





LIBRARY  
OF THE  
UNIVERSITY  
OF ILLINOIS

590.5

FI

v. 37-38

JAN 29 1957

~~LIBRARY~~

BIOLOG

The person charging this material is responsible for its return on or before the **Latest Date** stamped below.

Theft, mutilation and underlining of books are reasons for disciplinary action and may result in dismissal from the University.

UNIVERSITY OF ILLINOIS LIBRARY AT URBANA-CHAMPAIGN

~~AUG 22 1978~~

~~DEC 4 1972~~

~~DEC 11 1972~~

~~DEC 11 1972~~

~~OCT 2 8 1982~~

MAR 04 1984







# Western Atlantic Species of the Genus *Holocentrus*

LOREN P. WOODS

*Curator, Division of Fishes*

Among the fishes collected in the Gulf of Mexico by the United States Fish and Wildlife Service M/V Oregon during the years 1950-53, there were 17 specimens of *Holocentrus* taken from the bottom in otter trawls in depths from 29 to 60 fathoms. These could not be determined by using the key of Jordan and Evermann (1896, p. 848) or that of Parr (1930, pp. 34-35) or by comparing them with identified specimens in the Chicago Natural History Museum collection. It was therefore necessary to review the literature, especially of species that have long been in synonymy, and re-examine all available specimens. These studies have resulted in the reduction of two species to synonymy (*osculus* and *sanctipauli*), recognition of one previously synonymized species (*rufus*), and description of one new species (*bullisi*).

## METHODS

Counts and measurements have been made according to standard practice as outlined by Hubbs and Lagler (1947, pp. 8-15), except when noted otherwise. All rudiments of gill rakers are included in the counts given. The length of the lower jaw was measured from the posterior edge of the angular to the anterior tip of the dentary, that of the upper jaw, with mouth closed and bones in normal position, from the anterior tip of the premaxillary to the posterior margin of the maxillary. The head length was measured from the anterior tip of the premaxillary to the tip of the longest opercular spine, that of the preopercular spine from its tip to the dorsal angle with the *anterior* margin of the preopercle, that is, to the margin of the scales at the lower posterior corner of the cheek.

## DISCUSSION

Dr. Edward M. Nelson, Assistant Professor in Anatomy, Stritch School of Medicine, Loyola University, simultaneously has been studying the structure and relations of the air bladder to the auditory bullae in the entire family Holocentridae (Nelson, this volume, pp. 121-137). His observations have been referred to below, but without details or figures. It is considered not entirely inconsistent with Nelson's data to recognize the four lines of development that can be distinguished within the genus *Holocentrus* as subgenera as follows, although on the basis of internal structures Nelson has distinguished only two lines, *Holocentrus* and *Adioryx*.

**Flammeo** Jordan and Evermann

*Flammeo* Jordan and Evermann, 1898, Bull. U. S. Nat. Mus., no. 47, p. 2871 (type, *Holocentrus marianus*).

The species referred to *Flammeo* have the dorsal fin spines X, I, the last spine of the dorsal usually longer than the tenth, separated from it although attached at its base by a membrane and more or less closely joined with the first dorsal soft ray, the body elongate, and the lower jaw extending beyond the upper. This subgenus contains the species *marianus*, *sammara*, *laevis*, *opercularis*, and *scythrops*.

**Sargocentron** Fowler

*Sargocentron* Fowler, 1904, Proc. Acad. Nat. Sci. Phila., 55: 235 (type, *Holocentrus leo*).

*Sargocentron* includes species of large size, the body deep and squarish, the spiny dorsal fin high. The species grouped here are *leo* Cuvier and Valenciennes (= *spinifer*), *tieroides*, *spinosissimus*, *praslin*, and *ensifer*.

**Adioryx** Starks

*Adioryx* Starks, 1908, Science, 28: 614 (type, *Holocentrus suborbitalis*).

*Adioryx* includes the intermediate residue of species, some grading toward *Flammeo* as do *xantherythrus*, *coruscus*, and *bullisi*, and others forming a group more typical for *Adioryx*, such as *suborbitalis*, *vepillarius*, *punctatissimus*, *lacteoguttatus*, *microstomus*, *tiere*, and *hastatus*.

**Holocentrus** Scopoli

*Holocentrus* Scopoli, 1777, Int. Hist. Nat., p. 499 (misprint for *Holocentrus* after Gronow's *Holocentrus maxilla*).



*Holocentrus* contains only the species *ascensionis* and *rufus*. It is characterized externally by having the dorsal spines more nearly of equal length, produced anterior dorsal and anal soft rays, very elongate caudal lobes, and the upper lobe much longer than the lower; internally by the tubular structure of the auditory bulla with its opening directed posteriorly and the swim bladder with a membranous area on either side on its anterior face (Nelson, this volume, pp. 121-137).

Three of these groups are found in the Atlantic: subgenera *Holocentrus*, *Adioryx*, and *Flammeo*. The three in the Pacific are *Adioryx*, *Flammeo*, and *Sargocentron*.

Mr. Norman Wilimovsky has suggested that a number of generic names take priority over *Adioryx* Starks, 1908, type *Holocentrus suborbitalis* Gill. I have re-examined the descriptions, wherein numerous names have been conferred on larval and post-larval Holocentridae and others, and find as follows:

*Rhynchichthys* Valenciennes (Cuvier and Valenciennes, 1831, p. 504), type *R. pelamidis* Valenciennes, from the Indian Ocean, dorsal X, I, 12. The type is obviously a larval fish and we have at hand larval specimens of *Myripristis occidentalis* with preopercular spines almost as well developed as those figured for *R. pelamidis* (Cuvier and Valenciennes, 1831, pl. 208). Further, it is characteristic of *Myripristis* to have the dorsal X, I. The count, anal IV, 12, given by Valenciennes could not refer to any known species of *Holocentrus*, but the number 12 is characteristic of *Myripristis*. *Rhynchichthys pelamidis* Valenciennes is therefore referred to synonymy of the genus *Myripristis*.

*Rhinoberyx* Gill (1862, p. 237), type *Rhynchichthys brachyrhynchus* Bleeker, from Amboina. This species is figured in Bleeker's Atlas (9, pl. 357, fig. 1). It has the appearance of a small *Myripristis*. It has no preopercular spine, the dorsal is X, I, 13 or 14 and the anal is IV, 11 or 12, the anal spines are more like those of *Myripristis* in size and proportion, and the number of anal rays is applicable only to species of *Myripristis*. *Rhinoberyx chryseus* Cope (1870, p. 464, fig. 2) is a synonym of *Myripristis jacobus*.

*Rhamphoberyx* Gill (1863, p. 87), type *R. poecilopus* Gill, from Cape San Lucas, Baja California, Mexico. Specimens on which this genus and species were based were "1 $\frac{3}{4}$  to 2 $\frac{1}{3}$  inches long." From the description it is evident that the specimens were larval or were just transforming. The spine at the angle of the preoperculum is "not essentially enlarged, but simply forms the angle at

the preoperculum." Counts given are dorsal X, I, 14; anal IV, 11. No species of *Holocentrus* known to me has 11 anal rays. Gilbert and Starks (1904, p. 65) have placed *poecilopus* in the genus *Myripristis*, and Hildebrand (Meek and Hildebrand, 1923, p. 296), who had access to Gill's types, apparently agreed with Gilbert and Starks, although Meek and Hildebrand had no specimens of *poecilopus* from Panama. The other species placed in this genus by Gill (1863, p. 88), *Rhamphoberyx leucopus* Gill, has dorsal X, I, 14; anal IV, 12. No preopercular spine is mentioned in the original description. Hildebrand (Meek and Hildebrand, 1923, p. 295) has placed *leucopus* in the synonymy of *Myripristis occidentalis*.

*Neomyripristis* Castelnau (1873, p. 99), type *N. amaenus* Castelnau, from Torres Strait, Australia, is described as being very near to *Myripristis* but with different teeth; preopercular without a spine; dorsal X, I, 15; anal IV, 14; opercle with one long spine, below which are two short spines. All of these characters are those of *Myripristis* rather than *Holocentrus*.

The original description of the genus *Neoniphon* Castelnau (1875, p. 4), type *N. armatus*, from Cape York, Australia, is stated to have counts as follows: dorsal XI, I, 12; anal III, 9; pectoral 15; pelvics 7; scales over 38-40. The color, with a large black spot on membranes between the first three dorsal spines, and numerous round spots on cheek and body, forming irregular lengthwise lines; the proportions; and the counts, except for the number of anal spines, along with the mention of lower jaw being larger than upper, all agree closely with *Holocentrus sammara* Forskål. The chief difficulty is that the size is stated to be nearly 17 inches (470 mm.) and the largest *sammara* of which I can find a record is 267 mm. (about  $10\frac{3}{4}$  inches). *Neoniphon hasta* De Vis (1885, p. 537), from Queensland (dorsal XI, I, 12; anal III, 7; lateral line 40), has two long spines at the angle of the preopercle; the black blotch on the dorsal membranes seems to be identical with that of *armatus*. Both species have been recognized by McCulloch (1929, pp. 134-135). It appears likely that both of these species are synonyms of *H. sammara*, a species ranging from the Red Sea to the Tuamotus and abundant in the Sunda area and New Guinea. *H. sammara* is not reported from Australia although it should certainly occur along the northern shore and the northern portion of the eastern shore of Australia. At any rate it is fairly certain that both species described under *Neoniphon* belong to the *Flammeo* group and if so the name *Neoniphon* has priority over *Flammeo*. However, it appears to be

more sensible to continue to use the name *Flammeo* Jordan and Evermann (1898, p. 2871), based as it is on a well-known species widely used in the literature, rather than to replace it with a name based on a species whose status is uncertain.

