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A new species of characid fish of the genus *Nematobrycon* from the Rio Calima of Colombia (Pisces, Characoidei, Characidae)

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ABSTRACT

The systematic status of three nominal forms of the Colombian characid genus *Nematobrycon* is herein treated. All forms are illustrated and their interrelationships discussed. One species, *Nematobrycon lacortei* is described as new. *Nematobrycon palmeri* Eigenmann, a species from the northern headwaters of the Rio San Juan is compared with *Nematobrycon amphiloxus* Eigenmann & Wilson from the adjacent headwaters of the Rio Atrato. It is suggested that *N. amphiloxus* is probably a subspecies of *N. palmeri*. *N. lacortei* from the headwaters of the Rio Calima, a large southern tributary of the Rio San Juan, is considered specifically distinct from *N. palmeri* at the present time. Judgement on the systematic status of all forms of *Nematobrycon* must await collection of population samples from the headwaters of many uncollected tributaries of the Rio San Juan and Rio Atrato. Finally, forms of *Nematobrycon* being bred and/or imported by aquarists in the United States are identified.

INTRODUCTION

The species of *Nematobrycon* herein described was first discovered sometime during 1959 or 1960 by Mr William A. Kyburz of Bitaco, Colombia. Mr Kyburz collected the fish in the drainage basin of the Rio Calima, a southern tributary of the Rio San Juan in Colombia (Kyburz, 1961). Kyburz introduced the fish into the aquarium trade in the United States and identified it as *Nematobrycon amphiloxus* Eigenmann & Wilson, in Eigenmann, Henn & Wilson (1914). The species has retained this name in the aquarium trade up to the present. Previously two nominal species of *Nematobrycon* were known, *Nematobrycon palmeri* (Eigenmann, 1911) from the northern part of the Rio San Juan in the Rio Condoto near Condoto and the adjacent Rio Tamana, and *Nematobrycon amphiloxus* from the northern headwaters of the

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Rio San Juan and the southern headwaters of the Rio Atrato where the two rivers approach one another.

While visiting the tropical fish breeding establishment of Mr Rosario La Corte of Elizabeth, New Jersey during August of 1970, the authors noted that three forms of *Nematobrycon* are now in the aquarium trade and suspected one of them might be new. Mr La Corte generously donated specimens of each of the three forms of *Nematobrycon* in his possession for our studies and provided all the information available to him about them in the form of personal correspondence with Mr Kyburz.

Nematobrycon palmeri was introduced to the aquarium trade by Kyburz in 1960. See Kyburz (1960) for an account of the discovery of the fish. This account, although providing information on the habitat of this species, does not give the locality where Mr Kyburz collected. Letters from Mr Kyburz to Dr Leonard P. Schultz during 1958 and to Mr La Corte during 1960 indicate that during the late fifties and early sixties Mr Kyburz collected *Nematobrycon palmeri* extensively in the Choco region of Colombia, an area including both the headwaters of the Rio San Juan and the Rio Atrato. The *Nematobrycon palmeri* we obtained from Mr La Corte are descendants of specimens collected by Kyburz in 1960 and shipped to Mr La Corte. Unfortunately Mr Kyburz is now deceased and no more precise information is available on the live specimens of *Nematobrycon palmeri* in our possession. The fishes referred to *N. palmeri* by aquarists are a distinct problem and consist of two colour variants. One compares closely with the type material of *N. palmeri* (see figures 5, 6. and 7), and the other is a dark or black form which appeared as young in Mr La Corte's breeding tanks soon after he received the fish from Kyburz (see figures 9 and 10). Mr La Corte believed the dark form to be a mutant of the "normal" *N. palmeri*. These black specimens vary in the intensity and extent of the black and many of them, when preserved, have the same colour pattern as specimens of the nominal species, *N. amphiloxus*. We could not distinguish black aquarium specimens from paratypes of *N. amphiloxus* on the basis of colour pattern, counts, or measurements. Further investigation revealed almost no meristic or morphometric differences between material of *N. palmeri* and *N. amphiloxus* with locality data. Further, specimens of the nominal *N. amphiloxus* from Tambo, Colombia have a colour pattern more or less intermediate between *N. amphiloxus* and *N. palmeri*.

From the above the following questions are apparent. What is the identity of the form of *Nematobrycon* from the Rio Calima and identified by aquarists as *N. amphiloxus*? What is the significance of the colour pattern difference between the nominal *N. palmeri* and *N. amphiloxus*? Are these distinct species? Finally, what is the identity of the black *Nematobrycon* as known to aquarists?

In the descriptions that follow no attempt has been made to cite all the aquarium literature referring to species and forms of *Nematobrycon*. We cite only those that for one reason or another (such as colour photographs) appear important to us. The following convention is used in listing meristic

and proportional characters in the descriptions below. Holotype or lectotype proportions are given first, followed in parentheses by the range for males and females separated by a semicolon. In listing meristics, the holotype or lectotype count is given first followed in parentheses by counts for males and females separated by a semicolon; each count is given followed in brackets by the number of specimens with that count. Proportions are given as per cent of standard length.

We wish to thank the following people for loan of specimens and for information about specimens in their care: Dr W. Eschmeyer, California Academy of Sciences (CAS); Dr P. H. Greenwood, British Museum (Natural History) (BMNH); and Mr L. P. Woods, Field Museum of Natural History (FMNH). IUM refers to specimens formerly in the collections at Indiana University Museum and now at the California Academy of Sciences and CM refers to specimens formerly at the Carnegie Museum and now at the Field Museum of Natural History, Chicago.

Nematobrycon lacortei, new species
(Figs. 1, 2, 3, 4)

Nematobrycon amphiloxus (*nec* Eigenmann & Wilson) Kyburz, 1961; 53 (description from life; colour photographs; description of discovery in Rio Calima, Colombia). Axelrod, *et. al.*, 1962: F-433.00 (description of aquarium specimens, colour photograph). Innes, 1968: second unnumbered page beyond page 291 (colour photograph). Sterba, 1970: 115 (citation of occurrence in aquarium trade in USA).

Specimens examined

Holotype USNM 205594, ♂ 35.7 mm sl, aquarium specimen probably from Rio Calima, Colombia, or a descendant of specimens collected there by Kyburz or later collectors.

3 paratypes USNM 205595, 2 ♂ 26.0—27.9 mm sl, 1 ♀ 29.2 mm sl, with same data as holoytpe.

4 paratypes USNM 205596, 2 ♂, one 32.4 mm sl, the other damaged and unmeasurable, 2 ♀ 31.1—32.2 mm sl, with same data as holotype.

2 paratypes ZMA 110.740, 1 ♂ 33.6 mm sl, 1 ♀ 30.0 mm sl, with same data as holotype.

1 paratype FMNH 70525, ♂ 29.8 mm sl, with same data as holotype.

1 paratype CAS 13396, ♂ 29.2 mm sl, with same data as holotype.

1 paratype BMNH 1971.3.16. 1, ♂ 30.3 mm sl, with same data as holotype.

Description. — Body deep, compressed laterally; greatest body depth 37.5 (♂ 33.6—39.5; 34.1—37.6). Predorsal body profile strongly convex with a slight concavity at nape. Posterior to dorsal fin, body profile slightly convex to caudal peduncle where profile becomes parallel to longitudinal body axis and continues to procurrent caudal rays. Distance from eye to dorsal origin 39.2 (♂ 36.6—40.4; ♀ 38.6—39.4); distance from dorsal origin to end of caudal peduncle 54.6 (♂ 51.2—56.2; ♀ 53.6—54.8). Ventral profile rounded to anus, steepest inclination along lower jaw. Ventral profile protrudes its greatest distance at pelvic fin insertion. At anal fin origin body profile straight or slightly convex to caudal peduncle where it curves ventrally to procurrent

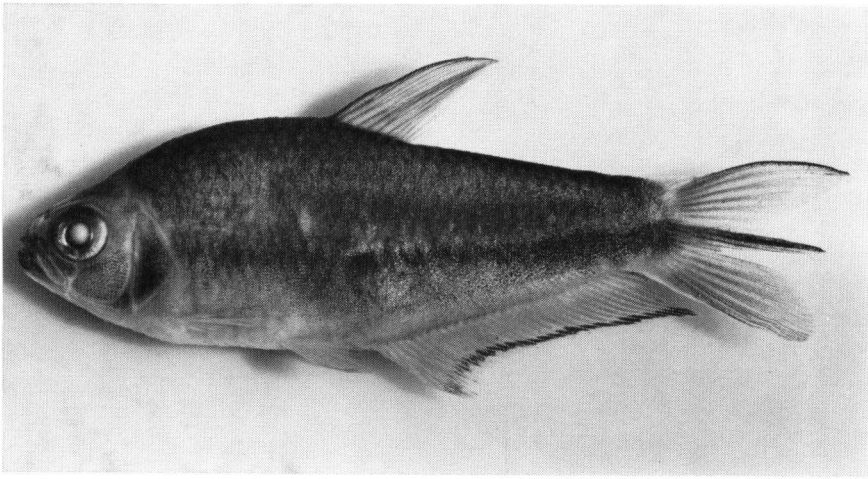

FIG. 1. *Nematobrycon lacortei*, new species, holotype, a male, USNM 205594, 35.7 mm sl, specimen preserved.

