TROPICAL FISH

HOBBYIST

DECEMBER, 1964

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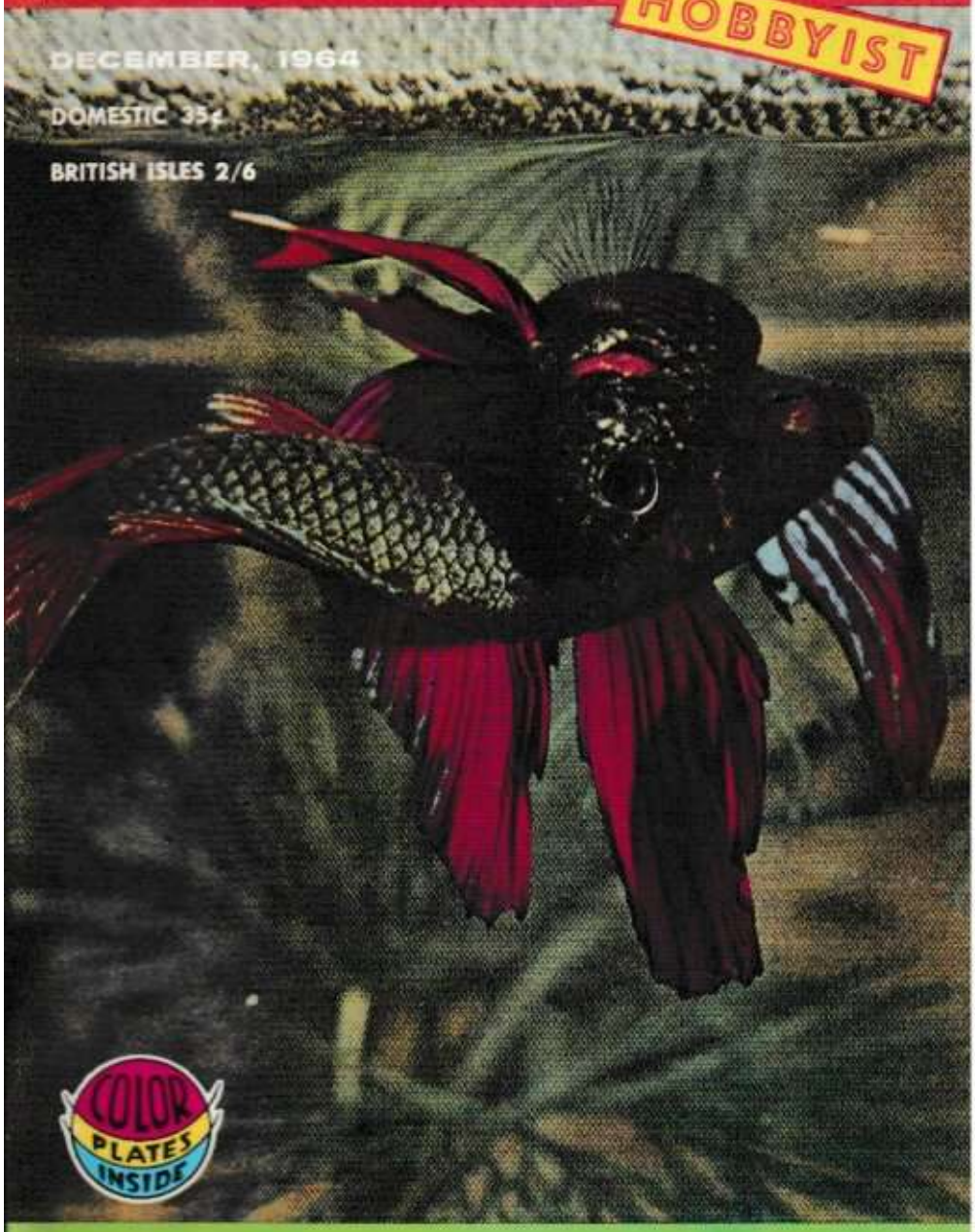

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TROPICAL FISH HOBBYIST

Contents

Vol. XIII, Dec., 1964 (#106) No. 4

COVER
Despite its limitations, the Betta remains the most popular egglayer, and nowhere are the reasons for the fish's longtime hold on aquarists more dramatically presented than on our cover for the month. Colorful, graceful, absorbing in its spawning habits . . . the Betta is all of these things and more, as explained by TFH Publisher Bill Vorderwinkler in his editorial on page 3. Cover photo by Horst Abel.

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EDITORIALLY . . .

I think that I can safely say that I get as many questions from people who have run into trouble with Bettas as all the other egglayers combined. The Betta is not particularly difficult to spawn for anyone with average knowledge and equipment, so the only conclusion I can make is that it is the most popular of all the egglaying fishes. It is certainly one of the most beautiful and interesting. Its long, flowing, gorgeous fins heighten its beauty, and the lovely colors are sure to elicit many admiring exclamations from everyone. The Betta, or Siamese Fighting Fish, has been developed in many colors and combinations of colors, the prevailing ones red, blue, green, and a type with a white body and colored fins. From a nondescript, fairly colorless fish which was first offered to hobbyists around the beginning of the present century, there has been developed a super-race of gorgeous fish which look like living flowers with their many-hued, big, flowing fins. One thing the Bettas have going for them is that there are so many Betta breeders, amateur and professional, which doubtless is the reason why so much progress has been made in such a comparatively short time.

William Vorderwinkler

A trip to the ocean's bottom.

The mat coral, *Cladocora caespitosa*, shows, in its dwarfed form, its close relation to the anemones. Photo by Holzhammer.

In the Wonder Garden of the Corals

BY PETER CHLUPATY
Munich, Germany

When we speak of the mighty ocean with its wealth of colors and shapes, we think at once of the coral reefs, those bewitchingly lovely structures composed of the tiniest coral polyps which certainly are among the most remarkable of all ocean creatures. By themselves, the coral creatures are of little importance, but these colonies of tiny architects have in the course of thousands of years formed structures of such immensity that the shape of the earth's crust has been altered.

Because the reef corals (Madreporaria) require high water temperatures, much light, and constant water motion, only in the tropic seas do we find conditions which are favorable for their existence. There are certainly only a few animal groups more dependent upon a certain temperature range than the corals. The range of distribution of these little builders therefore extends only in a broad belt on both sides of the Equator, but there are also some

lovely magic gardens of coral in the true sense of the word in the Red Sea. The range of occurrence is limited to places where the water temperature does not go below 68° in the coldest months. Because corals are not only creatures of warmth but also of light, their occurrence is also limited in depth. Usually they show up at only 65 to 130 feet, while a few are found at from 200 to 300 feet.

It is amazing that these little polyps, the builders of the coral reefs, can withstand the great mechanical power of the mighty ocean. Even if the power of the sea frequently shatters their structures, the damage is again repaired by billions of these tiny but busy builders that work year in and year out.

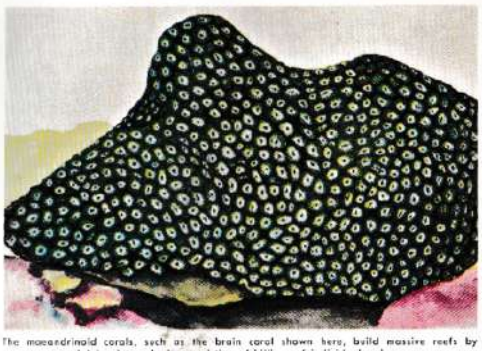
Indescribable is the fabulous beauty of these magic gardens of Neptune which are flooded with the sunlight passing through the crystal-clear water. The many shapes of the corals are wonderful, sometimes resembling trees or branches, sometimes delicate fans or lattices as well as wrinkled mushroom shapes and other fantastic forms. These trees, shrubs, pitchers, etc., are completely covered with colorful polyps which glow in the tropic sun from the deepest yellow to the deepest purple; all of these enticing blossoms are coral polyps, the builders of the reefs. The most beautiful flowery landscapes cannot compare with these fabulous undersea stretches with their glowing colors.

The most important of the reef corals belong to the suborder Perforata and under these are mostly the species of *Acropora* (*Madrepora*) and *Porites*, which play the most important part in reef-building. Many of these corals are, like some anemones, bisexual and livebearing. The young emerge as ciliate larvae and are distributed by the currents. Most important in reef-building, however, is their propagation by budding.

Among the six-limbed polyps are also found colonies of eight-limbed ones like the organ corals (*Tubipora*) which cover the ocean's bottom like a delicate growth of fresh moss. If such a colony is disturbed the corals suddenly change their beautiful green to a gleaming deep red.

In the riot of color of this flourishing animal forest there lives an unsuspected world of thousands of animals, one which the wildest imagination could not conjure up more grotesquely. We will here only refer to the bizarre crabs, real hobgoblins, snails with elegantly-shaped shells, fantastic brittle star-fishes, mighty sea-slugs armed with lances and club-shaped horns, and fascinating worms. Among the corals we find millipores, brightly-colored sponges, and interesting bryozoans. The most interesting and surprising among these, however, are the unbelievably shaped and beautiful fishes.