*Harpag* De Vis (1884, p. 447), type *H. rosea* De Vis, from the South Sea Islands. Dorsal XII, I, 14; anal III, 11, lateral line scales  $42\frac{5}{10}$ , "preopercle scarcely spiniferous, with short bifid spine at angle." The short preopercular spine, the structure of the dorsal and the number of the anal rays, and the premaxillary overhanging the mandible relate this species to, or identify it with, *Holotrachys*, as suggested by Jordan and Seale (1906, p. 223). *H. lima* has dorsal XII, 15; anal IV, 11; lateral line scales  $43\frac{4}{9}$ ; and bears a short spine at the angle of the preopercle. The short first anal spine may have been overlooked by De Vis. Nelson has found *H. lima* to be a specialized form of the *Myripristis* branch.

*Beanea* Steindachner (1902, p. 337), type *B. trivittata* Steindachner, from the Red Sea, may not even belong to the family Holocentridae. "D. VII-I, 9; A. IV, 8; P<sub>2</sub> I, 5; l. lat.  $25\frac{1}{5}$ ." All members of this family of which I can find a description have X, I, XI, or XII dorsal spines and 29 or more lateral line scales; further, all have more than 5 soft rays in the pelvic fin. The type of *Beanea* was a small specimen (larval?) 30.6 mm. in length. It is described as having the body form of *Myripristis*, and the "border of the preopercle and lower horizontal part of the forward arm of the same bone entirely sharply toothed." No mention is made of a spine at the angle of the preopercle that is characteristic of *Holocentrus*.

*Sargocentron* Fowler (1904, p. 235) was proposed as a subgenus for *Holocentrus leo* Cuvier, a species that I believe to be a synonym of *H. spinifer* Forskål. The name *Sargocentron* is used in this paper in the sense I believe it was proposed, namely, as a subgenus to include large, rectangular-bodied species with "margin of preopercle coarsely serrated." (See p. 92 for list of such species.)

A recently proposed genus *Beloholocentrus* Fowler (1944, p. 100), type *B. attractus* Fowler from Courtown Key (12° 24' N., 81° 28' W.), Caribbean Sea, appears to be based on young that have been described by Bean (1906, p. 42, fig. 2) as *Holocentrus meeki* (= *Holocentrus rufus*) and the "*Rhynchichthys*" stage of *H. ascensionis*.

Various names proposed for subgenera by Whitley (1933, pp. 68-69), namely, *Cephalofarer* (type *H. siccifer*), *Faremusca* (type *H. punctatissimus*), and *Kutaflammeo* (type *H. tahiticum*) do not

enter into the question of priority of names used herein. *H. sicifer* is a synonym of *H. vexillarius*, which along with *punctatissimus* fits very well into the subgenus *Adioryx*.

The remaining genera of this family, *Myripristis*, *Corniger*, *Holotrachys*, *Plectrypops*, *Ostichthys*, and the fossil genera are considered well enough known or far enough removed from this group to have no bearing on the divisions within the genus *Holocentrus* and require no further discussion.

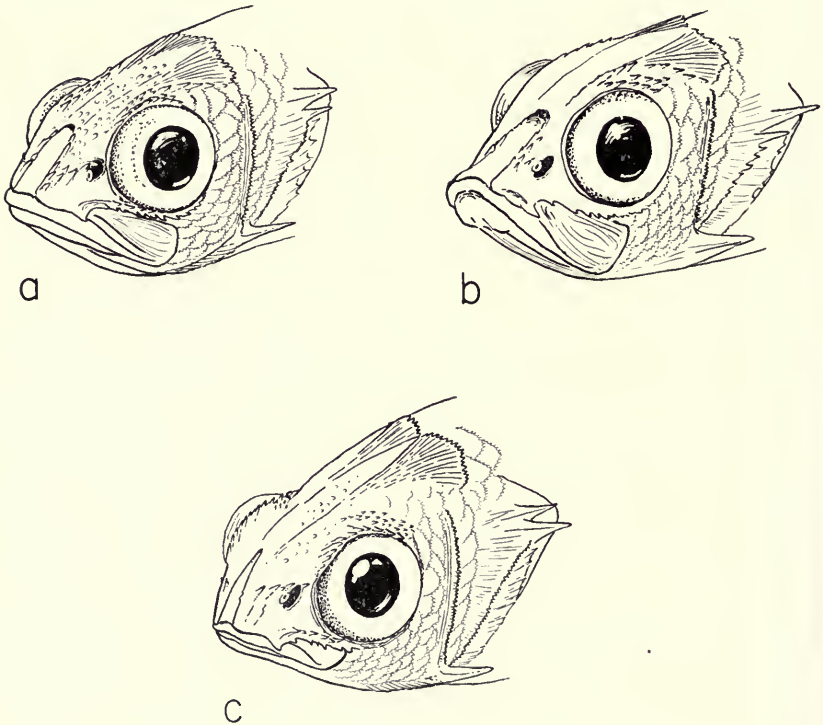


FIG. 14. Heads of *Holocentrus coruscus* (a), *H. bullisi* (b), and *H. vexillarius* (c), to illustrate differences in spination of snout and supraorbital regions.

#### KEY TO WESTERN ATLANTIC SPECIES OF *HOLOCENTRUS*

- 1a. Dorsal spines X, I (subgenus *Flammeo* Jordan and Evermann); scales in lateral line with tubes 46 or 47; dorsal X, I, 12 or 13; anal IV, 8 or 9; pectoral ii, 12; head pointed; mouth large, lower jaw protruding beyond upper; opercular spines short, upper slightly larger; third anal spine exceedingly long, reaching well beyond base of caudal fin. . . *Holocentrus marianus* Cuvier

## 1b. Dorsal spines XI.

2a. Scales in lateral line with tubes 46 to 57; gill rakers on lower limb of first arch 14 to 17.....subgenus *Holocentrus* Scopoli

3a. Length of upper jaw 6.60 to 7.40, of lower jaw 5.10 to 5.85, both in standard length; scales in lateral line with tubes 46 to 51.

*Holocentrus ascensionis* Osbeck

3b. Length of upper jaw 7.70 to 9.25, of lower jaw 6.10 to 6.82, both in standard length; scales in lateral line with tubes 50 to 57.

*Holocentrus rufus* Walbaum

2b. Scales in lateral line with tubes 45 or fewer; gill rakers on lower limb of first arch 9 to 12.....subgenus *Adioryx* Starks

4a. Pectoral axil black (or dusky in very large specimens); dorsal rays 13 or 14; anal rays 9; snout smooth, no spinules between narial opening and premaxillary groove, antero-dorsal orbital margin flanged and denticulate (fig. 14).....*Holocentrus vexillarius* Poey

4b. Pectoral axil always pale; dorsal rays 11 or 12; anal rays 7 or 8; snout with patch of spinules between narial opening and premaxillary groove; antero-orbital margin not flanged, entire.

5a. Pectoral rays ii, 10 or ii, 11; a large black oval spot on spiny dorsal membrane distally between first 3 or 4 spines, rest of membranes dusky in very small specimens; snout spinules prominent, a spine extending into posterior narial opening (fig. 14).

*Holocentrus coruscus* Poey

5b. Pectoral rays ii, 12; no large oval spot on first three or four spiny dorsal membranes; only a small spot on distal portion of membrane in specimens 58 to 76 mm.; snout spinules smaller, limited to rim of premaxillary groove (fig. 14) with snout merely rugose between this groove and nares. *Holocentrus bullisi* sp. nov.

TABLE 1.—FIN RAY COUNTS IN WESTERN ATLANTIC SPECIES OF THE GENUS *HOLOCENTRUS*

Species	X, I	Dorsal Rays						
		XI	11	12	13	14	15	16
<i>ascensionis</i> . . . . .		24	..	..	..	1	22	1
<i>rufus</i> . . . . .		19	..	..	..	5	12	2
<i>vexillarius</i> . . . . .		28	..	..	23	4	..	..
<i>bullisi</i> . . . . .		17	1	16	..	..	..	..
<i>coruscus</i> . . . . .		22	3	19	..	..	..	..
<i>marianus</i> . . . . .	5	..	..	1	4	..	..	..

TABLE 2.—FIN RAY COUNTS IN WESTERN ATLANTIC SPECIES OF THE GENUS *HOLOCENTRUS*

Species	Anal Rays					Pectoral Rays*						
	IV	7	8	9	10	11	12	13	14	15	16	17
<i>ascensionis</i> . . . . .	24	..	..	..	24	..	..	..	..	4	41	1
<i>rufus</i> . . . . .	19	..	..	1	17	1?	..	..	..	7	25	2
<i>vexillarius</i> . . . . .	28	..	1	26	1	..	..	..	2	35	2	..
<i>bullisi</i> . . . . .	17	..	17	..	..	..	..	..	32	2	..	..
<i>coruscus</i> . . . . .	22	2	20	..	..	..	1	37	..	..	..	..
<i>marianus</i> . . . . .	5	..	1	4	..	..	..	..	10	..	..	..