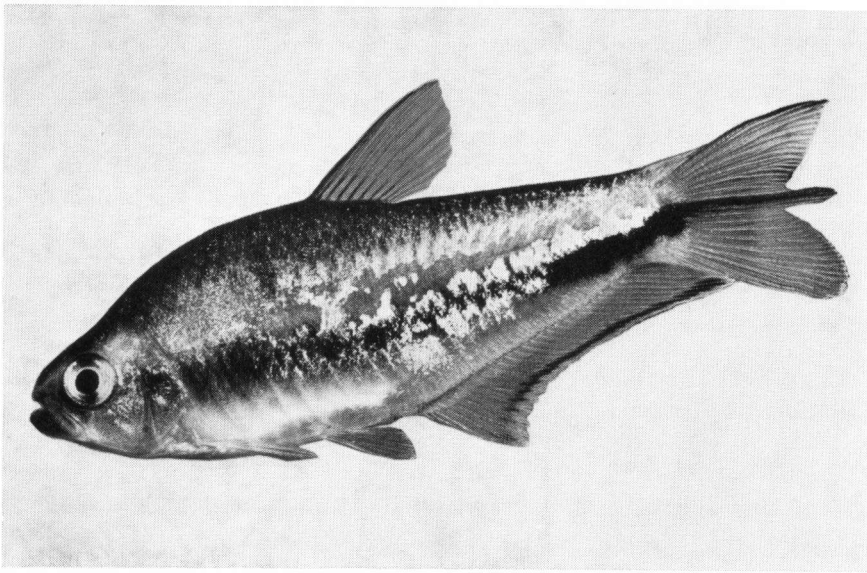

FIG. 2. *Nematobrycon lacortei*, new species, holotype, a male, USNM 205594, 35.7 mm sl, specimen photographed in life.

caudal rays. Caudal peduncle depth 15.1 (♂ 13.1—15.4; ♀ 13.2—15.4), its length 8.6 (♂ 9.0—10.3; ♀ 9.0—9.6).

Length of head 20.4 (♂ 17.5—21.6; ♀ 19.3—21.3). Eye diameter 8.9 (♂ 9.1—9.9; ♀ 9.6—10.0). Snout 6.7 (♂ 5.8—7.1; ♀ 6.3—7.0). Least bony interorbital 8.6 (♂ 7.7—8.9; ♀ 8.3—8.5). Maxillary sloping ventrally and posteriorly, forming an angle of about 75 degrees to longitudinal body axis. Upper jaw length 10.9 (♂ 10.8—12.3; ♀ 10.2—11.0). Median cusps of all teeth enlarged. Maxillary teeth uniserial, 13 (♂ 11 [1], 12 [3], 13 [2], 15 [1]; ♀ 8 [1], 11 [1], 13 [1], 14 [1]), unicuspid to tricuspid. Most proximal maxillary tooth largest, with teeth immediately distal to it reduced, teeth then becoming larger distally along maxillary until tooth row end, usually with 1 or 2 reduced teeth. Maxillary teeth may be unevenly spaced, with large gaps between teeth or groups of teeth. (These gaps may be result of teeth lost while fish transferred in nets, tooth pockets subsequently becoming healed). Premaxillary teeth in 2 rows, outer row tricuspid, 2 (♂ 2 [5], 3 [2]; ♀ 2 [4]). Inner row premaxillary teeth 4 (♂ 4 [7]; ♀ 4 [4]), distal tooth usually tricuspid, proximal teeth quinquecuspid. Median pair of teeth usually asymetrical with lateral cusps normal, central (median) cusp enlarged and inner cusps reduced; these teeth usually angled toward each other and often overlapping. Dentary with 4 large, quinquecuspid to tricuspid teeth and up to 11 smaller, unicuspid teeth. Vormer, palatines, and pterygoids toothless.

Fontanels moderate, that part anterior to epiphyseal bar slightly less than one-third length of fontanel posterior to bar. Gill rakers moderate, 17 (♂ 17 [1], 18 [3], 19 [1]; ♀ 18 [2]). Circumorbital bones well ossified, covering cheek area, infraorbital 3 wide, touching preopercle below and with a narrow naked area posteriorly.

Scales moderately large, cycloid with concentric circuli and 0—5 radii on exposed field. Lateral line incomplete, with a slight ventral slope; perforated scales 7 (♂ 7 [5], 8 [2], 9 [2]; ♀ 7 [3], 9 [1]). Lateral scales 32 (♂ 31 [1], 33 [4], 34 [3]; ♀ 32 [1], 33 [3]). Scales above lateral line 7 (♂ 6 [2], 7 [6]; ♀ 6 [2], 7 [2]); scales below lateral line 5 (♂ 5 [8]; ♀ 5 [4]). Scales around caudal peduncle 14 (♂ 14 [8]; ♀ 14 [4]). Scale sheath along entire base of anal fin; small accessory scales ventral to pelvic fins.

Dorsal fin with ii, 9 (♂ ii, 9 [8]; ♀ ii, 9 [4]). Dorsal origin anterior to anal fin origin, posterior to pelvic fin insertion, nearer eye than base of caudal fin. Distance from tip of snout to dorsal origin 52.1 (♂ 51.6—53.8; ♀ 52.1—53.6). Third and fourth (and sometimes fifth) rays of dorsal fin longest with posterior rays shorter, forming a convex posterior margin; length of longest ray 29.4 (♂ 29.1—30.0; ♀ 29.3—29.9).

Anal fin with iv, 27 (♂ iii, 25 [1], iv, 26 [5], iv, 27 [2]; ♀ iv, 24 [1], iv, 25 [1], iv, 26 [2]). First unbranched ray not always visible externally. Origin behind mid-point of standard length 61.3 (♂ 58.6—61.6; ♀ 59.7—61.1). Rays iv, 1—3 more elongate than rays caudal to them; 3 or 4 rays cephalad to last 2 rays elongate, with rays caudal to them abruptly shorter (these characters more pronounced in males than females). No hooks on anal fin.

Pectoral fin low, pointed or rounded, with i, 9 (♂ i, 8 [1], i, 9 [6], i, 10 [1];

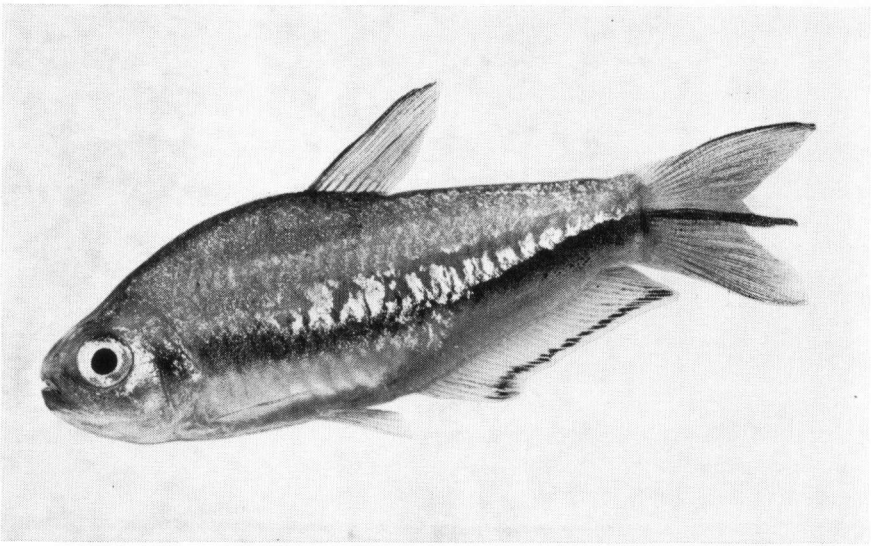

FIG. 3. *Nematobrycon lacortei*, new species, paratype, a male, ZMA 110.740, 33.6 mm sl, specimen photographed in life.

