoining closely posterior testis or lying at various distance (at most 264) posterior to its posterior margin. Ovary in some cases separated by uterine loop (or loops) from the second testis (Fig. 1C). Mehlis' gland and seminal receptacle distinct, posterior to ovary.

Vitelline follicles variable in shape and size, commence at the same (Fig. 1D) or at different level anterior to mid-portion of posterior testis (Fig. 1B) or posterior to ovary (Fig. 1C). Right vitelline branch extends in lateral fields of body at length of 1007—2002, left 1148—2000. In some specimens vitellaria are disposed laterally to intestines, in others are delating proximally to intestines.

Uterine loops in some cases extend beyond intestinal branches posterior to ovary (Fig. 1D), in others are situated intraceacally. Protruding uterine branch runs between testes, in some places forming a few small loops also in the region of acetabulum. Metraterm runs dorsally from bursa cirri and opens indistinctly next to distal male duct. Eggs 31—42 x 20—29.

Discussion

The genus *Dicrocoelium* Dujardin, 1845 includes the following avian dicrocoeliids described in time sequence: *D. albicolle* (Rud., 1819); *D. macrostomum* Odhner, 1911; *D. petrovi* Kassimov, 1952; *D. eurynorhynchi* Belopolskaya, 1954; *D. kronschnepi* Belopolskaya (1963), etc. (Skryabin and Evramova, 1952; Skryabin, 1970; Yamaguti, 1971; Panin, 1984). The first named species has not been adequately investigated, therefore it is host specificity rather morphology that can be used for accommodation of some forms with this species.

Our dicrocoeliids differ from *D. macrostomum* in larger size of body and acetabulum. From *D. petrovi* (described by Panin, 1984 in genus *Brachylecithum*) in body width and size of acetabulum and pharynx (Tab. 1).

D. petrovi was described by Kassimov (in Skryabin and Evramova, 1952) from *Alectoris graeca caucasica* in Azerbaijan and differentiated from *D. macrostomum* (described from *Numida ptilorhyncha, Coturnix coturnix*, etc.) by position of vitellaria, length of their branches, ratio of oral sucker and acetabulum, and body width. The first two characters are rather unconvincing in their role of differential characters since position of vitellaria and their length are variable in dicrocoeliids within the species (Macko, 1968a, 1968b, 1969; Macko and Birová, 1987; Sitko, 1994). The most conspicuous difference between *D. petrovi* and other taxa, including our dicrocoeliids, is in the ratio of oral sucker and acetabulum 3 : 2. With respect to the high variability of dicrocoeliids it is also important to know the degree of variability of this ratio, since suckers are considerably variable in size. Thus, e.g., in *D. dendriticum* oral sucker CV varies up to 14.6 % and acetabulum CV up to 14.7 % (Birová and Macko, 1987; Macko, 1987; Macko and Birová, 1988, 1989). Both the mentioned species (*D. macrostomum* and *D. petrovi*) were detected in Azarbaijan and elsewhere in the same host *Alectoris graeca caucasica* (Panin, 1984).

The variability of these taxa should therefore be meticulously studied.

Considering that most differences found between our dicrocoeliids on one hand and macrostomum and *D. petrovi* on the other were due partly to different techniques of permanent mount preparation, one group of our specimens could be identified with Odhner's and the other with Kassimov's species. Such a procedure would, however, be unreal, regarding the continual variability of representatives of this organophenote.

Much more striking is the fact that the morphology of the mentioned taxa and of our dicrocoeliids is within the