"Marine tropical fishes" does not mean members of any certain family of fishes. The tremendous number of fish species which populate the lovely coral reefs belong to the most varied families, such as the Chaetodontidae and Pomacentridae, which could be classed as typical reef dwellers.



The meandrinoid corals, such as the brain coral shown here, build massive reefs by joining into colonies consisting of billions of individual polyps.

Particularly interesting here are the Orange Clownfish, *Amphiprion percula*, which look as if their colors were painted on, the highly interesting Tomato Clowns, *Amphiprion ephippium*, *Amphiprion frenatus*, etc., the fabulously shaped *Heniochus acuminatus* with its tremendous banner of a dorsal fin, the wonderfully colored *Holocentrus rubrum* as well as the scrappy black-banded *Abudefduf saxatilis*. Of wonderful form and color are the Butterfly Fishes (Chaetodontidae). Interesting as well are the grotesque Trunkfishes (*Ostracion*), the Porcupine Fishes (*Diodon*), the scrappy Triggerfishes (*Balistes*) and the active Damselfishes (*Dascyllus*). Other impressive fishes are the always beautiful Parrotfishes (*Scarus*) as well as the sometimes beautifully blue shimmering Reef Fishes (*Pomacentrus*), etc. These are all fishes which many hobbyists have kept and are keeping, species which can be kept and admired in home aquaria.

In Neptune's lovely magic garden we also see large sea anemones in the most wonderful colors. One could believe that in this flower garden, where every animal has become transformed into a flower, eternal peace prevails. One look into this undersea kingdom with its eternal motion, where the roll of thunder and the howling of the gales is not heard, shows us, however, that the struggle for existence here is not the least bit less difficult and is conducted in just as bloody a manner as above, on the surface.

The beautiful sea anemones seem to lead an existence which is dreamy and forever distant from any upset by enemies. The uninterrupted color of their petals stretches out in a play of great beauty. Petals? Oh, no! These are the greatest frauds! These dreamy beauties are nothing more than stomachs. Form and color are merely display, and the rest is a greedy stomach.

Among other things, these "flowers" take small living fishes as nourishment. The remarkable thing is the fact that several fish species live in complete harmony with the anemones. They drag their food to the waiting sea anemone to eat it without being robbed by other fishes, and the anemone gets its share. The little fish is not afraid of slipping inside of the poisonous tentacles and taking a little "nap."

Even in captivity is this co-existence carried on between marine fishes of the genus *Amphiprion* and *Premnas* with the sea anemones. As a substitute for the expensive tropical sea anemones it has been found that this friendship is also extended to the more available Florida and Mediterranean anemones.

As tropical corals are seldom brought in, little can be said about their keeping. A common coral species, *Astroides calycularis* from the Mediterranean, can be kept for years in the aquarium. This coral especially prefers shady rock surfaces, which it covers with a gleaming orange-colored carpet.

These beautiful **Damselfishes** are right at home in their coral shelter; fishes accustomed to coral in their home waters should be provided with coral pieces in the marine aquarium, as they feel more secure with coral available for hiding. Photo by Douglas Faulkner.

The streamlined **Holocentrus xanthorythurus**, one of the Squirrel Fishes, is inclined towards shyness in the home marine aquarium and should be provided with coral for refuge. Photo by Dr. Herbert R. Axelrod.

Alcyonium palmatum is one of the cork corals and is also known as the sea hand or leather coral. Photo by Holzhammer.

Another coral which occurs in the Mediterranean is the yellow coral, *Dendrophyllia ramea*, whose polyps are sulphur yellow and which has been kept with good success.

There are some eight-limbed anemones, which are not related to the six-limbed corals and can be kept for quite a time in captivity. One of these is *Corallium rubrum*, native to the Mediterranean, where it occurs at depths from 250 to 300 feet. Related to these is the gorgonian, a colony of creatures with a tree-shaped branched form and a skeleton which is formed from deposits of calcium. It can be kept in aquaria for a long time. The cork corals, *Alcyonium palmatum*, are also very durable.

To keep the coral polyps it is necessary above all to use natural salt water, especially for transportation and acclimation. A change to artificial water must be undertaken slowly and very carefully. The temperature and specific gravity of the water must be watched particularly. Old water is usually not well tolerated. Freshly imported corals which are put in old water usually die very quickly, frequently in a matter of hours. *Astroides* can stand artificial water if first acclimated. Good aeration and water movement is necessary. For the keeping of coral polyps plankton must be provided, and in a well-kept aquarium this develops well. Now and then there must also be clam juice and very finely ground shrimp which is best introduced in the stream of bubbles from an airstone. In other matters such as temperature, light, etc., these creatures make varied demands. For decorative effects in the aquarium besides the rocks there can be used dead and carefully cleaned coral skeletons or limestone.

Rivulus And Its Habits

BY DR. GEORGE S. MYERS

Most tropical fish hobbyists have seen *Rivulus*, and many have kept them in their aquariums. These apparently lazy cyprinodont fishes are in reality among the star acrobats of the fish world, but you have to be a careful observer to see *Rivulus* in action.

Rivulus is a genus of cyprinodontid fishes including a large but not yet fully known number of species existing from the southern tip of Florida and southern Mexico southwards through South America to Argentina, and including Cuba, Hispaniola, and Puerto Rico in the West Indies. The largest species reach about four inches in total length, the smallest very little over one inch.

Two male Rivulus engage in a display of widely spread finnage during combat as female (background) looks on. Photo by Horst Abel.

A few kinds of *Rivulus* inhabit salt or brackish water; *Rivulus marmoratus* of Cuba and southern Florida is one of these. But most of them are fresh-water fishes, and they are reasonably common in all of the Atlantic slope streams of Central and South America down as far south in South America as really tropical fishes go. Only in parts of Central America is *Rivulus* known to occur in Pacific slope streams.

However, the average ichthyological collector in tropical America gets very few *Rivulus* or none at all! Why is this? Simply because *Rivulus* species are

Ordinarily sluggish in their movements, Rivulus species are capable of speed and long leaps. Pictured here are a male and female Rivulus urophthalmus, female at right. Photo by Dr. Herbert R. Axelrod.

very peculiar fishes, with very peculiar habits, and unless the collector is especially thorough in his collecting, or is familiar with the habits of *Rivulus*, he is likely to net himself a big fat zero, so far as these fishes are concerned.

One of the reasons why *Rivulus* is a very special prize of the general fish collector was made clear in the very first article on fishes that I ever published over 44 years ago! In that article I told the story of an enthusiastic tropical fish hobbyist who had several rows or banks of small aquariums along shelves in his small fish house. Into an aquarium at one end of one of the rows he put a *Rivulus*. The man was not familiar with *Rivulus*, for he had no covers on the tanks. (I think he was a goldfish fancier!) A few days later, when he looked for his *Rivulus* in the tank he put it in, he couldn't find it. But, lo and behold, in the tank *at the opposite end of the row*, there was the *Rivulus*, big as life! It had *flipped*, from tank to tank, along the entire row!

Rivulus does not like to stay where it is put, unless conditions are entirely to its liking. Even then it often likes to explore. It seems to have an uncanny ability to know *which direction to go*, overland so to speak, to reach other water. Over half a century ago, my old professor, Dr. Eigenmann, described the ability of *Rivulus* in British Guiana to ascend a wet rock-surface by flipping up and adhering with its fanlike tail fin, and then flipping up again. Several years later, Dr. Tee-Van confirmed Eigenmann's observations as to the out-of-water travelling ability of *Rivulus*.

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Upper Amazonian Characoid Fishes Collected by Mr. Jack Roberts

by Dr. J. Gery[1]
(Photographs by Dr. Herbert R. Axelrod)

At the end of 1963, Dr. Herbert R. Axelrod was kind enough to send me, for study, an interesting collection of small aquarium characoid fishes. They were procured by Mr. Jack Roberts, Roberts Fish Farm, well-known fish collector, who has just collected them in the Upper Amazon Basin, *in the Iquitos surroundings*.

Several species are either new for science or for the territory, or rare. Moreover, the coloration *in vivo*—as shown here by the magnificent photographs by Dr. Herbert R. Axelrod—represents the most interesting part of such a topic: the colors of very few of the forms were formerly known. To let illustrations have the foremost place I have thus reduced the species-descriptions to a minimum, making only some short comments concerning the already known forms (whose synonymy is to be found in Fowler, *Peixes do Brasil*, 1951), and concentrating on the new or rare ones, as well as on a key to the genus *Creagrutus* and a review of the *Leporinus striatus* group.

For more extensive data concerning most of the best known species and some of the other ones, see Gery 1964 (a) and (b).

(1) **Moenkhausia comma** Eigenmann.

1 specimen, male, 65.5 mm. in standard length.

A well-known Amazonian species, known from Upper Amazon to Belem do Para. See Gery 1964 (b).

