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Western Atlantic Clinid Fish
Malacoctenus triangulatus with a
Revised Key to the
Atlantic Species of *Malacoctenus*

VICTOR G. SPRINGER
and
MARTIN F. GOMON

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 200

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ABSTRACT

Springer, Victor G., and Martin F. Gomon. Variation in the Western Atlantic Clinid Fish *Malacoctenus triangulatus* with a Revised Key to the Atlantic Species of *Malacoctenus*. *Smithsonian Contributions to Zoology*, number 200, 11 pages, 3 figures, 3 tables, 1975.—*Malacoctenus triangulatus* occurs along the shallow coastlines of the Caribbean Sea, southwestern Gulf of Mexico, southern Florida, Bahama Islands, Fernando de Noronja and Bahia, Brazil. Data on meristic characters and their variation are reported for many populations of *M. triangulatus*. The species is highly variable but shifts in means for various meristic characters tend to follow a geographic pattern; however, several of the means for the Trinidad and Venezuela populations stand out from those of nearby populations. A key is given to the Atlantic species of *Malacoctenus*, following Springer (1958), but employing additional characters.

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Variation in the Western Atlantic Clinid Fish *Malacoctenus triangulatus* with a Revised Key to the Atlantic Species of *Malacoctenus*

Victor G. Springer
and Martin F. Gomon

Introduction

Springer (1958)¹ described *Malacoctenus triangulatus*. He had too few specimens to permit analysis of geographic variation. Since 1958, numerous specimens of *M. triangulatus* from many localities have become available. Study of these specimens indicates that *M. triangulatus* is geographically variable. Reporting this variation is desirable, not only because it expands the description of the species, but also because it represents the most comprehensive account detailing meristic variation in a shorefish of the tropical western Atlantic. The description of this variation can serve as a basis for comparison with other, similarly distributed species.

Early in our study we believed that we were dealing with a complex of related, allopatric species, but as analysis of our data progressed, the differ-

ences separating the supposed species decreased. It may well be that other presently recognized, closely related, allopatric species of tropical western Atlantic shorefishes may be synonymized when more complete geographic representation of the species is available.

INSTITUTIONAL ABBREVIATIONS.—The following abbreviations denote the institutions that furnished the additional material for the present study: AMNH=American Museum of Natural History, New York City; ANSP=Academy of Natural Sciences of Philadelphia; FAU=Florida Atlantic University, Boca Raton; FMNH=Field Museum of Natural History, Chicago; FSM=Florida State Museum, Gainesville; GCRL=Gulf Coast Research Laboratory, Ocean Springs, Mississippi; LACM=Los Angeles County Museum of Natural History; UMML=Rosenstiel School of Marine and Atmospheric Sciences, University of Miami; USNM=National Museum of Natural History (formerly in United States National Museum), Smithsonian Institution.

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Victor G. Springer, Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560. Martin F. Gomon, University of Miami, Rosenstiel School of Marine and Atmospheric Sciences, Miami, Florida 33149.

¹The date of publication on the serial is December 1958, but the journal was not actually mailed until sometime in June 1959.

C. E. Dawson (GCRL), R. J. Lavenberg (LACM), C. R. Robins (UMML), and F. Cervigon (Universidad de Oriente, Porlamar, Venezuela).

A. George, University of Maryland, assisted in the recording of data; F. J. McKinney and E. N. Gramblin (USNM) made many of the radiographs.

The manuscript benefited from critical reviews by J. E. Böhlke, C. R. Robins, and W. R. Smith-Vaniz, and from discussions with B. B. Collette, T. H. Fraser, and R. H. Gibbs, Jr. Some of these colleagues disagreed with certain of the speculations that appear in the text. The senior author takes full responsibility for all subjective matter that this study includes.

Methods

Fin-ray and scale counts based on specimens reported by Springer (1958) are incorporated with those taken from the new material (see "Material Examined"). Fin-ray and vertebral counts on the new material were taken from radiographs. Fin-rays were counted following the methods of Springer (1958) with the following exception: wherever a dorsal- or anal-fin pterygiophore appeared without a corresponding fin ray, the ray was counted as being present. Such "blank" pterygiophores occurred in only 11 of the approximately 500 specimens examined by radiograph. We do not believe, therefore, that combining Springer's original counts, from approximately 150 specimens, with the new counts has affected the averages or our conclusions based on them.

Only caudal vertebrae are reported; the first caudal vertebra is the anteriormost vertebra bearing a hemal spine. There are consistently 10 pre-caudal vertebrae in *M. triangulatus*.

Cirri counts include the number of free cirri tips (the cirri are normally simple, but where branched each branch was counted). The number of cirri increases slightly with size but appears to stabilize at about 30 mm SL. For this reason we include counts of only those specimens 30 mm SL or larger.

In Tables 1-3 and Figure 2 the localities were arranged in a geographic sequence intended to reflect the essentially circular configuration of the coastline where *M. triangulatus* occurs. We began with Florida and the Bahamas in the north, progressed south, then east, south, west (along northern South America) and, finally, north along

the Central American coast. Fernando de Noronja and Bahia, Brazil, followed at the end. Because of the coastline's circularity we could have begun the sequence of localities with almost any locality. No arrangement was completely satisfactory in reflecting the trends of the means. Plotting the means for the various characters on maps (which we did) has some advantages that are helpful in interpreting the data, but also has disadvantages in presenting the data in publication. We have also presented the means of several characters graphically (Figure 2). This method enables one to compare at a glance how several characters correlate, and also how the means shift for each character.