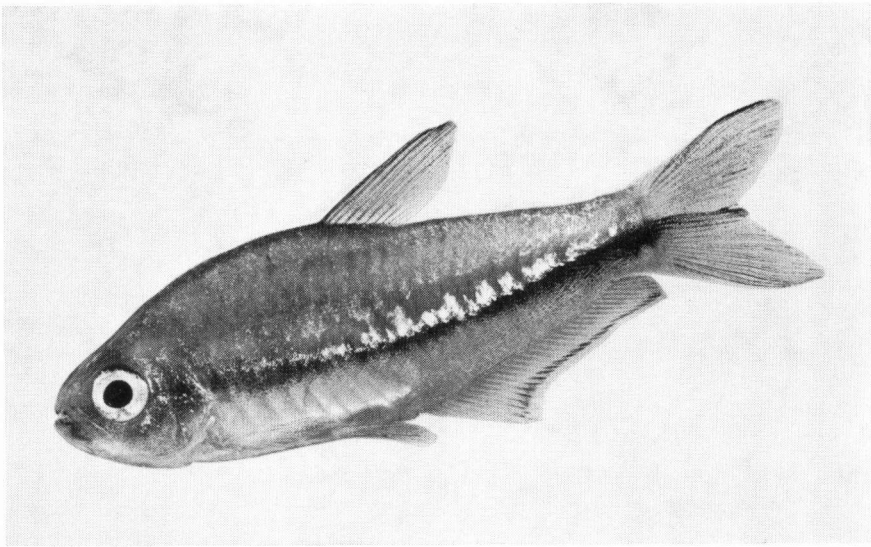

FIG. 4. *Nematobrycon lacortei*, new species, paratype, a female, ZMA 110.740, 30.0 mm sl, specimen photographed in life.

♀ i, 8 [1], i, 9 [2], i, 10 [1]). Pectoral fins reach to or beyond pelvic fin insertion. Distance from snout tip to dorsal end of pectoral base 26.0 (♂ 26.2—28.0; ♀ 26.5—27.4), and length of pectoral fin from base to tip of longest ray 20.4 (♂ 18.5—21.6; ♀ 20.3—21.5).

Pelvic fin rays i, 6 (♂ i, 6 [4], i, 7 [4]; ♀ i, 6 [3], i, 7 [1]), distal end reaching to or just beyond anterior termination of anal fin. Distance from tip of snout to pelvic insertion 44.5 (♂ 43.2—46.1; ♀ 44.0—45.6); pelvic fin length 17.0 (♂ 15.9—18.1; ♀ 17.3—18.6). No hooks on pelvic fins.

Caudal fin with 9/7 (♂ 10/8 [1], 10/9 [7]; ♀ 10/9 [4]); fin forked, not split to base. In males, upper lobe may be more pointed than lower lobe; also lower two rays of upper caudal lobe extended as a filament.

Vertebrae number 34 (♂ 33 [1], 34 [8]; ♀ 33 [1], 34 [3]).

Colour in alcohol. — Ground colour light brown, the body covered with numerous melanophores. On the nape and back the melanophores are so numerous as to give these areas a dark brown colour. Ventral to the dark dorsal areas, the melanophores become less concentrated (producing a light brown colour) until just ventral to the midline where they become larger and more numerous forming a narrow dark brown lateral stripe from the mouth to the termination of the middle caudal rays. In freshly preserved specimens melanophores of this stripe just posterior to the operculum are brown in colour. Posterior to the area of the second or third rib the melanophores of this stripe become black rather than brown. They remain black along the length of the body and caudal fin. Ventral to the lateral stripe, the melanophores become less numerous again but remain larger in size than those above the stripe. The belly is an unmarked light yellowish tan. All fins are hyaline except for scattered small melanophores, these being more numerous on the interradial membranes than on the rays. Dorsal fin with melanophores more concentrated anteriorly. Caudal fin with a stripe of melanophores on middle rays (a continuation of the lateral stripe); fin also with a concentration of melanophores along first and second (dorsalmost) principle rays of dorsal caudal fin lobe and a lesser concentration on the ventralmost two principle rays of the lower caudal fin lobe. Shortly after being preserved in formalin the males (and the females to a much lesser extent) developed bright orange caudal fin rays. This scarcely showed in our specimens in life, not even during the various phases of breeding behavior. This colour fades rapidly when the fish is placed in alcohol. The colour apparently does appear in life in some specimens (see the colour photo in Kyburz, 1961). Anal fin with a stripe of melanophores along distal edge of the fin in the region where the rays branch; ventral to this stripe there may be a very narrow area lacking melanophores.

Colour in life. — Two colour photographs of this fish have been published by Kyburz (1961). Neither of these photographs, apparently taken with light sources of different colour temperatures, provide a good impression of the colour of this fish. Another colour photograph, more true to life, was published in the reprint edition of "Exotic Aquarium Fishes" on an un-

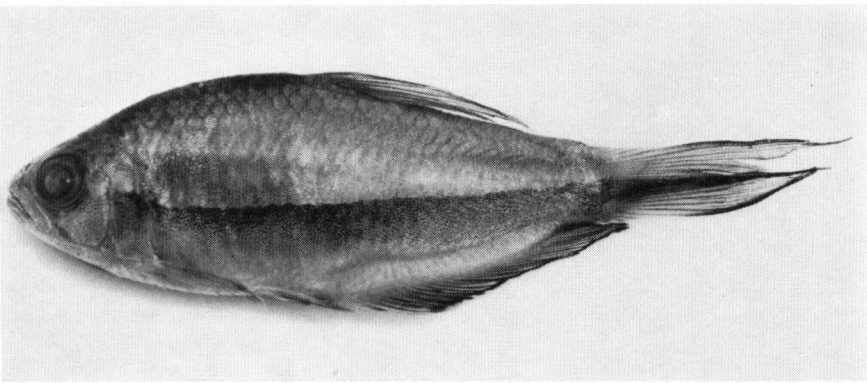

FIG. 5. *Nematobrycon palmeri* Eigenmann, lectotype, a male, BMNH 1910.7.11 : 196, 35.1 mm sl, Condoto, Rio Condoto, tributary Rio San Juan, Colombia.

numbered page two pages beyond page 291 (T.F.H. Publications, New Jersey, 1968).

The following colour description is based on four specimens while alive and on colour photographs of these four specimens, the holotype and three paratypes, ZMA 110.740, a male and female, and USNM 205595, a female 29.2 mm sl. In the males the back and sides above the lateral black stripe are reddish brown to reddish tan, shading to almost dark olive brown on the back. The dark mottled area on the sides above the lateral black stripe in the figure of the live photo of holotype (fig. 2) are brownish dull red. The bright reflective areas in this region, just above the black stripe and just below the stripe near the middle third of the fish are a brilliant specular greenish blue. These do not show in the preserved specimen (fig. 1) because the silvery reflecting layer of guanine has been destroyed by formalin. The area of the body between the anal fin base and black stripe is a pale, rather translucent tan. The dark single lateral stripe is black, especially posteriorly where the dorsal border (over the posterior one-half to two-thirds of the anal fin length, see figs. 1 and 2) of the stripe is relatively straight and the stripe itself is solid and dense. Anterior to this the stripe often becomes broken, covered by specular blue (again missing in preserved specimens so that the stripe appears more continuous) but remains black until the gill cover posterior to the area of the third rib. Here, as on the dark area of the gill cover itself, the melanophores are surrounded by an area of maroon red and the melanophores themselves are more brown than black. The belly and sides below the dark lateral stripe are silvery white as is the ventral part of the head. The iris of the eye is a pale, lustrous green with areas of brick red. The snout and top of the head are brown, similar to that of the back but the jaws are suffused with some maroon red.

The dorsal fin is hyaline but the anteriorly exposed edges of the first three fin rays are black (shown well in fig. 2 of holotype in life). The caudal fin is also hyaline but with some melanophores giving the fin a dusky ap-

TABLE I. Morphometric data of three nominal forms of *Nematobrycon*.