The dorsal fin and the caudal lobes are probably orange *in vivo*.

(2) **Moenkhausia colletti** (Steindachner).

5 specimens, largest about 49.5 mm. in standard length.

A well-known Amazonian and Guianese species.

Recently found in the Upper Rio Meta Basin (see black and white photograph in T.F.H., January 1964, p.27).

Dorsal fin, adipose, caudal lobes and front of anal-lobe orange *in vivo*.

(3) **Moenkhausia robertsi** sp. nov.[2] (Fig. 1).

HOLOTYPE: 48.8 mm. in standard length, collected in the Upper Amazon region surrounding Iquitos by Mr. Jack Roberts, end of 1963. Orig. Nr. 0308,1.

PARATYPES: 3, 40.2–48.0 mm. in standard length, collected with the type.

DIAGNOSIS: Characterized by the depth about 2.5–2.75 in the standard length, 4 or 4½ scales from lateral line to ventrals, branched anal rays 22 or 23; pattern consisting of two vertical humeral spots, a black (silvery in life) longitudinal line, a conspicuous caudal spot, generally up to the end of the middle caudal rays, and a dark lower caudal lobe; caudal scalation very feebly developed, consisting of 3 or 4 large scales on basal third or fourth of the caudal lobes.

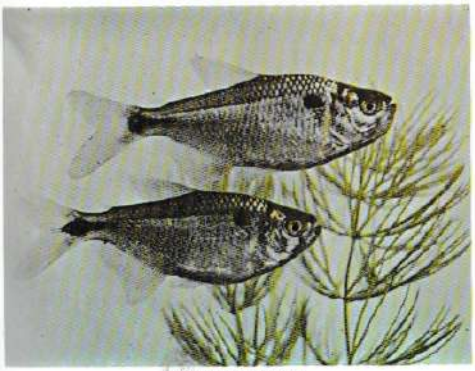
(1) Contribution Nr. 41 to the study of characoid Fishes. Types deposited in the USNM.

(2) For Mr. Jack Roberts, who discovered the species.

Actual date of distribution November 18, 1964.

Moenkhausia colletti (Steindachner)

Figure 1. Moenkhausia roberts sp. nov., holotype, about 49 mm in standard length.



Astyanax bimaculatus (L.)

Figure 2. Astyanax zonatus Eigenmann.

Jack Roberts, noted dealer-collector for whom Moenkhausia robertsi is named, is at right in photo, shown accompanied by associates.

DESCRIPTION (Table I): body of medium depth, profiles almost evenly arched; predorsal rather keeled, with a regular series of 9 or 10 scales; preventral not flattened; peduncle not elongated; dorsal fin very conspicuously nearer the snout than the caudal (snout-to-dorsal about 1.15–1.25 in dorsal-to-caudal). Pectorals and ventrals short, not overlapping or even reaching the base of next respective fin. Scales regular, 34–36 in lateral line, which is always complete, 4 or 4½ above ventrals, 6 or 5 above lateral line, depending on the presence or absence of one small scale (continuing the predorsal series) just below the first dorsal ray; anal base with a single series of 4 or 5 scales; caudal lobes only scaled to their proximal part, as stated in the diagnosis, without the very small scales along their sides which are characteristic for the genus *Moenkhausia;* nevertheless the caudal base is unmistakably "scaled" and this scalation cannot be overlooked unless the specimens are in bad condition (which is not the case here).

Head relatively short, not heavy, the eye small, the maxillary not very developed; frontal fontanel moderate; great suborbital leaving a narrow naked area on cheek, all around the bone; teeth not very broad, 4 tricuspid ones in the outer row of premaxillary, 5 or 6 quincuspid ones in the inner row; 2 very small maxillary teeth; mandibular teeth as usual, i.e. 4 large, quincuspid ones in front (the second one somewhat displaced forwards), followed on sides by 8 to 11 much smaller ones; there may be a small, tricuspid, intermediate tooth between the front teeth and the feeble posterior series; gill-rakers 8/11–13.

In vivo, body silvery with rosy tints on abdomen and on paired fins; dorsal fin, beginning of anal fin and base of caudal fin orange; the double

Figure 3. Astyanax kennedyi sp. nov., holotype, about 38 mm in standard length.

Hemigrammus hyanuary, the Costello Tetra.

Figure 4. Hemigrammus marginatus Ellis.

humeral spot is scarcely visible; after preservation in formalin, the fish has the anterior pattern of *Astyanax abramoides* for example, whereas the caudal spot is almost as conspicuous as in *Moenkhausia cotinho* for example; the lower caudal lobe is the darkest, which is quite unusual in the genus.

DISCUSSION: Owing to the feebly developed caudal scalation, *M. robertsi* sp. nov. has been compared with species of the genus *Astyanax* (nominal) as well as with *Moenkhausia*-species.

In *Astyanax*, there are few species with the dorsal fin clearly anterior, and a conspicuous caudal spot: *A. metae* and *A. maximus*, for example, have many more scales and anal rays. Species with 23 or less branched anal rays have generally the dorsal fin on the middle of the body or behind: for example the *scabripinnis*-group. Other species differ in the pattern, or in the meristics, or in both (see also discussion of a new *Astyanax*, below).

Considered as a *Moenkhausia*, as it is here done, *M. robertsi* sp. nov. would fall into the group with medium depth (intermediary between *bondi* and *lepidura*, for example) and about 4 scales above ventrals. It is clearly different from those species, falling in the group which has a caudal spot, like *oligolepis* and *sanctaemariae*, *ovalis*, etc. Nearest species (not included in Eigenmann's Key, 1917) are probably *M. metae* and *eigenmanni* (which have no caudal spot), *niangi* (which has more transversal scales and which has not the same anterior pattern) and *nepenis* (which again has more transversal scales and a different posterior pattern).

(4) **Astyanax (Poecilurichthys) bimaculatus** (L.).

1 specimen, about 78 mm. in standard length.

One of the most widely spread Characids. Color photograph in Axelrod, *et al, Exotic Tropical Fishes:* F. 92.00.

(5) **Astyanax (Poecilurichthys) zonatus** Eigenmann. (Fig. 2).

Astyanax zonatus Eigenmann, Bull. Mus. Comp. Zool. **52:** 95, *1908* (Tabatinga); Rept. Princeton Univ. Exp. Patagonia, **3:** 432, *1910*; Mem. Mus. Comp. Zool. **43** (3): 242–243, Pl. 41 Fig. 3, *1921*.

7 specimens, largest about 50 mm. in standard length.

These interesting specimens are probably the first to have been collected after the types, and they can be considered as topotypes. There are apparently no modern references. Fowler himself (*Peixes do Brasil*) has forgotten to cite the species.

The largest specimen has a depth of about 3 in the standard length, whereas all the other ones are somewhat more slender; dorsal fin clearly in advance of the middle of the body; predorsal line without regular scales-series; instead, there is a thin naked line (sub-genus *Poecilurichthys*); preventral region flattened; no procumbent pelvic spines (innominate bones of Eigenmann): anal iii, 23(i) or 24(i), scales 9/43/7. First rays of anal bright red, dorsal and caudal orange, abdomen and adipose yellow, *in vivo*.

(6) **Astyanax (Astyanax) kennedyi** sp. nov.[1]. (Fig. 3).

HOLOTYPE: 37.9 mm. in standard length, collected in the Upper Amazon region surrounding Iquitos by Mr. Jack Roberts, end of 1963. Orig. Nr. 0399,1.

PARATYPES: 2, 28.1 and 35.1 mm. in standard length, collected with the type.

DIAGNOSIS: Depth 2.92–3.56, and head 4.13–4.44 in the standard length; dorsal fin far in advance of the middle of the body; scales 5/36–37/4; branched anal rays 21; great suborbital almost entire; teeth pluricuspid, rather broad; a large caudal spot, almost as conspicuous as in the above-cited *A. zonatus;* a rather pale single vertical humeral band as in *A. mutator*, for example.

DESCRIPTION (Table I): Body rather slender, with a short head; dorsal and ventral profiles not much arched, symmetrical; narrow peduncle (its depth about 10 in the standard length); dorsal fin very conspicuously in advance of the middle of the body (snout-to-dorsal about 1.2–1.3 in dorsal-to-caudal); predorsal keeled, with a regular series of 9 or 10 scales; preventral more or less flattened; no procumbent pelvic spines; pectorals and ventrals short, not reaching next fin; scales regular, lateral line complete, few scales in transversal series (10); a feeble sheath of scales on base of anal, one or two scales on base of caudal lobes which are definitely "not scaled" in Eigenmann's sense.

Head short, as said above, with rather small eye and short maxillary, narrow interorbital and short snout; fontanels moderate; great suborbital leaving a very narrow naked area all around the cheek; teeth broad, premaxillary series consisting of 3 or 4 quincuspid, external teeth and 5, internal ones with five to seven cusps; 2 or 3 rather broad (about 5 cusps) maxillary teeth; dentary with 4 large quincuspid teeth in front, and one smaller tricuspid tooth, followed on sides by a relatively short series of about 4 or 5 conical teeth; gill-rakers 9/14.