\* Both pectorals of each fish were counted and tabulated separately.

TABLE 3.—LATERAL SCALE COUNTS IN WESTERN ATLANTIC SPECIES OF THE GENUS *HOLOCENTRUS*

Species	Scales in Lateral Line Bearing Tubes																		
	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
<i>ascensionis</i>	..	..	..	..	..	..	..	3	17	22	9	6	5	..	..	..	..	..	..
<i>rufus</i>	..	..	..	..	..	..	..	..	..	..	..	2	12	13	25	24	7	6	1
<i>vevillarius</i>	..	4	6	8	6	3	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>bullisi</i>	2	6	5	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>coruscus</i>	..	..	2	5	6	5	2	..	..	..	..	..	..	..	..	..	..	..	..
<i>marianus</i>	..	..	..	..	..	..	3	2	..	..	..	..	..	..	..	..	..	..	..

TABLE 4.—GILL RAKER COUNTS IN WESTERN ATLANTIC SPECIES OF THE GENUS *HOLOCENTRUS*

Species	Upper Limb									At Angle	Lower Limb									Total								
	5	6	7	8	9	1	9	10	11		12	13	14	15	16	17	16	17	18	19	20	21	22	23	24	25	26	
<i>ascensionis</i>	..	..	..	..	11	..	..	..	..	..	..	..	2	9	..	..	..	..	..	..	..	..	..	..	..	..		
<i>rufus</i>	..	..	1	14	1	16	..	..	..	..	..	..	4	8	4	..	..	..	..	..	..	..	..	..	2	9	..	
<i>vevillarius</i>	..	5	3	..	..	8	..	1	7	..	..	..	..	..	..	..	1	4	3	..	..	..	..	..	5	7	4	
<i>bullisi</i>	4	8	..	..	..	12	3	9	..	..	..	..	..	..	..	6	5	..	..	..	..	..	..	..	..	..	..	
<i>coruscus</i>	3	3	1	..	..	7	..	7	..	..	..	..	..	..	..	3	3	1	..	..	..	..	..	..	..	..	..	
<i>marianus</i>	..	1	3	..	..	4	..	..	..	..	4	..	..	..	..	..	..	1	3	..	..	..	..	..	..	..	..	

## Subgenus FLAMMEO

**Holocentrus marianus** Cuvier. Figure 15.

*Holocentrum marianum* Cuvier, 1829, in Cuvier and Valenciennes, Hist. Nat. Poissons, 3: 164 (219)—Martinique.

*Holocentrum rostratum* Poey, 1860, Memorias . . . , 2: 157—Cuba (name preoccupied).

Counts and description are based on 7 specimens, including cotypes of Poey's *rostratum*, 74 to 124 mm., from the Bahamas,

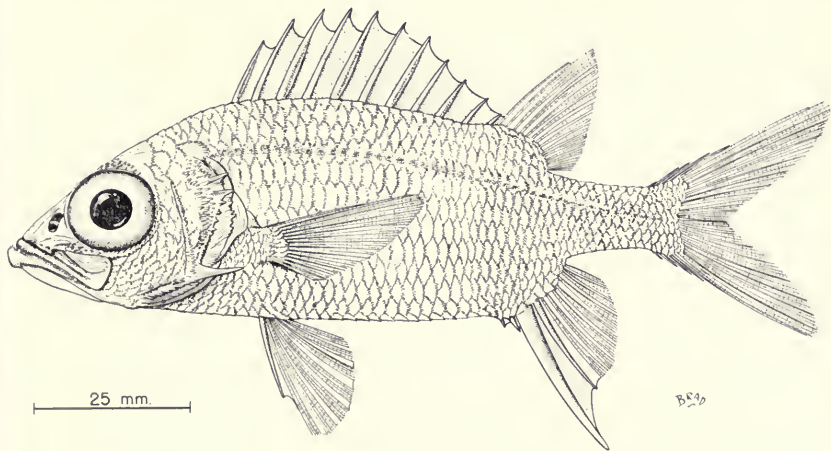


FIG. 15. *Holocentrus marianus* Cuvier, AMNH no. 19076; 103 mm. Haiti.

Cuba, Haiti, Glover Reef, Isle of Pines and Jamaica. These specimens belong to the Museum of Comparative Zoology, Natural History Museum, Stanford University, the American Museum of Natural History, and Bingham Oceanographic Collection.

*Description*.—Dorsal fin rays X, I, 13 (12 in one specimen); anal rays IV, 9 (8 in one specimen); pectoral rays ii, 12; pelvics I, 7; scales in lateral line bearing tubes 46 or 47,  $3\frac{1}{2}$  rows between lateral line and origin of dorsal fin, 8 between lateral line and anus; gill rakers 6 or 7 on upper limb, one at angle, 12 on lower limb.

Depth of body 2.93–3.23, length of head (to tip of longest opercular spine) 2.59–2.86, length of snout 9.46–10.6, diameter of eye 6.47–8.15, width of interorbital 11.5–14.8, length of upper jaw 5.88–6.72, length of lower jaw 4.64–4.86, depth of caudal peduncle 11.4–12.4, length of caudal peduncle 5.43–6.21, length of fourth dorsal spine 6.07–10.1, length of third anal spine 3.36–4.40, length of pec-

toral fin 3.60–4.97, length of pelvic fin 4.47–5.53, length of upper caudal lobe 3.49–3.73, length of lower caudal lobe 3.53–3.99, all in standard length.

Third anal spine very long, its tip reaching from base of caudal rays to fork of caudal; lower jaw projecting beyond upper; maxillary reaching from anterior margin of pupil to middle of pupil; last dorsal spine nearer to first dorsal soft ray than to penultimate spine; margin of premaxillary groove smooth; opercular spines short and heavy, of equal length or with upper spine slightly enlarged; profile nearly straight.

Color completely faded in all available specimens.

*Remarks.*—Mrs. M. M. Dick, Museum of Comparative Zoology, has very kindly re-examined Poey's types of *H. rostratum*, MCZ 10969, two specimens, 142 and 150 mm. standard length. These specimens are apparently correctly referred to the synonymy of *marianus* as was done by Howell-Rivero (1938, p. 183). Their fin ray and scale counts are in agreement with this species; the only differences noted are the slightly shorter maxillary (2.52 and 2.54)—but the maxillary reaches to the center of the pupil—and the shorter third anal spine (2.45 to 2.48). This latter difference is probably because of a difference in method of measuring. The other characters of serrae and spines on head bones, especially opercular spines, and projecting lower jaw are characteristic of *marianus*.

Dr. Edward M. Nelson has found no differences in the structure of the swim bladder and auditory bulla in species referred to *Flammeo* (*F. sammara*, *F. laevis*, *F. scythrops*, *F. opercularis*) and *Adioryx suborbitalis* or *Holocentrus coruscus*, *veixillarius* and numerous Pacific species referred to the genus *Holocentrus*. It is therefore proposed to recognize *Flammeo* as a subgenus of *Holocentrus* on the basis of its peculiar dorsal (X, I) and protruding lower jaw.

### Subgenus HOLOCENTRUS

#### *Holocentrus ascensionis* Osbeck. Figure 16.

*Perca ascensionis* Osbeck, 1771, *Iter Chinensis*, p. 388—Ascension Island.

*Holocentrum longipinne* Cuvier (part), 1829, in Cuvier and Valenciennes, *Hist. Nat. Poissons*, 3: 138 (185)—Brazil; Martinique; Porto Rico; St. Thomas; San Domingo; Havana.

*Holocentrum productum* Poey, 1868, *Synopsis*, p. 300—Cuba.

*Holocentrum sancti pauli* Günther, 1880, *Rep. Voy. Challenger*, *Zool.*, 1, pt. 6, *Rept. Shore Fishes*, p. 4, pl. 1, fig. A—St. Paul's Rocks.



