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VARIATION, LIFE COLORS, AND ECOLOGY OF *CICHLASOMA*  
*CALLOLEPIS*, A CICHLID FISH FROM SOUTHERN MEXICO,  
WITH A DISCUSSION OF THE *THORICHTHYS*  
SPECIES GROUP

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THE American cichlids classified in or near the genus *Cichlasoma* have differentiated chiefly in the faunally unsaturated waters of Middle America (R. R. Miller, 1959: 195). In the region between southern México and the Great Lakes of Nicaragua, especially on the Atlantic slope, these fishes have undergone considerable radiation to form a diverse complex, still imperfectly understood. One of the most distinctive phyletic lines within the genus *Cichlasoma* is the group to which Meek (1904: 222) assigned the generic name *Thorichthys* (adopted also by N. Miller, 1907: 121) and which Regan (1906-08: 26) included as one of five "Sections" of *Cichlasoma*. Subsequently, Meek (1907: 118, 126) regarded *Thorichthys* as a subgenus of *Cichlasoma*, an action which we are inclined to accept. However, until a thorough revisionary study has been made of the American cichlids, we prefer to regard *Thorichthys* as a species group only.

The fish that is the subject of this paper is one which has been known for more than half a century solely from the two type specimens in the British Museum (Natural History). Although *Cichlasoma callolepis* was described by Regan in the genus *Heros*, he promptly (1905: 321-22) referred it to *Cichlasoma* and later (1906-08: Pl. 2, Fig. 2) figured one of the types and assigned the species to his *Thorichthys* Section.

The following combination of characters distinguishes the *Thorichthys* group from other cichlids referable to *Cichlasoma* (including *Heros* and *Herichthys*): (1) the absence of scales at the bases of the soft dorsal and anal fins; (2) a truncate to lunate caudal fin, the lobes of which are typically produced into filaments in the adult; (3) the ex-

tension of the pectoral fin backward to or usually well beyond the origin of the anal fin; (4) a produced snout, with the preorbital region typically very deep; (5) a color pattern comprising five or six vertical bars behind the head (the first 4 prominent), the third with a blackish blotch on or below the lateral line; (6) a red (varying from salmon to rose) intermandibular region; (7) the subopercle typically with a conspicuous blackish blotch; (8) the head and anterior body parts usually with prominent blue spots; and (9) the consistent development of eight sensory pores (five on the mandible) between the tip of the chin and the angle of the preopercle.<sup>1</sup> The known species occur only on the Atlantic slope of Middle America.

Study of fresh material of *C. callolepis* shows that this species is one of the most distinctive in the complex. It is, for example, the only one known to us in which the characteristic subopercular blotch is either absent or is at best represented only by a trace of black (Pl. I). This species is also more slender-bodied and the preorbital is not quite as deep as in the other species. Its life colors (see below) are completely diagnostic. Despite these divergencies, *C. callolepis* possesses most of the characters of the *Thorichthys* group, as listed above, and agrees well in vertebral number with the known variation within that complex (Table 2). It is sympatric with a species here tentatively identified as *C. aureum*, also a member of the *Thorichthys* complex; the two are compared in Table 1 and Plate I.

Species that are currently assignable to the *Thorichthys* group have been described as follows:

*Heros aureus* Günther (1862:292; 1869:455, Pl. 73, Fig. 2), from Lago de Izabal and Río Motagua, Guatemala.

*Heros affinis* Günther (1862:292-93; 1869:455-56, Pl. 79, Fig. 1), from Lago del Petén, El Petén, Guatemala.

*Heros helleri* Steindachner (1864:64, Pl. 4, Fig. 1), from Río Teapa at Teapa, Tabasco, México.

*Heros callolepis* Regan (1904:258-59; 1906-08:26, Pl. 2, Fig. 2), from Santo Domingo de Guzmán, in the headwaters of Río Coatzacoalcos, Oaxaca, México.

*Heros ellioti* Meek (1904:223-25, Fig. 72), from Motzorongo, Veracruz, México, in the upper part of the basin of the Río Papaloapan.

*Thorichthys helleri meeki* Brind (1918:119-20, 2 figs.), from Progreso, Yucatán, México (see Hubbs, 1936:259-60, for discussion of the name, validity of the species, and illustration).

*Cichlasoma hyorhynchum* Hubbs (1935:15-17, Pl. 3, Fig. 2), from Río San

<sup>1</sup> This character was discovered by Jorge Carranza, who plans to publish a detailed account, with drawings. He advises us that he has noted this condition outside the *Thorichthys* group only in *C. salvini*, which otherwise bears little resemblance to that phyletic line.

Pedro de Mártir, a tributary of Río Usumacinta, at El Paso de los Caballos, El Petén, Guatemala.