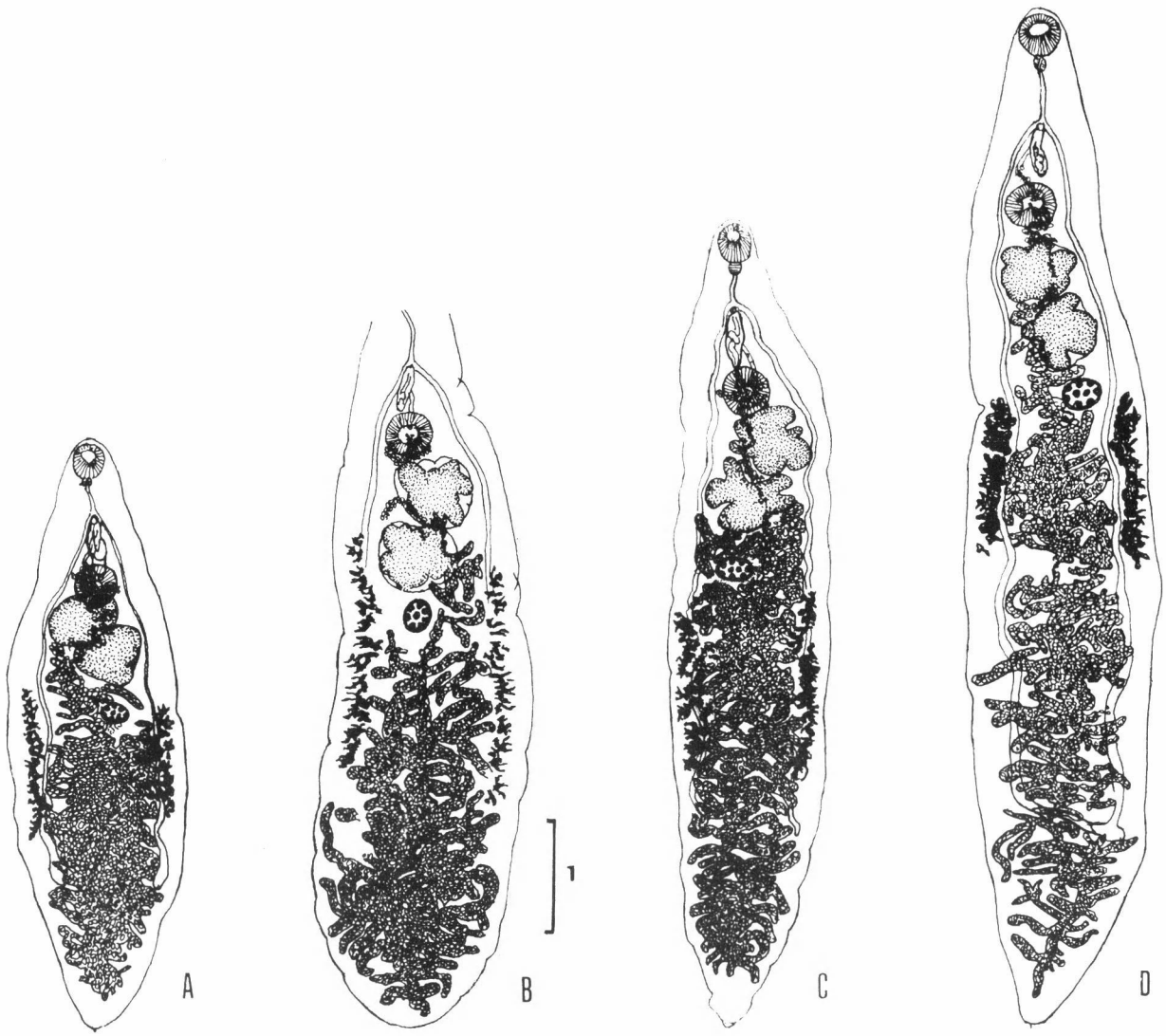

Fig. 1. *Dicrocoelium dendriticum* (Rudolphi, 1819) ? Individual variability of body size as well as of structure and position of reproductive and other organs. Scale-bars in mm

Tab. 1. **Data on species of the genus *Dicrocoelium* parasitizing birds and on *D. dendriticum* (Rud., 1819) according to different authors and from our own observations (measurements in mm, d—diameter)**

	***D. dendriticum* Odhner, 1911 after Odhner ex Skryabin et Evramova (1952)**	***D. petrovi* Kassimov, 1952 after Kassimov ex Skryabin et Evramova (1952)**	***D. dendriticum* (Rud., 1819) after Groschaft (1961)**	***D. dendriticum* (Rud., 1819) after different authors cited in this paper**	***D. dendriticum* (Rud., 1819)? our own data and statistical parameters**
Body size	3.65—4.75 x 1.0—1.5	4.9—6.0 x 0.567—0.891	2.043—3.92 x 0.8—0.96	5—12 x 1.0—2.5 or 4.5—13.8 x 0.7—2.5	length 4.94—8.55 ± 1.36—1.76; $\bar{x}$ = 6.53 ± 0.84; CV = 12.90
Oral sucker	0.28—0.33 in d.	0.248—0.275 in d.	0.216—0.260 (mean 0.244)	0.30—0.40	transverse d. $\bar{x}$ = 0.338 ± 0.027; CV = 7.9
Acetabulum	0.19—0.23	0.272—0.356 in d.	0.224—0.264 x 0.248—0.304 (mean 0.242 x 0.261)	0.40—0.45 in d.	transverse d. $\bar{x}$ = 0.408 ± 0.045; CV = 11.0
Ratio of oral sucker and acetabulum	3 : 2 or 1: 0.68—0.7	1 : 1.1—1.3		1 : 1.21 or 1 : 0.92—1.46	longitudinal d. = 1 : 0.8—1.45 transverse d. = 1 : 1.06—1.45
Pharynx	0.07—0.09 in d.	length 0.07—0.08	*	0.12—0.13 in d.	transverse d. $\bar{x}$ = 0.109 ± 0.014; CV = 12.3
Bursa cirri			*	0.5—0.6	length $\bar{x}$ = 0.420 ± 0.105; CV = 25.01
Testes	aslant tandem	aslant tandem to tandem 0.324—0.810 and 0.324—0.599	*	position highly variable	in juxtaposition or tandem, transverse d.: 1. $\bar{x}$ = 0.519 ± 0.035; CV = 12.4 2. $\bar{x}$ = 0.642 ± 0.075; CV = 12.0
Ovary	rounded, non-indented or lobed	non-indented 0.178 x 0.146—0.194 x 0.178	0.08—0.160 x 0.136—0.200	0.25—0.35 in d.	transverse d. $\bar{x}$ = 0.226 ± 0.035; CV = 15.6
Length of vitelline branches	0.5—0.65	0.810—1.134	0.240—0.880	0.45—0.81	$\bar{x}$ = 1.450 ± 0.236; CV = 16
Vitellaria commence	posterior to posterior testis	at level of Mehlis' gland		at anterior margin of posterior testis or posterior to ovary	in region of posterior testis or posterior to ovary
Eggs	0.04—0.043 x 0.026		0.24—0.031 x 0.037—0.045	0.038—0.045 x 0.022—0.030	length $\bar{x}$ = 0.037 ± 0.003; CV = 8.7

