

A COLLECTION OF FISHES FROM
THE PANAMA BIGHT,
PACIFIC OCEAN

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ROBERT CUSHMAN MURPHY

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INTRODUCTION

THE PANAMA BIGHT is here defined as the part of the Pacific Ocean bounded by the concavity of the American coast between the Gulf of Panama and Point Santa Elena, Ecuador, and extending offshore toward the west and south. It is thus synonymous with "Panama Bay," as sometimes used by Meek and Hildebrand (1923, pt. 1, p. 3) and certain other zoologists, but that term is both inappropriate and misleading. As applied to the field of the present report, the area comprises the coastal waters of the continent from the vicinity of the Pearl Islands southward beyond the parallel of 2° south, and the outlying ocean westward slightly beyond the meridian of 82° west.

Between February 9 and May 26, 1941, the junior author conducted an expedition in this region for the American Museum of Natural History, using as a base of operations the Diesel schooner "Askoy," the charter of which had been made possible through a generous gift from Mr. Jesse Metcalf of New York City.¹ Brief preliminary reports stating the purpose, course, personnel, and sponsorship of the expedition have already been published (Murphy, 1941, 1942, 1944). Work was undertaken at 113 stations, and fishes were collected at 28 of these.

The junior author had on seven previous occasions worked in, or passed through, the waters between Panama and Point Santa Elena, Ecuador. On each of these visits observations on fishes were made, and several of them included a greater or lesser amount of collecting. Such additional data are likewise made use of in the systematic section of this paper, each particular expedition being identifiable from the dates in the following list:

September 3–6, 1919. Direct voyage from Balboa to Paita, Peru, in the Peruvian steamship "Mantaro."

February 6–12, 1920. Voyage from Guayaquil, Ecuador, to Balboa, touching at Macha-

lilla and Manta, Ecuador, in the British steamship "Guatemala."

December 3–6, 1924. Direct voyage from Balboa to Talara, Peru, in the American steamship "Santa Ana."

February 11–22, 1925. Field work of R. C. Murphy and Van Campen Heilner in the Bay of Santa Elena, Ecuador, and at La Plata Island.

March 11–16, 1925. Voyage from Guayaquil, Ecuador, to Balboa, touching at Buenaventura, Colombia, in the Peruvian steamship "Huallaga."

September 8–26, 1937. Voyage in Mr. E. Hope Norton's launch "Wilpet" from Balboa to Guayaquil, Ecuador, with stops at Señora Island of the Pearl Islands, and Piñas Bay, Panama; Octavia Rocks, Cupica Bay, Cueva Bay, Buenaventura, Gorgona Island, and Tumaco, Colombia; San Francisco Bay, Cape Pasado, Manta, and La Libertad, Ecuador.

September 30–October 4, 1937. Voyage in the American steamship "Santa Rita," from Guayaquil, Ecuador, to Balboa, touching at Buenaventura, Colombia.

We have included also data from a small but exceedingly interesting collection of fishes made near the offshore limit of the area in 1941 by Mr. Leon Mandel, on a cruise in his yacht "Carola," and presented to the American Museum.

Furthermore, in December, 1942, Dr. C. M. Breder, Jr., was aboard the power cruiser "Wilpet," operating on the Ecuadorian coast under the auspices of the Marine Studios of Florida, and, with his colleagues, secured a number of specimens, mostly from La Plata Island. These he has very kindly turned over to us to study and report on herein.

The "Askoy" Expedition fishes were obtained in harbors and estuaries, on the open coastal shelf, in waters adjacent to both continental and oceanic islands, and in the upper layers of the high sea. Dipnets, plankton nets, hand lines, seines, and dredges were all put to use as opportunity offered, though the bulk of the material had its provenance in coral brought up chiefly by the diving operations of Dr. John C. Armstrong, second in command of the expedition.

¹ Other contributors to the "Askoy" Expedition Fund were Mrs. George Blumenthal, Mrs. Edward F. Dwight, Mr. and Mrs. Ward Melville, Messrs. Frederick F. Brewster, Guy Emerson, Edgar J. Marston, E. Hope Norton, Duncan H. Read, Henry D. Sharpe, and Carl Tucker.

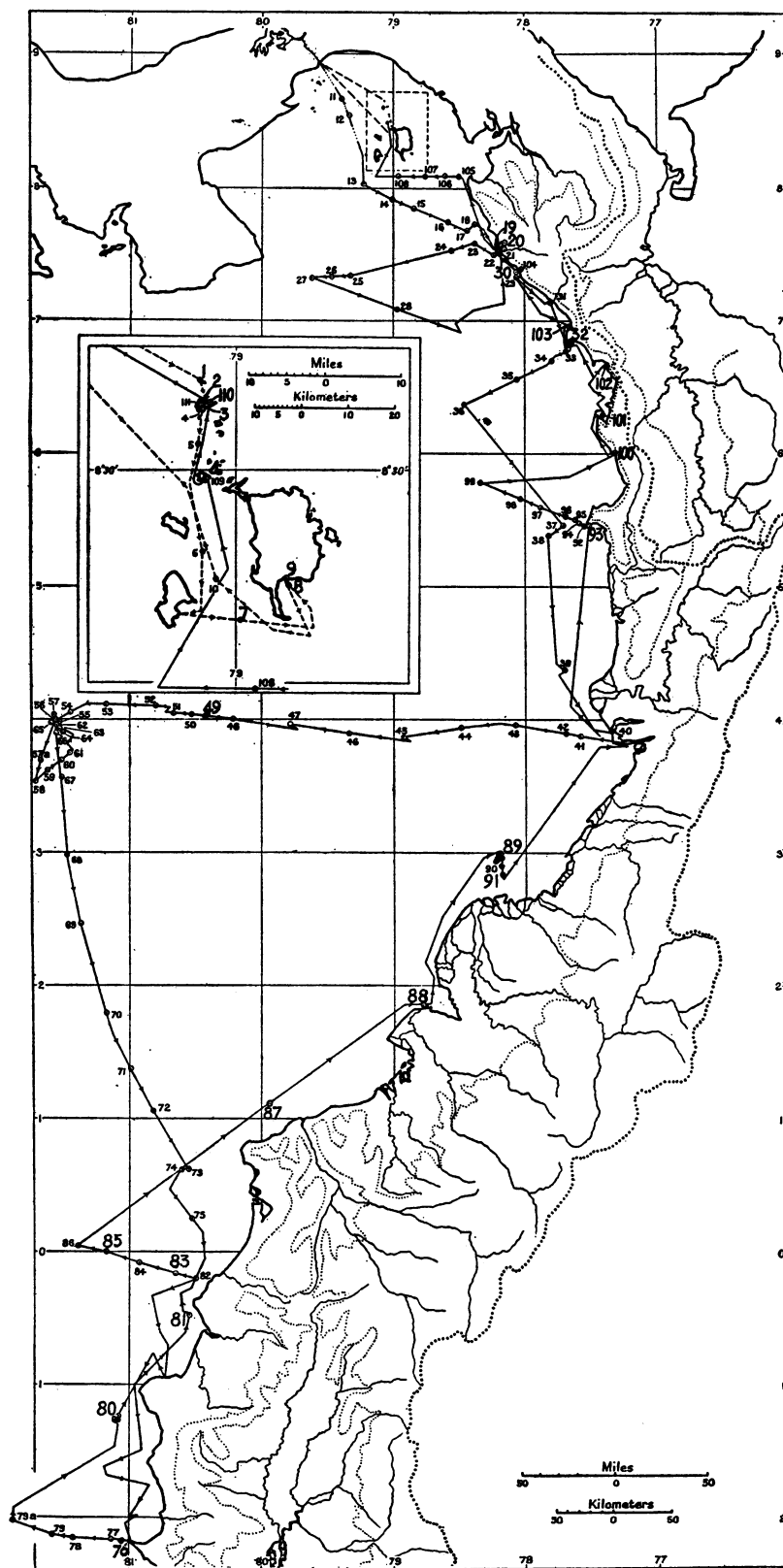


FIG. 1. The Panama Bight of the Pacific Ocean, from the Isthmus to Point Santa Elena, Ecuador, with an enlarged inset of the Pearl Islands. The line of larger dots represents the Pacific-Atlantic divide; the lines of smaller dots, the approximate limit of land above 200 meters west of the divide and in the Atrato basin.

The course of the schooner "Askoy" and the position of 113 stations are plotted. Fishes were collected during the cruise at the 28 stations denoted by enlarged figures.