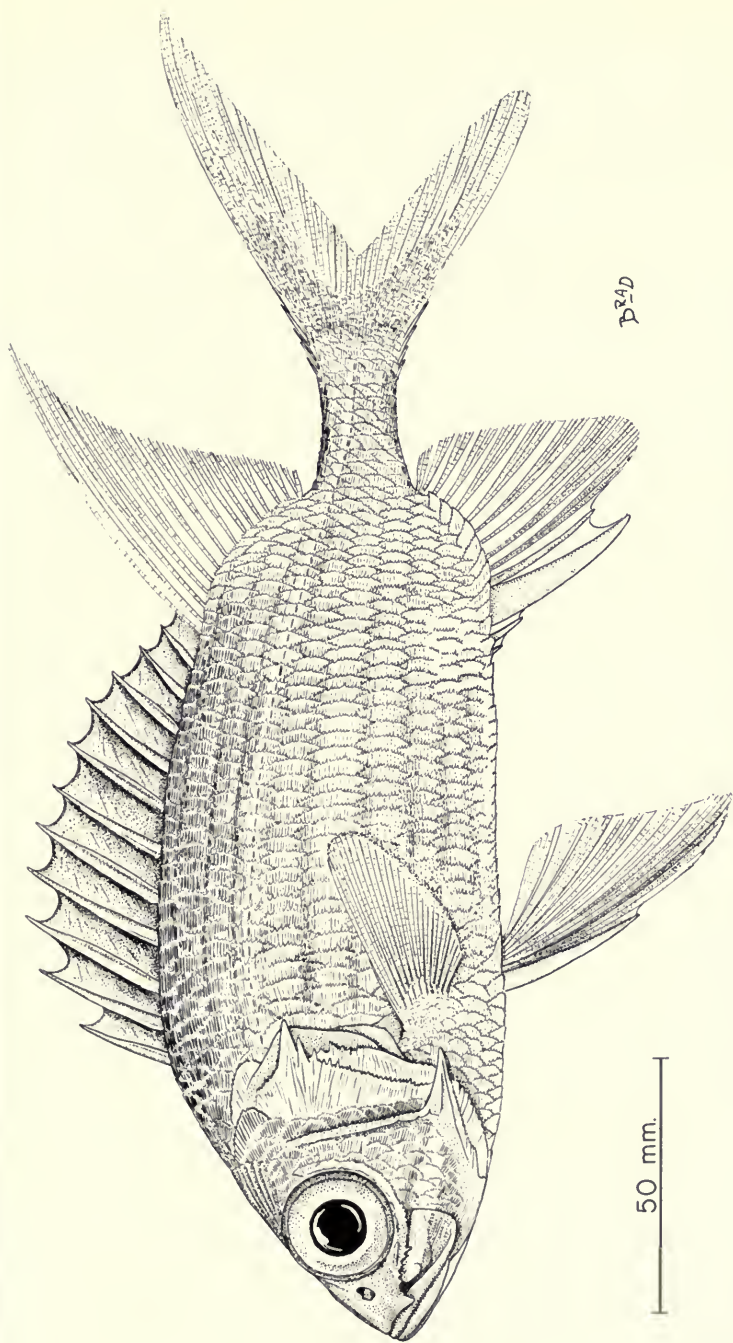


FIG. 16. *Holocentrus ascensionis* Osbeck, CNHM no. 48267; 190 mm. Bermuda.

Measurements are based on 25 specimens from Bermuda, St. Croix, and Brazil, 58 to 191 mm.

*Description.*—Dorsal fin rays XI, 15 (rarely 14 or 16); anal rays IV, 10; pectoral rays ii, 13 to 15 (usually ii, 14); pelvics I, 7; scales in lateral line bearing tubes 46 to 51,  $3\frac{1}{2}$  between lateral line and origin of dorsal, 8 between lateral line and anal opening; gill rakers on first arch 8 on upper limb, one at angle, 14 or 15 on lower limb, total 23 or 24.

Depth of body 2.69–3.13, length of head 2.80–3.17, length of snout 11.8–15.3, diameter of eye 6.35–9.45, width of interorbital 14.0–19.2, length of upper jaw 6.62–7.37, length of lower jaw 5.11–5.84, length of preopercular spine 16.0–18.7, depth of caudal peduncle 11.5–13.9, length of caudal peduncle 5.1–6.31, length of fourth dorsal spine 6.06–7.2, length of third anal spine 5.23–6.52, length of pectoral fin 4.32–4.93, length of pelvic fin 3.01–3.60, length of upper caudal lobe 2.60–3.93, length of lower caudal lobe 2.97–4.03, all in standard length.

Body deeper than in *H. rufus* except in small specimens; mouth large, upper jaw reaching posteriorly to below center of pupil or beyond; lower jaw generally not extending anterior to upper in small specimens, in large specimens even with or slightly protruding; anterior soft rays of dorsal and anal greatly elongate; upper caudal lobe considerably longer than lower.

*Color.*—In alcohol, essentially as in *H. rufus* (*q.v.*) except spiny dorsal membranes lacking distinct white spot distally, distal portion instead with a wedge pale or dusky colored (green to greenish brown in living specimens).

*Remarks.*—This species may usually be distinguished from *rufus* by the lower number of tube-bearing scales in the lateral line. Since *ascensionis* occasionally has 51 scales, it is necessary to rely on measurements. *H. ascensionis* always has a larger mouth (measurements of both upper and lower jaws) and in all except specimens 70 mm. or less a much shorter preopercular spine. When specimens of the same size of both *ascensionis* and *rufus* are measured and compared, there is no difficulty in distinguishing all specimens (see tables and comparative measurements under *H. rufus*). The species are very similar in characters but are not geographic subspecies since *ascensionis* ranges from Brazil, Panama, and the West Indies to Bermuda, while *H. rufus* is also found in all of these localities except Brazil. I have not been able to examine specimens of *ascensionis* from West Africa or Ascension Island. Osbeck's original description

did not give the number of lateral line scales (at least in the 1771, English edition, available to me). Günther's description of *H. sanctipauli* records 48 lateral line scales and this is in accordance with my findings on specimens from Brazil.

We have one small specimen from St. Croix that has the preopercular spine forked on one side as in *sanctipauli*; on the other side the spine is broken.

One larval specimen of *ascensionis* (61 mm.) from St. Croix was examined; it is similar to "*meeki*" in most respects but is deeper-bodied and has 48 and 49 tubed lateral line scales. We have also one specimen from Puerto Rico completely transformed at 52 mm. This specimen has 47 scales and in proportions closely resembles larger *ascensionis*.

*H. productum* Poey was based on a specimen 68 mm. long. The counts given in the original description (dorsal XI, 15; anal IV, 10) agree with *ascensionis*.

I have examined a specimen, USNM 37428, 56 mm. standard length, one of Poey's specimens and labeled as the type of *productum*. There are, however, a number of discrepancies between this specimen and the original description quoted above. The National Museum specimen has: Dorsal rays XI, 11; anal IV, 7; pectoral 13; scales in lateral line 42. All of these counts fit *coruscus*. There is a spot distally on the membranes between the first and fourth dorsal spines. Since the snout was broken the measurements of the head and body which were made are considered not reliable and are not given. At the time this type was examined (1947) no attention was paid to the presence or absence of spinules on the snout present in *coruscus*.

Since there are such differences in the counts given by Poey and the specimen labeled type in the National Museum it appears possible that there is an error in labeling and that USNM 37428 is not Poey's type of *productum*. At any rate it is believed USNM 37428 is certainly a specimen of *coruscus*.

Studies by Nelson show that the structure of the swim bladder and its relation to the auditory bullae as well as the structure of the bullae themselves are similar in *ascensionis*, *rufus*, and nominal *meeki* (= *rufus*). The form and relation of these two structures are different from all the other species of *Holocentrus* that were examined by Nelson (23 species, but not including the nominal *osculus* and *sanctipauli*).

**Holocentrus rufus** Walbaum. Figure 17.

*Perca rufa* Walbaum, 1792, Art. Pisc., p. 351—Bahamas (after *Perca marina rubra* of Catesby).

*Sciaena rubra* Schneider, 1801, in Bloch and Schneider, Syst. Ichthy., p. 82 (after Catesby) (ref. copied).

*Holocentrum osculum* Poey, 1860, Memorias, 2: 156—Cuba; Regan, 1904, Ann. Mag. Nat. Hist., (7), 13: 259–260—St. Thomas, Virgin Islands.

*Holocentrum perlatum* Poey, 1860, Memorias, 2: 157—Cuba.

*Holocentrus meeki* Bean, 1906, Proc. Biol. Soc. Wash., 19: 31—St. David's Island, Bermuda.

Measurements are based upon 18 specimens, 70 to 180 mm., from Bermuda, Florida, Panama, Colombia, St. Croix, and Glover Reef, British Honduras. The counts include many additional specimens.

*Description.*—Dorsal fin rays XI, 14–16; anal rays IV, 10 (rarely 9 or 11); pectoral rays ii, 13–15 (usually ii, 14); pelvics I, 7; scales in lateral line bearing tubes 50–57,  $3\frac{1}{2}$  between lateral line and origin of dorsal, 7 or 8 between lateral line and anal opening; gill rakers on first gill arch 8 or 9 on upper limb, one at angle, 15–17 on lower limb, total 24–26.

Depth of body 3.05–3.61, length of head 3.05–3.43, length of snout 13.6–16.6, diameter of eye 7.12–9.86, width of interorbital 13.4–17.7, length of upper jaw 7.74–9.25, length of lower jaw 6.12–6.82, length of preopercular spine 11.7–17.1, depth of caudal peduncle 13.4–15.3; length of caudal peduncle 4.68–5.5, length of fourth dorsal spine 5.63–7.01, length of third anal spine 4.85–6.10, length of pectoral fin 4.28–5.35, length of pelvic fin 2.99–4.10, length of upper caudal lobe 2.47–3.42, length of lower caudal lobe 3.14–3.85, all in standard length.

Body slender, compressed; mouth small, upper jaw reaching posteriorly from anterior margin of pupil to below center of pupil, rarely just beyond; lower jaw not extending to anterior margin of upper but slightly included; snout smooth, opercular spines two, upper spine longer and stronger, preopercular spine relatively long and slender; third anal spine about three-fourths of the length of first anal rays; anterior soft dorsal rays very much elongated, reaching beyond end of body when depressed; caudal fin deeply forked, its lobes long and slender, upper lobe longer than lower.