Distribution

Malacoctenus triangulatus occurs in the clear, shallow (to about 10 meters), tropical-subtropical waters of the western Atlantic from the northern Bahamas south to Bahia, Brazil (Figure 1). Rocks and corals are almost always, if not always, a dominant feature of its habitat. The absences of the species on the northern coast of South America between Trinidad and Fernando de Noronja and from all but the southwestern portion of the Gulf of Mexico are undoubtedly real and probably result from a lack of suitable habitat in these areas. Many of the reef-fish species of the Caribbean region are also absent from these same areas. The apparent absence of *M. triangulatus* from other long expanses of Caribbean coast (for instance, between Cubagua, Venezuela, and Santa Marta, Columbia; from western Cuba to eastern Hispaniola) probably indicates lack of collecting.

There is little known about the life history of *M. triangulatus* that might contribute toward an understanding of its distribution, for instance, whether it has pelagic stages during its life history. Even if it does not, the adults might be wafted. If the species owes its distribution to the prevailing ocean currents, it probably entered the Caribbean from the Brazilian coast and spread west and northward. Fernando de Noronja lies in the path of the South Equatorial Current, which flows east to west. This current splits at the eastern hump of South America and sends branches flowing both south along the Brazilian coast and northwest into the Caribbean. Currents in the Caribbean generally flow westward from the Lesser Antillean chain. A

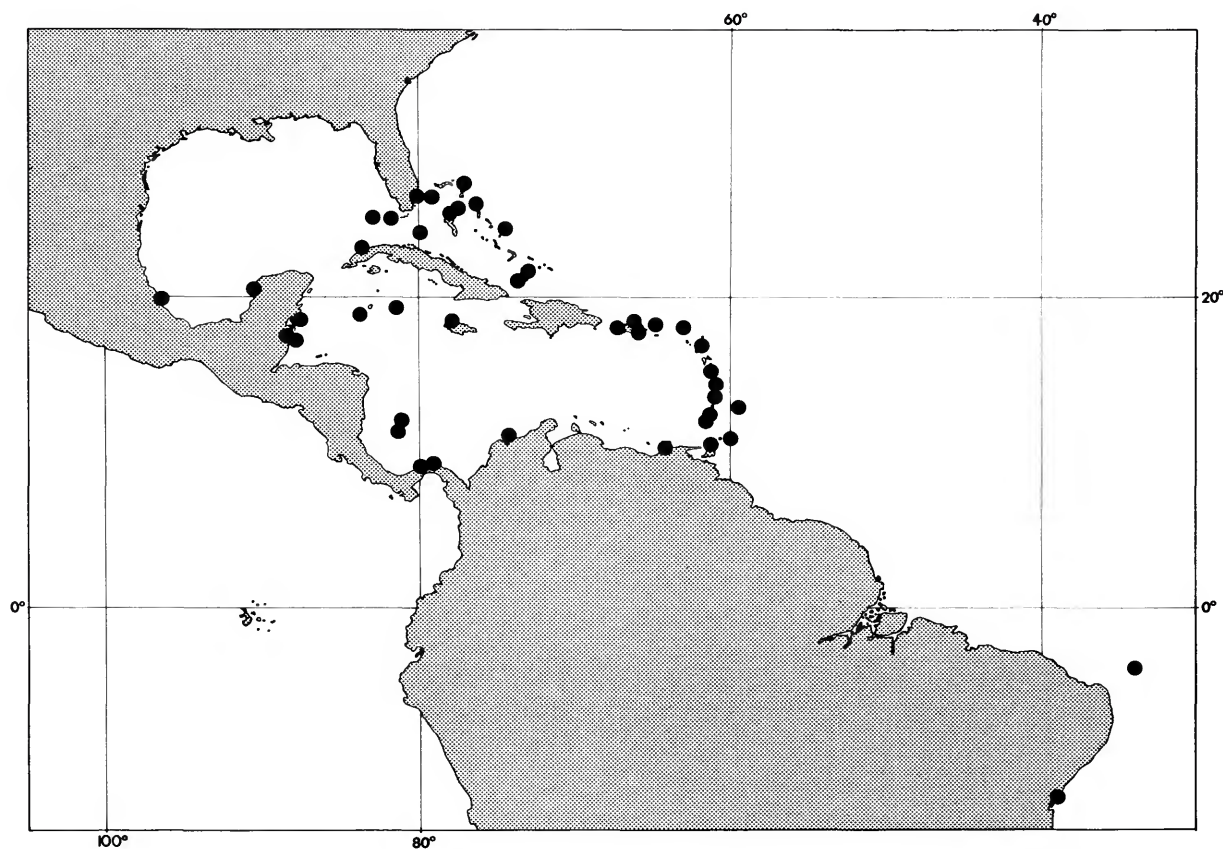


FIGURE 1.—Distribution of *Malacoctenus triangulatus* based on specimens examined.

gyre forms along the Panamanian coast, but the major flow passes north through the Yucatan channel and continues both northwestward into the Gulf of Mexico and northeastward through the Straits of Florida and up the coast of Florida (the Gulf Stream). There is also a prevailing northwestward flowing current, extending from the northern Lesser Antilles, that skirts the eastern coasts of the Bahama Islands. In this scheme there would be little chance for the northern populations to furnish colonizers to the south.

