

NEW AND PREVIOUSLY KNOWN DACTYLOGYRUS SPP. FROM SOUTHERN ONTARIO FISHES

George Hanek,* Kalman Molnar,† and C. H. Fernando

Department of Biology, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1

ABSTRACT: Six new and 15 previously described species of *Dactylogyrus* are reported: *Dactylogyrus cernyi* sp. n. and *D. micropogoni* sp. n. from *Nocomis micropogon* (Cope); *D. chrosomi* sp. n. and *D. eos* sp. n. from *Phoxinus eos* (Cope); *D. hankinsoni* sp. n. from *Hybognathus hankinsoni* Hubbs; *D. heterolepis* sp. n. from *Notropis heterolepis* Eigenmann and Eigenmann; and *D. apos* Mueller, 1938; *D. atratuli* Hanek and Fernando, 1972; *D. attenuatus* Mizelle and Klucka, 1953; *D. banghami* Mizelle and Donahue, 1944; *D. bifurcatus* Mizelle, 1937; *D. bulbosus* Mueller, 1938; *D. bychowskyi* Mizelle, 1937; *D. cornutus* Mueller, 1938; *D. dubius* Mizelle and Klucka, 1953; *D. eucalius* Mizelle and Regensberger, 1945; *D. lachneri* Chien, 1971; *D. luxili* Rogers, 1967; *D. microphallus* Mueller, 1938; *D. reciprocus* Rogers, 1967; and *D. rubellus* Mueller, 1938. *D. dubius* is redescribed, and the vagina of *D. luxili* is figured.

Studies on *Dactylogyrus* Diesing, 1850, in Canada have been made by Bangham (1955), Bangham and Adams (1954), Dechtiar (1972), Hanek and Fernando (1972), Mizelle and Donahue (1944), Monaco and Mizelle (1955), and Price and Arai (1967). From April to October 1973 we undertook intensive parasitological investigation of fishes from southern Ontario. Six new and 15 previously described species of *Dactylogyrus* were collected and are reported herein.

MATERIALS AND METHODS

Fish hosts were collected by seine and immediately segregated by species, transported to the laboratory alive, and examined. The hosts were identified using the keys of Hubbs and Lagler (1964), while systematic assignment of the species follows that proposed by the American Fisheries Society (1970). All dactylogyrids were collected from the gills and fixed in a mixture of glycerol and formalin (9:1) with a few drops of ammonium picrate. Measurements are in micrometers; those of holotypes are given first with ranges in parentheses. Observations were made with a phase-contrast microscope and illustrations were prepared with the aid of a camera lucida.

RESULTS AND DISCUSSION

Dactylogyrus cernyi sp. n.

(Figs. 1a-b, d-f)

Type host and locality: *Nocomis micropogon* (Cope); Conestogo River, Waterloo.

Specimens studied: 2.

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* Present address: Ministry of Agriculture and Fisheries, Nassau, N.P., Bahamas.

† On leave from Veterinary Medical Research Institute, Academy of Sciences, Budapest, Hungary.

Type specimens: Holotype, USNM Helm. Coll. No. 73150; paratype No. 73151.

Description

Body with thin, smooth cuticle; length 310 to 430, width 100 to 120. Cephalic lobes poorly developed. Eyespots subequal, equidistant. Pharynx circular, diameter 28 to 32. Peduncle moderate. Haptor ovate. Anchor shaft curved, point prominent; anchor 45 to 50 long, base 39 to 43 long. Dorsal bar gently curved posteriorly, expanded at ends, 22 to 26 long. Hook lengths: median (Nos. 1, 5, 6, 7)—19 (18 to 24); marginal (Nos. 2, 3, 4)—16 (15 to 18), 4A not observed. Cirrus highly curved, 35 to 39 long, base small. Accessory piece T-shaped, 21 to 23 long, serves as cirrus guide. Vagina sclerotized, V-shaped, enlarged at both ends, 20 to 28 long.

Remarks

This species differs from all described species by the shape of anchor, copulatory complex, and vagina. *D. cernyi* is named in honor of Dr. M. Cerny, who introduced the senior author to Biology.

Dactylogyrus chrosomi sp. n.