*Cichlasoma champotonis* Hubbs (1936:257-59, Pl. 11, Fig. 1), from Río Champotón, Campeche, México (near the base of the Yucatán Peninsula).

Both *C. helleri* and *C. ellioti* have been synonymized with *C. aureum* (Regan, 1905: 320), but Hubbs (1936: 257) indicated that *ellioti* and *aureum* are distinguishable and we provisionally recognize *helleri*, pending further study. N. Miller (1907: 121) recognized both *T. helleri* and *T. ellioti*, recording them as allopatric populations from the Atlantic slope of Guatemala. Meek (1908: 142) listed *C. ellioti* from Río Motagua at El Rancho, Guatemala, the same drainage from which some of N. Miller's specimens were taken. The *Thorichthys* of the Río Motagua and of Lago de Izabal, just to the north, are certainly very similar, if not identical; samples from both drainages have been assigned to the same species, *Cichlasoma aureum* (see above). We regard the records of *helleri* and *ellioti* from Guatemala, as listed above, to be misidentifications; their correct determination awaits further study.

*Cichlasoma rostratum* (Gill and Bransford) and *C. longimanus* (Günther), described from Lago Nicaragua, were placed by Meek (1907: 126-27) in *Thorichthys*, but Regan (1906-08: 23-24) put them in his "Section" *Astatheros* (preoccupied by *Amphilophus*). We agree that these two species should be excluded from the *Thorichthys* group, since they do not conform to the diagnosis presented above (although both have a long pectoral fin, deep preorbital, and dark lateral blotch); neither does *C. friedrichstahli* (Heckel), tentatively referred to *Thorichthys* by Meek (1904: 222).

In preparing the diagnosis of the *Thorichthys* species group, we have studied specimens (including types or topotypes) of all the described forms listed above, as well as material of some undescribed ones from México and Guatemala.

MATERIAL.—This study of variation in *Cichlasoma callolepis* (Regan) is based on 46 juvenile to adult specimens, 32.5 to 86 mm. in standard length. A series of 43 fish (UMMZ 178845) was collected in the Río Almoloya, a southern tributary of the Río Coatzacoalcos, at the Trans-Isthmian highway crossing (Hwy. 185) about 20 miles north of its southern terminus; 95° 01' W Long., 16° 45' N Lat., Oaxaca, México. They were taken on February 25, 1959, by R. R. Miller and R. Jack Schultz. An additional adult, now in the U. S. National Museum (USNM 196171), was taken at the same locality on

March 27, 1957, by R. R. and Malcolm Miller. In addition, data on the 2 type specimens (BM No. 1890.10.10.112-113), kindly examined for us by Carl L. Hubbs, are included.

The sympatric *Thorichthys* representative (tentatively referred to *Cichlasoma aureum*) used for comparison with *C. callolepis* (Table 1) is based on a young and a juvenile (UMMZ 178530) and on 39 juvenile to adult specimens (UMMZ 178846) taken at the same station on the Río Almoloya in 1957 and 1959, respectively.

The syntypes of *Cichlasoma callolepis* were collected by Dr. A. C.

TABLE 1  
COMPARISON BETWEEN TWO SYMPATRIC SPECIES OF THE *Thorichthys*  
SPECIES GROUP OF *Cichlasoma*

Character	<i>C. "aureum"</i>	<i>C. callolepis</i>
Pectoral fin extension . . .	To beyond third body bar, above bases of anal spines V-VII	To not more than middle of third body bar, above anal spines II-IV
Life colors:		
Throat region . . . . .	Blood-red	Reddish-orange
Lower sides and abdomen . . . . .	Reddish	With longitudinal rows of orange spots
Spot on subopercle . . . . .	Prominent	Obsolescent or, usually, absent
Blue spots on head . . . . .	Numerous, generally larger, widely scattered	A row under eye†; others on preopercle
Body depth into standard length* . . . . .	2.1-2.3, ave. 2.2	2.3-2.55, ave. 2.4
Pelvic fin extension . . . . .	Well beyond anterior anal spines	To anterior 1-3 anal spines
Pectoral length into head length* . . . . .	1.0-1.2, ave. 1.1	1.2-1.35, ave. 1.3
Last D spine into head length* . . . . .	0.95-2.25, ave. 2.0	2.15-2.6, ave. 2.4
Gill rakers on first arch. . . . .	10-13, ave. 11.7	12-14, ave. 12.9

† In one fish there is a single spot below the suborbital row.

\* Based on stepped measurements (with dividers) of 20 specimens of each species. Standard lengths: *C. "aureum"*, 46-72, ave. 57 mm.; *C. callolepis*, 53-74, ave. 62 mm.

Buller in 1890 at "San Domingo de Guzman," Oaxaca. This is evidently the present Indian village of Santo Domingo Petapa, about 9 mi WNW of the Río Almoloya highway crossing; it lies at a higher elevation (about 900 feet) on a separate tributary of the Río Coatzacoalcos.