Character	*N. lacortei*	*N. palmeri*	*N. amphiloxus*
Standard length	♂ 26.0—35.7	♂ 22.2—35.1	♂ 25.0—30.9
	♀ 29.2—33.2	♀ 23.2—28.1	♀ 22.3—26.9
Greatest depth	♂ 33.6—39.5 (37.4)	♂ 36.0—39.0 (37.7)	♂ 39.2—42.5 (41.5)
	♀ 34.1—37.6 (36.0)	♀ 37.1—39.6 (38.4)	♀ 42.4—43.5 (42.9)
Snout-dorsal	♂ 51.6—53.3 (52.2)	♂ 52.1—54.5 (53.1)	♂ 51.7—54.0 (52.7)
	♀ 52.1—53.6 (52.8)	♀ 51.0—54.4 (53.3)	♀ 52.4—54.7 (53.5)
Snout-pectoral	♂ 26.0—28.0 (26.8)	♂ 27.6—29.8 (28.4)	♂ 27.6—29.2 (28.2)
	♀ 26.5—27.4 (27.0)	♀ 28.5—29.7 (29.0)	♀ 28.6—29.6 (29.1)
Snout-pelvic	♂ 43.2—46.1 (45.1)	♂ 43.9—48.8 (45.5)	♂ 44.4—46.0 (45.3)
	♀ 44.0—45.6 (44.8)	♀ 44.6—47.4 (46.1)	♀ 44.6—48.0 (46.3)
Snout-anal	♂ 58.6—61.6 (59.9)	♂ 57.0—59.6 (58.1)	♂ 56.7—58.6 (57.4)
	♀ 59.7—61.1 (60.3)	♀ 56.9—61.4 (59.7)	♀ 57.6—61.1 (59.3)
Peduncle depth	♂ 13.3—15.4 (14.6)	♂ 11.7—14.8 (13.1)	♂ 11.6—12.7 (12.2)
	♀ 13.2—15.4 (14.3)	♀ 12.1—13.3 (12.7)	♀ 11.9—13.0 (12.4)
Peduncle length	♂ 8.6—10.3 (9.3)	♂ 8.3— 9.4 (8.9)	♂ 6.8— 8.4 (7.7)
	♀ 9.0— 9.6 (9.3)	♀ 8.5— 9.5 (9.0)	♀ 6.3— 7.6 (7.4)
Dorsal length	♂ 29.1—30.0 (29.6)	♂ 35.7—54.1 (42.9)	♂ 33.8—43.2 (38.5)
	♀ 29.3—29.9 (29.6)	♀ 31.3—32.4 (31.8)	♀ — — —
Pectoral length	♂ 18.5—21.6 (20.2)	♂ 20.2—23.6 (21.8)	♂ 20.4—22.4 (21.4)
	♀ 20.3—21.5 (20.9)	♀ 19.8—22.0 (20.7)	♀ 20.2—(1 spec.)
Pelvic length	♂ 15.9—18.1 (17.2)	♂ 17.5—20.2 (18.6)	♂ 18.2—22.1 (19.3)
	♀ 17.3—18.6 (17.8)	♀ 16.9—18.5 (17.5)	♀ 16.6—20.0 (18.3)
Head length	♂ 17.5—21.6 (20.3)	♂ 20.2—22.6 (21.6)	♂ 20.0—22.4 (21.4)
	♀ 19.3—21.3 (20.4)	♀ 20.6—23.0 (22.2)	♀ 21.6—23.3 (22.4)
Snout length	♂ 5.8— 7.1 (6.4)	♂ 6.0— 7.1 (6.4)	♂ 5.8— 6.8 (6.3)
	♀ 6.3— 7.0 (6.7)	♀ 6.0— 7.1 (6.6)	♀ 6.7 (2 spec.)
Eye diameter	♂ 8.9— 9.9 (9.6)	♂ 9.4—11.7 (10.4)	♂ 10.0—12.0 (10.8)
	♀ 9.6—10.0 (9.9)	♀ 10.3—11.7 (11.2)	♀ 11.5—11.7 (11.6)
Bony interorbital	♂ 7.7— 8.9 (8.2)	♂ 7.9— 8.6 (8.3)	♂ 8.0— 8.7 (8.4)
	♀ 8.3— 8.5 (8.4)	♀ 8.2— 8.7 (8.3)	♀ 8.5— 9.0 (8.7)
Upper jaw length	♂ 10.8—12.3 (11.4)	♂ 11.1—12.2 (11.6)	♂ 10.6—12.4 (11.6)
	♀ 10.2—11.0 (10.7)	♀ 10.8—12.1 (11.5)	♀ 11.5—12.6 (12.0)
Eye-dorsal origin	♂ 36.6—40.4 (38.3)	♂ 37.5—40.7 (39.0)	♂ 38.3—40.4 (39.1)
	♀ 38.6—39.4 (38.9)	♀ 37.5—40.2 (38.8)	♀ 38.1—38.6 (38.3)
Dorsal origin-caudal peduncle	♂ 51.2—56.2 (53.4)	♂ 50.4—54.0 (53.0)	♂ 52.3—55.6 (54.1)
	♀ 53.6—54.8 (54.2)	♀ 52.6—52.9 (52.7)	♀ 53.6—54.7 (54.1)

pearance. The largest undivided ray of the upper lobe of the caudal fin is black and the ventral elongate undivided principal ray of the lower caudal fin lobe, although not as black as the dorsal one, has a relatively high concentration of melanophores. The two elongate middle rays of the caudal fin are black and their colour is continuous with the black of the lateral stripe. The tips of the divided principle rays are bluish white, especially those of the lower caudal fin lobe. The anal fin of the male is hyaline except for a black stripe near the distal border of the fin. The border itself is pale blue. The colour photos in Kyburz (1961) show a considerable amount of reddish brown pigment in the caudal and anal fins of two of the specimens illustrated (see remarks under the colour of preserved specimens above). The pelvic and pectoral fins are hyaline.

The females are very similar to the males in live colour, usually having less specular blue green, a weaker black line near the anal fin border, and the reddish tan markings above the black lateral stripe and between the specular blue area are rather poorly developed.

Discussion. — *Nematobrycon lacortei* appears to be distinct from *Nematobrycon palmeri* in the following characteristics. There are marked differences in life colour patterns as described herein. There is less sexual dimorphism in colour pattern and fin filament length in *N. lacortei* than in *N. palmeri* (compare live colour descriptions given above and below). The two species differ in modal counts of pectoral fin rays (*lacortei* i, 9, *palmeri* i, 10), and outer row premaxillary teeth (*lacortei* 2, *palmeri* 3). There is also a difference in the average number of anal fin rays (*lacortei* iv, 25.8, *palmeri* iv, 28.1); see table 1. The only morphometric character difference found occurs in dorsal fin length; in *N. lacortei* this is 29.1—30.0 in sl for males and 29.3—29.9 in sl for females and in *N. palmeri* it is 34.7—49.0 in sl for males and 31.3—35.9 in sl for females. Compare species in table 2.

Nematobrycon lacortei is probably geographically isolated from *N. palmeri*, and the habitat requirements of *Nematobrycon* are probably responsible for this isolation. According to Kyburz (1961) who traveled extensively and collected fishes in many areas of the San Juan basin, *N. lacortei* is found in small, isolated forest pools at the headwaters of the Rio Calima. Similar habitats at the headwaters of the Rio San Juan and Rio Atrato are the only described habitats for *N. palmeri*, Eigenmann (1913) and Kyburz (1960). Probably neither *N. palmeri* nor *N. lacortei* ever occur in the main course of the Rio Calima, Rio San Juan or Rio Atrato, except perhaps transiently during flood periods. Once in the main stream it is very unlikely that a specimen ever returns to its habitat of origin. Since the Rio San Juan and Rio Calima meet only near their mouths it is probably very rare, if ever, that *N. palmeri* and *N. lacortei* are found together in nature. It is probably this type of isolation that has allowed these two forms to moderately differentiate from their common ancestor. Of special interest would be collections of *Nematobrycon* from the headwaters of five major eastern tributaries to the Rio San Juan just north of the Rio Calima. The sixth tributary in this series, the Rio Tamana, contains typical *Nematobrycon palmeri*. It is quite possible that intermediate

TABLE II. Meristic data of three nominal forms of the genus *Nematobrycon*.