(Figs. 2a-e)

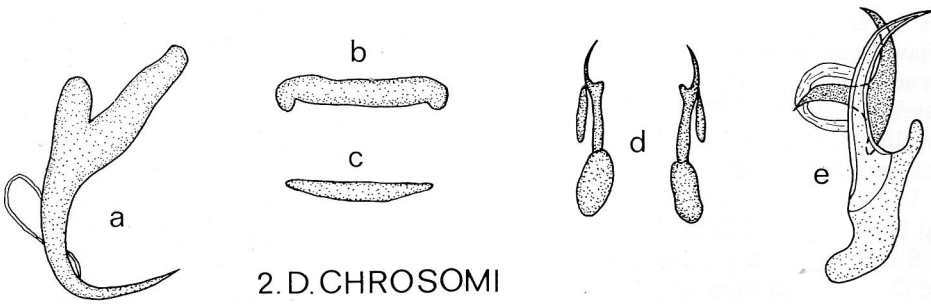
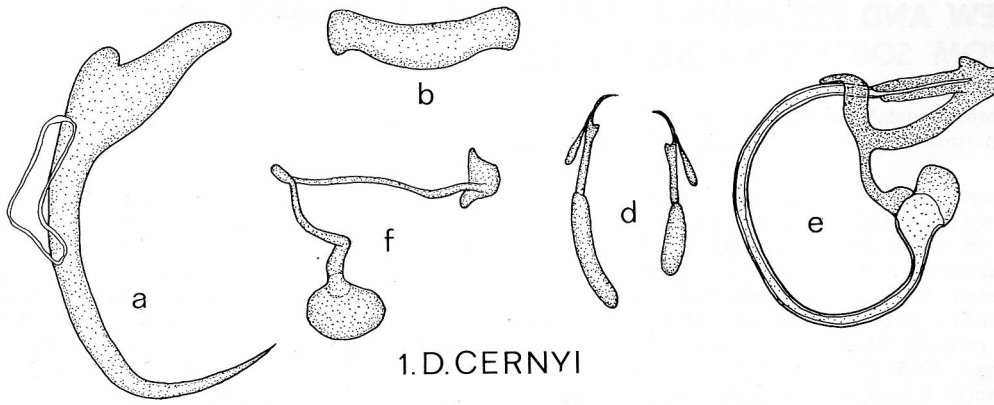
Type host and locality: *Phoxinus eos* (Cope); Saugeen River, Durham.

Specimens studied: 7.

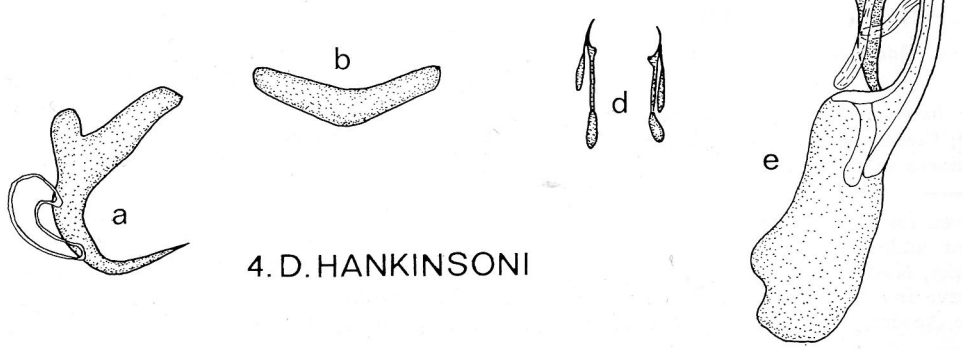
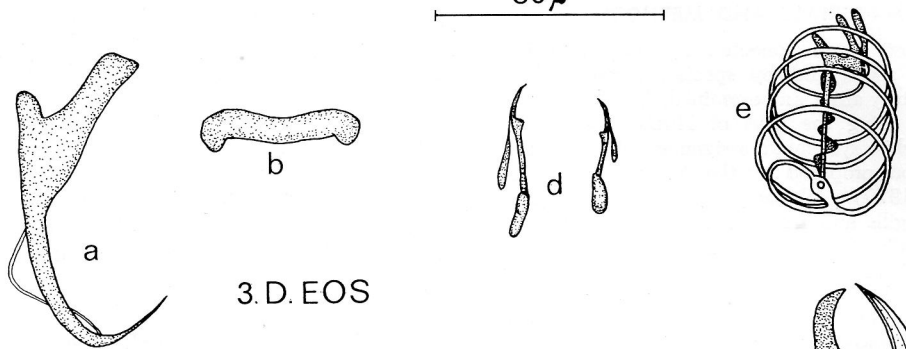
Type specimens: Holotype, USNM Helm. Coll. No. 73152; 2 paratypes No. 73152; paratypes in senior author's collection.

