BIOLOGICAL AND TAXONOMIC NOTES ON THE BLUE CROAKER, BAIRDIELLA BATABANA[1]

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ABSTRACT

The blue croaker, last described in 1889 by Jordan and Eigenmann as *Corvula sialis,* has been recently rediscovered in southwest Florida, Gulf of Campeche, Mexico, Puerto Rico, and the Virgin Islands.

Analysis of meristic and morphological characters show this species to be very near to *Bairdiella chrysura* (Lacépède) and that it is a synonym of *Corvula batabana* (Poey) known only from Cuba and Puerto Rico. Therefore, the blue croaker has been combined with the genus *Bairdiella* as *Bairdiella batabana* (new combination).

The blue croakers from south Florida have all been collected in or near seagrass beds, mainly of the species *Thalassia testudinum, Cymodocea manatorum,* and *Diplanthera wrightii,* and feed almost exclusively on small crustaceans of the grass and associated red and brown algae. Larger individuals appear to move to deeper water near patch reefs and rocks but continue to feed on the grass bed crustaceans. Although *B. batabana* and *B. chrysura* may be collected together, there is some evidence that *B. chrysura* is most abundant in sparsely vegetated, muddy or sandy areas adjacent to the grass beds and feeds on fish and polychaete worms as well as on crustaceans.

The distribution of this species is spotty because of the special and local nature of its habitat but probably it has a widespread distribution in the Greater Antilles and along the Atlantic coast of Central America.

INTRODUCTION AND ACKNOWLEDGEMENTS

Knowledge of sciaenid fishes (the drums, croakers, weakfishes and their allies) is on a comparatively high plane for North American species, especially so when contrasted with data available for South American species. The blue croaker, *Bairdiella batabana,* is exceptional for, apart from its inclusion in a variety of checklists or its brief mention in systematic works, nothing has been added since Jordan & Eigenmann described one specimen from Key West, Florida, under the name *Corvula sialis* in 1889 (pp. 378-379). Discovery of this species in Florida Bay in 1958 (see Tabb & Manning, 1962a: 629) led us to undertake a study of this rare species and sufficient material is now available to permit this report which aims to redescribe the species, discuss its synonymy and relationships and contribute to the knowledge of its biology.

Abbreviations indicating the depositories of specimens are as follows:

UMML—The Marine Laboratory, Institute of Marine Science, University of Miami.

USNM—The United States National Museum, Washington, D.C.

[1]Contribution No. 623 from The Marine Laboratory, Institute of Marine Science, University of Miami, Miami, Florida.

MCZ—The Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

UMMZ—The University of Michigan Museum of Zoology, Ann Arbor, Michigan.

We are indebted to our colleagues at various museums for aid during visits by the senior author, in particular to Leonard P. Schultz and Ernest A. Lachner (United States National Museum), P. H. Greenwood and P. J. Whitehead (British Museum [Natural History]), and Carter H. Gilbert (University of Florida).

Since 1958, field operations, laboratory studies and the addition of material has crossed the lines of numerous projects and for this support we are indebted to the National Science Foundation (through grants-in-aid NSF-G-3881 and NSF-GB-1456), The National Institute of Health (WP-00400-01 and WP-00400-02) and the Florida State Board of Conservation. Many students and other staff members aided our field programs and we are indebted to them. We may mention in particular, Edwin S. Iversen, Raymond B. Manning, Martin A. Roessler, and Bernard J. Yokel. Jonathan N. Baskin prepared the dissections and the preliminary sketches of the swim bladders of various sciaenid fishes. Ray S. Birdsong prepared the drawing of *Bairdiella batabana.*

Finally we have profited from discussions of sciaenid problems with Ethelwynn Trewavas of The British Museum (Natural History).

Bairdiella batabana (Poey), new combination

BLUE CROAKER

Tables 1-2, Figs. 1-2

Johnius batabanus Poey, 1860: 184-185 (description; type locality: Batabano [=Gulf of Batabano], south coast of Cuba).—Poey, 1861: 370 (compiled).—Poey, 1881: 327 (Puerto Rico; variation in spines and teeth).—Stahl, 1882: 77,163 (compiled).—Howell y Rivero, 1938: 204 (cotypes MCZ 10926, 10927, 21957).

Corvula batabana, Jordan & Eigenmann, 1889: 377-378; 380 (descriptive information in key; type, by original designation, of *corvula* Jordan & Eigenmann).—Jordan & Evermann, 1896: 397 (in checklist).—Jordan & Evermann, 1898: 1427, 1430; 1431 (compiled).—Jordan, Evermann & Clark, 1930: 345 (in checklist).—Evermann & Marsh, 1900: 217-218 (four specimens from Puerto Rico examined).—Nichols, 1929: 291 (Puerto Rico; compiled).

Corvula sialis Jordan & Eigenmann, 1889: 378-380 (description; type locality: Key West, Florida.—Jordan & Evermann, 1896: 397 (in checklist). Jordan & Evermann, 1898: 1427-1429 (compiled; holotype recorded as USNM 26575).—Welsh & Breder, 1923: 198 (brief mention).