In vivo, body silvery, fins yellowish; the large caudal spot which extends on base of caudal almost to the tips of the middle rays, is the most conspicuous pattern; the narrow, almost vertical, rather pale humeral spot is scarcely visible in life, slightly more prominent after preservation; as usual,

(3) In memory of the late President of the United States of America, John F. Kennedy.

Figure 5. Hemigrammus species, resembling H. ocellifer. (This species is described in another work, in press.)

Figure 6. Hemigrammus rodwayi Durbin.

Figure 7. Hemigrammus micropterus boesemani Gery.

Hemigrammus pulcher pulcher. Photo by G. J. M. Timmerman.

there is a silvery line along the body, with golden shine on peduncle, which becomes plumbeous in alcohol.

DISCUSSION: *A. hunnedyi* sp. nov. is apparently closely related to the poorly described *Astyanax gracilior* Eigenmann, which likewise has a large suborbital and a forward position of the dorsal fin. *A. gracilior* is nevertheless much more slender, with 5 large mandibular teeth, much narrower caudal peduncle, etc.

It is quite distinct from the species of the *scabripinnis*-group which all have the dorsal fin in the middle of the body or even behind the middle. *Astyanax mutator*, which pertains to the group, has a rather similar pattern, but its suborbital is much narrower, it has only 19 branched anal rays and 33–34 longitudinal scales; moreover it has a narrow snout with a peculiar form of the mouth and of the teeth, recalling *Deuterodon*.

In coloration, chiefly due to the large caudal spot and the habitus (see respective photographs), *A. hunnedyi* sp. nov. is also similar to *Moenkhausia roberti* just described, as well as to *Astyanax zonatus* and two *Hemigrammus* (see below). All these forms have evidently contrasting meristics, but their common appearance makes you believe that they may live in protective association.

Finally *Moenkhausia cotinho*, known to occur also in the same region, and which also has a prominent caudal spot, may be distinguished by a number of characters: only 16–18 branched anal rays and 7/9 gill-rakers, higher peduncle, the dorsal fin less forward and, of course, the caudal lobes clearly scaled (on well preserved specimens).

(7) **Hemigrammus marginatus** Ellis. (Fig. 4).

1 specimen, 38.7 mm. in standard length.

H. marginatus was chiefly known from Rio Guaporé and Parana, also from Rio San Francisco, and Venezuela: clearly a discontinuous distribution. I have it from Upper Rio Méta. It seems to be new for the Upper Amazon region.

The single specimen here mentioned is quite peculiar in having the great suborbital almost entire and (11)36 scales in longitudinal series (the types have (5–14) 29–34 scales).

(8) **Hemigrammus hyanuary** Durbin (in Eigenmann).

4 specimens, largest (a female ?) about 35 mm. in standard length.

This species seems to be officially new for the Upper Amazon region. It is known as "Tetra Costello" or "green neon" by the German aquarists (see Gery, D.A.T.Z. 15(4): 110–112, April, 1962). Color photograph in *Exotic Tropical Fishes*, F: 321.00.

(9) **Hemigrammus species.** (Fig. 5).

3 specimens, largest 34.5 mm. in standard length.

I have recently described this interesting species in a paper concerning the collections of Dr. K. H. Lüling, Bonn, near Iquitos and in the lower Ucayali (Gery, 1964(a)). The present specimens may be considered as "topotypes" of this form, which is named in the work referred to above, still in press.

It is a rather colorful Tetra, strikingly copying *H. ocellifer*, with the paired fins pale red.

(10) **Hemigrammus rodwayi** Durbin. (Fig. 6).

1 specimen, about 24.2 mm. in standard length.

It is rather surprising to find this species in the Upper Amazon Basin, whereas it was considered as a typical "coastal" Guianese form (see Gery, T.F.H. 12(3): 15, Nov., 1963, with regard to the discussion of *Hemigrammus pronoti*). The single specimen is rather characteristic, with 21 branched anal rays, a red spot on each caudal lobe base and (after preservation) the caudal spot *continuous* with the longitudinal line. It was never before photographed alive.

(11) **Hemigrammus micropterus boesemani** Gery. (Fig. 7).

3 specimens, largest about 38 mm. in standard length.

Again it is a surprise to find in the Amazon this form, although it is frequently collected along with *H. rodwayi* (in Guianas). It was known from Venezuela, and it was found afterwards in Surinam and French Guiana, where it represents a distinct subspecies, *H. micropterus boesemani*. These specimens are quite in conformity with the latter subspecies, and they differ from the type-description of *micropterus* (nominal) by a more slender body (3.33–3.51 in standard length), smaller maxillary (less than eye), scales formulae (5/(7–9)3–3 5/3 instead of 4/4–5)32/4), and dentition: the teeth are narrower, with about five cusps in the broadest instead of seven; all the more, there are only 4 frontal mandibulary teeth instead of 5 as stated by Meek.

In my first description of *H. m. boesemani* (Gery, 1959) I was not certain that the form was really conspecific with *micropterus;* examination of numerous additional specimens from Surinam confirmed that *boesemani* was indeed a well defined form, but hardly referable to the Venezuelan species of Meek. It is again the case with the present specimens, far remote (geographically) from both territories. If distinct, it will be known as *Hemigrammus boesemani* (Gery).

continued on page 33

MAIL CALL

If you have an aquarium question and cannot find the answer in any of the standard reference texts, send it to MAIL CALL. Each month this column will publish the most interesting questions received and their answers. Letters containing questions cannot be acknowledged or answered personally. Address all questions to: MAIL CALL, T.F.H. Publications, Inc., 245-247 Cornelison Ave., Jersey City 2, N. J.

Infusoria tablets.

Q. In regard to the September, 1964 issue, I would like to make a correction. On page 43-44 Mr. Hank Zucker of Great Neck, N. Y. asked if infusoria tablets were good food for fry. Your reply was that infusoria tablets were designed to feed infusoria, not fry. Both you and Mr. Zucker are correct. Infusoria tablets *do* feed infusoria, but there are also infusoria tablets designed to feed fry. The tablets are dropped into the tank and dissolve into a swarm of infusoria. This revolutionary product is quite convenient.

Mrs. Patricia A. Cuthbertson, Flint, Mich.

A. *I am always willing to learn, Mrs. Cuthbertson, but so far I am sticking to my guns. Your infusoria tablets are not composed of infusoria spores but of very finely ground prepared food. You can prove that either you or I am right by dissolving an infusoria tablet and getting what looks like a "swarm of infusoria." Examine it under the microscope; if there are many creatures hustling about in your drop of water I will doff my sombrero and admit defeat.*

Tank capacity.

Q. In your answer to Mr. P. L. Nisson on page 45 of the August issue you quoted a figure of 1½ inches of fish per gallon of water as a guide to the limit of the number of fish in an aquarium. I have always been under the impression that the fish capacity of an aquarium was governed by the surface area of the water and not by the capacity of the tank, since a 2-gallon tank can have a wide range of surface area. It has always been my rule of thumb to allow 10 square inches of water surface to each 1½ inches of fish. Which is the correct method to adopt?

F.W.J. Bryant, Middlesex, England

A. *A "rule of thumb" is admittedly a very general thing. Mine is based on the capacity of the standard-shaped aquarium, and even at that it can still be shot full of holes. There is a considerable difference, for example, in the oxygen content of two aquaria of identical size and shape where one is a few degrees warmer than the other. Another thing to consider is the difference encountered in 1½ inches of the various fish species. Could you make a rule, for instance, that would be the same for 1½ inches of Kuhli Loach and 1½ inches of Puffer? Neither of our "rules of thumb" will ever apply equally in all cases.*

Head and Tail Lights.

Q. I would like for you to answer my questions on *Hemigrammus ocellifer*, commonly known as Head and Tail Light:

1. How can you sex them?
2. What should the fry be fed?
3. Are there any articles in back

Head and Tail Light, Hemigrammus ocellifer.

issues of TFH about breeding this fish?

Betty Northcott, Winston-Salem, N. C.

A. 1. *Males can easily be identified by a light streak across the anal fin.*
2. *The fry do very well on fine-grained dry foods and newly hatched brine shrimp after the first few days.*
3. *Sorry, no, but there is space given to them in* Tetras, Book 2, *and* Colorful Tetras.

Bettas.

Q. I am raising *Betta splendens* and I would appreciate it if you would answer these questions for me:

1. A book I purchased stated that Bettas will eat nothing but mosquito larvae during the time the male cares for the eggs in the nest. If so, how do I go about raising mosquito larvae?
2. When I purchased my fish the female was a light brown and the male was light purple. Later the female turned gray with dark brown stripes and the male turned black, then a few days later gray. I then fed them color pills. The male turned a deep violet, but the female remained the same. Is this good? If not what should I do to keep the color the same?
3. The female is constantly being chased by the male. She has found hiding places in the tank, but when

I feed them she never eats. Is this all right?