"ASKOY" STATIONS AT WHICH FISHES WERE COLLECTED

The accompanying track chart of the "Askoy" Expedition (fig. 1) shows by the device of enlarged figures the stations at which fishes were obtained. The positions of these stations and the dates in 1941 on which work was carried out at each of them are as follows:

STATION	POSITION	DATE
1	Pacheca Island, Pearl Islands	Feb. 10
2	Saboga Island (northern side)	Feb. 11
3	Saboga Island (southern side)	Feb. 12
7	South Passage, Pearl Islands	Feb. 13
8	Santelmo Bay, Pearl Islands	Feb. 13
9	Cove at head of Santelmo Bay	Feb. 15
19	Piñas Bay, southern Panama	Feb. 24
20	Molino Cove, in Piñas Bay	Feb. 25
30	Ensenada de Guayabo Chiquito, Panama	Mar. 3-4
32	Aguacate (Octavia) Bay, Colombia	Mar. 6-7
49	Lat. 04° 01' N., long. 80° 26' W.	Mar. 24
76	3 miles west of Point Santa Elena, Ecuador	Apr. 10
80	La Plata Island, Ecuador	Apr. 12
81	Off Cape Pasado, Ecuador	Apr. 14
83	Lat. 00° 08' N., long. 80° 42' W.	Apr. 15
85	Lat. 00° 06' S., long. 80° 49' W.	Apr. 15
87	Lat. 01° 07' N., long. 79° 53' W.	Apr. 17
88	Tumaco, Colombia	Apr. 19
89	Gorgona Island, Colombia	Apr. 20-23
91	Lat. 02° 48' N., long. 78° 11' W.	Apr. 24
93	Cuevita Bay, Colombia	May 11
100	Puerto Utria, Colombia	May 14-15
101	Solano Bay, Colombia	May 16
102	Limón Bay, Gulf of Cupica, Colombia	May 17
103	Ensenada Coredó (Humboldt Bay), Colombia	May 18-19
104	Guayabo Chiquito (same as Station 30)	May 20-21
110	Contadora Island, Pearl Islands	May 24-25
111	Saboga Island (same as Station 2)	May 26

CONDITIONS IN THE VICINITY OF STATION 49

Station 49 yielded one of the few small pelagic collections of the "Askoy" Expedition, examples of the genera *Myctophum* and *Argyropelacus* being among the deep-sea fishes taken at the surface at night. While there is nothing unusual about such captures, the observed abundance of life indicated at the time a surface center of extremely rich pasturage in a high-sea area that normally seems relatively depauperate in the upper layers of its warm, blue, and highly saline water. Reference to certain peculiar phenomena described in the older literature and an account of conditions as observed in March, 1941, may, therefore, prove of interest.

In the outer waters of the Panama Bight, particularly toward the shifting border of the Peru Current, on its course toward the Galápagos Islands, such phenomena as intermingling surface flows of different color, consequent striping of the ocean, foam lines, "boiling" effects, etc., have been graphically described by many voyagers. Related conditions have been noted at least as far as four degrees of latitude farther north, for Valaux (1933, p. 198), who quotes from various

early sources, states that Malpelo Island likewise lies in a center of very active circulation, the violent currents around it sometimes causing bands of surface water to swell into crests that resemble reefs.

Colnett, after sailing from Point Santa Elena to the Galápagos, during the month of June, wrote as follows:

"In the course of our passage, we fell in frequently with streams of current, at least a mile in breadth, and of which there was no apparent termination. They frequently, changed the ship's course, against her helm, half the compass, although running, at the rate of three miles and a half an hour. I never experienced a similar current, but on the coast of Norway. The froth, and boil, of these streams, appear, at a very small distance, like heavy breakers. . . . Birds, fish, turtles, seals, sun-fish and other marine animals kept constantly on the edge of them, and they were often seen to contain large beds of cream-colored blubber, of the same kind as those of a red hue, which are observable on the coast of Peru" (Colnett, 1798, p. 45).

De Tesson, the physicist of Du Petit-

Thouars' voyage in the "Vénus," and the first to describe the phenomenon known as upwelling, recorded on February 12, 1838, even more detailed observations near the Galápagos Islands.

"Dans la journée, nous avons traversé des lits de courants très-marqués. La mer était divisée en longues bandes parallèles alternantes. Dans les unes, la surface de la mer

viron 3 a 4 encablures (600 à 800 mètres), et se succédaient en alternant dans la direction de l'est à l'ouest. Le vent était faible du S. E., et la frégate filait 3 noeuds vers le S. O." (De Tessan, *in* Du Petit-Thouars, 1844, p. 216).

Similar turbulent conditions, as observed from "Askoy," related chiefly to the part of the course between Station 47 and Malpelo Island (fig. 1) in late March. The general de-

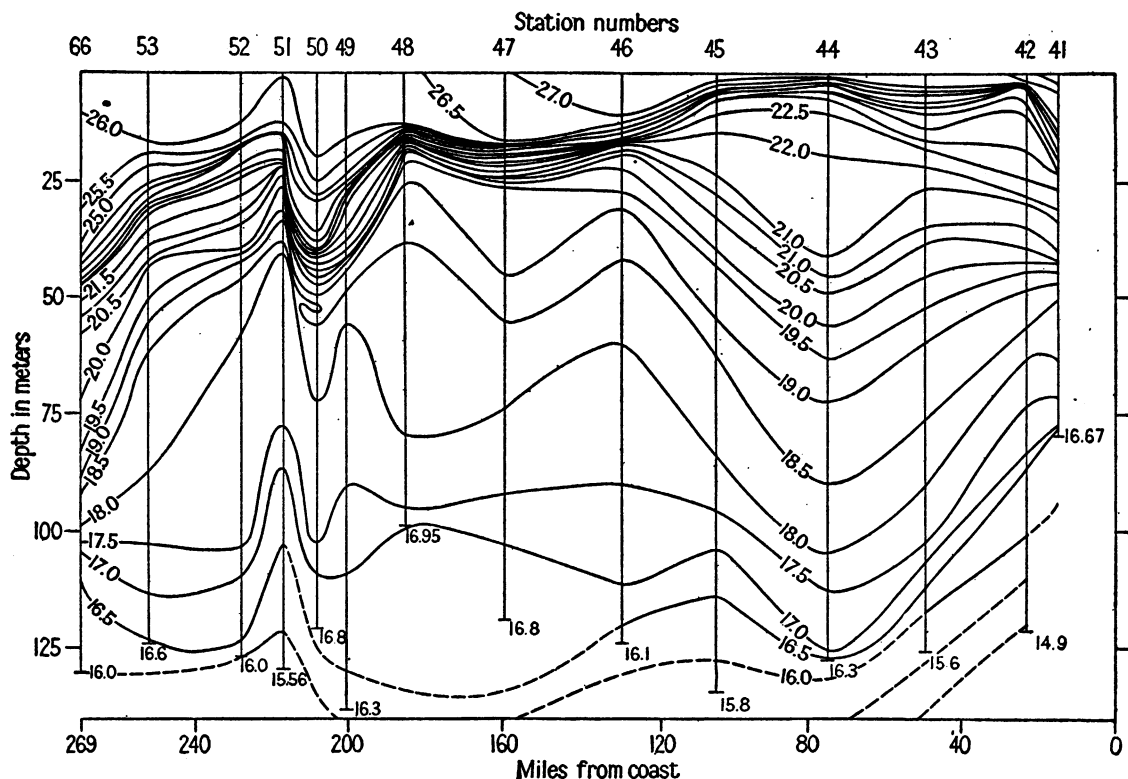


FIG. 2. Subsurface isotherms, in Centigrade degrees, to a depth of 125 meters, constructed from bathythermograph records obtained on the "Askoy" expedition transect from Station 41, near Buenaventura, Colombia (March 20, 1941), to Station 66, near Malpelo Island (March 29).

était clapoteuse, sonore et d'un bleu très-foncé; dans les autres, elle était lisse, striée et à reflet blanchâtre. Dans ces dernières, la mer présentait l'aspect d'un vaste bouillonnement, analogue à celui qu'on remarque en aval des culées d'un pont, avec cette différence, seulement, qu'ici le bouillonnement paraît d'une étendue sans borne. Les bandes où la mer était clapoteuse se détachaient très sensiblement en relief sur les autres. La largeur commune de ces bandes était d'en-

scription below is taken from the junior author's field journal, and figure 2 represents the subsurface isotherms of the transect from Buenaventura to Malpelo.