Description

Body with thin, smooth cuticle; length 540 (400 to 580), width 170 (140 to 200). Four lateroterminal cephalic lobes. Anterior eyespots slightly smaller, closer together. Pharynx circular, diameter 44 (40 to 50). Peduncle moderate.



30 μ



Haptor ovate; length 95 (70 to 120), width 105 (90 to 120). Anchor solid, well-developed roots, 28 (27 to 29) long; base 21 (20 to 22) long. Dorsal bar elongate, straight, with subterminal indentations on posterior border, 20 (19 to 21) long. Ventral bar thin, 14 long. Hook lengths: 19 (17 to 22), 4A not observed. Cirrus 22 (21 to 23) long, with well-developed base. Accessory piece 15 (14 to 16) long, solid, with process near midlength; accessory retractor curving over lateral process of accessory piece. Vagina large, muscular, dextral.

Remarks

Dactylogyrus chrosomi appears to be most closely related to *D. phoxini* Malewitskaya, 1949, and *D. hemitremae* Rogers, 1967. It may be distinguished from these species by the shape of the haptor. *D. chrosomi* is named after an earlier generic name of the host.

Dactylogyrus eos sp. n.

(Figs. 3a–b, d–e)

Type host and locality: *Phoxinus eos* (Cope); Saugeen River, Durham.

Specimens studied: 4.

Type specimens: Holotype, USNM Helm. Coll. No. 73153; 2 paratypes No. 73154; paratype in senior author's collection.

Description

Body with thin, smooth cuticle; length 250 (230 to 280), width 75 (52 to 100). Cephalic lobes poorly developed. Anterior eyespots smaller, members of both pairs equidistant. Pharynx circular to ovate, 18 (16 to 20) long, 17 (16 to 18) wide. Peduncle well developed. Haptor oval or pentagonal; length 54 (44 to 65), width 74 (52 to 90). Anchor solid, 32 (31 to 33) long; base 26 (25 to 27) long. Dorsal bar bent posteriorly, with prominent subterminal indentations on posterior border; 17 (16 to 18) long. Hook lengths: 18 (13 to 21), 4A not observed. Spiral-like cirrus with 4 coils around accessory piece, 27 (24 to 30) long. Accessory piece with 3 terminal processes, 26 (24 to 28) long. Vagina muscular, dextro-ventral.

Remarks

Dactylogyrus eos may be distinguished from all other species by the structure of the copulatory complex. The species is named after the host.

Dactylogyrus hankinsoni sp. n.

(Figs. 4a–b, d–e)

Type host and locality: *Hybognathus hankinsoni* Hubbs; Laurel Creek, Waterloo.

Specimens studied: 12.

Type specimens: Holotype, USNM Helm. Coll. No. 73155; 2 paratypes No. 73156; paratypes in senior author's collection.

Description

Body with thin, smooth cuticle; length 600 (440 to 710), width 135 (90 to 156). Two terminal and 2 lateral cephalic lobes, frequently confluent on either side. Eyespots subequal, equidistant. Pharynx subspherical, 29 (24 to 42) long, 29 (26 to 32) wide. Peduncle short to moderate. Haptor oval; length 73 (58 to 96), width 90 (58 to 120). Anchor solid, well-developed roots; length 23 (22 to 24), base 17 (16 to 18) long. Dorsal bar slightly V-shaped, 22 (20 to 23) long. Hook lengths: 15 (14 to 17), 4A not observed. Cirrus slightly curved, 32 (30 to 35) long; well-developed base. Accessory piece solid, 24 (23 to 26) long with process arising about midlength of shaft; accessory retractor arising from origin of cirrus tube and curving over lateral process. Vagina muscular, dextral.

Remarks

Dactylogyrus hankinsoni most closely resembles *D. banghami* Mizelle and Donahue, 1944, by the shape of the copulatory complex and anchor. The larger body size and the absence of an anteriorly directed process on the cirrus base of *D. hankinsoni* easily separates the two species. *D. hankinsoni* is named after the host.