E. M. Killelea, Chelmsford, Mass.

A. 1. There is no denying that mosquito larvae are a wonderful food not only for Bettas but for all other fishes, too; in tropical countries this is frequently the only live food available. Although a male guarding eggs is too busy to do much eating, I am sure he could be tempted to eat such foods as live brine shrimp, Daphnia, and Tubifex *worms.*

2. Bettas often undergo changes in color. The color pills you mention are only a temporary thing and could have bad consequences if used too often. There is no substitute for good healthy conditions and a good diet to bring out the best colors in a Betta.

3. Definitely not. Keep them separately until the female is well filled with eggs, then put them together to spawn. Separate the female again when the male begins to drive her away after the eggs are laid.

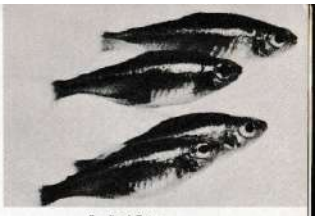
Gold and Lemon Tetras

Q. 1. I have a 10-gallon aquarium with five Cardinal Tetras, two Gold Tetras, one Red-Tailed Shark, three Pearl Danios, and one Algae Eater. Could you tell me what the pH should be for this tank?

2. My Red-Tailed Shark is just a baby now. Will he get aggressive when he gets bigger?

3. I just bought three *Vallisneria torta* a few days ago and they are turning brown. This has happened before and I don't know what I'm doing wrong. Is there any way I can revive the plants after they start turning brown?

4. Are the Lemon Tetra and Gold



Cardinal Tetras.

Lemon Tetra, Hyphessobrycon pulchripinnis

Gold Tetra, Hemigrammus armstrongi

Tetra the same fish or are they different?

Beverly Craig, Woodland Hills, Cal.

A. 1. The pH for such a tank should be neutral or slightly acid.

2. They frequently do.

3. Vallisneria often loses its leaves when transplanted. Unless the roots have become badly damaged, new leaves will begin to replace the dead ones in short order. Be patient, and don't move the plants any more than you have to.

4. They certainly are different. The Lemon Tetra is Hyphessobrycon pulchripinnis, *and the Gold Tetra is* Hemigrammus armstrongi. *They are quite different, although they are both Characins.*

Upper Amazonian Fishes

continued from page 52

The form was never photographed alive. The black band over base of anal, which is very characteristic for the species, is clearly visible on the color photo.

(12) **Hemigrammus pulcher pulcher** Ladiges.

1 specimen, 32.6 mm. in standard length.

This is a well-known species of the Loreto District in Peru, surrounding Iquitos. Color photograph in *Exotic Tropical Fishes*, F: 323.00.

(13) **Hyphessobrycon serpae** Durbin. (Fig. 8).

1 specimen, 29.9 mm. in standard length.

This specimen has the following characters: depth 3.05 in the standard length; scales 5½/(9)34/3½, 8 or 9 in (irregular) predorsal series; anal iii 26(i); dorsal fin clearly in advance of the middle of the body; great suborbital reaching below the preopercular canal; 2 or 3 external premaxillary teeth; 5 quincuspid frontal teeth on dentary, followed by a series of minute ones on sides.

As it can be seen, this single specimen has the dorsal-position and the depth of *serpae*, whereas it would approach *minor* (from Guianas) in the scalation and in the teeth structures. This seems characteristic for the Upper Amazonian populations of *H. serpae* which were recently discussed (Gery, 1964(b)).

(14) **Hyphessobrycon agulha** Fowler.

1 specimen, 38 mm. in standard length.

I discussed the uncertainties inherent to the "*agulha-metae* group" in the paper just referred to above (1964(b)). The species here called *agulha* is the same as the one figured in *Exotic Tropical Fishes* (Suppl.), F: 334.10. It was recently found to be abundant around Tabatinga as well as in the Rio Purus, in addition to its typical locality, the Rio Madeira. Its exact identification is still somewhat uncertain, as its meristics are not exactly those given by Fowler.

The present specimen has: scales 5/(20)35–36/3½, 10 in predorsal; anal iv 20(i); premaxillary teeth 3/5; maxillary teeth 1 or 2 (none in Fowler's description).

(15) **Hyphessobrycon bellottii** (Steindachner).

5 specimens, largest about 35 mm. in standard length.

These are typical (see for discussion and figures: Gery, T.F.H. 12(3): 15 and 57, Nov., 1963).

(16) **Hyphessobrycon minimus** Durbin. (Fig. 9).

1 specimen, 23.5 mm. in standard length.

Scales 5/(6)30–32/3; anal iii 15(i), falciform; dorsal fin in the middle of the body; 2 external, premaxillary teeth, 5 internal ones, quincuspid; maxillary with 2 rather broad, quincuspid teeth.

This is again a "typical" Guianese species, which is rather surprising to find in the Upper Amazon region (I recently noticed it in a collection from Upper Rio Méta). The resemblance between *Hyphessobrycon minimus* and *Hemigrammus iota* is remarkable, to such a point that Eigenmann (1918, plate 22) inverted the legends of the figures 6 and 7 (which seem to be exact in the original plate 49 of 1912). The only difference (besides the caudal scalation, which is a somewhat subjective character) is apparently in the peduncle, which would be higher in *H. iota*.

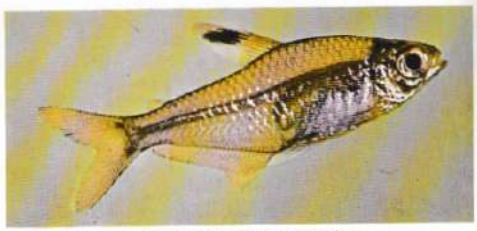
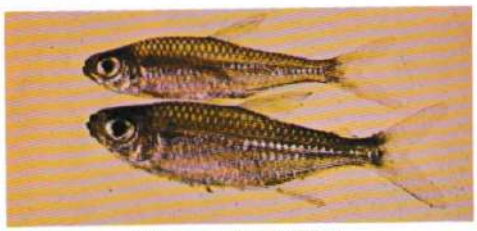
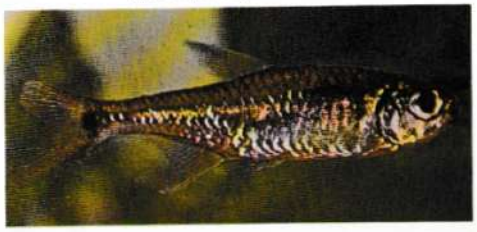


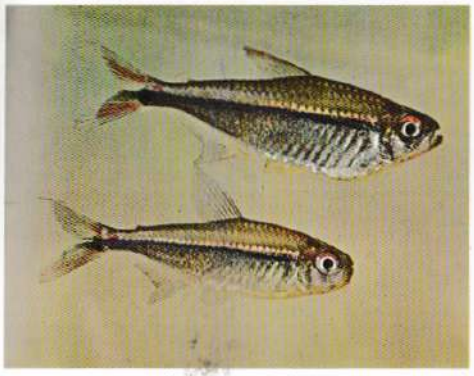
Figure 8. Hyphessobrycon serpae Durbin.



Hyphessobrycon bellottii (Steindachner).

Figure 9. Hyphessobrycon minimus Durbin.





Hyphessobrycon agulha Fowler.

(17) **"Hyphessobrycon" stigmatias** Fowler.

1 specimen, 20.5 mm. in standard length.

I have tentatively identified this specimen, as well as other ones from Igarapé Préto and Rio Purus, as *stigmatias*, and I proposed this species as the type of a new genus (Gery 1964(b)).

(18) ? **Bryconamericus (Knodus) breviceps** Eigenmann. (Fig. 10).

2 specimens, largest 49.5 mm. in standard length.

Depth about 3.2 and head about 4.5 in the standard length; scales 5½/38/3; anal iii 23(i); outer premaxillary teeth 5, one or two slightly withdrawn from the rest; maxillary teeth 2, mandibular teeth 3 large, quincuspid, not in a regular line, then one smaller tricuspid one and some conical ones on sides; the caudal-lobes bases are clearly scaled.

(19) ? **Bryconamericus (Knodus) moenkhausii** (Eigenmann & Kennedy) (Fig. 11).

1 specimen, 34.6 mm. in standard length.

Depth about 3.65 and head about 4.2 in the standard length; scales 5/36–38/3; anal iii 23(i); outer premaxillary teeth 4, in a "wavy" line; other series of teeth as in the preceding form; caudal scaly; snout distinctly produced.

There is little doubt, even with so small a sample, that we are dealing with two different sympatric species of the sub-genus *Knodus*. Some proportions, as well as the structure of the premaxillary teeth, are demonstrative. Neither of the identifications, nevertheless, is wholly satisfactory, as the group is very poorly known.

(20) **Creagrutus cochui** sp. nov.[4]. (Fig. 12).