"In this stage of the voyage (Station 47) the wires of lowered oceanographic instruments, as well as our navigational reckoning, began to show that we were encountering a strong, warm and shallow current, flowing from a northwesterly quarter. One effect of a conflict in force or direction between super-

imposed layers of ocean water was that our wires vibrated strongly as soon as they had been sent below the depth of surface movement. We could see as well as hear the humming in short sections of the tense and weighted cables, each such blurred spindle being separated by nodes of motionlessness from adjacent sections. The violent movement caused the wires to cut like a file, so that polished grooves appeared on the plates of 'Askoy's' hull. We particularly had to watch the snap-hooks of our lowering gear so as to replace them before they approached being sawn through.

"In the same period, curious phenomena in the dark blue water indicated the effect of the surface movement on the underlying stable and stratified layers of ocean. On Sunday morning, March 23d, for example, 'Askoy' passed in calm weather close to several areas of 'dancing water,' of an extent varying from one to a few acres. The disturbed patches were sharply marked off from the ocean round about, and within each of them small, extraordinarily steep waves appeared to be running at random, breaking into thin white crests before they subsided. The general aspect was that of a lively tide-rip over a bar, yet we knew that more than a mile of abyss lay beneath us.

"About eleven o'clock in the evening of this day the mate, at the wheel, called me on deck (Station 49). The night was still, cloudless, and black despite the stars, and 'Askoy' had no headway. The ocean, nevertheless, was dancing all around the schooner, little points of waves leaping into the air and exploding into the smallest of whitecaps. The display was pyrotechnic as well as audible because the water was pricked with sparkling organisms, especially with the copepod that made tiny sunbursts of blue light.

"On either side, and at a bafflingly uncertain distance from the ship, a dark line, like a wall of advancing water, seemed to be closing in upon us. By this time the schooner herself lay in a pool of almost complete calm, but we could hear the splash and murmur of a troubled surface close by, which was all the more impressive because there was no breath of wind to keep our limp sails from slatting. Presently we could see a gleam of foam

sprinkled with points of luminescence, on the slowly approaching swell or head to the left.

"However, when the dark, white-outlined menace reached us, it proved to be nothing more than a field of the dancing water, tossing its little peaks a mere foot or so into the air and beating a tattoo on the steel flanks of 'Askoy.' The front moved past us, and we lay for some time in a turbulent area which contrasted strongly with the preceding glassy calm, and which imparted a tremor to our hull.

"Presently a sharp hissing sound, different in character from the bursting of small waves, came out of the blackness to starboard, and this was followed by strange sighings and puffings.

"The puffers were blackfish (*Globicephalus*), many score or perhaps hundreds of them, rolling and lumbering along and diving to pass beneath 'Askoy' shortly before they reached her bilge. Others were evidently crossing bow and stern, because we could hear the bacchanalian clamor of their rumblings and belchings. In the long beam of our searchlight, the hissing proved to come from the jumping of small fishes. As far as the light carried in all directions, they were shooting into the air and pouring down like hail.

"We turned the brilliant ray close beside the port quarter while we watched and fished with dip-net and plankton net for more than an hour. The surface was seething, boiling, with life. Larvae of clawless lobsters, tinted jelly fish, nurse chains of salps, small herring-like fishes, a silvery hatchetfish with its face bitten off, rudder fishes hanging head downward, luminous lantern-fishes with bright light-pores, red and purple swimming crabs, other creatures which we could not name at sight, and much that was too small even to see distinctly—all swarming about under the searchlight, while pink squids, from a few inches to a foot or more in length, kept darting from below, causing the showers of fry from water to air and back again.

"A general holocaust was in progress. The little fishes were eating invertebrates or straining out the plankton; the squids were pursuing and capturing fishes of various sizes; and the blackfish were no doubt enjoying the squids.

"As the night wore on, the amazing manifestation of abundance and devouring almost imperceptibly died away. Eventually, 'Askoy' lay once more in water that seemed as still and dead as oil, and the lap-lap of skipping waves drew off farther and farther into the distance until it was lost. In a bucket of salt

water on deck, three delicate lantern-fishes or Myctophids, with great mother-of-pearl eyes, fragile coats of huge scales, and glowing port-holes along their sides, were also dying, the process told by a steady fading of what had first looked like fish-shaped bulbs of incandescent gas."

GENERAL OBSERVATIONS REGARDING THE FISHES OF THE AREA

The shore fishes of the west coast of Mexico have been studied enough to be comparatively well known. It is the commonly accepted opinion that a warm temperate or subtropical fauna blends into, or is replaced by, a tropical fauna at about the latitude of Cape San Lucas. There are also data from various sources on fishes of the west coast of Central America between Mexico and Panama, and Meek and Hildebrand's comprehensive work on "The marine fishes of Panama" (1923-1928) is an excellent textbook on the shore fishes of that area. Those of the Galápagos Islands and of Peru have also been studied, but relatively little is known of the fish life along the coast between Panama and Peru.

On oceanographic grounds, one would expect the warm temperate fauna to blend gradually into the tropical along the coast of Middle America, which it does; the tropical fauna to be purest in the Panama Bight south to Point Santa Elena, Ecuador (in just those waters which are relatively little known), and then to be replaced rather abruptly farther south by the Peruvian fauna. Although lying in the latitude of Ecuador, the oceanic Galápagos Islands would be sufficiently affected by the "Humboldt Current" to give their fishes at least a subtropical tinge and place them more or less outside the strictly tropical Panama Bight fauna we are here considering.

The collections upon which we are reporting are not comprehensive, but they are from waters that are generally little known, and they may serve to fill in and verify the faunal picture, as we believe they do. Except for the Peruvian moray, *Gymnothorax wieneri* (which see), they seem to contain but a single species already known from continental American waters and not previously found to the north of Peru, namely, *Cratinus agassizii*, which oc-

curs also at the Galápagos Islands, and of which we have a specimen from Santa Elena. On the other hand, they verify the uniformity of the fauna of the tropical belt by extending southward the known range of numerous species in continental waters, as indicated by the following list:

SPECIES	RANGE EXTENDED	
	from	to
<i>Mobula lucasana</i>	Costa Rica	Ecuador
<i>Garmanichthys apterus</i>	Mexico	Colombia
<i>Sphagebranchus selachops</i>	Mexico	Ecuador
<i>Bascanichthys cylindricus</i>	Panama	Ecuador
<i>Gymnothorax dovii</i>	Panama	Colombia
<i>Muraena clepsydra</i>	Panama	Ecuador
<i>Rabula panamensis</i>	Panama	Ecuador
<i>Uropterygius necturus</i>	Mexico	Colombia
<i>Dixonina pacifica</i>	Costa Rica	Ecuador
<i>Opisthonema libertate</i>	Panama	Ecuador
<i>Anchovia eigenmannia</i>	Panama	Ecuador
<i>Synodus scituliceps</i>	Panama	Colombia
<i>Tylosurus fodiator</i>	Panama	Ecuador
<i>Fistularia depressa</i>	Panama	Ecuador
<i>Dorythamphus californiensis</i>	Mexico	Panama
<i>Bleekeria lucasana</i>	Mexico	Ecuador
<i>Holocentrus suborbitalis</i>	Panama	Ecuador
<i>Acanthocybium solandri</i>	Mexico	Ecuador
<i>Nematistius pectoralis</i>	Panama	Ecuador
<i>Hemicaranx leucurus</i>	Panama	Colombia
<i>Chloroscombrus orqueta</i>	Panama	Ecuador
<i>Trachinotus rhodopus</i>	Colombia	Ecuador
<i>Evoplites viridis</i>	Mexico	Ecuador
<i>Dermatolepis punctatus</i>	Mexico	Ecuador
<i>Rhegma thaumasium</i>	Panama	Colombia
<i>Xenichthys xanti</i>	Panama	Ecuador
<i>Orthostoechus maculicauda</i>	Panama	Ecuador
<i>Cirrhitichthys corallicola</i>	Colombia	Ecuador
<i>Sectator ocyurus</i>	Panama	Ecuador
<i>Microspathodon bairdii</i>	Panama	Colombia
<i>Nexilarius concolor</i>	Panama	Ecuador
<i>Halichoeres sellifer</i>	Panama	Ecuador
<i>Pseudojulis notospilus</i>	Panama	Colombia
<i>Holacanthus passer</i>	Panama	Ecuador
<i>Scorpaena mystes</i>	Panama	Ecuador
<i>Scorpaenodes xyris</i>	Panama	Ecuador

SPECIES	RANGE EXTENDED	
	from	to
<i>Bollmannia chlamydes</i>	Panama	Colombia
<i>Evermannia zosterura</i>	Panama	Colombia
<i>Dactyloscopus zelotes</i>	Panama	Ecuador
<i>Thalassophryne dowi</i>	Panama	Colombia
<i>Porichthys margaritatus</i>	Panama	Colombia
<i>Enneapterygius carminalis</i>	Mexico	Panama
<i>Malacoctenus zonifer</i>	Panama	Colombia
<i>Starksia cremnobates</i>	Mexico	Ecuador
<i>Hypsoblennius brevipinnis</i>	Panama	Ecuador
<i>Otophidium indefatigabile</i>	Panama	Ecuador
<i>Carapus dubius</i>	Panama	Colombia
<i>Platophrys leopardinus</i>	Mexico	Panama
<i>Etropus crossotus</i>	Panama	Colombia
<i>Symphurus atricaudus</i>	Panama	Ecuador

In our text we have followed rather consistently the classification and nomenclature

of Meek and Hildebrand's monograph. To depart from their conclusions as an expression of personal opinion, in a faunal paper of this sort, would serve no useful purpose and might lead to confusion.