Dactylogyrus heterolepis sp. n.

(Figs. 5a–e)

Type host and locality: *Notropis heterolepis* Eigenmann and Eigenmann; Laurel Creek, Waterloo.

Specimens studied: 12.

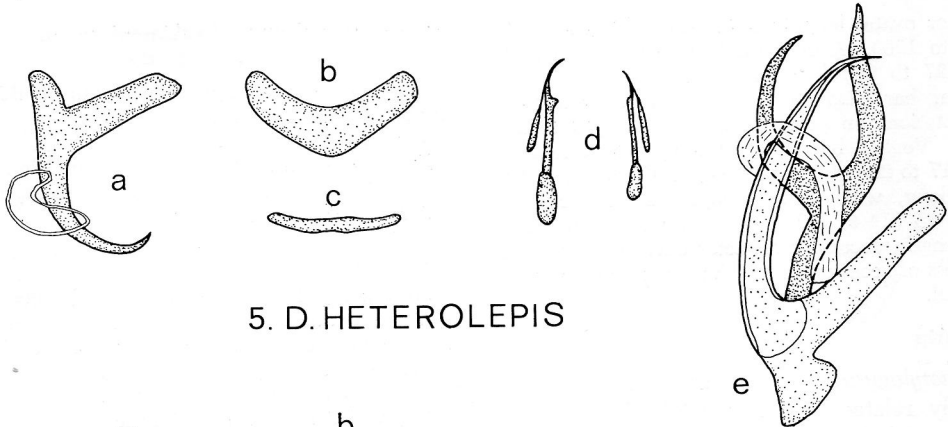
Type specimens: Holotype, USNM Helm. Coll. No. 73157; 2 paratypes No. 73158; paratypes in senior author's collection.

Description

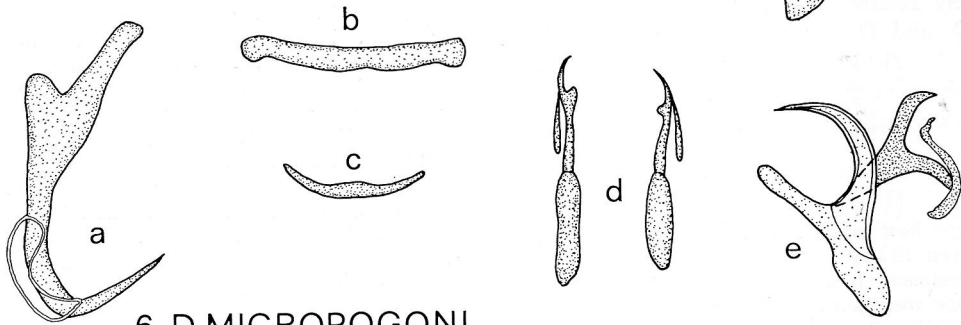
Body with thin, smooth cuticle; length 460 (325 to 580), width 112 (65 to 150). Cephalic lobes poorly developed. Anterior eyespots smaller. Pharynx circular, diameter 25 (21 to 29). Peduncle

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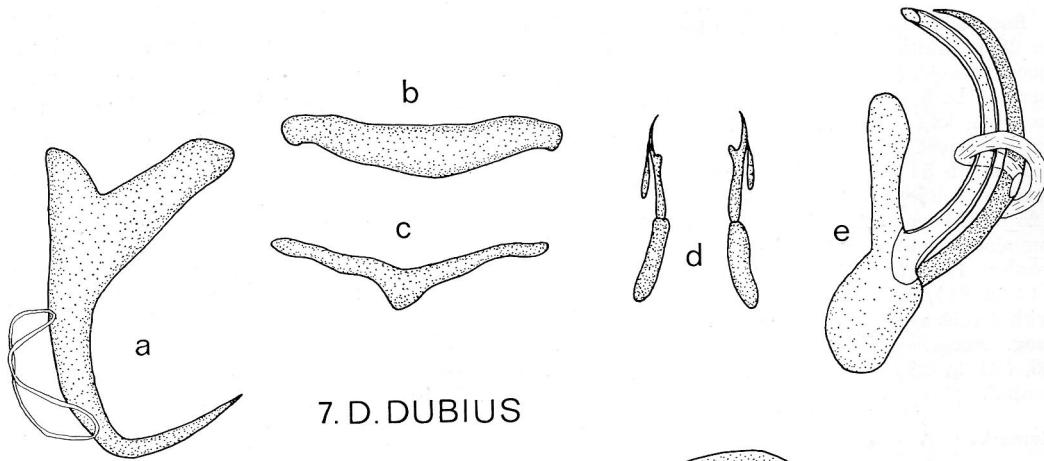
FIGURES 1–4. New dactylogyrids from freshwater fishes of southern Ontario. Species as labeled on the drawings. For all species: a, anchor; b, dorsal bar; c, ventral bar; d, hooks; e, copulatory complex; f, vagina.