Larimus batabanus, Jordan, 1886: 43-44 (description based on a specimen seen at Havana, Cuba).

Vacuoqua sialis, Jordan, Evermann & Clark, 1930: 345 (in checklist).—Briggs, 1958: 281 (in checklist).—Baily *et al.,* 1960: 31 (in list); common name: blue croaker).—Tabb & Manning, 1962a: 629 (recorded from Florida Bay; food habits; suggested relationship to *Bairdiella*).

TABLE 1

FREQUENCY DISTRIBUTION OF FIN-RAY, SCALE, AND GILL-RAKER COUNTS FOR THREE ATLANTIC SPECIES OF *Bairdiella*

	Dorsal Spines		Dorsal Soft Rays										Anal Soft Rays			
	11	12	20	21	22	23	24	25	26	27	28	29	7	8	9	10
B. batabana	8	26	—	—	—	—	—	4	7	11	9	3	1	32	—	—
B. chrysura	—	27	7	10	8	2	—	—	—	—	—	—	—	1	21	5
B. ronchus	13	2	—	1	—	3	9	2	—	—	—	—	4	10	1	—

	Caudal-peduncle Scales								Pored Lateral-line Scales								
	19	20	21	22	23	24	25	26	47	48	49	50	51	52	53	54	55
B. batabana	—	—	—	3	8	9	3	2	—	—	4	4	10	5	3	4	1
B. chrysura	—	—	—	—	11	13	1	—	2	2	4	14	4	—	1	—	—
B. ronchus	1	3	4	2	3	—	—	—	—	—	1	7	5	1	—	1	—

	Gill Rakers									Pectoral Rays			
	19	20	21	22	23	24	25	26	27	15	16	17	18
B. batabana	1	20	8	3	—	—	—	—	—	3	26	4	
B. chrysura	—	—	—	6	11	9	—	—	—	4	18	4	
B. ronchus	—	—	—	1*	—	—	4	7	3	—	2	8	4

*Count based on a small specimen

Corvulla batabana, Springer & Bullis, 1956: 86 (genus misspelled; recorded from OREGON stations 713, 714, 715, 716; Loren P. Woods, Chicago Natural History Museum [letter of 5 February 1960] provides data confirming the occurrence of *batabana* at these stations).

Description.—FINS: Frequency distributions of dorsal and pectoral fin rays are provided in Table 1. Typically there are 12 dorsal spines, the first small, the last associated with the soft dorsal fin. Dorsal soft rays vary from 25 to 29, the last ray in all instances being split to its base. Twelve of 13 specimens counted had 17 principal caudal rays (the exceptional specimen had 16). Similarly 16 of 17 specimens (including the holotype of *sialis*) had 2 spines and 8 soft rays (the last split to its base); the exception had 7 soft rays. All specimens had 1 spine and 5 soft rays in each pelvic fin. Only the left pectoral fin was examined and most specimens had 16 rays including the short element at the upper border of the fin.

The short first spine in the dorsal fin is about one-half the length of the longest spine in all specimens and one-third and one-fourth the height of these spines in larger specimens. Spines 3 to 7 are the longest spines, the peak usually being at spine 5. The posterior spines are shorter so that the two portions of the dorsal fin are nearly separate. The last spine is associated with the soft portion of the fin and is decidedly longer than the preceding spine in adults and preceding two spines in juveniles. The soft dorsal is high, proportionately more so in juveniles than adults. All except the first or first and second rays are branched. The two spines in the anal fin are stout but the first is short, only about one-third the height of the second in juveniles and one-fourth or less in adults. The second spine is itself only about two-thirds the height of the soft anal fin. The pectoral fin is inserted slightly in advance of and the pelvic fin slightly behind a vertical through the origin of the spinous dorsal fin.

All fins are dusky and rather uniformly so, the darkest areas being the spinous dorsal and anal fins and the tips of the pelvic fins.

The spinous dorsal is naked but at least the bases of all other fins are invested with scales. Several rows of scales form a distinct sheath along the basal portion of the soft dorsal and anal fins. From that point rows of imbedded scales run out the interradial membranes nearly two-thirds of the distance to the margin of the fin. On the caudal fin the interradial rows go nearly to the fin edge. In the pelvic fin the scales are confined along the rays (except basally) and are very elongate, cycloid and imbedded. The pectoral-fin scales are like those of the pelvic except for being smaller, and confined to the basal half of the fin or less.

SCALES (exclusively of those on fins): Frequency distributions of paired lateral-line scales and circumferential caudal-peduncle scales are given in Table 1.