Character	*N. lacortei*	*N. palmeri*	*N. amphiloxus*
Branched dorsal rays	9: 13	8: 2; 9: 15; x̄: 8.9	9: 6
Branched anal rays	24: 1; 25: 2; 26: 7; 27: 3; x̄: 25.8	26: 2; 27: 3; 28: 6; 29: 4; 30: 2; x̄: 28.1	27: 2; 28: 3; 29: 2; 30: 2; x̄: 28.4
Pectoral rays	i,8: 2; i,9: 9; i,10: 2; x̄: i,9.0	i,9: 2; i,10: 13; x̄: i,9.8	i,9: 2; i,10: 7; x̄: i,9.8
Pelvic rays	i,6: 8; ,7: 5; x̄: i,6.4	i,6: 4; i,7: 13; x̄: i,6.8	i,6: 3; i,7: 6; x̄: i,6.7
Lateral scales	31: 1; 32: 2; 33: 7; 34: 3; x̄: 32.9	32: 5; 33: 11; x̄: 32.7	32: 1; 33: 7; 34: 1; x̄: 33.0
Scales above lateral line	6: 4; 7: 9; x̄: 6.7	6: 3; 7: 13; x̄: 6.8	7: 9
Scales below lateral line	5: 13	5: 16	5: 9
Perforated scales	7: 9; 8: 2; 9: 3; x̄: 7.6	6: 2; 7: 10; 8: 4; x̄: 7.1	5: 1; 6: 1; 7: 3; 8: 4; x̄: 6.2
Gill rakers	17: 2; 18: 5; 19: 1; x̄: 17.9	17: 2; 18: 4; 19: 6; x̄: 18.3	16: 1; 17: 2; 18: 3; 19: 2; 20: 1; x̄: 18.0
Vertebrae	33: 2; 34: 12; x̄: 33.8	33: 10; 34: 6; x̄: 33.4	33: 3; 34: 5; x̄: 33.6
Maxillary teeth	8: 1; 11: 2; 12: 3; 13: 4; 14: 1; 15: 1; x̄: 12.2	7: 2; 10: 2; 11: 2; 12: 5; 13: 4; 16: 1; x̄: 11.5	6: 1; 11: 1; 13: 3; 15: 3; 17: 1; x̄: 13.1
Outer row premaxillary teeth	2: 10; 3: 2; x̄: 2.2	2: 4; 3: 13; x̄: 2.8	2: 1; 3: 8; x̄: 2.9

forms between *N. palmeri* and *N. lacortei* exist in the five intervening tributaries. *Nematobrycon palmeri* and *N. lacortei* are not reproductively isolated when bred in an aquarium. We have crossed the two but so far our efforts in this regard have not been extensive and we have obtained only a few young.

The new species is named for Mr Rosario La Corte in recognition of his long interest in characoids.

Nematobrycon palmeri Eigenmann
(Figs. 5, 6, 7, 8, 9, 10)

Nematobrycon palmeri Eigenmann, 1911: 215 (original description; type locality: Colombia, Condoto, Rio Condoto; types in British Museum [Natural History]). Eigenmann, 1913: 3 (listed from Boca de Raspadura, specimens later used as types of *N. amphiloxus*). Eigenmann, 1923: 154 (listed). Eigenmann, 1927: 351 (description, figure). Myers, 1953: 63 (discussion of geographical distribution). Kyburz, 1960: 161 (account of first aquarium importation). Vorderwinkler, 1960: 28 (announcement of aquarium importation with colour cover photograph). Axelrod, *et. al.*, 1962: F- 435.00 (description of aquarium specimens and colour photograph). Wolf, 1964: 321 (description of aquarium specimens and colour photograph). Schepp, 1967: 321 (description of aquarium specimens and colour photograph). Sterba, 1970: 115 (description of aquarium specimens).

Nematobrycon amphiloxus Eigenmann & Wilson in Eigenmann, Henn & Wilson, 1914: 13 (original description; type locality: Colombia, Boca de Raspadura). Eigenmann, 1922: 154 (listed). Eigenmann, 1927: 353 (description, figure). Myers, 1953: 63 (discussion of geographical distribution).

Specimens examined

Lectotype BMNH 1910.7.11:196, ♂ 35.1 mm sl. Colombia, Rio Condoto. Collected by Mr. M. G. Palmer.

3 paralectotypes of BMNH 1910.7.11: 197—201, 2 ♂ 29.5—31.6 mm sl, 1 ♀ 28.1 mm sl. With same data as lectotype.

1 paralectotype of BMNH 1910.7.11: 202—207, ♂ 22.2 mm sl. Colombia, labeled as Rio Condoto. Collected by Palmer. We presume them to be from Rio Tamana, see below.

Note: Concerning the syntypes of *Nematobrycon palmeri* in the British Museum (Natural History) Eigenmann (1911) lists: "Several specimens, 8—20 mm., from Condoto, Rio Condoto, and Novita, Rio Tamana, S. W. Colombia." Eigenmann (1927) lists 20 specimens 7.5—20 mm from Condoto, Rio Condoto, and 6 specimens, 7—13.5 mm from Novita, Rio Tamana, all collected by Palmer. At present there are 7 syntypes (4 examined by us and 1 selected as a lectotype), not 20 as listed by Eigenmann and according to Dr Greenwood there is no indication in the BMNH register that there ever were more than seven. In addition, we find the measurements to be grossly different from those recorded by Eigenmann, the Rio Condoto material having a length of up to 35.1 mm sl. Despite these discrepancies it appears that this must be the material Eigenmann examined and we designate the largest male specimen, 35.1 mm sl as the lectotype.

A second problem concerns Palmer's specimens from the Rio Tamana. Eigenmann (1927) records 6 specimens 7—13.5 mm in length. At present there are two specimens (one examined by us) with a register number indicating there should be eight in the jar. The label on the jar says Rio Condoto

but the register indicates they are from the Rio Tamana. These two fishes show the pronounced lateral stripe mentioned by Eigenmann as characteristic of this population. Thus we assume that these specimens are from the Rio Tamana and that the remaining specimens are now lost.

Other *N. palmeri* examined include:

9 specimens BMNH 1913.10.1:10—18, 4 ♂ 26.1—34.1 mm sl, 4 ♀ 21.9—26.5 mm sl, 1 juvenile 18.9 mm sl. Colombia, Rio Condoto. Collected by Spurrell.

5 specimens USNM 205602, 2 ♂ 25.9—29.8 mm sl, 3 ♀ 23.0—25.3 mm sl. Aquarium specimens from Mr. R. La Corte, descendants of his original stock received from Kyburz and collected in the Choco region of Colombia.

2 specimens USNM 205601, 1 ♂ 29.5 mm sl, 1 ♀ 26.3 mm sl, with same data as USNM 205602.

4 specimens USNM 205600, 3 ♂ 23.5—29.9 mm sl, 1 ♀ 23.6 mm sl, with same data as USNM 205602. Cleared and stained.

6 specimens USNM 205559 (SU 60719), 3 ♂ 22.2—27.1 mm sl, 3 ♀ 21.8—23.2 mm sl, with same data as USNM 205602.

1 specimen USNM 205604, ♀ 23.1 mm sl, (black form), with same data as USNM 205602.

4 specimens USNM 205608, 1 ♂ 32.4 mm sl, 3 ♀ 24.0—26.2 mm sl, (black form), aquarium specimens with no locality data.

3 specimens USNM 171749, 1 ♂ 35.7 mm sl, 2 ♀ 24.9—29.5 mm sl. Colombia, Choco region. Collected by Kyburz (original aquarium importation).

6 specimens USNM 205597 (IUM 13026), 1 ♂ 20.9 mm sl, 4 ♀ 19.3—23.8 mm sl, 1 juvenile 13.4 mm sl. Colombia, Condoto. Collected by Wilson, 1913.

12 specimens FMNH 56536 (CM 5350), 4 ♂ 20.6—27.6 mm sl, 2 ♀ 20.9—22.4 mm sl, 6 juveniles 16.5—18.9 mm sl. Colombia, Condoto. Collected by Wilson, 1913.

6 specimens USNM 205598 (IUM 13027), 2 ♂ 22.3—26.0 mm sl, 2 ♀ 20.3—21.3 mm sl, 2 juveniles 14.1—16.9 mm sl. Colombia, Tambo. Collected by Wilson, 1913. Paratypes of *N. amphiloxus*.