5. *D. HETEROLEPIS*

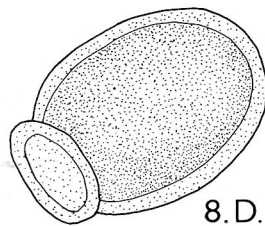


6. *D. MICROPOGONI*



7. *D. DUBIUS*

40 μ



8. *D. LUXILI*

FIGURES 5-8. New dactylogyrids from freshwater fishes of southern Ontario. Species as labeled on the drawings. For all species: a, anchor; b, dorsal bar; c, ventral bar; d, hooks; e, copulatory complex; f, vagina.

moderate. Haptor octagonal; length 66 (52 to 90), width 79 (65 to 130). Anchor solid, well-developed roots; length 20 (18 to 22), base 12 (10 to 13) long. Dorsal bar obtusely V-shaped, 20 (18 to 25) long. Ventral bar thin, inconspicuous, 16 (15 to 18) long. Hook lengths: 19 (16 to 21), 4A not observed. Cirrus slightly curved, tapered to a fine point, 36 (32 to 39) long; base with prominent, anteriorly directed process. Accessory piece solid, with anteriorly directed process near midlength; 33 (28 to 36) long; accessory retractor arises from proximal cirrus tube, curves over lateral process. Vagina muscular, dextroventral.

Remarks

The anchor and the cirrus of *D. heterolepis* are similar to those of *D. banghami*. However, the accessory pieces of these species are different. *D. heterolepis* is named after the host.

Dactylogyrus micropogoni sp. n.

(Figs. 6a–e)

Type host and locality: *Nocomis micropogon* (Cope); Conestogo River, Waterloo.

Specimens studied: 8.

Type specimens: Holotype, USNM Helm. Coll. No. 73159; 2 paratypes No. 73160; paratypes in senior author's collection.

Description

Body with thin, smooth cuticle; length 300 (210 to 330), width 69 (59 to 90). Cephalic lobes poorly developed. Eyespots subequal, equidistant. Pharynx circular or spheroid, 30 (23 to 40) long, 28 (21 to 40) wide. Peduncle moderate. Haptor broadly round to truncate; length 73 (68 to 85), width 105 (92 to 115). Anchor delicate, well-developed roots; length 28 (25 to 33), base 20 (19 to 24) long. Dorsal bar elongate, with subterminal indentations on posterior border, 21 (18 to 26) long. Ventral bar slightly curved anteriorly, 16 (15 to 17) long. Hook lengths: median—25 (23 to 27), marginal—17 (15 to 19), 4A not observed. Cirrus 18 (17 to 19) long, strongly curved, tapered to a fine point. Accessory piece solid with process near midlength of shaft and a platelike structure; length 15 (13 to 16). Vagina muscular, dextroventral.

Remarks

Dactylogyrus micropogoni most closely resembles *D. effusus* Chien, 1971, from which it differs by the shape of the anchor. It also appears to be related to *D. albertensis* Price and Arai, 1967, but the size of the hooks and the structure of the accessory piece differ sharply. *D. micropogoni* is named after the host.

Dactylogyrus dubius Mizelle and Klucka, 1953

(Figs. 7a–e)

Host and locality: *Notropis cornutus* (Mitchell); Laurel Creek, Waterloo.

Specimens studied: 20. Ten were deposited in USNM Helm. Coll. (No. 73161).