**COLORATION.**—The colors and color pattern of freshly preserved specimens of *Cichlasoma callolepis* were noted in the field and were recorded by kodachrome transparencies. In life, adults have the lower sides, up to about the level of the upper angle of the gill opening, marked by prominent deep-orange spots arranged in horizontal rows that extend from the opercle to the base of the caudal fin; the same markings are present on the abdomen. This pattern is represented by pale spots on the smaller syntype (Regan, 1906–08: Pl. 2, Fig. 2). A few spots of the same color may occur on the lower half of the opercle and forward, on the lower edge of the head, to the isthmus. The throat region is bright reddish-orange, marked in wavy streaks; after preservation, this region takes on a blotched or mottled aspect. Pale, chalky-blue spots, 4 to 7 in number, occur in a row, following the curvature of the orbit, directly under the eye and, in greater number, on the preopercle; such spots also are present on the sides (largely above the rows of orange spots) where they are particularly conspicuous around the black blotch that lies beneath the posterior part of the spinous dorsal fin. Both spinous and soft dorsal fins are narrowly margined with orange, a marking that is rendered more conspicuous by the presence of a broader white band below. The anal and pelvic fins, and the base of the caudal fin, are also orange, and the dorsal fins, below the white band, show a wash of orange. The anal fin also has pale blue spots. Both the pectoral fin and a large part of the caudal fin are olivaceous. Much of the head below the eye is pale. There is at most only a trace of the black, subopercular blotch that is characteristic of the *Thorichthys* species group; it is weakly shown (Pl. I) just above the upper part of the base of the pectoral fin and is comparatively well developed (for this species) on only 2 of the 46 specimens. No remnant of this mark appears on either type specimen. After fixation in formalin and preservation in 70 per cent ethyl alcohol, all of the pale blue spots turn black.

The broad vertical bars on the sides, typically 6 in number, are grayish except for the third, which is accentuated by the prominent black blotch (Pl. I).

**VARIATION.**—*Cichlasoma callolepis* shows the following meristic variation: Dorsal spines, XV (4), XVI (41), XVII (1); dorsal rays, 7 (1),

8 (9), 9 (33), 10 (3); anal spines, VI (2), VII (44); anal rays, 6 (3), 7 (41), 8 (2); pectoral rays (including all rudiments), 13 (2), 14 (21), 15 (22); and principal caudal rays, 15 (4), 16 (39), 17 (1). The pelvic fins invariably have 1 spine and 5 soft rays. The total number of vertebrae (including the hypural complex) is 27 or 28 (Table 2). The total number of gill rakers on the first arch of 20 specimens is: 12 (4), 13 (14), 14 (2). Scales in longitudinal series, 27 (1), 28 (8), 29

TABLE 2  
VERTEBRAL VARIATION IN THE *Thorichthys* SPECIES GROUP  
THE SPECIES ARE ARRANGED FROM NORTHWEST TO SOUTHEAST

Species	Total Vertebrae				No.	Ave.
	26	27	28	29		
<i>C. ellioti</i> .....	..	..	5	1	6	28.17
<i>C. callolepis</i> .....	..	3	27	..	30	27.90
<i>C. "aureum"</i> .....	..	6	20	1	27	27.81
<i>C. helleri</i> .....	..	1	6	..	7	27.86
<i>C. champotonis</i> .....	..	1	32	..	33	27.97
<i>C. affine</i> .....	..	3	17	..	20	27.85
<i>C. hyorhynchum</i> .....	1	19	1	..	21	27.00
<i>C. sp.</i> .....	..	2	13	..	15	27.87
<i>C. meeki</i> .....	1	25	7	..	33	27.18
<i>C. aureum</i> .....	..	3	18	1	22	27.91

(22), 30 (1); pored scales in upper lateral line, 18 (6), 19 (20), 20 (14), 21 (1), and in lower lateral line, 9 (7), 10 (20), 11 (11), 12 (3); scales around caudal peduncle, 15 (1), 16 (14), 17 (15); transverse scales, 4½ (28), 5½ (5) above lateral line and 11 (17), 12 (16) below lateral line.

The lower lip (in 43 specimens, UMMZ 178845) has a weak frenum that is not wider than the distance between the anterior pair of mandibular pores except in 3 specimens; in 4 fish there is almost no frenum, and Regan (1904: 259) wrote that the 2 types have a "strong continuous fold." The preoperculo-mandibular pores, from the angle of the preopercle to the tip of the mandible, number 8 on each side of 19 specimens and 10 on the left and 9 on the right side of 1 fish.

