

THE MONOGENEAN PARASITES OF AFRICAN FISHES. VIII  
A RE-EVALUATION OF THE GENUS *DOGIELIUS* BYCHOWSKY,  
1936, WITH THE DESCRIPTION OF A NEW SPECIES (\*)

by

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INTRODUCCION

The monogenetic trematode genus *Dogielius* was established by B. E. BYCHOWSKY in 1936. As BYCHOWSKY (1957) pointed out, this genus is very closely related to the cosmopolitan genus *Dactylogyrus* Diesing, 1850. The present study: (1) discusses the general morphological aspects of *Dogielius*, including the comparative aspects to *Dactylogyrus*, (2) furnishes an emended diagnosis for *Dogielius*, and (3) furnishes the description of a new species, *D. junorstrema*.

Prior to the present study, *Dogielius* consisted of two species, *D. forceps* BYCHOWSKY, 1936 and *D. planus* BYCHOWSKY, 1958. Both species were recovered from hosts belonging to the cyprinid genus *Schizothorax*, the host being native to the U.S.S.R.

Upon initial examination of the parasite described herein, it seemed that we were not dealing with a distinct genus but rather with a bizarre form of *Dactylogyrus*. It is immediately obvious that the two genera are similar in several ways. Further examination indicated that *Dogielius* is definitely qualified to exist as a separate genus.

The similarities existing between the genera are several in number, including the presence of a single haptor bar and a single pair of anchors, the presence of 14 haptor hooks, similarities in copula-

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tory complexes, and morphology of head organs, digestive system, etc.

There are several importance differences in the genera. One striking feature which separates the taxa is position of anchors and bars on the haptor. In *Dactylogyrus* it is well established that both anchors and bars are located in the dorsal portion of the haptor, whereas these structures are ventrally located in *Dogielius*.

A second differentiating factor is hook arrangement. Due to the differences in haptoral morphology of the genera, spatial relationships of the hooks are different. This point is extended in the Discussion section following the description of *Dogielius junorstrema* n. sp.

Another major difference, as pointed out by YAMAGUTI (1963), concerns the course of the vas deferens. In descriptions of *Dactylogyrus* in which the nature and course of the vas deferens are described, this structure is looped around one of the limbs of the intestine, whereas this looping does not occur in *Dogielius*, according to BYCHOWSKY (1936) and to the present authors. YAMAGUTI (1963) considers the course of the vas deferens an important taxonomic trait. Its importance in the present comparative study is evident.

An additional feature is consideration of morphology of anchor points. Whereas the point in *Dactylogyrus* normally ends without any hint of modification, in *Dogielius* there is a characteristic recurving near the distal aspect. (The Russian designation for this modification is Savig). While this feature initially appeared to possess little taxonomic value, we are presently of the opinion that it is, in actuality, an important character.

#### MATERIALS AND METHODS

Host specimens utilized in this study were donated by Dr. R. McC. Pott, Senior Fisheries Officer, Provincial Fisheries Institute, Lydenburg, South Africa. The authors wish to express their appreciation to Dr. Pott and to personnel of the Provincial Fisheries Institute.

Hosts were frozen and then preserved in 3½ % formalin prior to shipment to the United States. Parasites were recovered and treated as prescribed by PRICE (1966). Appropriate measurements and illustrations were made with the aid of a calibrated filar micro-

meter ocular and a camera lucida, respectively. Anatomical terms employed are those of HARGIS (1958) and PRICE and ARAI (1967). Measurements were made as outlined by PRICE and McMAHON (1967). Average measurements are given first, followed by minimum and maximum values enclosed in parentheses. All measurements are expressed in microns.

#### GENERIC DIAGNOSIS OF *DOGIELIUS* BYCHOWSKY, 1936, EMENDED

Dactylogyridae, Dactylogirinae: Haptor with one pair of anchors (ventral), their bases supported by a simple transverse bar. No vestigial bar in association. Hook 14 (7 pairs). Hooks similar in shape. Four eyespots. Copulatory complex composed of a tubular cirrus and a basally articulated accessory piece. Prostatic reservoir double. Seminal vesicle formed by simple dilatation of vas deferens. Vas deferens not looped around intestinal limb. Testis postovarian, but testis might partially overlap ovary (dorsal view). Vagina opens ventrally just to right of median line. Intestinal crura confluent posteriorly. Parasites of cyprinid fishes. Thus far recovered only from hosts in the U.S.S.R. and in South Africa.

#### DESCRIPTION OF *DOGIELIUS JUNORSTREMA* N. SP.

*Host and locality:* *Labeo rudii*; Limpopo River Catchment, Towla Ranch. Longitude 29 degrees, 50 minutes; latitude 21 degrees, 15 minutes. Bubi River, Rhodesia, Africa.

*Number of specimens studied:* Fifteen.

*Location of parasites on host's body:* Gill filaments.