To Dr. C. M. Breder, Jr., we wish to express our thanks for assisting the junior author in preliminary identification of the "Askoy" collection, for his helpful discussion of a number of taxonomic and biological problems encountered during the course of our study, and for the use of field notes, some of which are quoted in this paper.

List of new species herein described:

<i>Cubiceps carinatus</i>	page 245
<i>Acanthemblemaria askoy</i>	page 255
<i>Achirus opercularis</i>	page 258

SYSTEMATIC ACCOUNT

FAMILY GALEORHINIDAE

SMOOTH DOGFISHES

Galeorhinus dorsalis (Gill)

"WILPET" 1942 MATERIAL: The head (measuring 166 mm.) of a specimen estimated at 880 mm. standard length, found dried on the beach at La Plata Island, Ecuador.

FAMILY CARCHARHINIDAE

REQUIEM SHARKS

Sharks of the ground shark type were encountered during different years in many parts of the Panama Bight, but nowhere in such concentrated abundance as in the oceanographically dissimilar area off northernmost Peru, where warm and cool waters are frequently in contact. Although the area between La Plata Island and Point Santa Elena is sometimes considered a region abounding in sharks, the "Wilpet" 1942 party found them exceedingly scarce in December and January, and it was not until the party entered the Gulf of Guayaquil (extralimital) that numbers were encountered. Dense migrations of sharks at the surface are familiar sights, for example, about the Peruvian Island of Lobos de Tierra and in the ocean west and northwest of Cape Blanco. The northernmost movement of this type observed by the junior author was off the southern side of the Gulf of Guayaquil, on the course toward Talara, on December 6, 1924. On this occasion scores of small and medium-sized sharks could be seen at once, along a route of many miles.

Similar phenomena have not yet been reported in the area north of Point Santa Elena, Ecuador. Considerable numbers of ground sharks were, however, noted around Malpelo Island, in April, 1941, and around the Octavia Rocks, off Point Marzo, Colombia, on May 18, 1941. On September 21, 1937, several large sharks (about 10 feet in length) were seen cruising side by side at the surface of San Francisco Bay, Ecuador.

We have a photograph of a shark about 40 inches in total length, which was among specimens taken at Salinas, Ecuador, on February 13, 1925. It is very like *Carcharhinus*

cerdale Gilbert, which it may have been. The eye, however, seems large for that species.

Hypoprion brevirostris Poey

Plate 17, figure 1

"WILPET" 1942 MATERIAL: Jaws and photograph of a male specimen 8 feet 7½ inches (2629 mm.) in total length, from La Plata Island, Ecuador. It was yellowish tan in color and had fish remains in its stomach. Breder "saw many in the breakers at Santa Elena Point. They ran parallel to the beach and could be seen laterally through the advancing wave front, making off when it broke."

This shark should be racially distinct from the Atlantic shark with which it is here identified, but we find no characters on which to separate it therefrom. The photograph shows a somewhat blunter first dorsal, smaller anal and caudal than a comparable one of a Florida specimen, and no black on the fins—very probably matters of individual variation.

Galeocerdo arcticus (Faber)

"ASKOY" DATA: At Station 91, halfway between Gorgona Island and the Colombian mainland, "Askoy" was anchored by wire for current observations, on April 26, 1941. During the morning a large green turtle appeared near by and, while we were watching it, a spotted tiger shark, perhaps 6 feet in length, began to swim round and round the turtle, obviously worrying it. This continued for five minutes or more, but the shark disappeared when the sailing master lowered a boat with the object of capturing, rather than rescuing, the turtle.

FAMILY SPHYRNIDAE

HAMMERHEAD SHARKS

*Sphyrna*¹ sp.

A hammerhead shark about 7 feet long was observed lying at the surface south of Piñas Bay, southern Darien, early in the morning of September 11, 1937. On the same date, a few miles farther south, one was seen turning

¹ Meek and Hildebrand use *Cestracion* for the hammerhead sharks, an unjustified departure from long-established usage and one which has not been generally accepted.

or circling slowly until the launch almost ran it down.

Especially in view of recent revisions in this genus, attempted specific identification of these sight records would be futile.

FAMILY ISURIDAE

MACKEREL SHARKS

Isurus glaucus (Müller and Henle)

On February 7, 1920, on the coast of Ecuador south of Machalilla, toward which port we were heading, a large shark (8 or 9 feet long) with a very pointed snout and homocercal tail, leaped wholly out of water four or five times. It had a gray dorsal color and a ventral surface that looked pink rather than white. Its general aspect was that of the "mako," with which the observer has since that date become familiar from photographs made in the Australasian region.

Again, in San Francisco Bay, Ecuador, on September 21, 1937, a similar but smaller shark, with a decidedly pinkish belly, leaped out of water close to the anchored launch and rotated at least twice on its axis while in the air.

FAMILY RHINEODONTIDAE

WHALE SHARKS

Rhineodon typus Smith

"WILPET" 1942 DATA: One estimated to be 30 feet long seen off Santa Elena Point on December 11, 1942, by A. F. McBride. The whale shark is, of course, cosmopolitan in warm seas.

FAMILY PRISTIDAE

SAWFISH

Pristis sp.

Sawfish beaks, many of which are of large size, are among the commonest souvenirs or trophies offered to travelers at ports along the coast of Ecuador. The junior author saw numerous examples brought out to anchored steamers at Machalilla and Manta, in February, 1920.

The genus *Pristis* is in need of revision. The beaks or saws of sawfish are common objects in collections, though usually without data, and we are familiar with three dissimilar types which must belong to unlike species. The first type is broad and massive, comparatively

short, with few, large, well-spaced teeth. *P. antiquorum* Latham (1794) is of this type, and it has been suggested that *antiquorum* is a synonym of *Squalus pristis* Linnaeus (1758). British authors, such as Day (1878-1888, p. 729, India) and Norman (1938, p. 60), generally refer this broad, massive type to *P. perrotletii* Müller and Henle (1838). The teeth of the broad saw of *P. microdon* Latham (1794) were very small, but this is now considered a matter of individual variation rather than a specific character.

There is a second type, contrastingly long and slender, with more numerous teeth, crowded distally, of which we have seen specimens probably from the Orient, and one from a very large fish taken in Australia. Authors agree in referring a saw of this type to *P. cuspidatus* Latham (1794).

The third type of saw is one of intermediate character, such as carried by the familiar sawfish of Florida. This is usually referred to *P. pectinatus* Latham (1794).

It is likely that more than one recognizable form carries the same type of saw, or that there are sawfish with beaks not readily referable to any of the types mentioned.

Meek and Hildebrand refer the Panamanian sawfish to *P. microdon* Latham. To judge from their description, and a photograph of a large one we have seen published in a newspaper, it has a saw of the broad, massive type. The Ecuadorian fish would be likely to be the same, but the junior author's remembrance is that most of the beaks he saw were rather of the "common sawfish" (*Pristis pectinatus*) type. We can, therefore, only record that we are uncertain as to the species.

FAMILY MOBULIDAE

MANTAS

Mobula lucasana Beebe and Tee-Van

Three or more species of rays leap out of water in the waters of the Panama Bight, but the constant performance of one of them may be called a characteristic and a tradition of the region. This particular species is locally called "manta" and, according to Breder, who has had good opportunity for observation in the field, it is a *Mobula*, doubtless *M. lucasana* described as ranging from Lower California to Costa Rica.

South of Cape Santa Elena, Ecuador, the presence of the leaping mantas is more or less seasonal and sporadic. Their invasion of the Peruvian coastal waters is alleged to be one of the most reliable signs of a rise in ocean temperatures which accompanies a cessation of upwelling and an advance of the counter-current from the north or from offshore.