Malacoctenus triangulatus, however, may have had a more continuous distribution along the northeastern coast of South America in past geologic periods. If so the Fernando de Noronja and Brazilian populations would represent relict populations. There is some divergence, particularly in color pattern, exhibited by both of these southern-

most populations, and one or both may be expected to speciate ultimately. If, however, the prevailing currents do carry introductions of *M. triangulatus* from these southern populations into the Caribbean, complete differentiation of the southern populations, as distinct from the northern populations, may never transpire.

Results

Our findings can, for the most part, be derived by examination of Tables 1-3 and Figure 2, where the shifts and trends of the means for meristic characters are readily observable. The Trinidad and Venezuelan populations stand out for their high numbers of dorsal-fin spines, total dorsal-fin elements and caudal vertebrae, and relatively high numbers of nape cirri. These two populations

TABLE 3.—Total number of nape cirri (both sides) in specimens, 30 mm SL and larger, of *Malacoctenus triangulatus*

Locality	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	\bar{x}
FLORIDA																				
Broward County	1	1	1	2	9	9	4	1												12.3
Monroe County			1	2	4	6	5													12.7
BAHAMAS																				
Green Turtle Cay							5	3	4											14.9
New Providence				1	2	1	11	5	3	1	1									14.4
Eleuthera				1	-	1	3	1	2	1										14.4
Andros							5	2	5	1	1									15.4
Cay Sal Bank					1	-	1													13.0
Little Inagua				1	1	5	12	6	5	2										14.5
Great Inagua						4	5	3	1											14.1
MISSTERIOSA BANK	1																			
GRAND CAYMAN		1	1	2	5	4	9													12.7
JAMAICA								4	2											15.3
PUERTO RICO								1	-	1										16.0
ST. THOMAS							1													
ANGUILLA											1									
ST. BARTHELEMY							2	1	2	2	1	-	1							16.3
ANTIGUA											1									
DOMINICA							1	-	-	-	2	1	2							18.2
MARTINIQUE											1	1	1							19.5
ST. LUCIA							1	-	1	3	5	-	2							17.6
BEQUIA											1	-	-	-	-	-	-	-	-	22.0
LITTLE ST. VINCENT									1	-	-	-	1	-	-	1				19.7
GRENADA									3	2	5	2	5	-	1					18.4
TOBAGO			1	-	-	1	1	1	2	3	2	4	2	1						17.1
TRINIDAD									1	4	8	5	-	2						18.2
VENEZUELA				2	-	-	2	1	3	2	4	1	2							16.4
PANAMA									1	-	1	-	1							18.0
COURTOWN CAY								1	1											15.5
BELIZE					1	3	19	4	2	1										14.2
BANCO CHINCHORRO						1	1													14.5
FERNANDO DE NORONJA			4	8	7	19														13.1
BRAZIL (Bahia)				1	1	13	2													13.9

misled us initially into believing that we were working with a complex of species. However, it can be noted that there is a slight trend toward higher mean numbers of the same meristic characters in the northern populations—particularly those of Barbados and Tobago, and to a much lesser degree, Grenada—that are nearest to Trinidad and Venezuela.

Aside from the Trinidad and Venezuelan populations, the means, except for nape cirri, tend to be highest in the northernmost, lower in the northwesternmost, and lowest in the eastern (Lesser Antilles) populations.

The means for the Fernando de Noronja and Bahia populations are not close for most characters, and there is no overlap in the ranges for lateral-line scales between these two populations. In no character, however, do these two populations stand out from the Caribbean populations.

Springer (1958) reported meristic variation in dorsal- and anal-fin rays in the Caribbean populations of *Labrisomus nuchipinnis* and *Malacoctenus gilli*. The shifts in averages for the various populations of these two species show little relationship to each other or to those of *M. triangulatus*.

A re-evaluation of variation in *L. nuchipinnis* and *M. gilli*, based on the greater amount of material now available, perhaps would provide a more meaningful basis for comparison with *M. triangulatus*.