*Types:* Holotype and one paratype deposited in the United States National Museum, Washington, D. C. (Accession numbers: holotype, 71341; paratype, 71342). One paratype deposited with the Zoological Institute of the Academy of Sciences of the U.S.S.R.

*Description:* A small dactylogyrid provided with a thin cuticle; length 202 (178 to 243); greatest width of body 58 (46 to 72). Two pairs of eyespots, members of anterior pair larger. Pharynx prominent, very muscular. Head organs (on either side) consist of 4 glan-

dular structures connected by a small duct, the duct terminating in a larger pharyngeal gland. Anterior and lateral cephalic lobes moderately developed in most specimens, well developed in a few. Peduncle essentially non-existent, however, haptor is well set off from body proper in all specimens. See whole mount. Fig. 1.

Haptor provided with one pair of anchors, located in ventral portion of haptor (Fig. 2). Each anchor composed of: (1) a solid base provided with vestigial roots, (2) a narrow, solid shaft, and (3) a solid point. Point recurved. Length of anchor 48 (43 to 51), width of base 17 (15 to 20). Bases of anchors connected by a heavily sclerotized bar (Fig. 6); length 51 (47 to 55). Hooks 14 (7 pairs), 5 pairs located ventrally on haptor, remaining 2 pairs located dorsally. (Figs. 3, 4, 5). Fig. 5 is top view of a hook. Each hook composed of: (1) a solid elliptical base connected to (2) a narrower solid shaft, and (3) a sickle-shaped termination provided with an opposable piece. Range of lengths of medially located hooks 18 (17 to 20); range of marginally located hooks 24 (21 to 29).

Copulatory complex composed of a tubular cirrus and a basally articulated accessory piece (Figs. 7, 8); length of cirrus 21 (19 to 24); length of accessory piece 19 (17 to 22). Two prominent prostatic reservoirs, each emptying into cirrus base by a fine duct (Fig. 9). Testis subspherical in outline, smaller than pretesticular ovary, the ovary containing several nucleated egg cells. Vas deferens appears not to loop around intestinal limb; seminal vesicle formed by simple dilatation of vas deferens. Vagina opens ventrally, just to right of midline; seminal vesicle not observed with certainty.

Vitellaria moderately to well developed, forming two broad lateral bands, the bands coextensive with intestinal crura. Intestinal crura confluent posteriorly.

*Discussion:* This new species resembles *Dogielius forceps* BYCHOWSKY (1936) in morphology of body shape, anchors, bar, and hooks. The shapes of the copulatory complexes of the two species are different in several respects. There are three additional characters for differentiation.

First, while Bychowsky's species possesses a single prostatic reservoir, the present form possesses two of these structures. Secondly, the testis of *D. forceps* lies almost alongside the ovary, whereas that of *D. junorstrema* is definitely postovarian in position. Finally, the hook arrangements of the two species differ. In *D. forceps* only one

pair is located medially on the haptor, the remainders arranged marginally. In our species the arrangement is two pairs dorsal and five pairs ventral; two pairs (both ventral) are located medially on haptor, the remainders peripherally. Mizelle and Crane (1964) furnish a full account of the "generalized" hook arrangement of a large percentage of monopistocotylean Monogenea.

There exists little doubt that *Dogielius* is related to *Dactylogyrus*. Aside from the enumerated similarities, all three species of *Dogielius* have been recovered from minnow hosts (family Cyprinidae), as have more than 90 % of the more than 300 species of *Dactylogyrus*. Thus host-parasite relationships strongly indicate the two genera are related. In spite of these similarities, we feel that *Dogielius* should be considered a separate, distinct genus.

#### SUMMARY

The monogenetic trematode genera *Dogielius* BYCHOWSKY, 1936 and *Dactylogyrus* DIESING, 1850 are compared. Although the genera are apparently closely related, the conclusion is advanced that each should be considered a separate, distinct genus. A new species, *Dogielius junorstrema*, is morphologically described.

#### RESUMEN

Se comparan los géneros trematodes monogénéticos *Dogielius* Bychowsky, 1936 y *Dactylogyrus* Diesing, 1850.

Aunque ambos géneros parecen estrechamente relacionados, se anticipa la conclusión de que deben ser considerados géneros distintos. Se describe morfológicamente una nueva especie: *Dogielius junorstrema*.

#### DEDICATION

This species is named in honor of F. J. Junor, Fisheries Biologist, Department of National Parks and Wild Life Management, Fort Victoria, Rhodesia, Africa, in recognition of the generous contributions of host material he and his associates have made.