The junior author first became acquainted with this fish in waters close to La Plata Island, Ecuador, on September 5, 1919. Examples 3 or 4 feet long kept jumping out of water and flopping back with a great splash. They had dark upper surfaces and white bellies, and their lateral fins were pointed rather than rounded. Many of them leaped close enough to the S. S. "Mantaro" so that it was easy to see their complete somersaults in the air. Fully 50 individuals were observed within a few minutes.

Subsequent field work between Panama and western Ecuador made him very familiar with this species, but a specimen was never captured. Occasions when large numbers of the small mantas were observed jumping are as follows: off Piñas Bay, southern Darien, February 26, 1941; all over the Bay of Manta, Ecuador, April 4 and 14, 1941; off Salango Island, Ecuador, February 17, 1925; off Point Santa Elena, February 21 and March 12, 1925.

Manta birostris hamiltoni (Newman)

The giant manta, or devilfish, apparently occurs throughout the area, though in smaller numbers than several other species of rays. If the Eucadorian bay and town of Manta derive their name from a fish, it is likely to be the smaller *Mobula*, which is abundant and conspicuous in the neighborhood and is commonly called "manta."

Giant mantas were observed chiefly close to land. Along the coast of southern Darien, on the "Askoy" Expedition, the upcurled fins became a familiar sight in quiet weather, the nearer tip appearing white or silvery, the farther one black, in consonance with the respective exposures of the ventral and dorsal surfaces of the body. Specific observations, from north to south, are as follows:

Close to a sandy beach of Saboga Island, Pearl Islands, February 11 and 12, 1941, a

fish or fishes perhaps 10 feet in width.

Just north of Piñas Bay, southern Darien, February 23, 1941, an example at least as wide as the length of our skiff (16 feet). On the following day, within a stone's toss of Centinela Islet, off Point Piñas, a large example thrust its head out of water and gave the appearance of watching us. Off Ensenada de Guayabo Chiquito, southern Darien, March 5, another very large one at the surface, with its "wing tips" in the air.

Off Cape Pasado, Ecuador, one jumped clear out of water near the junior author's launch on September 23, 1937; and next day the same spectacular phenomenon was witnessed off Cape San Lorenzo.

Breder reports devilfish at La Plata Island, Ecuador, in 1942, as "sometimes incredibly numerous, leaping high in the air. Some may have been *Mobula* but others were so large as certainly to be *Manta*."

Opinion differs as to whether the Pacific *Manta* is or is not recognizably different from that of the Atlantic. The two are very close, but, from such evidence as we have seen, are probably recognizable as races. Though recorded from Peru, and doubtless well known off the west coast of northern South America, we have come across no previous specific mention of this ray between Panama and Ecuador.

FAMILY SILURIDAE

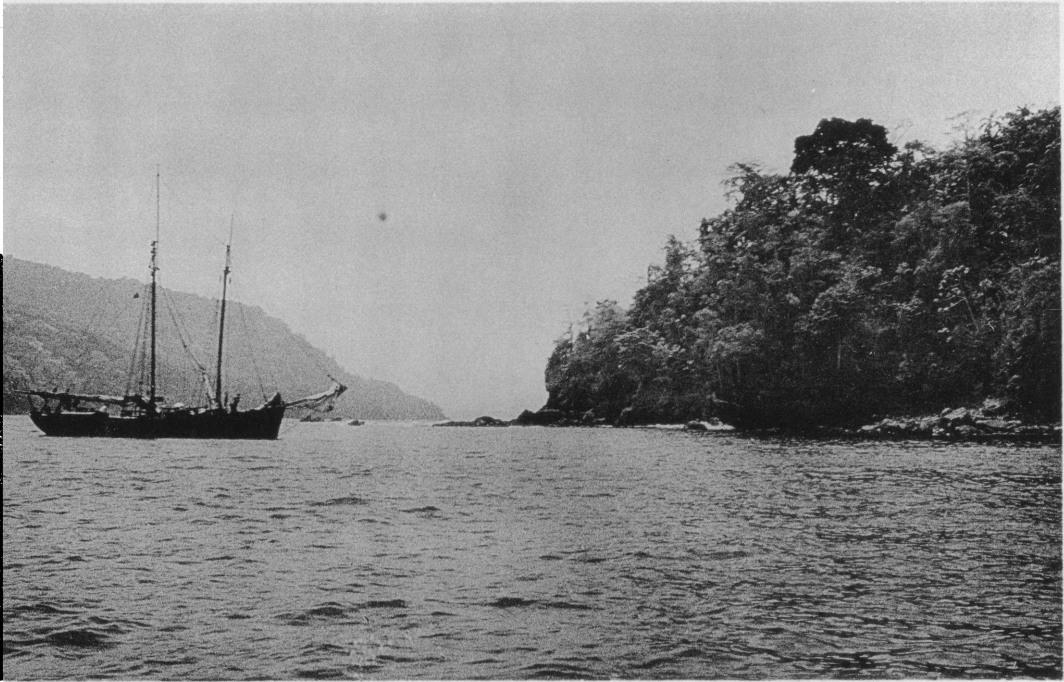
CATFISHES

Galeichthys seemanni (Günther)

"ASKOY" MATERIAL: One specimen, 227 mm. standard length (Station 88), from the harbor of Tumaco, Colombia, April 19. Purchased from a fisherman.

This species is believed to be the scavenger *bagre* or catfish of the estuaries of Colombian Pacific rivers and the tension zone between fresh and salt water. At Buenaventura a similar fish formerly disposed of much of the city's garbage and other putrescible refuse. Groups of bagres still rise uncannily to the plumbing outlets of all craft at anchor.

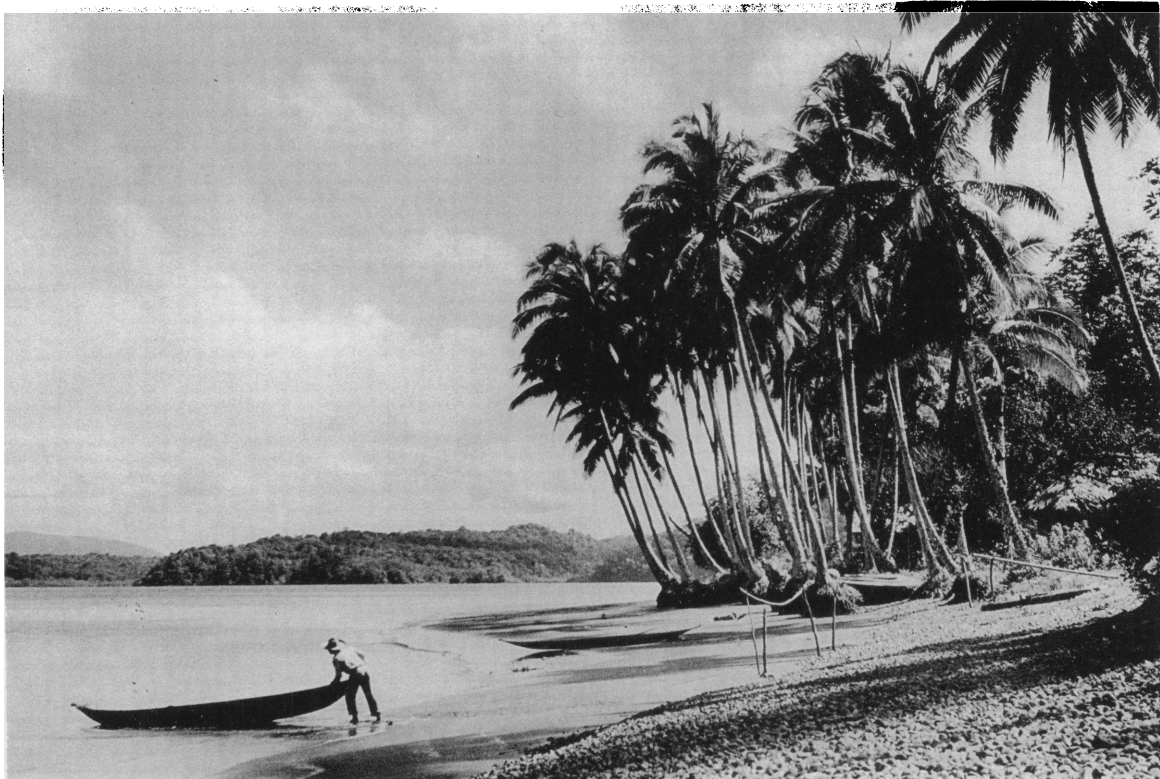
One young catfish, 56 mm. standard length (Station 80), was taken with other fish and crabs in a seine on the sandy beach of the landing cove on the northeastern coast of La Plata Island, Ecuador, April 12. It is of a re-



Askoy Station 30. Ensenada de Guayabo Chiquito, Panama. The schooner "Askoy" entering a land-locked cove after dredging operations in this indentation of the mountainous Darien shore



Askoy Station 102. One of several mouths of the River Limón, Gulf of Cupica, Colombia. *Spheroides* and *Lutianus argentiventris* ascend from the sea as far as the falls of such forest-covered streams of the Baudó Mountain coast



Askoy Station 100. Puerto Utria, Colombia, midway between Point Solano and Cape Corrientes, looking northward up the narrow fiord. *Kirtlandia* and other fishes were taken by seine on the sandy beach



Askoy Station 93. Cueva Bay, Colombia, looking northward toward the two Picos de Ananá. At this point the Baudó Range ends at the coast, giving way toward the south to a low, broad, perpetually rainy shore of many rivers

lated and very similar species, but presumably not this one because its patches of palatine teeth project backward, and the roof of its pharynx is blackish.