The arrangement of the scales along the lateral line is peculiar and yet consistent though the precise shapes of the scales involved vary

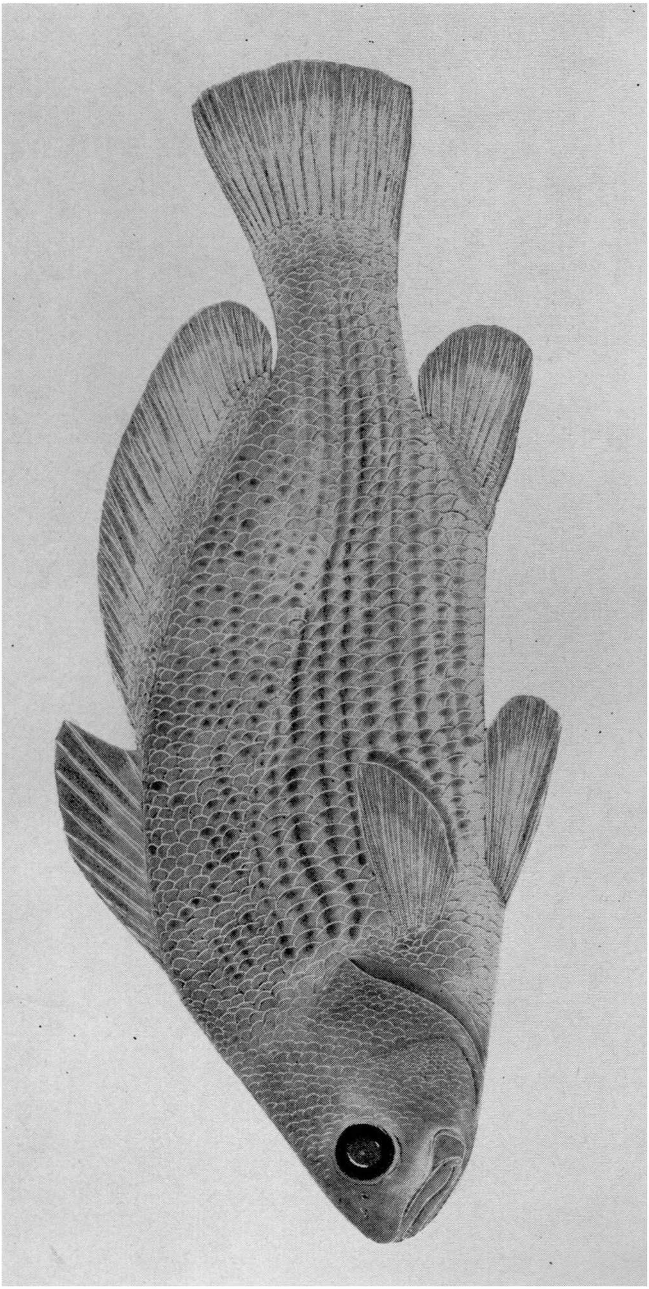

FIGURE 1. *Bairdiella batabana* (Poey). Lateral view of adult, 127 mm in standard length, from Florida (UMML 13588). Drawing by Ray S. Birdsong.

TABLE 2

FREQUENCY DISTRIBUTION OF BODY PROPORTIONS EXPRESSED IN PERCENT OF STANDARD LENGTH FOR (1) *Bairdiella chrysura*, (2) *B. batabana*, AND (3) *B. ronchus*

	Length of Second Anal Spine															
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
(1) *B. chrysura*	—	—	1	2	2	6	3	3	5	2	—	—	—	—	—	—
(2) *B. batabana*	4	8	8	5	—	—	—	—	—	—	—	—	—	—	—	—
(3) *B. ronchus*	—	—	—	—	—	—	—	1*	—	—	2	3	3	2	3	1

	Least Depth Caudal Peduncle				Body Depth at Dorsal-fin Origin									
	10	11	12	13	28	29	30	31	32	33	34	35	36	37
(1) *B. chrysura*	1	12	10	1	—	3	3	2	8	5	3	—	—	—
(2) *B. batabana*	—	—	7	18	—	—	—	—	1	2	6	10	6	1
(3) *B. ronchus*	7	7	—	—	1	3	2	1	3	2	—	—	—	—

	Head Length								
	29	30	31	32	33	34	35	36	37
(1) *B. chrysura*	—	—	—	—	7	10	3	3	1
(2) *B. batabana*	1	1	2	5	4	10	2	1	—
(3) *B. ronchus*	—	—	2	4	4	3	—	2	—

*Only small specimen measured; S.L. = 42.5 mm.

somewhat. Each lateral-line scale is much overlain by the adjacent scales in the first row above and below it, this imbrication increasing with growth. The lateral-line scale itself is of regular and rounded shape except that the short and exposed ctenoid edge is straight. The canal is simple with a main posterior opening and two or three terminal branch canals. Each lateral-line scale has two pairs of modified scales associated with it. The first pair represents the overlying scales from the adjacent two scale rows. These are usually modified on their ventral and dorsal edges respectively by a curled indentation that fits over the tube of the lateral canal of the lateral-line scale. The second pair underlies the lateral-line scale and projects beyond its posterior border. They are small (their combined areas less than that of the lateral-line scales), they are devoid of ctenii and they lie, respectively, just dorsal and ventral to the lateral canal and its terminal branches on the inner surface of the lateral-line scale. To fit they are both grooved posteriorly and the upper has a deep notch on its ventral surface while the reverse is true for the lower.