HOLOTYPE: a female 71.5 mm. in standard length, collected in the Upper Amazon region surrounding Iquitos, by Mr. Jack Roberts, end of 1963. Orig. Nr. 0403,1.

PARATYPE: male, 56.3 mm. in standard length, collected with the type.

DIAGNOSIS: An elongated species (depth 3.91–4.28 in the standard length) with short head (4.14–4.26 in the standard length) relatively numerous longitudinal scales (40–41) branched anal rays (12–13) and gill-rakers (8–9/11–13), and large suborbital, almost covering cheek; teeth rather regular, intermediate between the *muelleri*-type (*Creagrutus* nominal) and the *affinis-beni*-type; they can be described as "typical" (see below).

DESCRIPTION (Table I): Slenderer than the majority of the *Creagrutus*-species, with the dorsal fin very strongly in advance of the middle, at mid-distance between snout and end of adipose; dorsal profile short, elevated, ventral profile almost horizontal; peduncle slender, laterally compressed, its depth about 2 in its length, more than 2 in head; pectorals and ventrals not very developed, not quite reaching next fin; ventrals originating under level of first or second dorsal ray, adipose above last anal ray; base of caudal lobes clearly scaled.

Head very short, the snout not very produced, much smaller in profile than *horizontal* diameter of eye, which is contained 2.85–2.95 in length of head; eye horizontally oval, its *vertical* diameter about 3.25–3.45 in length of head; great suborbital equal to eye, reaching preopercular canal below, leaving behind a narrow naked zone which is contained 5 or 6 times in the width of the bone; premaxillary teeth (Fig. 12a) in 3 rather distinct rows, with, on each side, 4 outer teeth, 2 middle ones and 4 inner ones; maxillary with 3 small teeth (once 2); dentary with 3 large teeth in front, followed by one or two small ones on sides, which are elevated immediately after the tooth-bearing portion.

PATTERN: a black lateral band (plumbeous when alive) up to the end of the middle caudal rays; no real caudal spot; a roundish humeral spot, more or less coalescent with the beginning of the band; fins without any pattern; yellowish *in vivo*.

DISCUSSION: The 16 or so species of the genus *Creagrutus* (type-species *muelleri* Günther) are small Tetragonopterine Characids characterized as follows: anal short (i)ii 8(i) to (i)ii 14(i); dorsal ii 8; caudal lobes-base often with some large scales; dorsal fin far in advance of the middle of the body; depth 2.75 to 4.33 and head 3.15 to 4.3 in the standard length; scales 4 to 6/33–42/2½ to 4, with the lateral line always complete; suborbital variable, not always covering entire cheek as in *Bryconamericus;* premaxillary teeth rather thick, in three irregular rows; maxillary teeth generally small, 1 to 4; mandibulary teeth not numerous, only 3 large ones in front and one or two much smaller ones on sides; not more than 13 gill-rakers on lower arch.

Eigenmann (1927: 418) used as a Key-character the disposition of the premaxillary teeth. He distinguished two groups: the first typical group (*melanzonus*, *peruanus* and *muelleri*) has 3 outer teeth, 2 middle ones and 4 or 5 inner ones; the second group which is the largest (*beni*, *amary*, *brevipinnis*, *magdalenae*, *affinis*, *simus* and *caucanus*), Eigenmann estimated it had an inner series of 3 or 4 teeth and a second *oblique* series starting backwards from

(4) For Mr. Fred Cochu, a close friend to Dr. Herbert R. Axelrod, who suggested the name for this species.

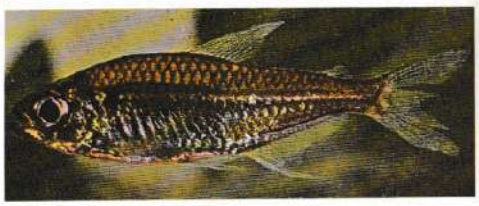


Figure 10. Bryconamericus (Knodus) breviceps Eigenmann?

Figure 11. Bryconamericus (Knodus) moenkhausii (Eigenmann & Kennedy)?

Figure 12. Creagrutus cochui sp. nov., paratype, a male 56.3 mm in standard length.

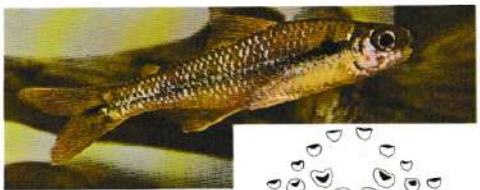


Figure 12a. Premaxillary and maxillary teeth of the holotype (from a plastic cast) of Creagrutus cochui, sp. nov.

Figure 13. Phenacogaster pectinatus (Cope).

the third inner tooth to the tip of the snout; lateral to this oblique series is another tooth which is just external to the first one (that is, the fourth counting from the front tooth) and finally another one which is internal to the same one (i.e., in the angle formed by the inner and the oblique series).

This distinction is quite subjective, depending on what one may call "inner," "oblique" and "outer," and I believe that every intermediate may be found between the two types. Böhlke (1958 p.32) pointed out that "the literature accounts of its dentition (of *C. muelleri*) are variable and somewhat confusing." It may be recalled that *muelleri* is at the same time the most important species in that respect (being the type of the genus) and the less specialized one, having (if one trusts the Fig. 7, Pl. 35 of Eigenmann, 1927) a premaxillary-disposition which is not far from a *Bryconamericus* with extremely irregular external series of teeth. Until "not interpreted" schemas of each species are known (that is, based on cast of the jaw and not on free hand sketches), it is preferable not to count on this unreliable character.

Since Eigenmann's time, *notropoides* has been found to be distinct from *affinis*, whereas *simus*, on the contrary, was synonymized with *affinis*. *C. melanzonus* was tentatively attributed to *Creagrutichir*, a different genus. Finally a number of forms were described: *phasma* (whose dentition is close to that of *peruanus*), *atrisignum* (of the *affinis-beni* group), *amoenus* and *londonoi* Fowler (the latter close to *notropoides* ?), and *hildebrandi* and *bolivari* Schultz (*pellegrini* Puyo has nothing to do with *Creagrutus*, being a *Chalceus*). Some of the species were discussed by Schultz (1944) and by Böhlke (1958).

The following Key, mostly compiled, is intended to serve as a differential diagnosis of *Creagrutus cochui* sp. nov., as well as to give some ideas about the affinities of the species.

a. Head short, 4 in standard length or more

b. Longitudinal scales about 33–36; not typical dentition

c. Depth 2.75–3.25; caudal scaled; (anal 10–12 branched rays; rarely 37 scales in lat. line)

. . . **magdalenae** (middle Magdalena Basin)

cc. Depth 3.1–3.6; caudal only scaled on base of lobes
d. Anal 10–12 branched rays; a longitudinal band up to end of caudal, with a horizontal humeral and a caudal spot
. . . atrisignum (Goyaz)
dd. Anal 12–14 branched rays; a vertical humeral spot; no caudal pattern
. . . notropoides (Chagres) (very close to *affinis*)

bb. Longitudinal scales more than 36 (rarely 36 in *affinis*)
e. Longtiduinal scales 37–38
f. Depth 3.25–3.75; not typical dentition
g. Anal (i)ii 9 or 10; snout-to-dorsal = dorsal to middle of peduncle or a little more
. . . brevipinnis (Upper Cauca)
gg. Anal (i)ii 10 or more; snout-to-dorsal = dorsal to adipose or a little more
h. Eye larger than interorbital, 2.5 in head; anal (i)ii 12 or 13; depth about 3.6
. . . affinis (= *simus* and *leuciscus*, Cauca, Strato, San Juan)
hh. Eye equals interorbital, about 3 in head; anal (i)ii 11, generally; depth 3.25–3.5 (a variable species with numerous populations)
. . . beni (Bolivia, Peru, Méta, Venezuela)
ff. Depth more than 4 in the standard length; mx. 4 or 5 teeth, pmx. dentition "typical" (anal short, (i)ii 10; dorsal black at tips; Sc. 4/38/2½; suborbital large)
. . . phasma (Cassiquiare)
ee. Longitudinal scales 39–41
i. Dentition not typical, same as *beni*; depth 3.5–3.75, anal (i)ii 11–13; peduncle slender; accessory scales or flaps on distal part of lateral line
. . . caucanus (Upper Cauca)
ii. Dentition "typical"
j. Depth about 3.33; scales about 39; dorsal only slightly nearer snout
k. Suborbital narrow; snout-to-dorsal = dorsal-to-adipose or a little more
. . . peruanus (eastern Peru)
kk. Suborbital large; snout-to-dorsal = dorsal to middle of peduncle or a little more
. . . muelleri (eastern Ecuador)
jj. Depth 3.9 to 4.3; scales 40–41; suborbital large; snout-to-dorsal = dorsal-to-adipose
. . . cochui sp. nov. (Iquitos surr.)
aa. Head normal, 3.15–3.75 in standard length (rarely 4 in *bolivari*), dentition not typical
l. Longitudinal scales 34–35 (depth 2.75–3, anal iii 11–12, a small caudal spot and some dark blotches on sides)
. . . amoenus (Orteguasa, Amaz. drainage)