*Color.*—In alcohol: lips light orange; premaxillary processes dusky; upper margin of exposed portion of maxillary white, a band of white diagonally extending across cheek to base of preopercular

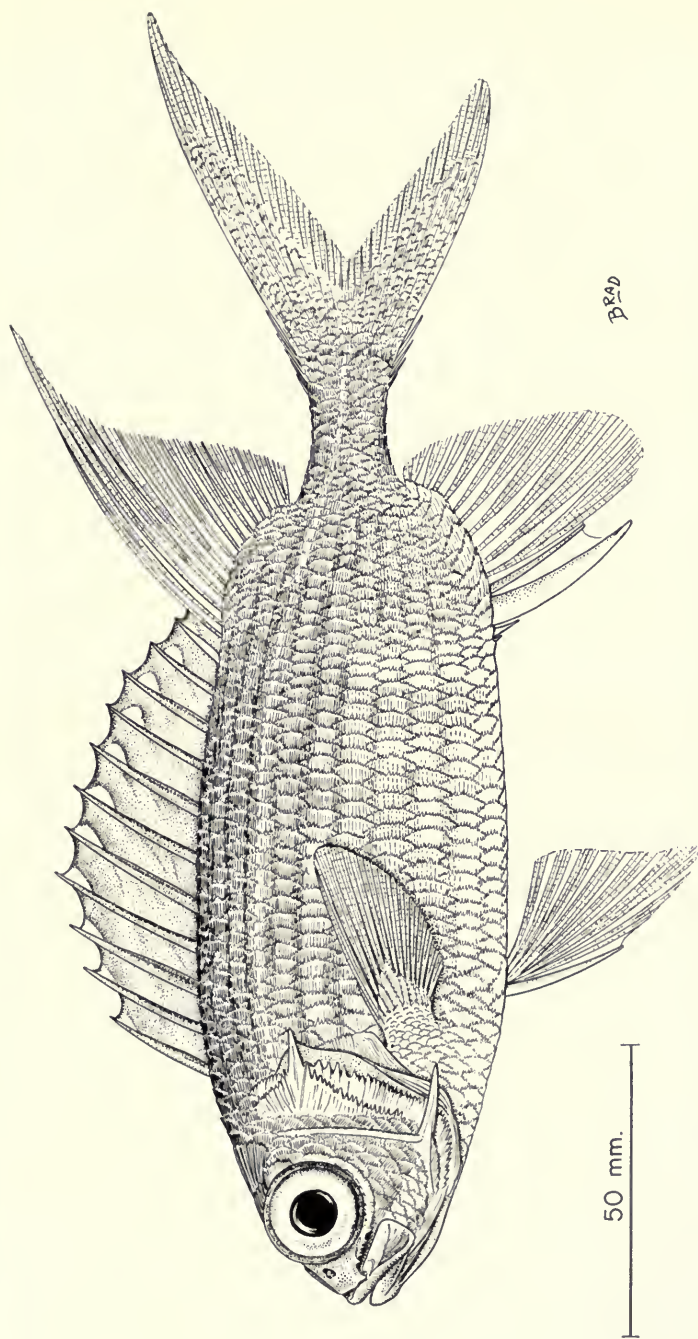


FIG. 17. *Holocentrus rufus* Walbaum, CNHM no. 46206; 164 mm. St. Croix, Virgin Islands.

spine, cheeks rosy; back reddish orange, lower sides yellow. In formalin-preserved specimens: three distinct brown lines along back above lateral line; spiny dorsal membrane pink basally, dusky distally except a distinct white spot on anterior distal edge of each membrane, dorsal spines brown; soft dorsal, anal, and caudal pale orange to pink; first three anal spines white, fourth dusky; pectoral light orange, the axil white; pelvics pale orange, the spine and outer edge of first ray white, inner edge of first ray dusky. Fresh-frozen specimen: tips of premaxillaries and mandibles dark red; upper margin of maxillary white continuous with white diagonal bar across cheek to angle of preopercle; head and body pale brick red, above lateral line 3 narrow greenish brown lengthwise lines following margins of scales narrowing and disappearing posteriorly, centers of scales pale pink, lower sides paler than upper, belly white, breast streaked with faint pink, base of pectoral dark red; spiny dorsal membranes each with small white spot distally just behind spine, narrow black line along margin of membrane; membranes pink anteriorly, dark green posteriorly; soft dorsal, caudal and anal fins red or faint orange red; first three anal spines white; pelvic spines white, outer rays red, inner rays paler; pectoral rays pale pink.

*Remarks.*—This species has been recognized by Jordan and Evermann (1896, p. 849) as a subspecies of *ascensionis* and by Jordan, Evermann, and Clark (1930, p. 236) as a separate species with the note, "The northern form probably varying into *H. ascensionis*, which ranges from the Bahamas to Brazil." Specimens in the Chicago Natural History Museum collection labeled *ascensionis* from Bermuda, Bahamas, Puerto Rico, St. Croix, Florida, Misterioso Bank (Lat. 18° 30' N.; Long. 83° 30' W.), Glover Reef, Panama, Colombia, Venezuela, and Brazil (149 specimens in all) can readily be separated into two groups based on the number of tube-bearing scales in the lateral line. Geographically it is apparent that *ascensionis* is commonly found from Bermuda throughout the West Indies to Santos, Brazil, while *rufus* appears to be rare in Central America and northern South America and does not occur in Brazil. Only one *rufus* was found among 17 specimens of *ascensionis* from Panama. In the West Indies and Florida the two species appear to be equally abundant. In Bermuda *ascensionis* has been found on the offshore banks and in the passes exclusively; both are found together along shore near the edge of the reef, while *rufus* alone was collected on the lagoon reefs. A lot of 21 specimens from

Bermuda (CNHM no. 42867) was separated into two groups with the following differences noted:

	<i>rufus</i> 8 specimens	<i>ascensionis</i> 13 specimens
Standard length.....	87.70-168	81.40-191
Head.....	3.14- 3.32	2.80- 3.17
Depth of body.....	3.08- 3.35	2.80- 3.09
Length of maxillary.....	8.08- 8.67	6.62- 7.15
Preopercular spine.....	13.40- 14.50	16.00- 18.70

All of the above specimens were well preserved and carefully measured. Specimens of each sex in each group were measured and compared with the above.

Specimens smaller than 80 mm. that were separated on the basis of lateral line scales could be distinguished by all characters except size of eye and length of preopercular spine. In measuring additional specimens from other parts of the range the proportions occasionally overlapped but individuals aberrant in one or another of the separating characters could always be distinguished. In all cases the lengths of the upper and lower jaws were different and after the two groups had been distinguished nearly all individuals could be sorted by inspection before scales were counted or measurements made.

I have examined Catesby's figure of *Perca marina rubra* (1731, 2, pl. 3, fig. 2) on which Walbaum based his *Perca rufa*. This figure is not carefully drawn and was made from a specimen with its mouth open and the jaws protruded forward, the head raised, and the opercular bones separated; the preopercular spine is not clearly delineated, and the number of scales and fin rays is not accurate. Nevertheless, Catesby's figure unmistakably represents the same kind of fish herein called *rufus*. The text accompanying the plate mentions color but otherwise states no characters of any use in defining the species.

A specimen from St. Thomas, described by Regan (1904, p. 259) with the remark, "I have no doubt it is the little known *H. osculum* of Poey," has been received on exchange from the British Museum. This specimen agrees in all respects with the counts, measurements, and coloration given here for *rufus*. The lateral-line scales number 52, the maxillary extends to below the center of the pupil, and the spiny dorsal membranes bear white spots distally.

Mrs. M. M. Dick has examined the type of *H. perlatum* Poey, MCZ no. 10938, said by Howell-Rivero (1938, p. 183) to be a syno-

TABLE 5.—COUNTS OF LATERAL-LINE SCALES IN HOLOCENTRUS ASCENSIONIS AND H. RUFUS

Number of lateral-line scales bearing tubes.....	46	47	48	49	50	51	52	53	54	55	56	57	Total specimens
<i>ascensionis</i>													
Bermuda.....	7	12	3	2	1	..	..	..	..	..	..	..	25
Puerto Rico.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Florida.....	1	3	1	..	2	..	..	..	..	..	..	..	8
St. Croix.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Misterioso Bank.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Panama.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Colombia.....	2	6	5	1	2	2	..	..	..	..	..	..	18
Venezuela.....	..	3	2	4	2	..	..	..	..	..	..	..	11
Brazil.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Total.....	3	17	22	9	6	5	..	..	..	..	..	..	62
<i>rufus</i>													
Bermuda.....	..	..	..	..	2	10	11	21	16	7	5	1	73
Florida.....	..	..	..	..	..	..	..	..	..	..	..	..	..
St. Croix.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Misterioso Bank.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Jamaica.....	..	..	..	..	..	1	2	3	6	..	..	..	12
Puerto Rico.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Bahamas.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Glover Reef.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Panama.....	..	..	..	..	..	1	..	1	..	..	..	..	2
Colombia.....	..	..	..	..	..	..	..	..	..	..	..	..	..
Total.....	..	..	..	..	2	12	13	25	22	7	5	1	87



nym of *H. osculus* Poey. The measurements, especially of the eye and the maxillary, and the length of the latter in relation to the pupil, as well as the color of the dorsal membrane, all support my opinion that *perlatum* is a synonym of *rufus*.