BODY COLORATION AND PROPORTIONS: The general proportions and main features of the color pattern are best determined by reference to Figure 1. In life the blue croaker has a distinctive bluish-grey cast. After preservation this turns toward violet before fading completely. Analysis of head length, depth of body at the dorsal-fin origin, least depth of caudal peduncle and the length of the second anal spine is presented in Table 2. *B. batabana* is a strongly compressed species, its body almost slab-sided. The deep caudal peduncle is quite flattened laterally. No attempt was made to study changes with growth because of the small number of specimens available, particularly for the smaller sizes. The features mentioned above did not change proportionally through the sizes studied (all adults).

PREOPERCLE: The preopercle has a prominent lateral ridge (Fig. 2 A) running along its middle. Behind and beneath this ridge is the canal of the preoperculo-mandibular branch of the lateralis system. Five trabeculae bridge this canal connecting the lateral ridge to the hind and lower sections of the preopercle. The preopercular border is spiny and the fleshy margin is fringed. The spines in *batabana* are not strong, the largest ones being at the angle. Their arrangement can be seen in Figure 2A.

INTERNAL ANATOMY: The swimbladder in *B. batabana* is simple, without appendages. There are two chambers, quite distinctive externally but connected internally. The anterior chamber is yoke-shaped and impinges anteriorly on the posterior part of the skull, centrally at the level of the basioccipital and laterally and anterioraly at the region of the pterotic. Posteriorly the long second chamber tapers to a fine point that is attached basally in the first interhaemal bone. There is no posterior opening.

Vertebral numbers determined from X-rays of 2 specimens were 25, 13 precaudal and 12 caudal (including the hypural vertebra).

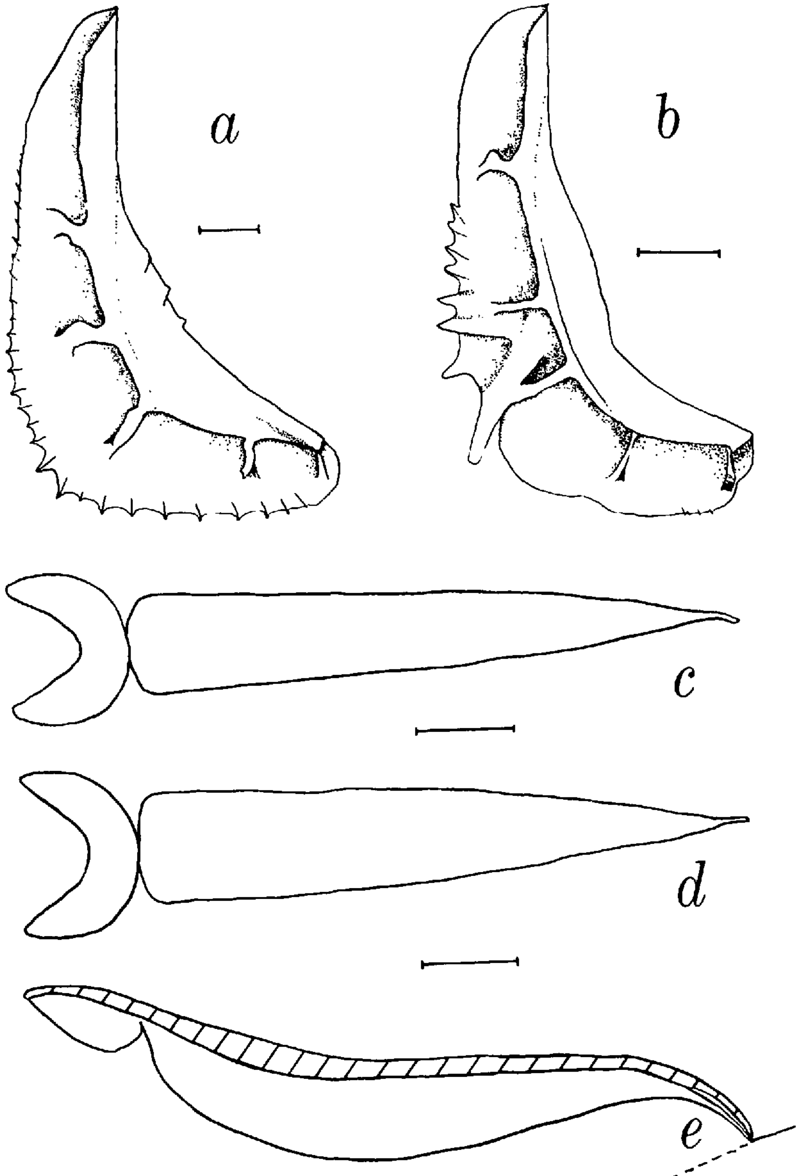

FIGURE 2. *a*, Lateral view of right preopercle of *Bairdiella batabana* (Poey) from stained specimen 100 mm in standard length, from UMML 16118; scale=5 mm.—*b*, lateral view of right preopercle of *Bairdiella chrysura* (Lacépède) from stained specimen, 136 mm in standard length, from UMML 16119; scale=6 mm.—*c*, ventral view of swimbladder of *B. batabana*, from male, 129 mm in standard length from UMML 8852; scale=10 mm.—*d-e*, ventral and lateral views of swimbladder of *B. chrysura*, male, 146 mm standard length, from UMML 12379; scale=10 mm. (Hatched area depicts cutaway of body wall, dotted line the ventral profile of the fish at the anal region.)