#### ACKNOWLEDGE

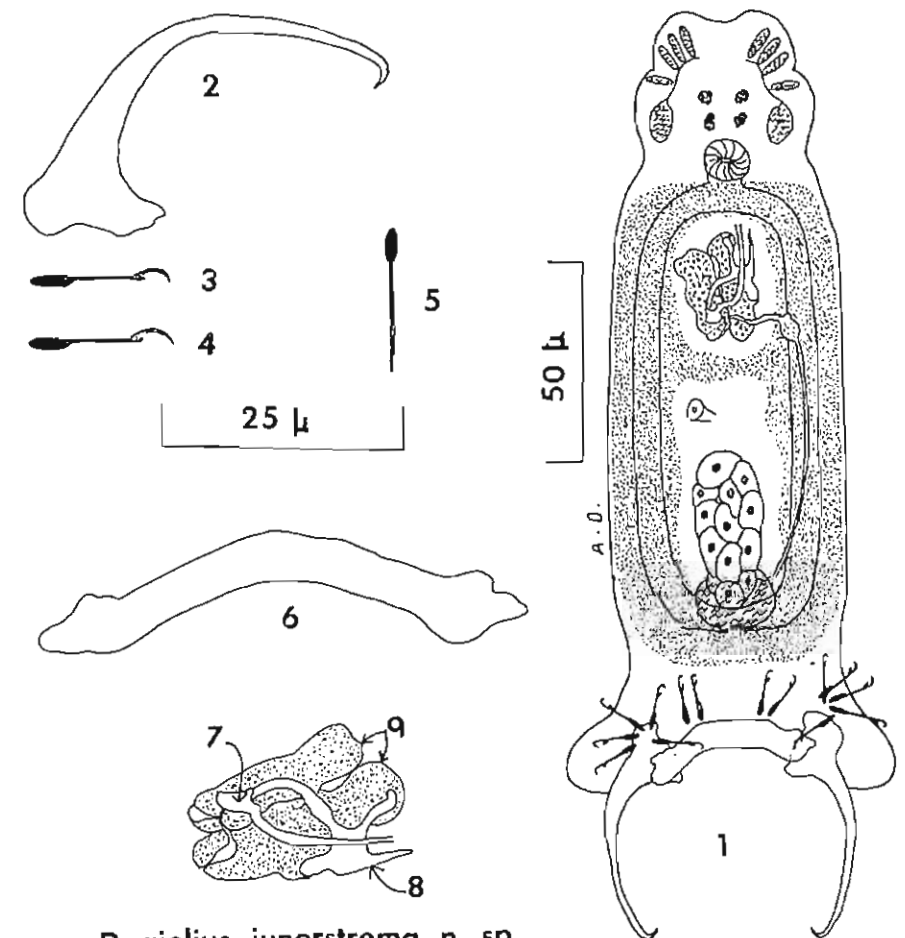
Our thanks to Miss Anne Druckenmiller, of the Art Departament, Millersville State College, who made all illustrations utilized in this paper.

#### REFERENCES

- BYCHOWSKY, B. E. (1936).—Die monogeneischen Trematoden der Fische des Tschu-Flusses. (Russian text). *Trav. Exped. Et. Republ. Kirghiz, Moscow*, 3: 245-275.
- BYCHOWSKY, B. E. (1957).—Monogenetic trematodes-their systematics and phylogeny. (Originally in Russian. American version edited by W. J. Hargis, Jr.). *Graphic Arts Press, Washington, D. C.* 506 pags.
- HARGIS, W. J., Jr. (1958).—A revised, annotated list of terms useful for morphological studies of monogenetic trematodes. (Mimeographed at Virginia Marine Laboratory, Gloucester Point, Virginia). 12 pags.
- MIZELLE, J. D.; CRANE, J. W. (1964).—Studies on monogenetic trematodes. XXIII. Gill parasites of *Micropterus salmoides* (Lacépède) from a California pond. *Trans. Amer. Micr. Soc.*, 83: 343-348.
- PRICE, C. E. (1966).—*Urocleidus cavanaughi*, a new monogenetic trematode from the gills of the keyhole cichlid, *Aequidens maroni* (Steindachner). *Bull. Georgia Acad. Sci.*, 24: 117-120.
- PRICE, C. E.; ARAI, H. P. (1967).—A proposed system of anatomy for freshwater Monogenea. *Canadian J. Zool.*, 45: 1283-1285.
- PRICE, C. E.; McMAHON, T. E. (1967).—The monogenetic trematodes of North American freshwater fishes. *Riv. Parassit.*, 28: 177-220.
- YAMAGUTI, S. (1963).—Systema helminthum. Vol. IV. Monogenea and Aspidocotylea. *Interscience Publishers, New York.* 599 pags.

#### LEGEND TO ILLUSTRATIONS

Figures 1-9. Camera lucida illustrations of *Dogielius junorstrema* n. sp. 1. Whole mount (ventral view); 2. Anchor; 3, 4, 5. Hooks (no. 5 is a top view); 6. Bar; 7. Cirrus; 8. Accessory piece; 9. Prostatic reservoirs.



*Dogielius junorstrema* n. sp.