HABITAT.—Toward the end of the dry season (February-March), the Río Almoloya was a clear winding stream of moderate gradient that averaged about 20 feet wide with pools reaching a maximum depth of 8 or 9 feet. The river consisted of swift, rocky riffles alternating with

long pools and some sluice-like sections. About a fourth of the stream was shaded by marginal vegetation. Although clear, the water was easily roiled in the pools (though not on the riffles) because the bottom included much sand and silt, alternating with rocks and boulders. There was also some bedrock. The banks were steep, and trees and brush were common. The only aquatic vegetation noted during the two visits (1957 and 1959) was a green alga and local, marginal growths of cress (*Nasturtium*). The current was swift in places, varying to slight along the margins of the broader pools. Water and air temperatures on March 27, 1957, at 7 P.M., were estimated to be 80° F. and 75° F., respectively. The elevation is about 750 feet.

The Río Almoloya rises on the northern slopes of the mountains that lie south of the railroad station of Almoloya. These form a spur of the range that rises rapidly in elevation to the west and which forms the separation between waters draining northward to the Atlantic from those flowing southward to the Pacific. The divide is perhaps 5 miles to the southwest of the Highway 185 crossing. The river follows a northerly course and eventually joins the Río Coatzacoalcos, the major stream that flows from the Isthmus of Tehuantepec to the Gulf of Mexico.

ASSOCIATES.—A rather rich and diverse fish fauna has been sampled at the Río Almoloya. Included are 18 species in 8 families: Characidae (*Astyanax*), Pimelodidae (*Rhamdia*), Belonidae (*Strongylura*), Poeciliidae (2 spp. of *Mollienesia*, *Pseudoxiphophorus*, 2 spp. of *Poeciliopsis*), Atherinidae (*Archomenidia* and *Xenatherina*), Mugilidae (*Agonostomus*), Cichlidae (6 spp. of *Cichlasoma*), and Eleotridae (*Gobiomorus*).

DISTRIBUTION.—*Cichlasoma callolepis* appears to be confined to the headwater tributaries of the Río Coatzacoalcos drainage, on the northern slope of the Isthmus of Tehuantepec, Oaxaca. It is known thus far from only two localities in this region, although more widespread collecting should reveal its presence throughout the area.

The cichlids belonging to the *Thorichthys* species group are found on the Atlantic slope of Middle America, in fresh to brackish water, from the Río Antigua drainage of southern Veracruz eastward to the Río Motagua basin of southeastern Guatemala and northwestern Honduras.

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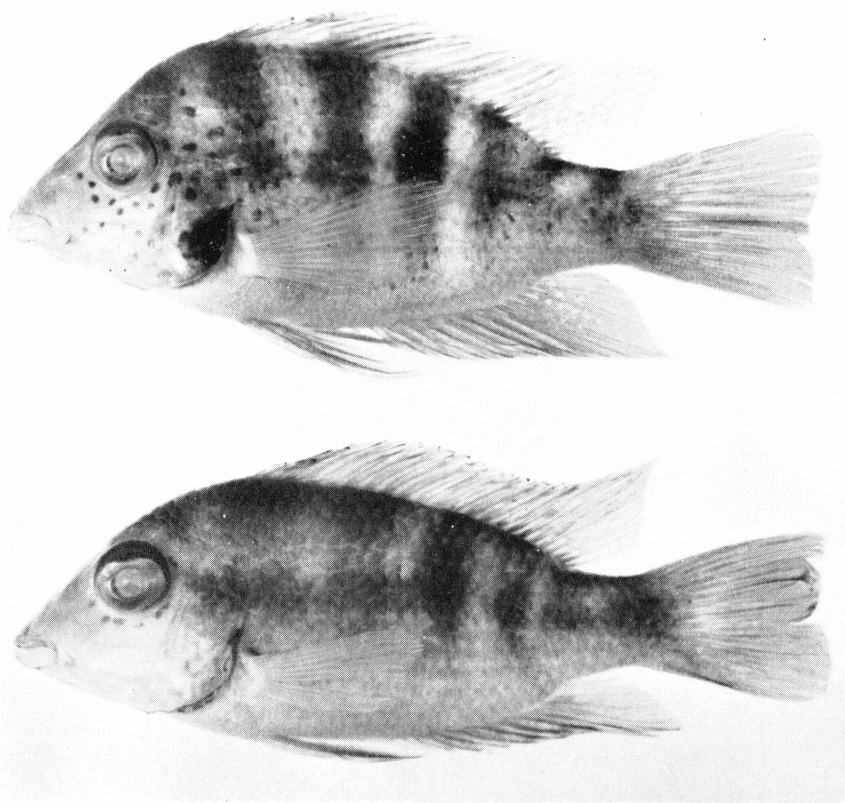
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## PLATE I

Two sympatric species of *Cichlasoma* from Río Almoloya, Oaxaca, México. Above, *C. "aureum"*, 72.5 mm. S.L., UMMZ 178846; below, *C. callolepis*, 74.0 mm. S.L., UMMZ 178845.