Age and growth.—The scales of *B. batabana* are ctenoid. The circuli and growth checks are clearly defined in most instances and are concentric with the scale margin. There is no crowding of circuli in the area of periodic checks; rather there is a difference in light refraction due to a dip in the scale surface at these areas. There is sharp disconformity of the circuli in the lateral posterior angle of the scale at the checks. The scales are remarkably like those of spotted seatrout (Tabb, 1961: 9, fig. 2).

Scales are most regular in shape and show their characteristic markings most clearly if taken from the side of the fish, mid-way between the middle rays of the spinous dorsal fin and lateral line.

Examination of the scales of 32 specimens, ranging between 64 and 195 mm in standard length indicates that the first mark is formed when the fish are about 60-75 mm, the second at about 90-100 mm, the third at about 140-150 mm, and the fourth between 180-190 mm. The largest fish available, 195 mm in standard length, had 4 marks and some growth beyond the most recent check. These data suggest, but in no way prove, that *Bairdiella batabana* reaches an age of 4 years, perhaps 5.

Welch & Breder (1923: 174) report that *Bairdiella chrysura* reaches an age of 6 years and a length of 23 cm. Hildebrand & Schroeder (1928: 281) examined *B. chrysura* from Chesapeake Bay and found that specimens ranging between 165 and 195 mm were "probably in their third summer."

Food.—Bairdiella batabana and *B. chrysura* are often caught together in the complicated environment of Florida Bay and adjacent edge of the Gulf of Mexico. There are indications, however, that they do not occupy exactly the same niche and that they occur together more commonly when low tides have exposed most of the grass flats, the preferred home of *B. batabana,* thus driving it to the channels in company with *B. chrysura.* In addition, extensive collections of *B. chrysura* made by the junior author around the state of Florida show that this species is much more common over muddy and sandy bottoms than it is over beds of *Thalassia* and *Cymodocea.* If these similar species did, in fact, use different niches this might become apparent from food studies. Consequently all the available specimens (32) of *B. batabana* and a representative series of 34 of *B. chrysura* from several areas throughout the Florida Bay region were opened and food items examined. No attempt was made to measure the volume of food consumed since the numbers of fish examined were small.

The results are expressed as percentages of total recognizable food organisms (Table 3). *B. batabana* had eaten only crustaceans while some individuals of *B. chrysura* had eaten large numbers of nereid polychaete worms. Examining the food species we find that two species of caridean prawns, *(Periclimenes longicaudatus* and *Hippolyte pleuracantha),* constitute the majority of food items of *B. batabana.* Both are small members of the grass community, being most abundant in clumps of red algae of the genera *Dasya* and *Gracillaria*. The other species eaten by *B. batabana* are crustaceans that are most abundant in the beds of *Thalassia-Cymodocea*. These observations support the observations based on catch records, that *B. batabana* up to at least 130 mm in standard length is actually most abundant in and prefers, the grass beds. Larger specimens, to 195 mm, may live near reef tracts or rock ledges yet they apparently move out to the grass flats to feed, since they too contain small caridean shrimp. On the other hand, the polychaete worm, *Eumida sanguinea*, found in the stomachs of *B. chrysura* is most common in the soft shelly sand of the channel bottoms adjacent to the grass flats. In addition, some of the crustaceans found in stomachs of *B. chrysura*, notably the larger ones such as grooved shrimp and caridean prawns (*Leander* sp. and *Palaemon* sp.),

TABLE 3

COMPARISON OF FOOD ITEMS IDENTIFIED FROM STOMACHS OF *Bairdiella batabana* AND *B. chrysura*, TWO SCIAENID FISHES FROM SOUTHERN FLORIDA

Rank	Food item		Quantity	% of total items
	Bairdiella batabana (32 examined; 7 stomachs empty)			
1	*Periclimenes longicaudatus*	(caridean prawn)	47	45.2
2	*Hippolyte pleuracantha*	(caridean prawn)	31	29.8
3	Unidentified amphipod crustaceans		9	8.7
4	*Thor* sp.	(caridean prawn)	6	5.8
5	*Panaeus duorarum*, postlarvae	(pink shrimp)	4	3.8
6	*Latreutes fucorum*	(caridean prawn)	2	1.9
7	*Tozeuma carolinensis*	(caridean prawn)	1	0.9
8	*Leander paulensis*	(caridean prawn)	1	0.9
9	*Palaemon* sp.	(caridean prawn)	1	0.9
10	*Synalpheus* sp.	(snapping shrimp)	1	0.9
11	*Exosphaeroma faxoni*	(isopod)	1	0.9
			104	100.0
	Bairdiella chrysura (34 examined; 20 empty)			
1	*Eumidia sanguinea*	(polychaete worms)	84	70.0
2	*Palaemon* sp. and *Leander* sp.	(caridean prawns)	18	15.0
3	*Penaeus* sp.	(Penaeid shrimp)	10	8.3
4	Unidentified amphipod crustaceans		3	2.5
5	Unidentified caridean shrimp heads	(Large)	2	1.7
6	*Periclimenes longicaudatus*	(caridean prawns)	1	0.8
7	*Opsanus* sp.	(toadfish)	1	0.8
8	*Synalpheus* sp.	(snapping shrimp)	1	0.8
			120	100.0