Observations by Beebe (1936, p. 198) on specimens of *H. meeki*, kept alive in aquaria on Nonsuch Island, Bermuda, are summarized as follows: "Little by little, in the course of several weeks they changed from *Holocentrus meeki* to the common squirrel fish, *Holocentrus ascensionis*. . . . There was no doubt about the fact that *meeki* is the immature stage of *ascensionis*." I have again counted the lateral-line scales on the types of *H. meeki* and find 52 and 53 bearing tubes. Other specimens collected by Mowbray in Bermuda (CNHM no. 49077), certainly the same as the types of *meeki*, have 51 and 56 tubed scales. This number agrees with *rufus* rather than with *ascensionis*. Also, the number of fin rays and gill rakers of *meeki* are within the range of *rufus*. There are three specimens from Bermuda (CNHM no. 48723), 70.5 to 71.7 mm. standard length, that have completely transformed and resemble young *rufus* in shape of head and size of eye. The preopercular spine is short, however, proportionately equal to *ascensionis* of the same size. The depth, head, size of eye, and length of maxillary are different from those of *ascensionis*.

Types of *meeki* are 69 and 75 mm. standard length. Three specimens from Brazil that measure 58, 65, 67 mm. and one from Puerto Rico that is 52 mm. are completely transformed and resemble young adults in shape of head and size of eye. The mouth, however, is small (7.2, 7.31, 7.24) but still larger than the mouth size of *rufus* (71.2, 70.7, and 70.0 mm. standard length; length of upper jaw 9.25, 8.64, 8.76 in standard length respectively). (The specimen of *ascensionis* from St. Croix that resembles *meeki* in its stage of development is 61 mm.) I am of the opinion that *ascensionis* transforms at a smaller size than *rufus*.

### Subgenus ADIORYX

#### *Holocentrus vexillarius* Poey

*Holocentrum vexillarium* Poey, 1860, *Memorias*, 2: 158—Cuba.

*Holocentrus brachypterus* Poey, 1865, *Repertorio*, 1: 184—Cuba.

*Holocentrum sicciferum* Cope, 1871, *Trans. Amer. Phil. Soc.*, 14: 465—New Providence, Bahamas.

*Holocentrum riparum* Poey, 1875, *Enumeratio*, p. 37—Cuba.

Six specimens measured, 53.7 to 142 mm., from Bermuda, Glover Reef, and Panama.

*Description.*—Dorsal fin rays XI, 13 (rarely 14); anal rays IV, 9 (rarely 8 or 10); pectoral rays ii, 13 (rarely ii, 12 or ii, 14); scales in lateral line bearing tubes 40–44, 3½ rows between lateral line and origin of dorsal, 8 between lateral line and anal opening; gill rakers on first gill arch 6 or 7 on upper limb, one at angle, 11 (rarely 10) on lower limb, total 17–19.

Depth of body 2.54–2.79, length of head 2.56–3.03, length of snout 12.5–13.4, diameter of eye 6.17–9.05, width of interorbital 9.37–10.8, length of upper jaw 7.56–8.82, length of lower jaw 5.65–6.90, length of preopercular spine 10.5–18.0, depth of caudal peduncle 9.84–11.2, length of caudal peduncle 4.93–6.55, length of fourth dorsal spine 5.37–6.17, length of third anal spine 4.18–5.08, length of pectoral fin 3.86–4.51, length of pelvic fin 3.97–4.68, length of upper caudal lobe 3.55–3.91, length of lower caudal lobe 3.99–4.18, all in standard length.

Body deep, compressed, upper profile angular; mouth small, premaxillary extending posteriorly to below a point midway between anterior margin and center of pupil; lower jaw fitting into upper, not entering profile; no spinules on snout; dorso-anterior margin of orbit broadened into flange bearing heavy obtuse spines in specimens of 80 mm. and greater (a specimen 54 mm. had orbit flanged but spines did not reach margin, which was entire); opercular spines two, these nearly equal in size (usually lower is longer and sometimes stronger); preopercular spine rugose, extending beyond lower margin of subopercle; third anal spine equal to or slightly shorter than anterior anal soft rays, when pressed parallel with lengthwise axis of body its tip not reaching end of body.

*Color.*—In alcohol: three broad dark brown lengthwise lines above lateral line, running between scale rows, centers of scales pale; head, breast and lower sides with brown punctulations; sides below lateral line with faint broad brown lines narrowing and fading posteriorly (not evident in largest specimens); *axil of pectoral jet black in young, dusky in large individuals*; spiny dorsal membranes dusky distally with vertical brown or black line covering most of membrane immediately anterior to each spine; membrane between third and fourth anal spines sometimes faintly dusky distally; rest of fins pale.

*Remarks.*—The specimen figured by Fowler (1904, p. 234, fig. 5), stated to be the type of *H. sicciferum* Cope, is certainly a small

specimen of *H. vexillarius*. The counts of dorsal, anal, and pectoral fin rays given by both Cope and Fowler are within the range of this species (see table) and this combination of counts does not fit any other Atlantic species. *H. sicciferum* is reported by Cope to have 45 lateral-line scales. Three of our specimens have 44 tubed scales and the one following the last tubed scale is not much smaller and is perforated so the apparent difference of *sicciferum* is attributed to method of counting. In our series of specimens from Bermuda ranging in size from 38 to 142 mm. there are some whose dorsal fins are colored as shown in Fowler's figure of the type of *sicciferum*. The large eye, small mouth and abruptly down-curved snout as well as the relatively deep body are all characteristic of this species at all sizes.

The figure and description in Metzelaar (1919, p. 43) of *H. coruscus* are based on small *vexillarius*. His counts—dorsal XI,  $13\frac{1}{2}$ –14; anal IV, 9—and his figure showing the black pectoral axil could refer to no other species than *vexillarius*.

One large specimen from Bermuda (142 mm., approx. 175 total length) agrees with the details of proportions and color pattern given by Poey for *brachypterus*, the type specimen of which he stated to be 195 mm. in length. The only discrepancy is in the number of soft anal rays, stated to be 8 by Poey. I have found 9 soft rays in most specimens of *vexillarius* counted, but one had 8 and another 10 rays.

*H. riparum* was based on a specimen of 50 mm. If this is total length (including caudal fin) it is almost certainly a larval stage. The counts of *riparum* agree with *vexillarius* as do the markings on the dorsal fin membranes described by Poey. Howell-Rivero (1938, p. 183) examined the type specimens of *riparum* and listed them as synonyms of *vexillarius*.

*Holocentrus hastatus* Valenciennes, ranging from Cape Verde Islands to Angola, according to Fowler (1936, pp. 549–551) appears to be a close relative of *H. vexillarius*. It differs in having dorsal rays XI, 15, anal IV, 10, scales 48 to 51, and in having the dark color on spiny dorsal membranes limited to the anterior portion of the dorsal. No specimens of this species were examined by me; the above notes are from Fowler (loc. cit.) who also regarded *hastatus* as a close relative of *sicciferum* Cope, here considered a synonym of *vexillarius*.

**Holocentrus coruscus** Poey

*Holocentrum coruscum* Poey, 1860, *Memorias*, 2: 158—Cuba.

*Holocentrus tortugae* Jordan and Thompson, 1905, *Bull. U. S. Bur. Fish.*, 24: 236, fig. 1 (published in May, 1905)—Garden Key, Tortugas.

*Holocentrus puncticulatus* Barbour, 1905, *Bull. Mus. Comp. Zool.*, 46: 117, pl. 2 (published in September, 1905)—Flatts Inlet, Bermuda.

Eight specimens measured, 53 to 100 mm., from Bermuda and the Bahamas.

*Description.*—Dorsal fin rays XI, 12 (rarely 11); anal rays IV, 8 (rarely 7); pectoral rays ii, 11; pelvics I, 7; scales in lateral line bearing tubes 41–45, 3½ rows between lateral line and origin of dorsal fin, 6 or 7 between lateral line and anal opening; gill rakers on first arch 5–7 on upper limb, one at angle, 10 on lower limb, total 16–18.

Depth of body 3.09–3.70, length of head 2.70–3.08, length of snout 13.4–15.2, diameter of eye 6.13–8.14, width of interorbital 9.58–13.0, length of upper jaw 6.46–7.68, length of lower jaw 5.53–5.97, length of preopercular spine 17.4–20.0, depth of caudal peduncle 12.0–13.7, length of caudal peduncle 5.03–5.72, length of fourth dorsal spine 5.77–7.32, length of third anal spine 4.17–5.41, length of pectoral fin 4.50–5.41, length of pelvic fin 4.52–5.07, length of upper caudal lobe 4.54–4.93, of lower lobe 4.67–4.93, all in standard length.

Body elongate, slender, but sides more rounded than other Atlantic species of *Holocentrus*; mouth large, upper jaw reaching posteriorly to below center of pupil; lower jaw very slightly shorter than upper, not fitting inside upper; a patch of spinules on snout between nares and premaxillary groove (fig. 14), one or two spines extending laterally over posterior narial opening; antero-dorsal margin of orbit entire; opercular spines two, the upper longer and stronger; preopercular margin serrate, a strong, keeled spine at its angle extending beyond spines of ventral portion of subopercle; third anal spine longer than anterior anal rays, when laid back falling short of end of body; caudal forked, lobes rounded.

*Color.*—In alcohol: reddish brown with three narrow, white, lengthwise lines following centers of scale rows above lateral line, lines broader below lateral line; cheek white with oblique brown band from orbit to postero-ventral angle, breast silvery; spiny dorsal fin with prominent black oval spot distally on membranes between first three spines in large specimens, sometimes extending

to fourth spine, rest of dorsal membranes faintly dusky distally; soft dorsal and other fins pale; pectoral axil pale.