Redescription

Body with thin, smooth cuticle; length 685 (530 to 850), width 157 (110 to 195). Two terminal and 2 lateral cephalic lobes. Eyespots subequal, equidistant. Pharynx circular, diameter 37 (32 to 40). Peduncle moderate to broad. Haptor subpentagonal; length 104 (79 to 140), width 116 (101 to 140). Anchor solid with stout superficial root; length 35 (32 to 38), base 27 (24 to 30) long. Dorsal bar bend posteriorly in midregion, 29 (23 to 32) long. Ventral bar curved anteriorly with prominent medial, posteriorly directed projection; length 23 (18 to 28). Hook lengths: 21 (19 to 25). Cirrus elongate arcuate tube, 34 (24 to 40) long. Accessory piece elongate, parallel to cirrus, 30 (24 to 32) long; accessory retractor near midlength of accessory piece, curves over cirrus, terminates near its origin. Vagina muscular, dextral.

Remarks

Mizelle and Klucka (1953) described this species on the basis of a fragment of a single specimen which lacked the haptor. The present record, the first since the original description, provides additional information about the morphology of this species. Based on this redescription, *D. arcus* Rogers, 1967, is considered a synonym of *D. dubius*.

PREVIOUSLY DESCRIBED SPECIES

In addition, 14 other species of *Dactylogyrus* are reported. Species denoted with (*) are new host records, those denoted (') are new records for Canada. They are listed below followed by their host(s), and locality.

- (') *D. apos* Mueller, 1938: *Hypentelium nigricans* (Lesueur); Bronte Creek, Milton.
- D. atratuli* Hanek and Fernando, 1972: *Rhinichthys atratulus* (Hermann); Bronte Creek, Milton, and Saugeen River, Durham.
- (') *D. attenuatus* Mizelle and Klucka, 1953: *Semotilus atromaculatus* (Mitchill); Laurel Creek, Waterloo.
- D. banghami* Mizelle and Donahue, 1944: *Notropis cornutus* (Mitchill); Laurel Creek, Waterloo. *Rhinichthys atratulus* (Hermann); Bronte Creek, Milton.
- D. bifurcatus* Mizelle, 1937: *Pimephales notatus* (Rafinesque); Conestogo River,

Waterloo. *Pimephales promelas* Rafinesque; Laurel Creek, Waterloo.

D. bulbosus Mueller, 1938: *Notropis cornutus* (Mitchill); Laurel Creek, Waterloo.

(*) *D. bychowskyi* Mizelle, 1937: *Pimephales notatus* (Rafinesque); Conestogo River, Waterloo. *Pimephales promelas* Rafinesque; Laurel Creek, Waterloo.

D. cornutus Mueller, 1938: *Notropis cornutus* (Mitchill); Laurel Creek, Waterloo.

D. eucalius Mizelle and Regensberger, 1945: *Eucalia inconstans* (Kirkland); Stix River, Durham.

(*)(*) *D. lachneri* Chien, 1971: *Nocomis micro-pogon* (Cope); Conestogo River, Waterloo.

(*)(*) *D. luxili* Rogers, 1967: *Notropis cornutus* (Mitchill); Laurel Creek, Waterloo.

(*) *D. microphallus* Mueller, 1938: *Semotilus atromaculatus* (Mitchill); Laurel Creek, Waterloo.

(*) *D. reciprocus* Rogers, 1967: *Nocomis micro-pogon* (Cope); Conestogo River, Waterloo.

(*) *D. rubellus* Mueller, 1938: *Notropis rubellus* (Agassiz); Bronte Creek, Milton and Saugenee River, Durham.

Remarks

When examining specimens of *D. luxili* we observed a prominent, sclerotized vagina (Fig. 8f). A large number of hosts is listed for *Dactylogyrus banghami* by Mizelle and McDougal (1970). In the present work, the specimens collected from *Rhinichthys atratulus* were doubtfully assigned to *D. banghami*. Since only a few specimens were collected, we were unable to undertake a thorough examination of the species. Many specimens have been assigned to *D. banghami* by various authors (Hanek and Fernando, 1972; Monaco and Mizelle, 1955; Price and Arai, 1967; Rogers, 1967), even though they exhibit differences in the structure of the copulatory complexes. We feel that some of these specimens, particularly those collected from *Couesius plumbeus* (Agassiz), *Hybognathus placitus* Girard, *Rhinichthys atratulus* (Hermann), *R. cataractae* (Valenciennes), and *Richardsonius balteatus* (Richardson), represent a species-group complex consisting of several species.

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