TABLE I

No.	*Moenkhausia roberti* sp. nov. TYPE USNM	2	3	4	Ranges	*Astyanax kennedyi* sp. nov. TYPE USNM	2	3	Ranges	*Creagrutus cochui* sp. nov. TYPE USNM	2
Std. length (mm.)	48.8	48.0	43.3	40.2	40.2–48.8	37.9	35.1	28.1	28.1–37.9	71.5	56.3
Std. length/depth	2.49	2.55	2.76	2.56	2.46–2.76	2.92	3.28	3.56	2.92–3.56	4.26	3.91
Std. length/head	3.90	3.87	4.05	3.79	3.79–4.05	4.26	4.44	4.13	4.13–4.44	4.26	4.14
Head eye	3.29	3.27	3.82	3.95	3.27–3.95	2.87	2.82	2.52	2.52–2.87	3.43 (2.95)	3.24 (2.84)
Head interorb.	3.15	3.02	3.05	3.12	3.02–3.12	2.96	3.04	3.09	2.96–3.09	3.11	3.24
Head maxillary	3.39	3.10	2.97	3.12	2.97–3.39	2.78	3.04	3.09	2.78–3.09		
Head snout	4.17	4.14	4.12	4.08	4.08–4.17	4.45	4.65	4.25	4.25–4.65	5.6	5.04
Dorsal-to-caudal/ snout-to-dorsal	1.20	1.18	1.24	1.15	1.15–1.24	1.29	1.22	1.22	1.22–1.29	1.49	1.49
Std. length/depth pcd	8.4	8.9	9.2	8.9	8.4–9.2	9.7	10.6	10.0	9.7–10.6		
Peduncle/length depth & head depth)										1.88–2.18	1.97–2.16
Dorsal	ii 9	ii 9	ii 9	ii 9	ii 9	ii 9	ii 9	ii 9	ii 9	ii 8	ii 8
Anal	iii 23(1)	iii 22(1)	iii 23(1)	iii 22(1)	iii 22–23(1)	iii 21(1)	iii 21(1)	iii 21(1)	iii 21(1)	(i) ii 13	(i) ii 12
Sc. lat.	35	35	36	34	34–36	36	37	36?	36–37	40–41	41
Sc. tr.	5½ 4–4½	6–4½	5–4	5–4	5–6 4–4	5–4	5–4	5–4	5–4	4½/5	4½/5
Sc. predors.	0	10	0	0	0 (10)	10?	10	0	(0) 10	0	0 (irreg.)
Teeth pmx. c.	4	4	4	4	4	4	3	3	3–4	4	4
pmx. l.	5–6	5–6	5	5–6	5	5	5	5	5	2.4	2.4
mx.	2	2	2	2	2	3	3	2	2–3	3	2–3
dn.	4+11	4+9	4–8	4+1+7	4(+1)–7+10	4+1+4	4+1+5	4+?	4+1–4+5	3+1+1	3+1
Gill-rakers	8/12	8/12	8/11	8/13	8/11–13	9/14	9/14	9/14?	9/14	8/13	9/11

Table 1. Proportions and counts of types of *Moenkhausia roberti* sp. nov., *Astyanax kennedyi* sp. nov., and *Creagrutus cochui* sp. nov.

Figure 14. **Iguanodectes spilurus** (Günther).

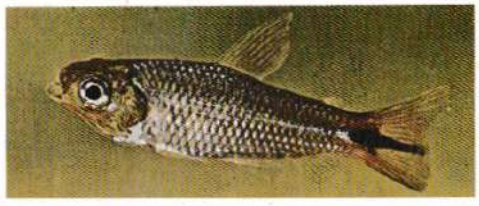
ll. Longitudinal scales more than 36
m. Lat. line scales 37–38
n. Depth 3 or slightly more in standard length (anal iii 11, a caudal spot)
. . . londonoi (Honda; see also *notropoides*)
nn. Depth 3.25–3.75
o. Head 3.33–3.5; anal iii 10–12; a caudal spot
. . . hildebrandi (Venezuela)
oo. Head 3.66 (–4); anal iii 8–10; no caudal spot
. . . bolivari (Venezuela)
mm. Lat. line scales 40–42 (depth 3.66–3.75; anal ii 11(i); a small caudal spot)
. . . anary (Madeira)

Figure 15. **Leporinus arcus** Eigenmann.

Figure 16a. A female of **Curimatopsis macrolepis** (Steindachner).

(21) **Phenacogaster pectinatus** (Cope). (Fig. 13).
9 specimens, largest 42.4 mm. in standard length.
This is a well-known Upper Amazonian species, easily identifiable by its body-form, numerous maxillary teeth and peculiar preventral scalation. The characters given for *beni* (Rio Guaporé Basin) and *microcticus* (Essequibo Basin, British Guiana) are largely overlapping those of *pectinatus*: they are perhaps members of a "Rassenkreis" or "racial group" and not separable at the species level.
The present specimens are clearly on the *beni* "side," having relatively few branched rays (36) and the lateral line not complete (Sc. (29) 39), but they are more elongate.
(22) **Iguanodectes spilurus** (Günther). (Fig. 14).
2 specimens, largest 57.5 mm. in standard length.
Böhlke (1954) has shown that *Iguanodectes tenuis* Cope (name much better known by aquarists), is a synonym of *spilurus* Günther.

Figure 16b. A male of the same species, to show the sexual dimorphism. Photograph by Harold Schultz.



(23) **Leporinus arcus** Eigenmann, 1912. (Fig. 15).

2 specimens, largest 61 mm. in standard length.

There is a rather confused situation with this species, which may easily be taken for *striatus*.

Inger (1956), recording it from Venezuela, gives the following differences between *striatus* and *arcus*:

Mid-lateral black stripe covering lower half of scale row bearing lateral line; profile flat or concave over orbit . . . *striatus* Kner

Mid-lateral black stripe covering entire width of lateral line scale; profile evenly convex over orbit . . . *arcus* Eigenmann

Judging from the scarce material at hand (*L. striatus*, or a subspecies of it: 13 specimens from Ecuador and 2 from Upper Rio Meta, none from the typical locality, which is Mato Grosso; *L. arcus*: 3 specimens from Surinam and the 2 present ones, none from the typical locality which is British Guiana), the diagnostic characters are as follow:

	L. striatus (Western South America populations).	*L. arcus*
Total length in mm. ...	Up to 175 or slightly more	Up to 400
Depth in the standard length ...	About 3.66 to 4	Slightly more than 3
Premaxillary teeth ...	3, rarely 4	4
Profile over eyes ...	Straight	Slightly convex
Dorsal fin	Between snout and adipose	Between snout and middle of peduncle

The respective patterns are as follow:

L. striatus has the longitudinal bands beginning on snout, of equal size, the inferior one often attenuated (not seen by Kner) and not divergent below on peduncle from the middle one (which is not as thin as said by Inger); the light bands (between stripes) golden; the fins not colored, except adipose and base of anal, which are black.

L. arcus has a prominent middle band (somewhat larger than a scale-row) beginning after the eye, with consequently the inferior band somewhat more below, arched, and more or less ending on anal level instead of ending symmetrically (relatively to the superior one) on peduncle as in *striatus*; the light bands (between stripes) rosy; the fins reddish or orange, with some dark on middle of adipose and base of anal; *a constant black spot at base of pectoral*, which is lower than the inferior band.

There are numerous citations of both forms in the literature, the study of which permits us to suspect the following distribution:

L. striatus Kner°, typical form
- Mato Grosso (Kner; Amaral Campos; Travassos)
- Paraguay (Steindachner; Eigenmann & Kennedy)
- State of Sao Paulo (Amaral Campos; Travassos-Parana and Sao Francisco Basins)
- ? Bolivia, Rio Beni Basin (Pearson)

L. striatus, septentrional form (if any)
- Colombia (Steindachner; Eigenmann & Ogle; Regan; Eigenmann)
- Ecuador (Boulenger; Böhlke)

L. arcus Eigenmann
- Venezuela (? Pellegrin; Inger)
- British Guiana (Eigenmann)
- Surinam (Hoedeman)
- ?Para (Cope; Eigenmann & Ogle; as *striatus*).

(5) See Gery, 1960 for principal references.

Eigenmann & Allen cited *L. striatus* from Peruvian Amazon: this is dubious, as the reference is based on specimens lost before any correct examination. It is likely that they refer to the present form, which, without much doubt, represents *L. arcus* as here defined.

(24) **Curimatopsis macrolepis** (Steindachner). (Figs. 16a and b).

1 specimen, female, 46.3 mm. in standard length.

This specimen is probably the largest known. Altogether the females are larger than the males. Other interesting dimorphic differences may be seen in the accompanying photographs. The one by Mr. Harald Schultz concerns a male from Igarapé Préto, near Leticia-Tabatinga, down-stream.