COLOR PATTERN OF PRESERVED SPECIMENS.—Although there is much variation in color pattern within all populations of *M. triangulatus*, some populations exhibit differences in pigmentation that are shared by many or most individuals of the same population. For example, sexual dichromatism is usually marked in specimens from the northern and western portions of the species' range (Florida south to northern Lesser Antilles; Central America). Males possess rather uniformly dark, triangular saddle markings on the body, which often have irregularly intensified anterior and posterior margins. The marginal intensifications may be present as poorly defined spots, which are never a prominent feature of the color pattern. In females (Figure 3a) the saddle markings may be less prominent and less well defined than in males, and often enclose small irregular, pale marks, which are rarely present in males. Marginal intensifications of the saddles are usually even less obvious

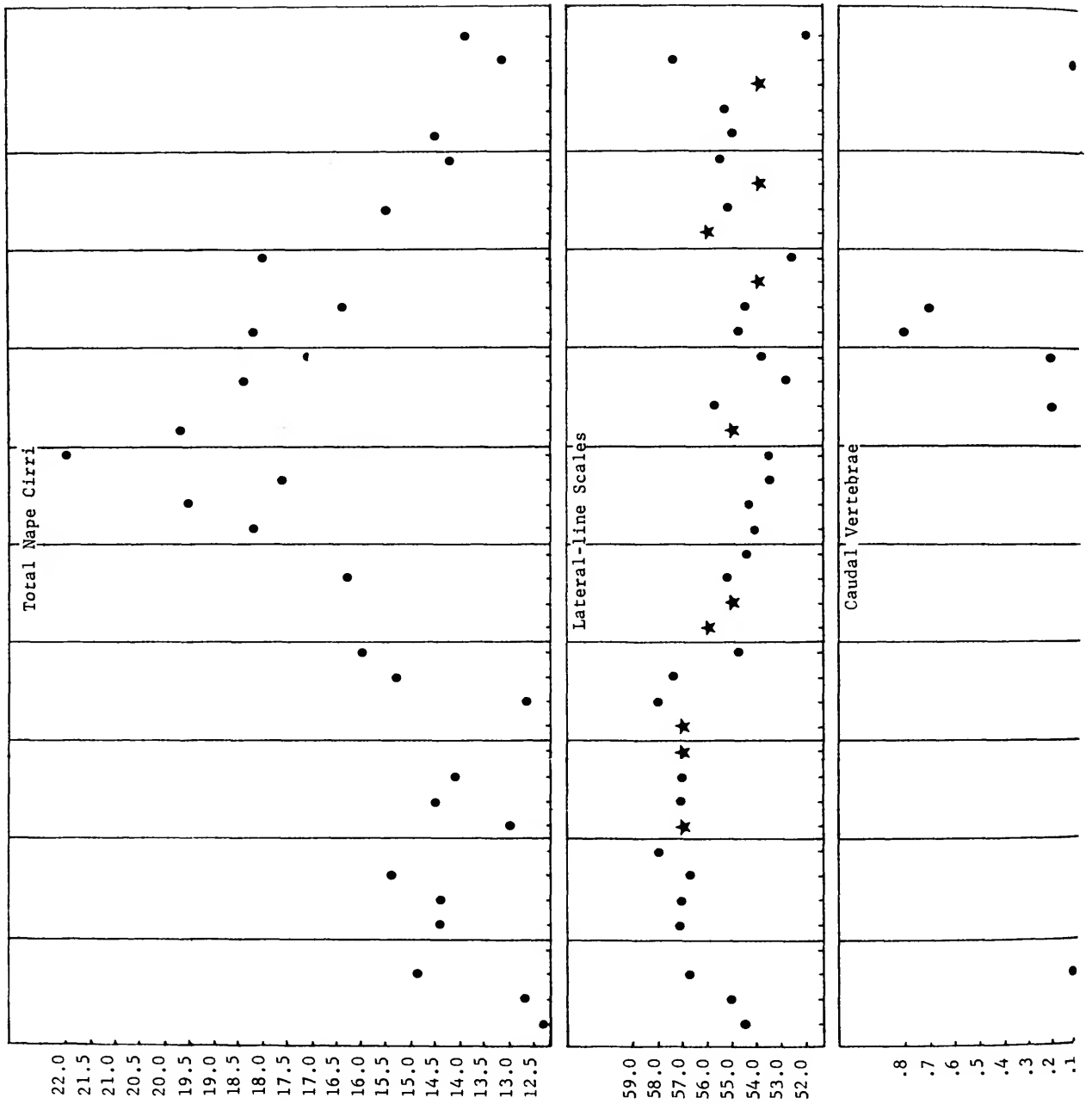
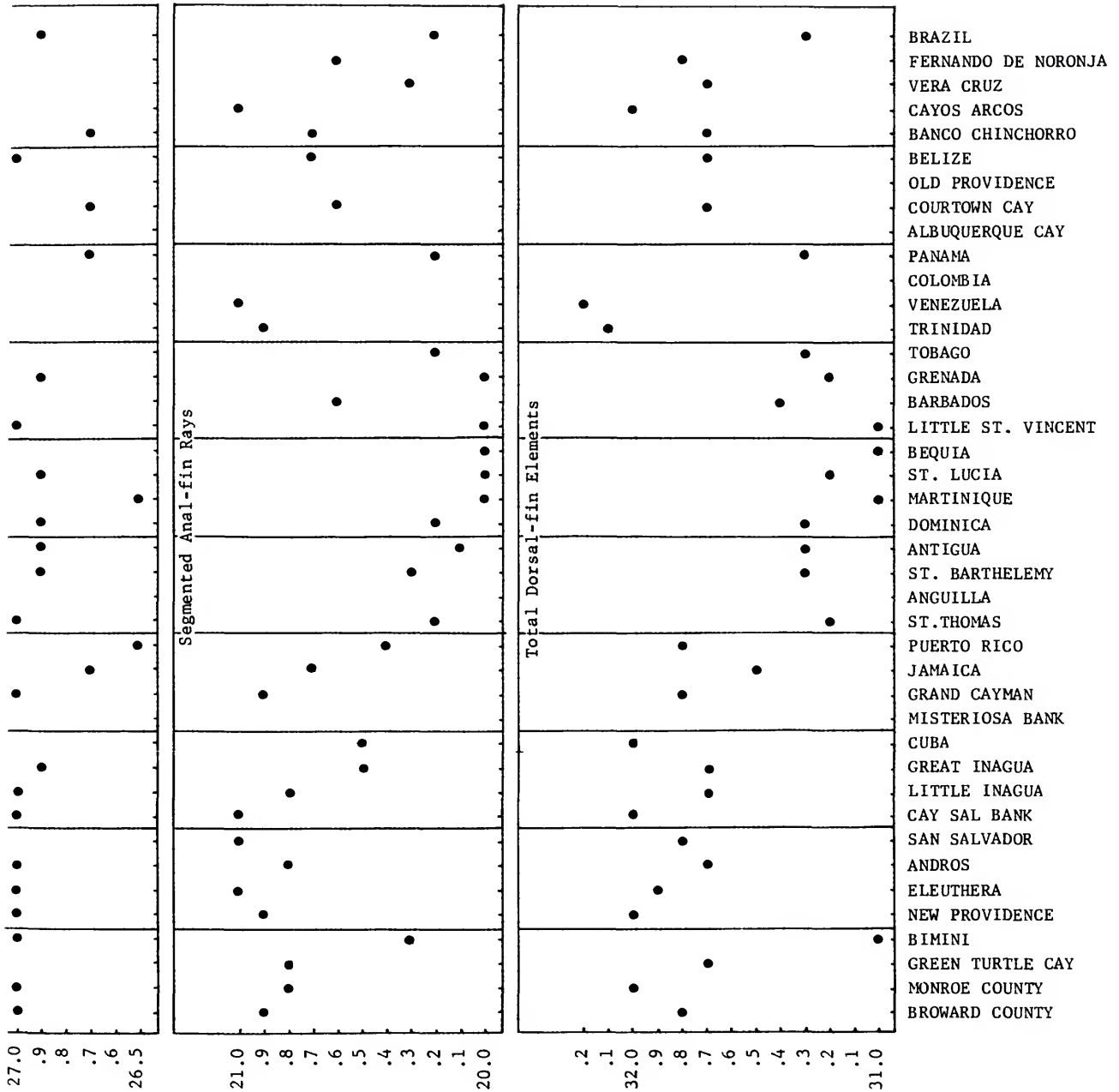