*Remarks.*—Although Parr (1930, p. 36) has stated that Poey's original description of this species is inadequate for proper identification, I believe Poey's combination of counts (dorsal XI, 12; anal IV, 8; pectoral 13) must refer either to *coruscus* or, possibly, to *bullisi*, which has no large black spot on the dorsal. From the counts given by Jordan and Bollman (1889, p. 550) and Beebe and Tee Van (1928, p. 81, fig.) it appears that all these authors had specimens of *H. vexillarius* with 13 dorsal rays and 9 anal rays. Two of Beebe and Tee Van's counts give 8 and 8½ anal rays. *H. tortugae* Jordan and Thompson and *H. puncticulatus* Barbour are also certainly the same species. I have compared numerous Bermuda and Bahama specimens with the original descriptions of these two species and can find no significant differences. Both descriptions state 13 dorsal rays and both figures show 12. Both figures also show the characteristic spinules on the snout, but these are not mentioned in the descriptions. Longley and Hildebrand (1941, pp. 54–55) have discussed these spinules and other contrasting differences between *coruscus* and *vexillarius*.

**Holocentrus bullisi** sp. nov. Figure 18.

*Type.*—United States National Museum no. 164980, Oregon Station 222, Campeche Banks, Lat. 22° 32' N., Long. 88° 47' W., 29 fathoms, January 11, 1951. Collected by Harvey Bullis. Standard length 116.5 mm.

*Paratypes.*—CNHM no. 48730, Bermuda, Argus Bank, April 6, 1908. Collected by L. L. Mowbray. Standard length 79 mm.

CNHM no. 46193, Oregon Station 35, 75 miles northwest of Dry Tortugas, Florida, Lat. 25° 35' N., Long. 83° 46' W., 60 fathoms, June 26, 1950. Collected by H. H. Shoemaker. Standard length 129 mm.

CNHM no. 59868, Oregon Station 646, Campeche Banks, Lat. 22° 27' N., Long. 89° 59' W., 37 fathoms, October 5, 1952. Collected by J. B. Siebenaler. One specimen, standard length 71 mm.

CNHM no. 59869, Oregon Station 725, Campeche Banks, Lat. 22° 15' N., Long. 88° 55' W., 25 fathoms, December 13, 1952. Collected by Loren Woods and Robert Inger. Three specimens, standard length, 58.8 to 76.5 mm.

CNHM no. 59870, Oregon Station 727, off Cape San Blas, Florida, Lat. 28° 44' N., Long. 85° 01' W., 30 fathoms, December

16, 1952. Collected by Loren Woods and Robert Inger. Nine specimens, standard length 105 to 120 mm.

CNHM no. 59871, Oregon Station 892, off Cape San Blas, Florida, Lat. 28° 55' N., Long. 87° 07' W., 29 fathoms, March 7, 1953. One specimen, 116 mm.

*Description*.<sup>1</sup>—Dorsal fin rays XI, 12 (XI, usually 12, rarely 11); anal rays IV, 8 (IV, 8); pectoral rays ii, 12 (ii, 12, rarely ii, 13);

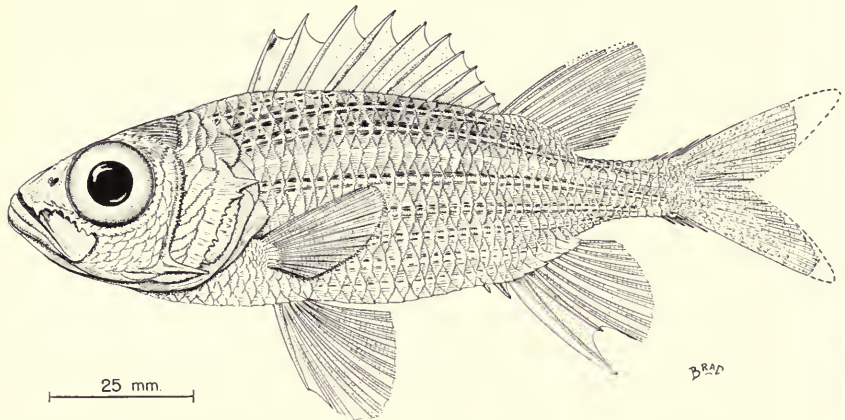


FIG. 18. *Holocentrus bullisi* sp. nov. Type, USNM no. 164980; 116.5 mm. Campeche Banks, Yucatan, Mexico.

scales in lateral line bearing tubes 39/40 (39 to 43), 3½ (3½) rows between lateral line and origin of dorsal, 7 (7) between lateral line and anal opening; gill rakers on first arch 6 (5 or 6) on upper limb, one at angle, 10 (9 or 10) on lower limb, total 16 (16).

Depth of body 3.20 (2.56–3.19), length of head 2.88 (2.66–3.08), length of snout 12.0 (10.9–12.2), diameter of eye 7.67 (5.98–7.82), width of interorbital 13.4 (9.8–14.1), length of upper jaw 7.33 (6.13–7.18), length of lower jaw 5.84 (4.82–5.67), length of preopercular spine 15.3 (10.3–17.1), depth of caudal peduncle 11.9 (9.8–13.2), length of caudal peduncle 5.62 (5.12–6.16), length of fourth dorsal spine 6.26 (5.16–6.56), length of third anal spine 4.70 (4.04–4.68), length of pectoral fin 4.42 (4.20–4.73), length of pelvic fin 4.27 (4.06–4.56), length of upper caudal lobe 3.97 (3.82–4.34), length of lower caudal lobe 4.80 (3.85–4.80), all in standard length.

<sup>1</sup>The counts and proportions of the type are given first, with extremes noted on paratypes in parentheses.

Body slender, compressed; mouth moderately small, maxillary extending posteriorly to midway between anterior margin of eye and middle of pupil in all specimens; lower jaw fitting into upper in the type, upper and lower jaws equal in paratypes; pre- and sub-orbitals serrate; a patch of spinules on snout between nares and pre-maxillary groove (these broken in type but scars remain), no spine directed over nares as in *H. coruscus*; no spines on dorso-anterior border of orbit; interorbital concave with numerous pores; opercular spines two, the upper longer and stronger; preopercle serrate on both margins, preopercular spine strong with keel basally, reaching just beyond longest spine of subopercle in type, longer in paratypes; dorsal fin almost completely divided, third and fourth dorsal spines subequal and slightly shorter than soft rays; third anal spine longer than anterior anal rays, when pressed down reaching to base of caudal rays; caudal forked, rays broken on type so exact shape of lobes cannot be determined, lobes angular or rounded, upper slightly longer in paratypes; 5 more or less free spines on dorsal base of upper caudal rays, 4 on ventral.

*Color.*—In alcohol: pale brownish yellow; cheeks pearly white; back and sides above lateral line darker with three very distinct narrow white lines from head, fading posteriorly, following centers of scales; each scale with brown dot on both sides of this line giving appearance of very narrow brown border to white line, very faint in largest paratype; below lateral line four broader white lengthwise lines, narrowing and fading posteriorly, brown border of these lines scarcely evident on type; fins all pale except for a minute dusky spot distally immediately behind first dorsal spine on type, on smallest paratype traces of dusky vertical streaks on each membrane; pectoral axil pale.

*Remarks.*—This species appears to be most closely related to *Holocentrus coruscus* Poey, from which it differs as follows:

	<i>bullisi</i>	<i>coruscus</i>
Pectoral rays.....	14	12 or 13
Lateral line scales.....	40 and 41	42 to 45
Narial spine.....	Absent	Present
Color of dorsal.....	See above	Oval black spot distally between first 3 spines

From *ascensionis*, *rufus*, and *vexillarius*, *bullisi* differs in number of fin rays, scales, and color; from *marianus* it differs in number of lateral line scales, structure of dorsal (XI in *bullisi*, X, I in *marianus*) (see table for counts).

Named for Harvey R. Bullis, Jr., of the United States Fish and Wildlife Service.

#### ACKNOWLEDGMENTS

I wish especially to thank Mrs. M. M. Dick of the Museum of Comparative Zoology for having examined the types of two of Poey's species, *Holocentrus perlatum* and *H. rostratum*. Miss M. Storey, Natural History Museum of Stanford University, Dr. D. Merriman, Bingham Oceanographic Laboratory, Mr. J. T. Nichols, American Museum of Natural History, and Mr. N. Marshall, British Museum (Natural History) have lent specimens for study. Dr. Robert R. Miller, University of Michigan, has made numerous helpful editorial suggestions.