FAMILY **LEPTOCEPHALIDAE?**

CONGER EELS

Figure 3

"ASKOY" MATERIAL: One leptocephalus or larval eel, 147 mm. long (Station 30), from Ensenada de Guayabo Chiquito, southern Panama, March 4. A large, translucent larva, dredged from a green sand bottom in a depth of between 25 and 64 meters between the middle of this bay and the ocean outside.

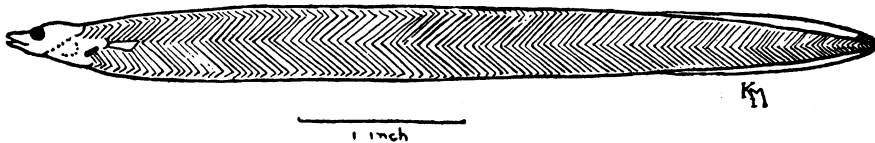


FIG. 3. Larval eel (? *Ariosoma*). 147 mm. long.

This may be *Ariosoma prorigera* (Gilbert). It is strongly compressed, with the head and tail about equally pointed; snout narrow and pointed, extending appreciably beyond the tip of the lower jaw; no noticeable teeth. The pectoral is well developed, rather narrow; an appreciable terminal fin fold on the tail seems to pass around its end. The gill opening is short and subvertical, slanting slightly forward and downward, about twice as wide as the base of the pectoral, its upper corner very slightly below that of same. Depth in length, 13.2; head, 12.1. Eye in head, 5; snout, 4; gill slit, 6; pectoral, 4.

FAMILY **NEMICHTHYIDAE**

SNIPE EELS

Nemichthys fronto Garman

"ASKOY" MATERIAL: One young specimen about 250 mm. long (Station 85), from latitude 00° 06' S., longitude 80° 49' W., April 15. Taken in 50-cm. plankton net at a depth between 100 meters and the surface at 10:30 P.M.

Its color is whitish, with numerous irregular contrasted black spots. These are most crowded along the base of the anal, more scattered dorsally, leaving the dorsal line for

the most part, and the whole top of the head entirely, immaculate.

Presumably this is the young of *N. fronto* (recorded south to latitude 07° 31' 30" N., longitude 79° 14' W.). We have compared it with Garman's figure and description of same, also with a grown specimen so determined (of 720 mm., estimated, tail broken) from Lower California, taken off Point San Bartolomé in 480 fathoms. Though the color is more suggestive of the description of *N. avocetta* Jordan and Gilbert, from Puget Sound, its eye is smaller, 4, upper jaw (snout) shorter, 0.5 in head without snout. Its dorsal rays become short, spine-like, back from about the middle

of the body, as in *N. fronto*. Larger, more uniformly dark specimens of this species are all from much greater depths.

There is very little evidence to explain the peculiar jaws of *Nemichthys*. Mowbray (1922) records catching a snapper with a snipe eel attached to the posterior margin of its caudal by its slender jaws, and concludes, "The specimen being taken in this way gives good reason to believe that grasping the tails of fishes is the function of the divergent mandibles of these eels."

FAMILY **MYRIDAE**

WORM EELS

Garmanichthys apterus (Beebe and Tee-Van)

"ASKOY" MATERIAL: Three specimens, 77 to 85 mm. total length (Stations 19, 32), from Piñas Bay, southern Panama, February 23, and Aguacate Bay, Colombia, March 6, dredged from green sandy mud and from gray sand and mud bottoms, respectively, at depths between 15 and 33 meters.

This species was described from Lower California. Aguacate Bay, which appears on many maps as Octavia Bay, is the harbor which penetrates toward the north behind Cape Marzo. It is a short distance south of

the Panama-Colombia boundary, at about 06° 50' N. latitude.

According to Dr. Leonard P. Schultz, who helped us identify this eel, *Arenichthys* Beebe and Tee-Van is a synonym of *Garmanichthys* Seale.

FAMILY **OPHICHTHYIDAE**

SNAKE EELS

Sphagebranchus selachops (Jordan
and Gilbert)

"ASKOY" MATERIAL: Two specimens, 135 and 233 mm. long (Stations 87, 83), from off the coast of Ecuador, near latitude 01° 07' N., slightly less than 10 miles from the continental shore; and latitude 00° 08' S., longitude 80° 42' W., 22 miles west of Punta Jama; about April 15. The larger was dredged from a hard bottom, with rocks and corallines but no corals, at a depth between 10 and 30 meters. The smaller was taken in a 50-cm. plankton net, which accidentally dredged on the bottom at a depth of 122 meters.

This eel, described from Cape San Lucas, is not recorded from Panama by Meek and Hildebrand, but in view of other evidence of the uniformity of the tropical west coast ichthyofauna, it is not surprising to find it off Ecuador.

Bascanichthys cylindricus Meek
and Hildebrand

"ASKOY" MATERIAL: One specimen, 675 mm. long (Station 87), from approximately 10 miles off the continental coast of northwestern Ecuador, near latitude 01° 07' N., longitude 79° 53' W., April 17. Dredged from a mud bottom, at a depth between 40 and 60 meters.

Meek and Hildebrand (1923, p. 151) write, "This genus has been reported only once from the Pacific, the record being based on a single specimen (*B. peninsulae* Gilbert) from the Gulf of California." They then describe two new forms from the Pacific coast of Panama. However, Osburn and Nichols (1916) reported a specimen of *B. peninsulae* from Pichilique Bay (in the Gulf), and described and figured another from San Cristobal Bay, on the west coast of Lower California, as *B. bascanoides*. Our Ecuadorian specimen is too close to *B. cylindricus* to be differentiated from it, at least on the basis of a

single specimen. Its dorsal origin seems to be a little farther back, but the dorsal is so low at its origin that this point is difficult to determine. Meek and Hildebrand had 10 specimens of *B. cylindricus* and over 100 of their other form. Similarly adequate material, north and south, might show that more (or fewer) species are recognizable.

FAMILY **MURAENIDAE**

MORAYS

Gymnothorax dovii (Günther)

"ASKOY" MATERIAL: One specimen, 152 mm. long (Station 103), from Ensenada Coredó (Humboldt Bay), Colombia, May 19. Found among stones close to low-water mark on the bar off the mouth of the Río Coredó.

The name "Humboldt Bay," which appears on many maps, is unknown to the inhabitants of the region, who call the southern end of the large indentation north of Cape Marzo, Ensenada Coredó, after the river which flows into it, or Puerto Quemado, after a rocky islet off shore.

"WILPET" 1942 MATERIAL: One mutilated specimen approximately 520 mm. long taken at La Plata Island with hook and line seems to be this species.

Gymnothorax wieneri Sauvage

"WILPET" 1942 MATERIAL: Seven young, 100 to 192 mm. total length, from La Plata Island, Ecuador, December 12, 1942. Eight larval eels, 86 to 108 mm. long, cast on the beach December 14, may also be this species.

Concerning the former, Breder quotes from his notes as follows: "In one place where a pile of fallen rocks had lodged on a sandy place between two formations of living rock, a number were collected. These were entirely dry, in the upper half of the tidal zone (at dead low water). Here they rested between rock and sand and were apparently perfectly at home. They were sticky, like a salamander in a dry woods. At the time they reminded one of unusually large *Plethodon cinereus*. They did not attempt to bite, although several were certainly large enough, but behaved much like elongate salamanders. Associated with them were two quite large brittle stars which made off while the fish were being gathered. Considerable examination of other

similar places yielded only crabs, amphipods et cetera. In the place where the morays were taken, there were *no* such crustacea."