are more apt to be encountered in areas where vegetation is sparse to absent. The toadfish, *Opsanus beta,* is common in Florida Bay in grass beds as well as in the shell rubble of tidal channels so its presence in the stomach of *B. chrysura* tells us only that this species consumes fish at times. This may be meaningful, however, for no trace of fish flesh, bones, or scales were observed in *B. batabana.* Hildebrand and Schroeder (1928: 280) state that the food of *B. chrysura* from Chesapeake Bay consists very largely of small and minute crustaceans and that fish and annelids are of "much less importance."

Springer & Woodburn (1960: 49-52, fig. 12) discussed the food preference of *B. chrysura* throughout its range and concluded that crustaceans formed the basic food while fishes and polychaete worms constituted a less important element of the diet.

Habitat.—Most Florida specimens of *Bairdiella batabana* collected have come from a small area in Everglades National Park in an area where the waters of the Gulf of Mexico impinge upon the shallow flats and basins of Florida Bay. This area, bounded on the east by Joe Kemp Key, on the south by Murray and Sandy Keys, and on the north by the mainland has been described by Tabb & Manning (1962b: 44-46, frontisp.). In this region, strong tidal flow from the Gulf of Mexico runs parallel to shore toward Joe Kemp Key through Joe Kemp Channel and between Murray and Sandy Keys by way of Conchie Channel. Generally, the shallows south of Joe Kemp and Conchie channels are heavily vegetated with two species of seagrasses, *Thalassia testudinum* and *Cymodocea manatorum,* as well as lesser quantities of Cuban shoal weed, *Diplanthera wrightii.* These plants stabilize the bottom muds, which are principally calcium carbonate marl, and create moderately clear to very clear water conditions. The non-vegetated Joe Kemp and Conchie channels are constantly turbid due to the effects of wind and tidal action.

Bairdiella batabana may be taken occasionally in almost any spot in these grass flats but is most abundant in very clear waters of a deeper basin northeast of Sandy Key, called Sandy Key Basin. Here the average depth is about 6 feet at mean high water; sub-surface visibility is practically unhindered by turbidity and, there are luxuriant growths of red and brown algae. These algae, mainly species of the genera *Dasya* and *Gracillaria,* support a rich community of caridean prawns of the genera *Hippolyte, Periclimenes,* and *Latreutes.* Few samples have been made in Sandy Key Basin because it has been largely outside the area of past studies, but trawl hauls that have been made there have nearly always produced from one to seven specimens of *B. batabana.* This is considered by the authors to represent the preferred habitat for juveniles of this species.

Few adults (longer than 120 mm in standard length) have been collected, but all that are available with habitat notes suggest that there is a movement out of the shallow grass-flat environment about the time individuals reach 120-130 mm in standard length. The larger individuals have been taken in deeper water, 15 to 50 feet, and near rock ledges or reef patches. The water in such areas is usually clear. In all the cases where sufficient information is available, from St. John (Virgin Islands), Alligator Light, and near Carysfort Light off Key Largo (Monroe County, Florida), the fish were still near the *Thalassia testudinum* environment and their stomachs contained food characteristic of that habitat rather than food from rocky or reef areas. This implies that they probably move from the reef shelter onto the adjacent grass beds at night for feeding.

Bairdiella batabana prefers highly saline waters, only rarely being taken when salinity was as low as 27 ppt. Usually they are collected in areas having a range of salinity between 32 and 37 ppt. The smallest specimen collected (49 mm SL) was taken in Buttonwood Canal near where it enters Florida Bay at Flamingo when salinity was 36.7 ppt. and temperature of the water was 31.1°C.

All the specimens from Sandy Key Basin and adjacent grass flats were taken during the months of September through March. Two small specimens from the Florida Kays were collected during the months of April and July. Large specimens were collected as follows: St. Johns, Virgin Islands, 1 in March; vicinity of Alligator Reef Light, Monroe County, 4 specimens in April; inside Carysfort Reef, Monroe County, Florida, 1 in July.

Range.—*Bairdiella batabana* is known from scattered localities from southern Florida, Bay of Campeche (Mexico), Cuba, Puerto Rico and the Virgin Islands. Its special habitat preferences make for a spotty distribution; *B. batabana* may be expected to have a broader distribution particularly in The Greater Antilles and along the Central American coast.