* Morphology and position of organs as in *D. dendriticum* from naturally infected hosts

variability of *D. dendriticum* (Rud., 1819) (cf. Skryabin and Evramova, 1952; Belopolskaya, 1954; Groschaft, 1961; Macko and Birová, 1987, 1988, 1989; Macko and Pačenovský, 1987, etc. In this connection interesting are the metric data of Groschaft (l.c.) on mature flukes *D. dendriticum* obtained by experimental infection of guinea pigs. Measurements of these dicrocoeliids are on the lower level of species variability and partly correspond with the metric data of *D. petrovi* (Tab. 1) and of other described taxa of the genus. Even if there is no intention to synonymize the above-mentioned species, their more or less corresponding variability raises the question whether or not *D. dendriticum* parasitizes virtually only a traditionally mentioned class of hosts (Panin, 1984), and whether in case of heavy infections in domestic ruminants in lowland areas of Slovakia (Ryšavý and Erhardová, 1953; Groschaft, 1961; Hovorka, 1963) it could possibly sporadically occur also in birds.

Since this possibility cannot be unambiguously ruled out, our finding is presented under the name *D. dendriticum* (Rudolphi, 1819) ?

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New books

B a r u š, V., O l i v a, O. *et al.*: *Fauna of Czech Republic and Slovak Republic. Lampreys - (Petromyzontes) and Fishes (Osteichthyes)* (1). Academia, Prague 1995. 623 pages. Hardcover.

The 28th volume of Fauna of Czech Republic and Slovak Republic covers the members of two scientifically and economically important classes of the vertebrate fauna - lampreys (Petromyzontes) and fishes (Osteichthyes). It deals with 6 lamprey and 84 fish species - native or introduced to the fauna of Czech Republic and Slovak Republic.

Each animal group is divided into a general and a systematic part. The general part describes the methods of research, classes' characteristics, it present brief chapters on external morphology, osteology, muscular system, lymphatic system, blood and circulatory system, respiratory system, gastrointestinal tract, excretory system and on reproductive system. The following chapters deal with the mode of nutrition, environmental requirements, geographical species distribution and with phylogenetic development. This part is concluded with chapters analyzing the importance of lampreys and fishes for man, their protection and the history of their research on the regional and global scale.

The systematic part of the book gives the list of all the species in the fauna of Czech Republic and Slovak Republic with particulars on individual species and their classification keys by which the fish larval and juvenile stages can be identified. Each species is described by its morphology and colouring, sexual dimorphism, karyotype, environmental requirements, behaviour, reproduction and assessment of growth. There are brief data on their general area of distribution, details on the distribution in the territories of Czech Republic and Slovak Republic, evaluation of their importance and description of their parasites.

The first part covers lampreys and fishes of the families A c i p e n s e r i d a e, C l u p e i d a e, E s o c i d a e, S a l m o n i d a e, T h y m a l l i d a e, and U m b r i d a e.

The second part deals with C y p r i n i d a e and with other fish families in the Czech Republic and the Slovak Republic.

The book is a synthesis of the initial and current sources on the fauna of both the vertebrate classes, with many materials being publishes for the first time. It will be found useful by zoologists, parasitologists, students and conservationists, as well as by pisciculturists and anglers. The book contains large numbers of original penk - and - ink drawings and photographs.

M. Ryboš
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