After examining the type description of *Gymnothorax wieneri*, and a grown Peruvian specimen of 710 mm., we believe this material is referable to that species, although the teeth are quite different from those of the large fish, more like those of *Uropterygius*. It may be noted that larvae of a Peruvian eel might be expected to drift into Ecuadorian waters, and that, due to evaporation, the temperatures below rocks exposed by the falling tide would naturally be lower than those of adjacent sea water.

The larval specimens are very compressed, transparent, small-headed leptocephali: "Cast on the beach in considerable quantities on December 14 only. Many *Salpa* with them" (Breder).

***Muraena clepsydra* Gilbert**

"WILPET" 1942 MATERIAL: One specimen, 435 mm. standard length, taken with hook and line at La Plata Island, Ecuador.

This eel seems not to have been recorded previously south of Panama.

***Rabula panamensis* (Steindachner)**

"ASKOY" MATERIAL: Eleven specimens, 75 to 190 mm. long (Stations 80, 89, 104), from Ensenada de Guayabo Chiquito, southern Panama, May 20; Gorgona Island, Colombia, April 22-23; La Plata Island, Ecuador, April 13.

All were from masses of coral brought up from depths of from 5 to 11 meters.

Described from Panama. The Colombian and Ecuadorian specimens have somewhat blunter snouts and less elevated napes than the Panamanian.

***Uropterygius necturus* (Jordan and Gilbert)**

"ASKOY" MATERIAL: Five specimens, one 58 mm., four 97 to 280 mm. long (Stations 89, 110), from Contadora Island, Pearl Islands, Gulf of Panama, May 25 (the smallest only), and from Gorgona Island, Colombia, April 22-23 (the four larger). All from masses of coral brought up from depths of from 5 to 11 meters.

One of the Gorgona Island specimens (of

220 mm.) is marbled below with large whitish spots, and is also somewhat less long-bodied than the others, which are rather uniformly dusky, paler, and somewhat freckled on the lower jaw. The small one from Contadora is similarly marbled. The uniformly colored specimens are easily confused with *Rabula panamensis*, in which the fin development is somewhat variable.

Uropterygius necturus was described from Cape San Lucas. Here, as in *Rabula*, it is possible that more related forms are involved than we can differentiate on the basis of our present material.

FAMILY ELOPIDAE

TARPONS, ETC.

***Elops affinis* Regan**

"ASKOY" MATERIAL: One specimen, 465 mm. standard length (Station 88), from Tumaco, Colombia, April 19. Purchased from a fisherman.

FAMILY ALBULIDAE

BONEFISHES

***Albula vulpes* (Linnaeus)**

"ASKOY" MATERIAL: Twenty-nine young, 23 to 33 mm. standard length (Stations 3, 9), from Saboga Island, and the cove at the head of Santelmo Bay, San Miguel Island, Pearl Islands, Gulf of Panama, February 12 and 15. Seined on sandy beaches.

***Dixonina pacifica* Beebe**

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 208 mm. standard length, from Santa Elena, Ecuador, February 21, 1925, Murphy and Heilner.

Whether or not it should be given generic rank, *Dixonina* is so distinct from the cosmopolitan *Albula vulpes* that it is surprising it had been confused with it so long. Beebe (1942, p. 43), in differentiating his Pacific from the Atlantic species of *Dixonina*, gives no locality for the former south of Costa Rica.

Breder reports this species seen in anglers' catches at Santa Elena and Salinas, and a small one at La Plata Island, Ecuador.

FAMILY CLUPEIDAE

HERRINGS

***Opisthonema libertate* (Günther)**

"ASKOY" MATERIAL: Eighty-four specimens, young, 27 to 38 mm. standard length

(Station 80), from La Plata Island, Ecuador, April 13; all captured with a dipnet under the riding light of the schooner at an anchorage off the eastern shore of the island during an evening watch. One of 29 mm. (Station 89), from Gorgona Island, Colombia, April 20.

This species seems not to have been recorded previously south of Panama. Our young material might easily be confused with *Sardinella*¹ *stolifera*. It is slender (depth 3.5 to 4.5), has a well-defined silvery (or dusky in preservation) lateral band, and a dark stripe along midline of back; also the exserted, filamentous *Opisthonema* last dorsal ray, or "flag," develops only at lengths of about 30 mm., and is easily broken. The 29-mm. Gorgona specimen has it definitely developed, but short. In the La Plata material 13 specimens of 32 to 38 mm. have it well developed, but in 57 specimens of 27 to 33 mm. it is lacking.

The Gorgona Island specimen, and a small anchovy (*Anchovia eigenmannia*) collected with it, were from a large school of small fishes, driven ashore on a shingle beach by cormorants. The relationship between these fish and the birds is interesting because the cormorants represented an extralimital species, the guanay (*Phalacrocorax bougainvilli*), a bird native to the Peruvian guano islands, which in its normal habitat feeds principally upon the anchovy known as *Engraulis ringens*. Many hundreds of the cormorants were about Gorgona Island at the date of the "Askoy" visit. Their mortality rate was extremely high, and the beaches were strewn with their bodies. The survivors appeared to be subsisting largely on the species of fishes represented by these specimens.

FAMILY ENGRAULIDAE

ANCHOVIES

Anchovia arenicola Meek and Hildebrand

"ASKOY" MATERIAL: One specimen in bad condition, 45 mm. standard length (Station 3), from Saboga Island, February 12, seems

¹ This is the name used by Meek and Hildebrand, but it should be replaced, probably, by *Harengula* Cuvier and Valenciennes or by *Lile* Jordan and Evermann. We are quite familiar with the western Atlantic *Sardinella*, questionably distinct from *S. aurita*, type of the genus, and it is very different from other American species commonly placed in *Sardinella* or *Harengula*.

to be this species. Eight larvae of 19 to 23 mm. (Station 1), from the northern coast of Pacheca Island, February 10, are very likely the same. All seined on sandy beaches of the Pearl Islands, Gulf of Panama. The larval specimens have the same data as a grown example of *Eurystole eriarcha*.

Anchovia eigenmannia Meek and Hildebrand

"ASKOY" MATERIAL: One young specimen, 37 mm. standard length (Station 89), from Gorgona Island, Colombia, April 20; driven ashore on a shingle beach by cormorants, with a specimen of *Opisthonema libertate*, which see.

This specimen can be identified with reasonable certainty, but since a number of more or less similar species of *Anchovia* are recorded from these waters, it is difficult to determine our inadequate "Askoy" material representing the genus.

"WILPET" 1942 MATERIAL: Two specimens, 67 and 93 mm. standard length. "The smaller is from La Plata, the larger from the beach at Salinas where Pelicans and Laughing Gulls were feeding on them and driving them ashore" (Breder). A third specimen, also of 93 mm., without data.

FAMILY SYNODONTIDAE

LIZARD-FISHES

Synodus evermanni Jordan and Bollman

"ASKOY" MATERIAL: Two young, 39 and 42 mm. standard length (Station 30), from Ensenada de Guayabo Chiquito, southern Panama, March 4. Dredged from a green sand bottom at depths between 25 and 64 meters, with young *S. scituliceps*.

Synodus scituliceps Jordan and Gilbert

"ASKOY" MATERIAL: Five young, 43 to 50 mm. standard length (Station 30), from Ensenada de Guayabo Chiquito, southern Panama, March 4. Dredged from a green sand bottom at depths between 25 and 64 meters. One specimen of 73 mm. (Station 88), from Tumaco, Colombia, April 19, obtained from a fisherman.

Previously recorded from the Gulf of California to Panama, and also from the Galápagos Islands.

"WILPET" 1942 MATERIAL: A larval synodontid, 39 mm. standard length, taken at La Plata Island in a dipnet, from the boat, and 62 others, 26 to 39 mm. standard length, cast on the beach there, December 11 (on this date only, many were cast up), are of doubtful identity. They all have similar dark marks ventrally, and a dark mark across the caudal base. The first mentioned has four pairs of large, dark, semi-oval blotches between the ventral axil and anal origin, another higher up just below and behind the pectoral axil, and a pair of larger oval blotches under the posterior margin of the gill cover. A figure of a specimen of *S. foetens*, of comparable size but evidently less advanced, from Florida (Nichols, 1911, p. 278, fig. 1) has comparable spots, all much smaller, and those before the ventral placed lower. In this Ecuadorian fish there are also faint dusky streaks and spots along the midline of the side, and a larger faint dusky triangle, with one side across the upper base of the caudal, continuous with a sharp black bar across its lower base.