10 specimens FMNH 56539 (CM 5353), 5 ♂ 18.7—27.3 mm sl, 3 ♀ 19.0—20.5 mm sl, 2 juveniles 14.1.16.9 mm sl. Colombia, Tambo. Collected by Wilson, 1913. Paratypes of *N. amphiloxus*.

1 specimen FMNH 56537 (CM 5351), juvenile 13.3 mm sl. Colombia, Manigru. Collected by Wilson, 1913. Paratype of *N. amphiloxus*.

4 specimens FMNH 56538 (CM 5352), 1 ♂ 30.9 mm sl, 3 juveniles 21.2—21.5 mm sl. Colombia, Raspadura. Collected by Wilson, 1913. Paratypes of *N. amphiloxus*.

1 specimen USNM 205646, ♂ 30.8 mm sl. Colombia, Raspadura. Collected by Wilson, 1913. Paratype of *N. amphiloxus*.

4 specimens SU 24658, 2 ♂ 25.0—25.4 mm sl, 1 ♀ 26.9 mm sl, 1 juvenile 18.4 mm sl. Colombia, Raspadura. Collected by Eigenmann. Paratypes of *N. amphiloxus*.

Note: The "holotype" of *N. amphiloxus*, CM 5050 could not be found at the Field Museum of Natural History where the Carnegie Museum fish collections are now deposited. Also paratypes from the type locality, Boca de Raspadura, IUM 12819 are not present at the California Academy of Sciences where they should now be deposited. It thus appears that the type and paratypes from the type locality are now missing. Thus we have illustrated a paratype (fig. 8) from the nearest locality, Raspadura, formerly FMNH 56538 (CM 5352), now USNM 205646.

In the description below we exclude data from all aquarium material and from all specimens of the *amphiloxus* form. Counts and measurements of aquarium specimens fell within the range of the specimens of *palmeri* descri-

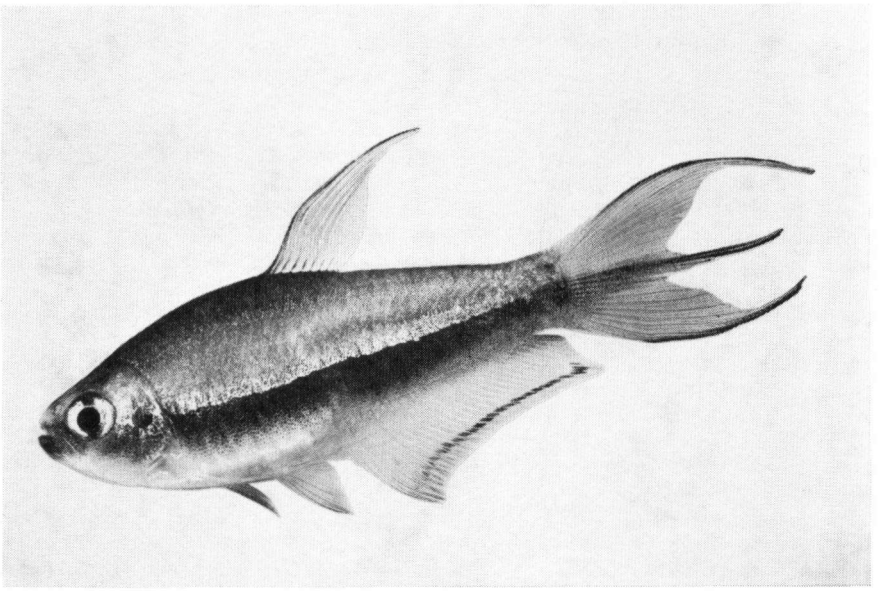

FIG. 6. *Nematobrycon palmeri* Eigenmann, a male, USNM 205602, 29.8 mm sl descendant of specimens from Choco region of Colombia, specimen photographed in life.

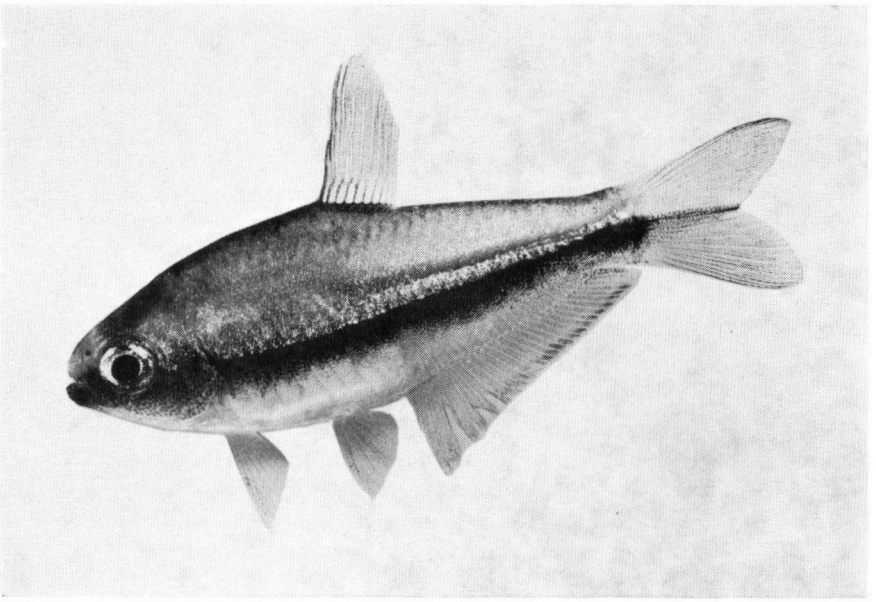

FIG. 7. *Nematobrycon palmeri* Eigenmann, a female, USNM 205602, 25.3 mm sl, descendant of specimens from Choco region of Colombia, specimen photographed in life.

bed here. See tables 1 and 2 for comparison of counts and measurements of the *palmeri* and *amphiloxus* forms.

Description. — Body deep, compressed laterally; greatest body depth 39.0 (♂ 36.7—39.0; ♀ 37.1—39.6). Predorsal body profile moderately convex with a slight concavity at nape. Posterior to dorsal fin body profile slightly convex to caudal peduncle where profile becomes parallel to longitudinal body axis and continues to procurrent caudal fin rays. Distance from eye to dorsal origin 40.7 (♂ 37.5—40.1; ♀ 37.5—40.2); distance from dorsal origin to end of caudal peduncle 53.9 (♂ 50.4—54.0; ♀ 52.6—52.9). Ventral profile rounded to anus, steepest inclination along lower jaw. Ventral profile protrudes its greatest distance at pelvic fin insertion. At anal fin origin body profile is straight to caudal peduncle where it curves ventrally to procurrent caudal rays. Caudal peduncle depth 14.8 (♂ 11.7—13.6; ♀ 12.1—13.3), its length 9.4 (♂ 8.3—9.4; ♀ 8.5—9.5).

Length of head 20.2 (♂ 20.2—22.6; ♀ 20.6—23.0). Eye diameter 9.4 (♂ 9.4—11.7; ♀ 10.3—11.7). Snout 6.0 (♂ 6.0—7.1; ♀ 6.0—7.1). Least bony interorbital 8.8 (♂ 7.9—8.6; ♀ 8.2—8.7). Maxillary sloping ventrally and posteriorly, forming an angle of about 75 degrees to longitudinal body axis. Upper jaw length 11.1 (♂ 11.1—12.2; ♀ 10.8—12.1). Median cusps of all teeth enlarged. Maxillarly teeth uniserial, 13 (♂ 11 [1], 12 [4], 13 [4]; ♀ 7 [2], 10 [2], 11 [1], 12 [1], 16 [1]), unicuspid to tricuspid. Most proximal maxillary tooth largest, with teeth immediately distal to it reduced, teeth then becoming larger distally along maxillary until tooth row ends, usually with 1 or 2 reduced teeth. Maxillary teeth unevenly spaced or with large gaps between teeth or groups of teeth. Premaxillary teeth in 2 rows, those in outer row tricuspid, 3 (♂ 3 [9], 2 [1]; ♀ 3 [4], 2 [3]). Inner row premaxillary teeth 4 (♂ 4 [8]; ♀ 4 [7]), distal tooth usually tricuspid, proximal teeth usually quinquecuspid. Median pair of teeth usually angled toward each other and often overlap Dentary with 4 large, quinquecuspid to tricuspid teeth and up to 11 smaller unicuspid teeth. Vomer, palatines, and pterygoids toothless.