FIGURE 2.—Graphs of means for certain meristic characters in populations of *Malacoctenus*



triangulatus based on information in Tables 1-3. (Stars represent counts for single specimens.)

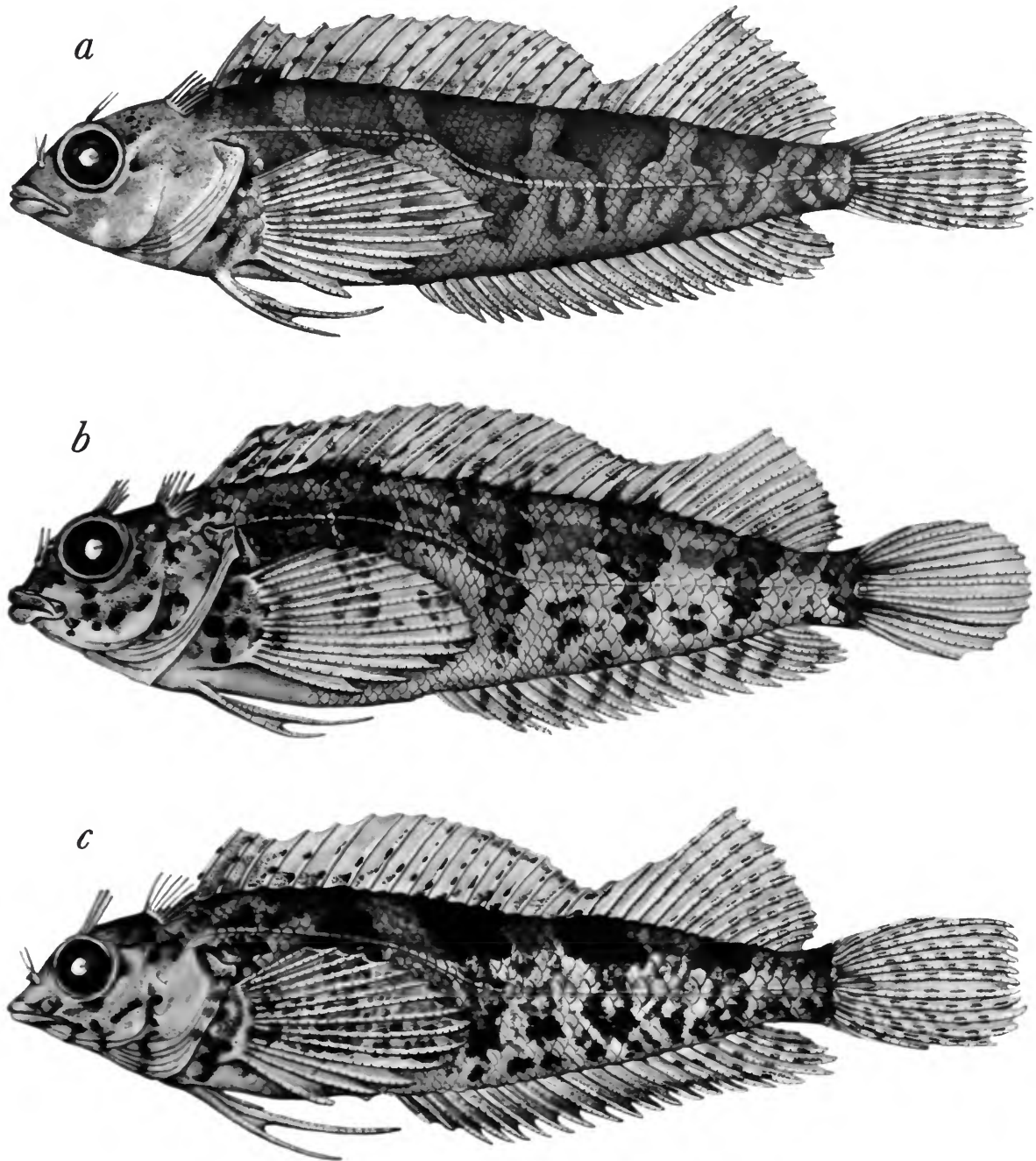


FIGURE 3.—*Malacoctenus triangulatus*, females; *a*, ANSP 74341, 43.3 mm SL, Hog Island (vicinity of New Providence), Bahamas; *b*, USNM 198134, 53.4 mm SL, Chupara Pt., Trinidad (innermost pelvic-fin ray not visible externally); *c*, GCRL 1576, 36.1 mm SL, Bahia, Brazil. (Drawn by J. R. Schroeder.)

in females than males. Both sexes usually possess indications of dusky to dark areas in the pale spaces between the ventral ends of the saddles, but dark markings more dorsally in the interspaces occur more often in females. Males often lack dark spots posteriorly in the dorsal, anal, and caudal fins, but when the spots are present they are usually not as well developed as they are in females. An obvious dark mark on the body at the base of the anterior dorsal-fin spines that extends onto the fin basally is usually present in all specimens but may be more prominent in females than in males. The ventrolateral sides of the head in both sexes are usually pale with few prominent markings, and transverse bands beneath the head, when present, are approximately uniform in width and dusky.

There appears to be a change, perhaps gradual, from the northern type color pattern to another type that is found in the Lesser Antilles as far south as Trinidad and Venezuela. In specimens from Grenada, Trinidad, and Venezuela, for instance, sexual dichromatism, although present, is not always as obvious as in the more northern specimens, but is manifested by a generally darker overall coloration of males. Females (Figure 3b) have a much paler background color and, consequently, appear to have a more contrasting saddle pattern. The dark marginal spots of the saddles of females are more obvious than are those of males, and females have considerable numbers of irregular, dark spots along the ventral portion of the body, which are reduced or absent in males. Females often have darkly spotted, narrow, transverse bands on the underside of the head, which are faint and diffuse, at best, in males. The dorsal fin of females is marked with continuations of the body saddles basally along its anterior half, and the base of the fin is mostly free of pigment posteriorly. The dorsal fin of males is almost without pigment anteriorly and exhibits a diagonal banding posteriorly. Conversely, females possess banded anal and caudal fins, whereas those of males are overall dusky, although the caudal of males may be faintly banded. The dark mark anteriorly on the base of the dorsal fin is present in many of the Grenada specimens but is much less developed or absent in the Trinidad and Venezuelan specimens. Some females we have seen from Florida are indistinguishable from the southern females, but we have not found similar overlap with males from the two areas.

The body color pattern of both sexes from Fernando de Noronja approaches that of males from the northern areas, but the intensified spots on the margins of the body saddles are, in contrast, prominent. In addition, the intensified dark blotches between the ventral tips of the body saddles, together with the tips of the saddles, form a distinct horizontal row of large, irregular spots. There is little or no development of the dark mark anteriorly at the base of the dorsal fin. The anal fin is transparent to dusky. The underside of the head is traversed by several rows of small, dark spots or narrow, faint to dark lines. Males have no spots, or only faint spots, in the dorsal fin, whereas all females have prominent spots in this fin.

In specimens from Bahia, Brazil, sexual dichromatism appears as a reverse bicolouration or intensification of pigment on the dorsal and ventral halves of the body: males are darkest ventrally and females (Figure 3c) dorsally. Although the dorsal one-third of the body is usually darker than the ventral two-thirds in all populations of *M. triangulatus*, this intensification appears to be slightly more evident in females from Bahia. The body saddles stand out less in the Bahia specimens due to the complex dark, irregular spotting within the saddles and in the pale spaces between the saddles, particularly on the ventral half of the body. Spotting is less distinct and fainter on males despite the ventral intensification. Fine, dark spots anteriorly on the dorsal fin and banding posteriorly on the dorsal and anal fins are better developed in females than males. Both sexes have only faint development of the dark mark anteriorly on the dorsal fin. The ventral half of the head is often traversed by narrow, dark bands in females, whereas that of males is faintly marked at best.