Discussion of Relationships.—Although *Bairdiella batabana* has been discussed in decisive language and placed under four generic names, knowledge of the species has been fragmentary and nomenclatural decisions tenuous. The identity of *Vacuoqua sialis* (Jordan and Eigenmann) with *Corvula batabana* (Poey) is here noted for the first time and may be confirmed by comparisons of the description above with the two original descriptions and by reference to Tables 1 and 2. The current placement of these synonymous forms in different genera stems from Jordan and Evermann's (1927: 507) statement of the aberrant nature of *Corvula batabana* compared to the species of *Vacuoqua* (including *sialis*).

The status of *Corvula* itself needs attention. This genus (or at least its type) to us is indistinguishable from *Bairdiella* Gill. Table 1 compares meristic data of *Bairdiella chrysura* (Lacépède) and *B. ronchus* (Cuvier)[2]

[2]Robins (in press) synonymizes *Sciaena bedoti* Regan and *Corvina subaequalis* Poey with *Bairdiella ronchus*.

with the maverick *batabana*. While three good species emerge, there is no basis in these data for the union of *ronchus* and *chrysura* to the exclusion of *batabana*. The arrangement of lateral-line scales in *B. chrysura* and *B. batabana* is similar though the accessory scales of *B. chrysura* may have ctenii. The preopercle is very similar in *batabana* and *chrysura* in general configuration including the presence of four trabecular bridges. *B. chrysura* has the spines on the posterior corner better developed and fewer in number, and it has a strong spine at the angle of the preopercle. This to us is insufficient basis for generic or even subgeneric separation though it unfailingly separates these two species. Its utility was seriously questioned by Schultz (1945: 124) in his discussion of *Ophioscion* and *Bairdiella*. The otoliths, especially the sagitta, of *batabana* and *chrysura* were examined and the construction was found to be very similar with regard to general shape, major projections and sulci. At the same time these finely sculptured structures present many differences in detail and there is no question that the two species could be distinguished on the basis of the sagitta alone. Again the similarities outweigh the differences and this structure suggests no case for separate genera. Schultz (1945: 125, fig. 5) diagrammed the pore system of the tip of the jaw and snout in several fishes including *B. chrysura*. *B. batabana* agrees with the arrangement shown for *chrysura* except that the double pore at the jaw tip is combined into a single pore. Finally, the swimbladder has been found by Trewavas (1962: 167) to be of value in aligning sciaenid genera. The gas bladders (Figure 2c, d, e) are nearly identical in *batabana* and *chrysura*. Both are divided into 2 chambers and in both the underside of the first two vertebrae is modified to seat that portion of the swimbladder where the two chambers connect.

Both *B. chrysura* and *B. batabana* have 25 vertebrae but the division is different in the two, *chrysura* having 12 and *batabana* 13 precaudal vertebrae.

Bairdiella needs serious review and, in addition to *Corvula*, probably will encompass *Vacuoqua* and bear close relation to *Ophioscion*, *Stellifer* and perhaps *Larimus*. The gas bladder of *Larimus breviceps* (see Trewavas, 1962: 168, fig. 1a) certainly resembles that of *Bairdiella*.

Material examined of B. batabana.—FLORIDA (number of specimens and their ranges in standard length in parentheses): UMML 4363 (1, 138) 15 December 1958; UMML 5087 (2, 88-91) 11 March 1959; UMML 8463 (2, 122-136) 29 January 1959; UMML 8852 (5, 89-128) 13 January 1959; UMML 8883 (7, 64-159) 29 October 1958; UMML 10293 (2, 73-81) 13 December 1961; UMML 12234 (1, 110) 28 March 1962; UMML 12549 (2, 75-95) and UMML 16118 (1, 100 [cleared and stained]) 28 November 1961; UMML (1, 127) 13 December 1961; UMML 13646 (1, 75) 4 December 1963; UMML 13655 (1, 75) 16 November 1963;

UMML 16524 (1, 93) February 1962; 1962; UMML 16357 (1, 49) 24 August 1964; all from Florida Bay waters of the Everglades National Park from Joe Kemp Channel, Murray Key and mostly Sandy Key Basin. (for a map of this region see Tabb and Manning, 1962a: 553, fig. 1). UMML 15529 (1, 48) 2 September 1964; UMML 15536 (1, 35) 5 October 1964; UMML 16065 (1, 35) 6 October 1964; UMML 16356 (1, 52) June-September, 1964; all from Buttonwood Canal at Flamingo in Everglades National Par. UMML 15646 (1, 123) Broad River, west coast of Everglades National Park, 8 October 1964. UMML 12378 (1,110) Monroe County, patch reef *ca.* ¼ mi NE of Mosquito Beacon, 11 February 1961. UMMZ 110161 (4, 135-185) ½ mi. SSW of Alligator Reef Light in 15-20 feet, 30 April 1961. UMML 13120 (1, 194) Monroe Co., off Key Largo wreck inside Carysfort Light, July 1960. UMML 13637 (1, 66) Monroe Co., E. side of lower Matecumbe Key, 8 April 1961. USNM 26575 (1,132; holotype of *Corvula sialis*) Monroe Co., Key West.