## REFERENCES

- BEAN, T. H.  
 1906. Catalogue of the fishes of Bermuda, with notes on a collection made in 1905 for the Field Museum. Field Columbian Mus., Zool. Ser., 7: 21-89, figs. 1-14.
- BEEBE, WILLIAM  
 1936. Food of the Bermuda and West Indian tunas of the genera *Parathunnus* and *Neothunnus*. *Zoologica*, 21, (15), pp. 195-205, pls. 1-3.
- BEEBE, WILLIAM and TEE VAN, JOHN  
 1928. The fishes of Port-au-Prince Bay, Haiti. *Zoologica*, 10, (1), pp. 1-279, map and text figs. (not numbered).
- BLEEKER, PIETER  
 1862-77. Atlas ichthyologique des Indes Orientales Néerlandaises. 9 vols., 416 pls.
- CASTELNAU, F. L.  
 1873. Contributions to the ichthyology of Australia. Proc. Zool. Acclim. Soc. Victoria, 2: 37-158.  
 1875. Researches on the fishes of Australia. Offic. Rec. Phila. Cent. Exhib. 1876, pt. 7, (2), pp. 1-47.
- CATESBY, MARK  
 1731. The natural history of Carolina, Florida, and the Bahama Islands. 2 vols., 43 pls. London.
- COPE, E. D.  
 1870. Contribution to the ichthyology of the Lesser Antilles. Proc. Amer. Phil. Soc., 14: 446-483, figs. 1-10.
- CUVIER, G. and VALENCIENNES, A.  
 1831. Histoire naturelle des poissons. 7, 242 pp., 23 pls. (Strasbourg de luxe edition).
- DE VIS, C. W.  
 1884. Fishes from South Sea Islands. Proc. Linn. Soc. N. S. Wales, 8: 445-457.  
 1885. New Australian fishes in the Queensland Museum. Proc. Linn. Soc. N. S. Wales, 9: 537-547.
- FOWLER, H. W.  
 1904. New, little known and typical berycoid fishes. Proc. Acad. Nat. Sci. Phila., 56: 222-238.  
 1936. The marine fishes of West Africa. Bull. Amer. Mus. Nat. Hist., 70, (pts. 1 and 2), 1493 pp.  
 1944. Results of the Fifth George Vanderbilt Expedition (1941). The Fishes. Acad. Nat. Sci. Phila., Monogr. 6, pp. 57-529, figs. 1-268, pls. 1-20.
- GILBERT, C. H. and STARKS, E. C.  
 1904. The fishes of Panama Bay. Mem. Calif. Acad. Sci., 4: 1-304, pls. 1-33.

## GILL, THEODORE

1862. Remarks on the relations of the genera and other groups of Cuban fishes. Proc. Acad. Nat. Sci. Phila., 14: 235-242.

1863. Catalogue of the fishes of Lower California. . . collected by Mr. J. Xantus. Part IV. Proc. Acad. Nat. Sci. Phila., 15: 80-88.

## HOWELL-RIVERO, LUIS

1938. List of the fishes, types of Poey, in the Museum of Comparative Zoology. Bull. Mus. Comp. Zool., 82, (3), pp. 169-227.

## HUBBS, C. L. and LAGLER, K. F.

1947. Fishes of the Great Lakes region. Cranbrook Inst. Sci. Bull., 26, xi+186 pp., 251 figs., 26 pls.

## JORDAN, D. S. and BOLLMAN, C. H.

1889. List of fishes collected at Green Turtle Cay, in the Bahamas, by Charles L. Edwards, with descriptions of three new species. Proc. U. S. Nat. Mus., 11: 549-553.

## JORDAN, D. S. and EVERMANN, B. W.

1896-1900. The fishes of North and Middle America. Bull. U. S. Nat. Mus., 47, pts. 1-4, 3313 pp., 392 pls.

## JORDAN, D. S., EVERMANN, B. W. and CLARK, H. W.

1930. Checklist of the fishes and fishlike vertebrates of North and Middle America north of the northern boundary of Venezuela and Colombia. Rept. U. S. Comm. Fish. for 1928, pt. 2, 670 pp.

## JORDAN, D. S. and SEALE, ALVIN

1906. The fishes of Samoa. Bull. U. S. Bur. Fish., 25: 173-455, pls. 33-53.

## LONGLEY, W. H. and HILDEBRAND, S. F.

1941. Systematic catalogue of the fishes of Tortugas, Florida. Publ. Carnegie Inst. Washington, no. 535, xiii+331 pp., 34 pls.

## MCCULLOCH, A. R.

1929-30. A check list of the fishes recorded from Australia. Mem. Austr. Mus. Sydney, 5, x+534 pp.

## MEEK, S. E. and HILDEBRAND, S. F.

1923-28. Marine fishes of Panama. Field Mus. Nat. Hist., Zool. Ser., 15, xi+1045 pp., 52 pls.

## METZELAAR, JAN

1919. Over Tropisch Atlantische Visschen. Part I. West Indian fishes. Part II. Marine fishes of tropical West Africa. 314 pp., 64 figs. Amsterdam.

## NELSON, E. M.

1955. The morphology of the swim bladder and auditory bulla in the Holocentridae. Fieldiana, Zool., 37: 121-137, 3 pls.

## PARR, A. E.

1930. Teleostean shore and shallow water fishes from the Bahamas and Turks Island. Bull. Bingham Oceanogr. Coll., 3, art. 4, 148 pp., 38 figs.

## REGAN, C. T.

1904. Descriptions of *Holocentrum osculum*, Poey, and of a new fish of the genus *Centropomus*. Ann. Mag. Nat. Hist., (7), 13: 259-261.

STARKS, E. C.

1904. The osteology of some berycoid fishes. Proc. U. S. Nat. Mus., 27: 601-619, figs. 1-10.

1908. On a communication between the air bladder and the ear in certain spiny-rayed fishes. Science, 28: 613-614.

STEINDACHNER, FRANZ

1902. Über zwei neue Fischarten aus dem Rothen Meer. Anz. Akad. Wiss. Wien, 39: 336-338.

WHITLEY, J. P.

1933. Studies in ichthyology. No. 7. Rec. Austr. Mus., 19: 60-112, pls. xi-xv, text figs.



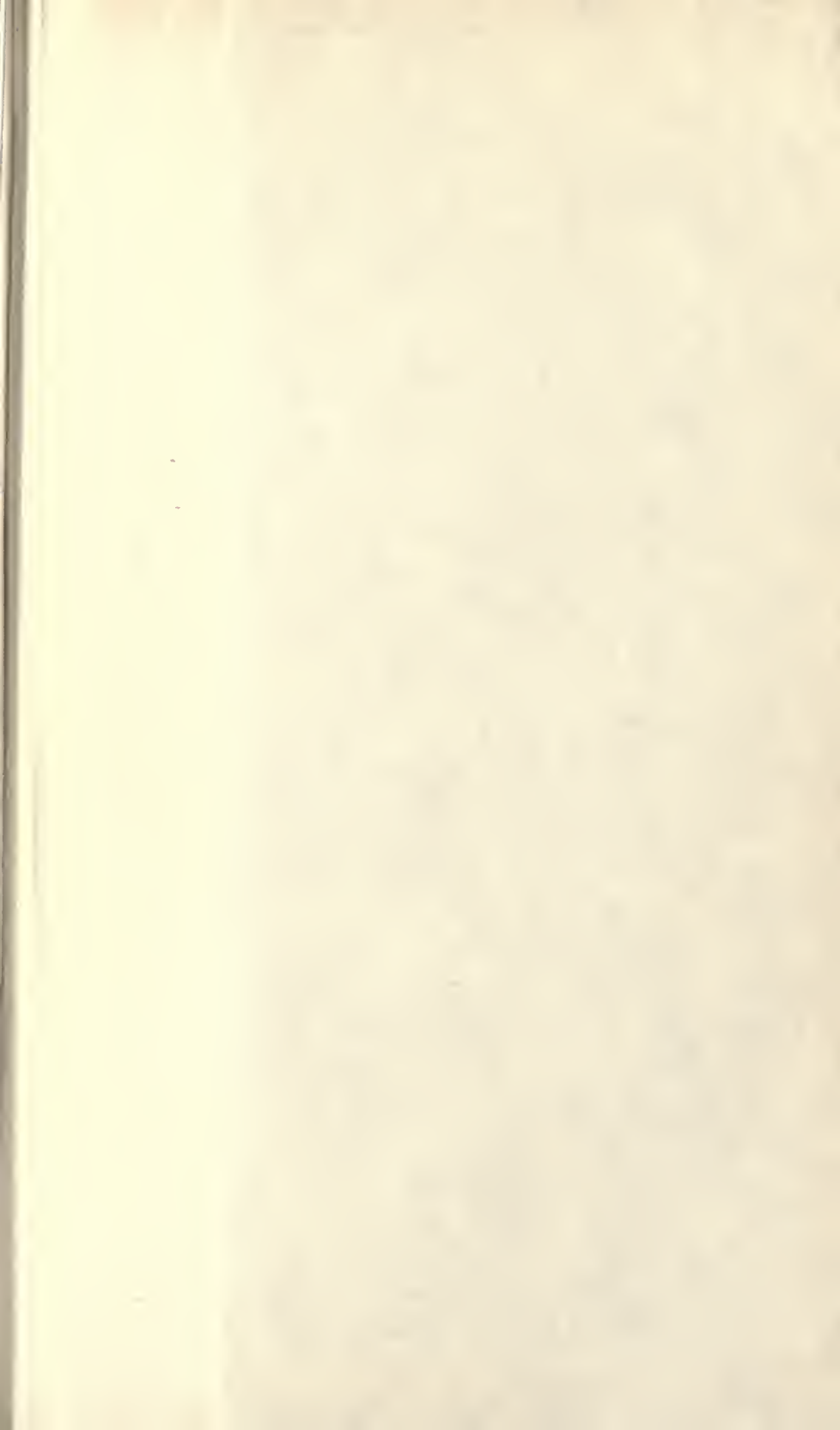












UNIVERSITY OF ILLINOIS-URBANA

590.5F1 C001  
FIELDIANA, ZOOLOGYSCHGO  
37-38 1955-56



3 0112 009379683