Discussion

We are unable to explain fully the variation we note among the populations of *M. triangulatus*. Most probably the variations are the result of the varying degrees of reproductive isolation exhibited by the populations as influenced by complex ecological factors: temperature, light, water currents, physiography. Hence consistent trends in meristic characters should not be expected.

Often in fishes, high vertebral, scale and vertical

fin-ray counts are correlated with the higher or lower latitudes as one progresses away from the equator (Barlow, 1961, gives an illuminating review of this subject). These correlations are also a reflection, but not necessarily a result, of decreasing average annual water temperatures. The generally high means for meristic characters of the northernmost populations of *M. triangulatus* conform with the temperature-mean relationship, but the appearance of the highest means for some characters in the Trinidad and Venezuelan populations, where water temperatures average higher than at the northern limits of the species' distribution (Bahamas), and the low means of the population at Bahia, Brazil, where water temperatures are similar to those of the northernmost populations, do not.²

The fairly good correlation between high numbers of nape cirri and low numbers of lateral-line scales in the various populations is readily apparent on Figure 2. Inasmuch as both cirri and lateral-line

scales have sensory functions,³ one could infer that the species is compensating for reduction in one structure by increase in the other. We have no information that would permit expanding on this intriguing idea.

Springer (1958) reported that the prepectoral area of *M. triangulatus* was scaled, with rare exceptions, and that there was at least one scale in the midline before the first dorsal-fin spine. We now find these characters to be more variable than Springer reported. The absence or degree of scaling in the prepectoral and predorsal areas is quite variable within a population and can only be used with qualification as key characters. Several colleagues have mentioned to us difficulties in identifying specimens of *M. triangulatus* using Springer's earlier key, which employed scalation. We, therefore, present a new key to the Atlantic species of *Malacoctenus*, which takes advantage of several characters not employed in the earlier key.

Key to the Atlantic Species of *Malacoctenus*
(Couplets 4-8 refer only to specimens 25 mm SL or larger)

1. Length of shortest pelvic-fin ray contained 4 or more times in length of longest; patch of small teeth anteriorly behind outer row of large teeth in each jaw; ventral hypural plate autogenous; pectoral-fin rays usually 15 *Malacoctenus boehlkei*
Length of shortest pelvic-fin ray contained less than 4 times in length of longest; small teeth, when present, in single row behind outer row of large teeth in each jaw; ventral hypural plate fused to urostylar centrum; pectoral-fin rays 14-17 2
2. Pectoral-fin rays typically 15-17; scales on prepectoral area, if present, about same size as those on body; small teeth present behind outer row of large teeth in each jaw (extremely difficult to see in *M. erdmani*) 3
Pectoral-fin rays typically 14; scales on prepectoral area, if present, smaller than those on body; small teeth not present behind outer row of large teeth in each jaw 4
3. Cirri on anterior nostril and above eye 2 (occasionally simple); pectoral-fin rays 15-17 (usually 16); prepectoral area without scales; small teeth behind large outer row 5 or less in each jaw; distinct, dark blotch present at bases of posteriormost dorsal-fin spines; rarely exceeding 30 mm SL *Malacoctenus erdmani*
Cirri on anterior nostril and above eye simple (occasionally 2); pectoral-fin rays 14-16 (usually 15); prepectoral area rarely without scales; small teeth behind large outer row more than 6 in each jaw; no distinct, dark spot at bases of last dorsal-fin spines; commonly exceeding 40 mm SL *Malacoctenus macropus*
4. Conspicuous, dark spot on anterior dorsal-fin spines and a dark ocellus dorsally on mid-dorsal body contour extending dorsally onto posterior dorsal-fin spines; nasal + supra-orbital + nape cirri = 6-10 on each side (nasal cirri 1; supraorbital cirri 2, with rare exceptions; nape cirri 3-7); lateral-line scales 42-47 *Malacoctenus gilli*
Combination of conspicuous dark spot and ocellus on dorsal fin not present (many specimens of *M. triangulatus* have a dark spot at the anterior end of the dorsal fin); nasal + supraorbital + nape cirri = 10-47 (nasal cirri 2 or more, except simple in *M. africanus*, for which only one specimen was available, and rarely in *M. triangulatus* and *M. auro-lineatus*); lateral-line scales 42-64 5

² Average surface water temperatures were inferred from data presented in U. S. Naval Oceanographic Publication 700 and Charts II and III in Sverdrup, Johnson and Fleming (1942).

³ Ford (1959) reported that the cirri of *Malacoctenus hubbsi* are variously supplied by branches of the fifth, seventh, and tenth cranial nerves. On the basis of Ford's findings, a sensory function for these cirri can be inferred.