Fontanels moderate, that part anterior to epiphyseal bar slightly less than one-third length of fontanel posterior to bar. Gill rakers moderate, 18 (♂ 18 [1], 19 [4]; ♀ 17 [2], 18 [2], 19 [2]. Circumorbital bones well ossified, covering entire cheek area, infraorbital 3 wide, touching preopercle below and with a narrow naked area posteriorly.

Scales moderately large, cycloid with concentric circuli and 0—5 radii on exposed posterior field. Lateral line incomplete, with slight ventral slope; perforated scales 8 (♂ 6 [1], 7 [6], 8 [2]; ♀ 6 [1], 7 [4], 8 [1]. Lateral scales 33 (♂ 32 [2], 33 [6]; ♀ 32 [3], 33 [4]. Scales above lateral line 7 ♂ 6 [1], 7 [7]; ♀ 6 [2], 7 [5]); scales below lateral line 5 (♂ 5 [8]; ♀ 5 [7]). Scales around caudal peduncle 14 (♂ 14 [8]; ♀ 14 [7]). Scale sheath along entire base of anal fin. Small accessory scales present ventral to pelvic fins.

Dorsal fin with ii, 9 (♂ ii, 9 [8], iii, 8 [1]; ♀ ii, 9 [6], iii, 8 [1]. Dorsal fin origin anterior to anal fin origin, posterior to pelvic fin insertion, nearer to eye than base of caudal fin. Distance from tip of snout to dorsal origin 52.1 (♂ 52.1—54.5; ♀ 51.0—54.4). Third ray of dorsal longest, extending with fourth

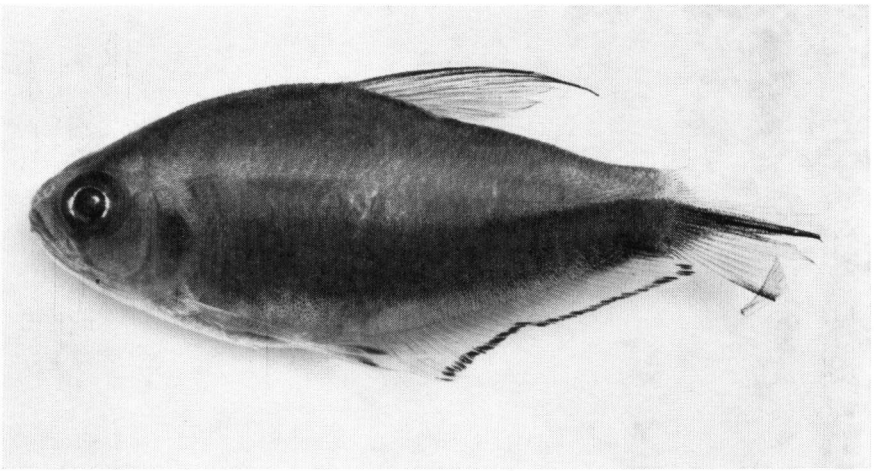

FIG. 8. *Nematobrycon palmeri* Eigenmann, a male, USNM 205646, paratype of *Nematobrycon amphiloxus* Eigenmann & Wilson, 30.8 mm sl, Raspadura, Colombia.

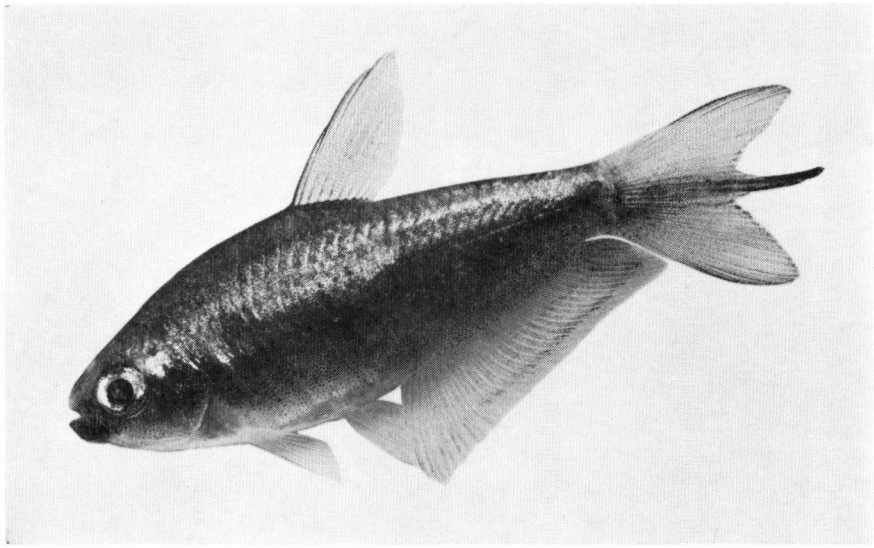

FIG. 9. *Nematobrycon palmeri* Eigenmann, a male, aquarium black form, USNM 205608, 32.4 mm sl, specimen photographed in life.

as a filament in males, with posterior rays shorter, forming a convex posterior margin; fourth or fifth ray longest in females. Length of longest ray 42.1 (♂ 35.7—54.1; ♀ 31.3—32.4).

Anal fin iv, 27 (♂ iv, 26 [1], iv, 27 [2], iv, 28 [2], iv, 29 [2], iv. 30 [2]; ♀ iv, 26 [1], iv, 28 [4], iv, 29 [2]). First unbranched ray not always visible externally. Origin behind mid-point of standard length 57.0 (♂ 57.0—59.6; ♀ 56.9—61.4). Rays iv,1—3 more elongate than rays caudal to them, forming a concave ventral fin margin; 3 or 4 elongate anal fin rays cephalad to last 2 anal rays, rays caudal to elongate rays abruptly shorter. Elongate anal fin rays much more pronounced in males. No hooks on fins.

Pectoral fin low, rounded or pointed, with i, 10 (♂ i, 9 [2], i, 10 [5]; ♀ i, 10 [7]). Pectoral fins reach to or beyond pelvic fin insertion. Distance from snout tip to dorsal end of pectoral base 27.6 (♂ 27.8—29.8; ♀ 28.5—29.7), and length of pectoral fin from base to tip of longest ray 21.9 (♂ 20.2—23.6; ♀ 19.8—22.0).

Pelvic fin rays i, 7 (♂ i, 6 [3], i, 7 [6]; ♀ i, 6 [1], i, 7 [6]), distal end reaching to or just beyond anterior termination of anal fin in females, reaching to or well beyond this point in males. Distance from tip of snout to pelvic insertion 43.9 (♂ 44.0—48.8; ♀ 44.6—47.4); pelvic fin length 19.1 (♂ 17.5—20.2; ♀ 16.9—18.5). No hooks on fins.

Caudal fin with 10/9 (♂ 10/9 [7]; ♀ 10/9 [6]); fin forked, not split to base. In males principle rays 2, 3, 9, and 10 of upper lobe and 7 and 8 of lower lobe extended as filaments, giving impression of a "triple tail."

Vertebrae number 33 (♂ 33 [7], 34 [2]; ♀ 33 [2], 34 [4]).

Colour in alcohol. — Ground colour light tan, the body covered with numerous melanophores. On the nape and back melanophores are so numerous as to give these areas a darker brown colour. Ventral to the dark dorsal areas, the melanophores become less numerous producing a brown colour. Just below midline there is a very narrow stripe with no or few melanophores, then ventral to this stripe the melanophores are abruptly more concentrated, forming a wide, dark brown or intense black stripe from the snout to the termination of the middle caudal rays. Ventral to the darkest areas of the stripe the melanophores gradually become less numerous to the anal fin base. All fins hyaline except for small melanophores, these being more numerous on the interradial membrane than on the fin rays. Dorsal fin with numerous small melanophores, more concentrated anteriorly. Caudal fin with melanophores more concentrated on first and second principle rays of upper lobe, on the middle rays (as a continuation of the lateral stripe), and on the two ventralmost principle rays of the lower lobe. Anal fin with a broad stripe of concentrated melanophores just dorsal to its distal margin, this stripe primarily along the region where the rays branch; distal to the stripe, the number of melanophores is reduced, especially posteriorly.