PUERTO RICO: USNM 125983 (1, 172) FISH HAWK collection.

VIRGIN ISLANDS: UMML 9153 (1, 183), St. John, Moor Point, Coral Bay, 20 March 1959.

Comparative material examined of other species.—Material used in obtaining data for *Bairdiella ronchus* have been summarized by Robins (in press). The following material of *Bairdiella chrysura* was studied; all collections are from Florida.

ST. JOHNS COUNTY: UMML 8532 (1, 152) off St. Augustine, 5-6 April 1961. UMML 8768 (1, 126) St. Augustine to Matanzas, 14-15 September 1960.

BREVARD COUNTY: UMML 1352 (33, 17-111) Banana River, east end of Barge Canal, 25 September 1956. UMML 542 (4, 77-110) Merritt Island, 3 mi. N of Cocoa, 26 October 1955.

EVERGLADES NATIONAL PARK: UMML 4739 (1, 127) Conchie Channel, Joe Kemp Channel, 8 May 1958. UMML 8853 (3, 120-158) Conchie Channel, 14 October 1958. UMML 8911 (2, 55-134) Joe Kemp Channel, 15-16 March 1958. UMML 12379 (16, 40-148) and UMML 16119 (3, 133-142, cleared and stained) Kemp Key, 10 October 1951. UMML 12430 (1, 121) Buttonwood Canal just N of Flamingo, 13 August 1963. UMML 13658 (2, 92-147) Joe Kemp Channel, 26 February 1962.

SUMMARY

The little known blue croaker, here termed *Bairdiella batabana,* is redescribed largely on the basis of new material from southern Florida. The species is illustrated for the first time along with sketches of the structures of the preopercle and swimbladder. The nomenclatural history of *batabana* is discussed and a bibliographic synonymy is provided. *Corvula sialis*

Jordan and Eigenmann, recorded in recent literature as *Vacuoqua sialis,* is synonymized with *Johnius batabanus* Poey, the type species of *Corvula.*

In considering relationships *B. batabana* was compared with *B. chrysura* and *B. ronchus,* two divergent species that have been considered congeneric by all recent revisers of sciaenid fishes. All three species seemed sufficiently close in their characters to be congeneric; hence *Corvula,* of which *B. batabanus* is the generic type, is synonymized with *Bairdiella.*

B. batabana in south Florida prefers the clear waters of grassy basins where there are good growths of red and brown algae, particularly *Dasya* and *Gracillaria.* Here *batabana* feeds mainly on caridean shrimp, especially *Hippolyte pleuracantha* and *Periclimenes longicaudatus.* In contrast the related *B. chrysura* seeks the more open muddy and sandy bottoms where it feeds to a large extent on polychaetes and larger crustaceans.

There is some evidence that at about a standard length of 120-130 mm *B. batabana* moves offshore to the shelter of rocky or reef areas but the few specimens available suggest that even in such areas *batabana* seeks its food in the grass flats. Other considerations of habitat and food are discussed and a summary of the known range is given.

SUMARIO

NOTAS BIOLÓGICAS Y TAXONÓMICAS DEL RONCO AZUL, *Bairdiella batabana*

El poco conocido ronco azul, aquí llamado *Bairdiella batabana,* es redescrito basándose mayormente en nuevo material del Sur de la Florida. Esta especie es ilustrada por primera vez, junto con dibujos de la estructura del opérculo y la vejiga natatoria. Se discute la historia de la nomenclatura de *batabana* y se da una sinonimia bibliográfica. *Corvula sialis* Jordan y Eigenmann, presentada en literatura reciente como *Vacuoqua sialis,* se hace sinónima de *Johnius batabanus* Poey, la especie tipo de *Corvula.*

Considerando sus relaciones, *B. batabana* se comparó con *B. chrysura* y *B. ronchus,* dos especies divergentes que han sido consideradas congenéricas por todos los que recientemente han revisado los peces esciaénidos. Las tres especies parecen lo suficientemente próximas en sus caracteres para ser congenéricas; de aquí que *Corvula,* de la cual *B. batabanus* es el tipo genérico, es sinónimo con *Bairdiella.*

B. batabana en el Sur de la Florida prefiere el agua clara de fondos con hierbas donde crecen abundantes las algas rojas y carmelitas, particularmente *Dasya* y *Gracillaria.* Aquí *batabana* se alimenta principalmente de camarones carídeos, especialmente *Hippolyte pleuracantha* y *Periclimenes longicaudatus.* En contraste, otra especie relacionada *B. chrysura* busca los fondos fangosos y arenosos donde se alimenta en gran parte de poliquetos y crustáceos grandes.

Hay evidencia de que con una longitud promedio de 120-130 mm *B. batabana* se va lejos de la costa a refugiarse en áreas rocosas o de arrecifes,

pero los pocos ejemplares disponibles sugieren que aún en esas áreas *batabana* busca su alimento en lechos de hierbas. Se discuten otras consideraciones sobre habitat y alimentación y se da un sumario de las variaciones conocidas en su distribución.

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