5. Dorsal-fin spines 18-19 (rarely 19); total nasal cirri (both sides) 6-14 (usually more than 7); nape cirri 14-32 on each side; lateral-line scales 59-64; total vertebrae 34-36 (modally 35) *Malacoctenus versicolor*
Dorsal-fin spines 18-21 (rarely 18); total nasal cirri 2-6 (rarely more than 5); nape cirri 4-18 on each side; lateral-line scales 42-62; total vertebrae 35-39 (modally 36-38) 6
6. Supraorbital cirri 2 on each side; nape cirri 9-13 on each side; lateral-line scales 42-55; dorsally projecting, short, bony point (hook) extending from dorsolateral margin of cleithrum in many specimens (hook can be seen by lifting operculum); anterior two dark bands on body often coalesced on dorsal portion of body, forming humeral blotch *Malacoctenus aurolineatus*
Supraorbital cirri 2-8 on each side (2 only in some specimens of *M. triangulatus* under 30 mm SL, which have fewer than 8 nape cirri, or unilaterally in rare specimens over 30 mm SL); nape cirri 4-18 on each side; lateral-line scales 48-62; no hook on cleithrum; humeral blotch not present 7
7. Total nape cirri (both sides) 24-36; prepectoral area without scales; symphyseal pores 1-6 (usually 3-4) *Malacoctenus delalandei*
Total nape cirri 8-26 (more than 21 in only 3 of several hundred specimens of *M. triangulatus* examined); prepectoral area with or without scales; symphyseal pores 1-3 (usually 1 or 2) 8
8. Segmented dorsal-fin rays 10; total nasal cirri (both sides) 2; preopercular series of pores not extending onto operculum; prepectoral area scaled *Malacoctenus africanus* (only 1 specimen available)
Segmented dorsal-fin rays 10-13 (10 in only 4 of several hundred specimens examined); total nasal cirri 2-7 (2 in only 2 of several hundred specimens examined); preopercular series of pores with 1 or 2 branches extending onto operculum; prepectoral area with or without scales *Malacoctenus triangulatus*

Material Examined

(for additional material incorporated in this study, see *Malacoctenus triangulatus* in Springer, 1958)

FLORIDA: Broward County, FAU 71-21 (2), 71-22 (7), 71-63 (18), 72-19 (1); Monroe County, USNM 186168 (1). BAHAMAS: Green Turtle Cay, UMML 5845 (5), 6508 (10); Bimini, UMML 10035 (3); Eleuthera, ANSP 100731 (5), 111904 (5); Andros: Pigeon Cays, UMML 1601 (12); Mastic Cay, ANSP 100730 (6); Cay Sal Bank, ANSP 100733 (2); Great Inagua, AMNH 21372 (5), 27193 (8); Little Inagua, AMNH 21297 (24), 21324 (6), 27663 (8). MISTERIOSA BANK: USNM 198599 (1). GRAND CAYMAN: FSM 10744 (25). JAMAICA: LACM 6383 (1), 6384 (1), 6385 (4). PUERTO RICO: ANSP 118488 (1), LACM 6721-15 (1). ST. THOMAS: LACM 7789 (5). ANGUILLA: ANSP 114362 (1). ST. BARTHELEMY: ANSP 127052 (2), 127057 (4), 127131 (12), 127574 (1), 127595 (1). ANTIGUA: ANSP 127597 (22). DOMINICA: USNM 198281 (6), 198282 (9), 201022 (1), 205074 (1), 212023 (1). MARTINIQUE: ANSP 112972 (2), 113003 (2). ST. LUCIA: ANSP 127057 (2), 127095 (1), 127116 (9), 127130 (27). BEQUIA: ANSP 124601 (1), 126958 (1). LITTLE ST. VINCENT: ANSP 114329 (1), 127092 (1), 127098 (1). GRENADA: ANSP 113241 (5), 114381 (3), 124599 (5), 127053 (1), 127129 (8). TOBAGO: ANSP 102189 (6), 102191 (10), 102193 (1), 102196 (3), 102197 (1), 102199 (2). TRINIDAD: USNM 198134 (22), 199159 (4). VENEZUELA: Charagato (Cubagua), USNM 212241 (6), 212242 (2), 212244 (8); Laguna Grande, USNM 212243 (2). COLOMBIA: Santa Marta, USNM 212108 (1). PANAMA: vicinity of Colon, GCRL V69:3153 (1), V69:3486 (1), V69:3488 (1), V72:9183 (6), V72:9795 (1), V72:9866 (1); San Blas Islands, GCRL V73:11073 (1), V73:11152 (2). ALBU-

QUERQUE CAY: UMML 23327 (1). COURTOWN CAY: UMML 23364 (13), 24023 (1). BELIZE (British Honduras): FMNH 78689 (1), 78690 (10), 78691 (1), 78692 (1), 78693 (15), 78694 (16), UMML 9472 (3), 9543 (2), 9824 (9), 10314 (2). YUCATAN: Banco Chinchorro, UMML 9368 (1), 9754 (1), 9770 (1). FERNANDO DE NORONJA: USNM 212024 (77). BRAZIL: Bahia, GCRL 1576 (17), 1579 (2).

While this study was in press, additional specimens representing northern range extensions of *M. triangulatus* came to our attention: Florida Department of Natural Resources Marine Laboratory 4304 (2) and 4305 (16), St. Lucie Inlet, Martin County, Florida. We were also informed of specimens from Indian River County, Florida, at FSM.

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