Colour in life. — Colour photographs of this species by Arend van den Nieuwenhuizen have been published by Wolf (1964) and Schepp (1967). The colour of the photo published in 1967 is better but both the male and female have abnormally shortened spinal columns. Another colour photograph of

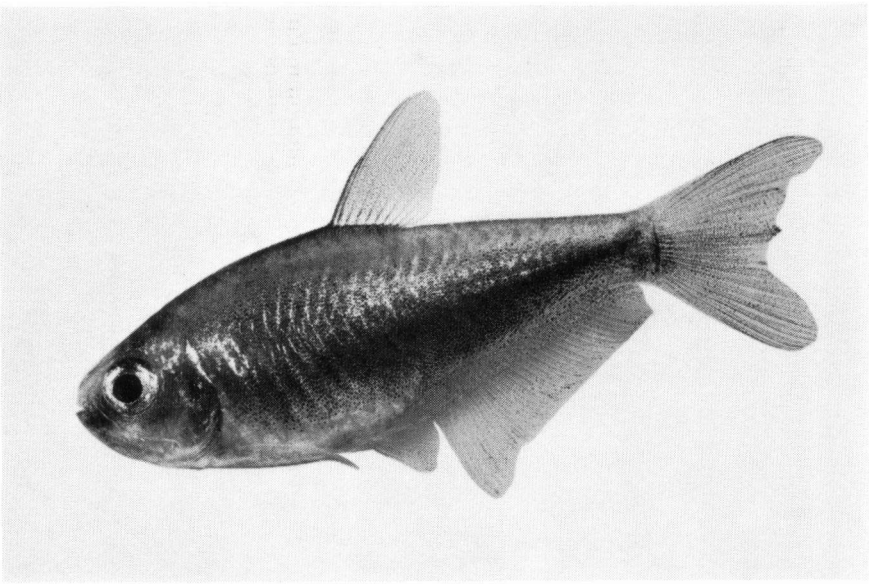

FIG. 10. *Nematobrycon palmeri* Eigenmann, a female, aquarium black form, USNM 205608, 26.2 mm sl, specimen photographed in life.

the fish by Axelrod was published on the cover of the "Tropical Fish Hobbyist" for December 1960.

The males have a relatively broad lateral black stripe extending from the jaws, through the head, entire length of the body and the caudal fin to the posterior tip of the median elongate caudal rays. The dorsal border of this stripe is sharply defined the entire body length. In fig. 6 this stripe does not have a sharply defined ventral border. However in this same male kept in a dark environment the ventral border of the stripe is much more sharply defined. The sides above the black stripe are a bright specular greenish blue that is interrupted by a narrow horizontal stripe of orange-yellow brown a short distance dorsal to the black stripe and extending the posterior half of the body length to the origin of the caudal fin. The back, dorsal to the specular blue, is a dark brown as is the top of the head. The body between the black stripe and anal fin base is a pale tan, almost white. The belly region is white and shades to tan near the horizontal stripe. The ventral portion of the head below the lateral black stripe is white and the border between the white and the black of the head is not a distinct sharp line, even in a fish kept over black sand in a darkened environment. The bright portions of the iris in figs. 6 and 7 are specular blue as is the bright portion of the head behind the eye. There is no maroon red on the body, head or opercle. The dorsal fin is hyaline but with a fairly heavy scattering of small melanophores between the divided fin rays. The anterior leading edges of the first three to four dorsal fin rays are black. The upper and lower lobes of the caudal fin are

edged in black with the elongate non-branched rays being black. The black rays extend one-fourth to one-third the length of the caudal fin lobes posteriorly beyond the main lobes of the fin. The central elongate rays are black. The remainder of the fin is hyaline except for a slight amount of white on the tips of the fin rays of the lower caudal lobe. The anal fin is mostly hyaline except for the distal black stripe and that portion of the rays ventral to the stripe which are cream-white. The pectoral and pelvic fins are hyaline except for a small amount of cream-white colour in the distal ends of the pelvic fin rays.

The females are similar to the males but have far less specular blue (usually confined to a narrow stripe above the black stripe), less black on the fins and almost no creamy white on the fins.

We are aware of only one colour photograph of the black form, a female (cover of "Tropical Fish Hobbyist", 1960, no. 9; also Axelrod *et al.*, 1962; F-435.00). Stocks we have seen and those in our own aquaria are variable as to the width and intensity of the black side stripe, the intensity and distribution of black pigment, the amount of specular blue colour, and the quantity of pale wine red that replaces the blue when that is absent. The dorsal border of the black stripe is irregular, never a straight line as in *N. palmeri*. The black edges of the caudal fin and the black stripe through the anal fin are relatively faint in the males of the black form and there is less yellow-cream pigment along the distal border of the anal fin in the dark form than in *palmeri*. In other ways the colour pattern of the two kinds is closely similar.

Discussion. — The significance of the wild population samples of *N. palmeri* and *N. amphiloxus* poses a distinct problem. Of the specimens with locality data of *N. palmeri* examined, all have the same colour pattern with the sharply delimited dorsal border for the midside black stripe. All samples designated as *N. amphiloxus* by Eigenmann and Wilson and examined by us have this dorsal border gradually defined, not sharply delimited. The material, examined from Raspadura is typical of *N. amphiloxus* as Eigenmann and Wilson described it (see fig. 8). There is little evidence of a sharply delimited dorsal border for the body stripe, except posteriorly. In the material from Tambo, however, although the dorsal border of the stripe gradually fades, an abrupt dark border is present within the broad stripe of dark pigment. Examination of table 2 shows two morphometric differences, greatest body depth and caudal peduncle length, between specimens of *N. palmeri* and *N. amphiloxus*. These differences are overlapping or nearly so and few specimens with locality data were available for study. However, we suspect that these differences are indicative of population divergence. Colour pattern differences are real and appear to be geographically correlated. The Tambo material appears to be somewhat intermediate between that of the typical *palmeri* and *amphiloxus* populations. In our opinion *N. palmeri* (including *N. amphiloxus*) constitutes a species whose colour pattern and body depth (compare also figs. 5 and 8) varies geographically and the two forms may be considered subspecifically distinct if future studies based on adequate population samples indicate this level of separation. Myers (1953) points out that

these geographical colour forms of *N. palmeri* were probably once completely isolated from each other but may have become mixed by a canal dug in Spanish colonial days between the headwaters of the Rio Atrato and Rio San Juan. The accounts of both Eigenmann (1913) and Kyburz (1960 & 1961) indicate that the habitat of *Nematobrycon* is restricted to small weed grown ponds and backwaters near the headwaters of the Rio San Juan, Rio Atrato and their affluents. It would seem likely that a fish such as this would more quickly occupy a sluggish man-made canal than open river fishes and that it is very likely that the two colour forms are now mixed to some degree in the headwaters of the Rio San Juan and Rio Atrato.

As to the origin of the aquarium black form, it appears that Kyburz collected extensively in the Choco region, in areas including both the headwaters of Rio San Juan and Rio Atrato. In a collection of *N. palmeri* sent by Mr Kyburz to Dr Leonard P. Schultz in 1960 we find one specimen, a female, with the *amphiloxus* colour pattern. A single female was also found in a series of specimens sent to the senior author in 1960 by Mr La Corte. These latter specimens were received from Mr Kyburz by Mr La Corte and were from the same group used by La Corte for breeding his stocks of both the "normal" *N. palmeri* and the "black strain." Live females of the "black" or *amphiloxus* type are not obviously distinct from females of the "normal" *palmeri* type and could easily be missed. The colour photograph published in the December 1960 issue of the "Tropical Fish Hobbyist" shows a "normal" male *palmeri* and a female with the "black" or *amphiloxus* colour pattern. These fishes may have come from early spawnings of Kyburz' specimens sent to the United States and represent the geographically mixed lots of *N. palmeri* sent by him.

Once the black form appeared Mr La Corte carefully selected it and by careful separation of his stocks today has specimens which appear to represent the *palmeri* and *amphiloxus* geographical colour pattern types. Black aquarium forms of *Nematobrycon* have become very common in the aquarium trade in the United States and may in part have resulted from additional importations of the black geographical colour form or subspecies from Colombia. The considerable degree of variation in colour pattern in the black form available to aquarists also suggests that these fishes are of mixed origin with a parentage of both *palmeri* and *amphiloxus* types.

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