(25) **Curimata metae** Eigenmann. (Fig. 17).

1 specimen, 50.5 mm. in standard length.

Mouth sub-inferior; scales 5/38/5, slightly crenate; predorsal scarcely keeled, postdorsal rounded; preventral flattened, postventral scarcely keeled. This single specimen does not differ from those from Upper Rio Méta (typical locality).

(26) **Curimata (Semelcarinata) isognatha** juvenile ? Eigenmann & Eigenmann. (Fig. 18).

2 specimens, largest about 48.5 mm. in standard length.

This identification is rather uncertain, the specimens being small. Moreover the literature is scarce and the species was never figured.

Scales 12/50–52/8, denticulate, clearly smaller above and behind; predorsal rather keeled, postdorsal scarcely keeled, preventral not flattened, postventral keeled, the scales normal, not spinous.

The only difference between *Semelcarinata* (only one species) and *Curimata* nominal (chiefly the species *C. schomburgki* which is very near) is that in the former the preventral region would be not flattened, whereas in the latter the preventral region is flat, with the scales on sides bent at right angle. This is a rather subjective character, altogether not visible on small specimens.

Figure 17. Curimata metae Eigenmann.

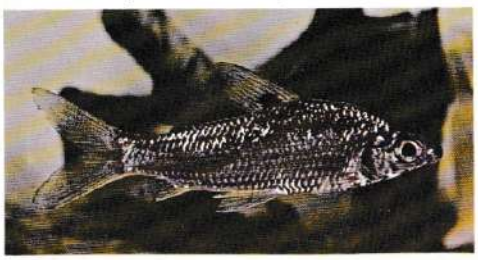


Figure 18. Curimata isognatha Eigenmann & Eigenmann?

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Rivulus

continued from page 19

Many years later, Dr. Charles M. Breder studied fishes in the Rio Tuyra-Chucunaque basin of Panama, a region covered by heavy rain-forest. There, along a forest trail at a considerable distance from any permanent stream, Breder found many rainwater-filled hoofstracks of cattle. And in a large number of these tiny muddy hoofstracks he found a very healthy, active *Rivulus!* Either these little fishes flip about generally, exploring the rain-soaked forest floor, or they have a marvelous built-in directional finder to lead them to even the smallest puddle of temporary water!

Another *Rivulus* story was told to me thirty-five years ago by the late Mr. John T. Nichols, then Curator of Fishes in the American Museum of Natural History in New York City, who had described *Rivulus heyei* from Saona Island off the southeastern coast of Hispaniola in the West Indies. Only the original unique type specimen of that species has yet been found, so far as I know. It was collected by the anthropologist, Mr. Heye, of the Museum of the American Indian. According to Nichols, Heye was doing some anthropological digging on Saona Island. In the afternoon, a water bucket was filled at a nearby spring or stream and the water partly used. No fish was seen. The next morning, when Heye went to use the water left in the bucket, there was a fish in it! That fish became the type specimen of *Rivulus heyei*. Whether the fish was dipped up the day before, and not seen, or whether it had flipped into the bucket at night, is anybody's guess. Knowing *Rivulus*, I suspect that the latter explanation is the true one.

Even in permanent waters where it is common, *Rivulus* is seldom seen, even when looked for. It especially likes any odd nooks and crannies into which it can force itself, often partly out of water, and the fish remains there quietly for long periods, watching carefully for mosquito larvae or other small prey which may come close. Masses of matted aquatic vegetation are the especial delight of some species of *Rivulus*, for the slender little fish can force itself through such masses with comparative ease, then remaining quietly wedged-in and watchful. Often it lies atop such masses of vegetation, or atop a water-lily leaf, half out of water. Many mosquito larvae congregate in such places, and *Rivulus* is just about the only fish within its geographical range which can reach the larvae in such protected places.

Some species of *Rivulus* are more active open-water swimmers than others, but all of them that I have kept alive in aquariums like to spend much time quietly hiding and awaiting whatever turns up. In many ways, they are similar in habits to the North American mudminnow, *Umbra*, which also likes to burrow into masses of vegetation and lie there quietly awaiting its prey.

Guppy Corner

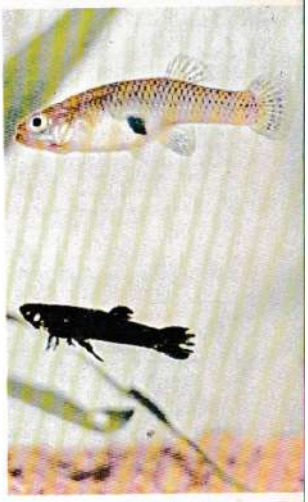
By Paul Hahnel

Guppy-Gambusia hybrid.

Q. 1. Is there any possibility of a fertile cross-mating of a Guppy and related livebearers of the genus *Gambusia*?
2. Has it ever been done before?
3. What were the characteristics of the offspring?
4. What are the absolute requirements (in numbers of aquaria and capacity) in firmly establishing a pure strain of Veiltail Guppies?
5. Which of the above tanks should be filtered and/or aerated?
6. Is it possible to establish a pure strain of Veiltails on a regular allowance of $20 to $30 a month over an indefinite period of time?

Richard Polomski, New York City, N. Y.

A. 1, 2 & 3. *To my knowledge this has never been done.*
4. *Six to ten aquaria with a capacity of 10 to 20 gallons each will be sufficient for the start. Some breeders have 50 to 100 tanks.*
5. *I advise that each tank be filtered and aerated.*
6. *Once you have all the equipment and fish, your cost will be only for food, light, and occasional replacement of equipment.*



Gambusia affinis holbrooki

Divided Tank.

Q. I have read in the past that direct contact is necessary in order for female Guppies to become pregnant, and I have also read that young females become pregnant merely by being in the tank with the father. I am interested in the tank divider system as a method of separating different batches of fry or young breeding pairs. Perhaps you are familiar with the type I mean: rigid plastic with holes to allow circulation of water through the entire tank. If I use this divider system, will having a breeding pair on one side have any effect on the fry on the other side — or would keeping males on one side and a breeding pair on the other side cause any undesired results to the female? This system seems eminently suitable to me since it will provide two 5-gallon sections of a tank while needing only one filter and heater, but it could spoil some carefully sought after results if the mere circulation of the water could make breeding selections that I cannot control. I will appreciate your advice in this matter.

Patricia Renfrew, Monterey Park, Calif.

A. *Dividing a tank by your system is for experiments only. I never tried it, so I could not tell you what the results would be. My best advice to you is to separate the sexes before they are more than six weeks old. Then when the virgin females are three months old you put a male into their tank. As far as I know, it is not proven that free sperm in the water will fertilize a female Guppy.*

Salts From The Seven Seas

By Alfred A. Schultz

Q. 1. Can I buy the "synthetic resin" filter carbon mentioned on page 48 of *Saltwater Aquarium Fish* anywhere in Europe? It does not appear to be available in England. Do you think they are essential to a really successful aquarium?
2. In an English magazine subsand filters are advertised as "recommended by T.F.H. for marine aquaria." I was surprised to find no mention in Axelrod and Vorderwinkler's book. Is a subsand filter *alone* suitable for a marine aquarium or can it just be used to keep the sand fresh? I have found it impossible to prevent even half an inch of sand from becoming polluted and now have no sand in my tank. I have stuck sand to the bottom of the tank using a cement which is inert in water. This is satisfactory but does not look very good.
3. In the "Salts from the Seven Seas" column you recommend putting pennies in a marine tank. What is the reason for it? I thought most metals were poisonous to fish, although I know there is a filter medium which uses silver-coated grains. What do you call a "penny?" Is it a silver coin?

Nikolaos, Famagusta, Cyprus

A. 1. *It can be ordered by mail from the U.S.A., but it is not an absolute necessity.*
2. *A subsand filter may be used, but in addition I would use a good outside filter. If your feeding conditions are correct, there should be no reason for the sand to become polluted.*
3. *A penny in the U.S. is a copper coin. When placed in salt water it releases copper in small amounts, enough to be a cure for many ailments but not enough to be toxic to the fish.*

French Angel Photo by Douglas Faulkner.

Q. 1. I have a food problem. Would Damselfish, Clownfish, and French Angels live on *Tubifex* worms, brine shrimp (frozen), and dried shrimp?
2. How many small marine fishes can I keep in a marine tank with an undergravel filter?
3. How would you treat a regular freshwater tank to suit marine fish?
Jeffrey Hoffman, Los Angeles, Calif.
A. 1. *Tubifex worms can be fed to your fishes. Make sure the worms are well washed and alive, then feed a few worms at a time. Overfeeding can be disastrous, because the worms die very quickly in the salt water. Frozen brine shrimp and dried shrimp are acceptable to some fishes.*
2. *Four 1-inch fish can be kept in a 5-gallon tank which is well filtered and aerated.*
3. *Give three washes of fresh water, leaving each change of water standing for 24 hours. Then dry the tank and coat each corner with aquarium sealer. When it has set, add your salt water.*