These specimens match Norman's (1935, p. 100, fig. 1E) figure of young *Trachinocephalus myops* (Schneider) rather well, but we find 12, or at most 13, rays in their anal fin.

FAMILY MYCTOPHIDAE

LANTERN FISHES

Myctophum aurolaternatum Garman

"ASKOY" MATERIAL: Four specimens, one of 21 mm., three of 65 to 85 mm. standard length (Station 49), from latitude 04° 01' N., longitude 80° 26' W., March 24. Captured in a dipnet at the surface toward midnight.

During the course of the five-day section from Buenaventura to Malpelo Island, in late March, the expedition encountered at several stations the curious phenomenon of "dancing" surface water in calm weather, accompanied by upwelling and the ascent of several kinds of depth organisms to the surface. These manifestations have been discussed above (p. 225).

On the evening of March 24, the phenomena were particularly pronounced, and toward midnight several myctophids were observed at the surface alongside "Askoy." Examples of these, other fishes, cephalopods, etc., were captured.

When placed in a bucket on deck, the larger myctophids glowed like neon bulbs.

"CAROLA" MATERIAL: Nineteen specimens, 40 to 90 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

Myctophum evermanni Gilbert

"CAROLA" MATERIAL: Seven specimens, 36 to 65 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net, as were a larger number of *M. aurolaternatum*.

This seems to be the first record for *M. evermanni*, described from the Hawaiian Islands, off the American coast.

FAMILY STOMIATIDAE

MOUTH-FISHES

Stomias atriventer Garman

"ASKOY" MATERIAL: One specimen, about 115 mm. standard length (Station 85), taken at sea 50 miles off northwestern Ecuador, latitude 00° 06' S., longitude 80° 49' W., April 15.

Captured with a snipe-eel (*Nemichthys*) in a 50-cm. plankton net drawn from a depth of slightly more than 100 meters to the surface at 10:30 P.M. It was dark in color, with fine bluish spots and a luminous barbel.

FAMILY STERNOPTICHIDAE

HATCHET-FISHES

Argyropelacus lynchnus Garman

"ASKOY" MATERIAL: One mutilated specimen, which might have been 40 mm. in standard length (Station 49), from latitude 04° 01' N., longitude 80° 26' W., March 24.

It was picked up from the surface with a dipnet at night. Myctophid fish and other organisms normally belonging to the depths were captured at the surface on the same occasion. The significance of the "dancing water" and related phenomena which characterized Station 49 and adjacent high-sea areas between the Colombian coast and Malpelo Island during the period of latter March are discussed in a special section of this paper (pp. 223-226).

FAMILY BELONIDAE

NEEDLEFISHES

Tylosurus fodiator Jordan and Gilbert

Plate 17, figure 2

MATERIAL FROM PREVIOUS EXPEDITIONS: Photographs of a specimen about 5 feet long, obtained at Point Santa Elena, Ecuador, in February, 1925. Others of similar size were seen in neighboring waters, because these fishes seemed to have a proclivity to lie alongside the hulls of launches and small steamers.

"WILPET" 1942 MATERIAL: A head measuring 290 mm., of a fish with estimated length of 1015 mm. standard, found dried on beach, La Plata Island, Ecuador. Only a few *Tylosurus* apparently of this species seen.

Tylosurus pacificus (Steindachner)

"CAROLA" MATERIAL: One specimen, 152 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net, as were also *T. stolzmanni* and other fishes.

This specimen resembles the description given by Meek and Hildebrand for young *T. fodiator* Jordan and Gilbert, which is possibly a synonym of *pacificus*. It is almost within the range of individual variation recorded for *T. fodiator*.

Its enlarged teeth are higher than in *T. stolzmanni*, very slender and sharply pointed. The posterior dorsal rays are elongated to extend slightly beyond base of caudal when depressed; they are black, and there is a slight black keel on the peduncle. The groove on the top of head is rather narrow; dorsal and anal origins approximately apposed. Snout in head, 1.5; interorbital, 1.8 or 1.9.

Tylosurus stolzmanni (Steindachner)

"CAROLA" MATERIAL: Four small specimens, 185 to 275 mm. (estimated, jaws broken) standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

Agujas (needlefishes) of several sorts are common fishes in the area of tropical water under discussion. At Gorgona Island, Colombia, in April, 1941, the "Askoy" party ob-

tained from fishermen the salted flesh of large examples.

The *aguja* has a historical interest at Gorgona because it may well have been the fish upon which Francisco Pizarro and his marooned comrades fed in the year 1527, in the course of the second voyage of the *conquistador* toward the Inca empire. According to the chronicles, the Spaniards captured on the sandy beaches of the island, on nights after the full moon, as many silvery fishes as they could use. Merizalde del Carmen (1921, p. 102) reports that at Gorgona Island, "after each full moon, from two to three thousand *agujas* can be caught at night with the greatest facility" (translation).

Some species of these fishes have large eggs, which agglutinate readily and which also stick to other objects because of the mucilaginous filaments with which they are covered. It is likely that they have a beach or tide-line breeding habit, similar to that of *Menidia* or *Leuresthes*, and that they swarm on nights of spring tides.

FAMILY HEMIRAMPHIDAE

HALFBEAKS

Numbers of these fishes skittered along on their tails ahead of "Askoy" as the schooner entered the harbor of Tumaco, Colombia, on April 18, 1941.

Hemiramphus saltator Gilbert and Starks

"CAROLA" MATERIAL: Six specimens, 73 to 105 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

Hyporhamphus unifasciatus (Ranzani)

"ASKOY" MATERIAL: One specimen, 101 mm. standard length (Station 110), from Contadora Island, Pearl Islands, Gulf of Panama, May 25. It leaped into a skiff a short distance off the shore of the island.

MATERIAL FROM PREVIOUS EXPEDITIONS: Field sketch by R. C. Murphy of a specimen of 140 mm. taken at Manta, Ecuador, February 9, 1920. Identifiable with reasonable certainty.

This specimen was captured at the surface by hand while the steamship "Guatemala" lay at anchor off the port of Manta. Many of

these fishes were about the vessel. During the middle of the day they were apparently preyed upon by catfish, which frequently rose from the depths.

Meek and Hildebrand do not differentiate such Pacific material from *H. unifasciatus* of the Atlantic, a somewhat variable species; and we notice no significant differences between the Pearl Islands specimen and others from Puerto Rico with which it has been compared. However, these authors describe two similar Pacific species, with longer and more numerous gill rakers. They give the range of *unifasciatus* on the Pacific Coast as from the Gulf of California south to [Panama and] the Galápagos Islands; but it has also been reported from Peru. We are of the impression that American forms of this genus are difficult and still in need of revision.

FAMILY EXOCOETIDAE

FLYING FISHES

Flying fish are far less conspicuous in the Panama Bight than, for example, in the Caribbean. Nevertheless, they are common near the continent at the northern and southern extremities of our area, while they avoid the silty waters of the central Chocó. Far offshore they are likely to be seen anywhere, particularly when dolphins pursue them, but no notably large numbers were encountered on any cruise, including the transect to Malpelo Island. During the junior author's field work, the greatest concentrations were noted off the mouth of the Gulf of Panama, near "Askoy" Station 27, in rough, northeast trade-wind weather, on February 27, 1941.

Other dates and places for observation of flying fishes in numbers are as follows: off Cruces Point, Colombia, September 11, 1937; near Gorgona Island, September 16, 1937; off Machalilla, Ecuador, and about Pelado Islet, February 8, 1920.

While netting specimens near La Plata Island, Ecuador, the junior author observed that these fishes "fly" well when they are no more than half an inch in length.

Breder tells us that mangled remains of both "four-winged" and "two-winged" species were seen in booby regurgitations at La Plata Island, 1942, but not many were seen in flight.

Fodiator acutus (Cuvier and Valenciennes)

"ASKOY" MATERIAL: One specimen, 97 mm. standard length (Station 91), from latitude 02° 48' N., longitude 78° 11' W., midway between Gorgona Island and the mouth of the Río Charco, Colombia, April 24. Taken with a dipnet at the surface during the working of a night station.

Exocoetus monocirrhus Richardson

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, taken about halfway between Buenaventura and Gorgona Island, Colombia, September 16, 1937.

On the junior author's launch trip in 1937, this small flying fish flew to the deck of the craft, 2 meters above the water. The position was in deep blue oceanic water, outside the littoral strip of low salinity, and approximately 40 miles on the course toward Gorgona, but several miles west of the longitude of that island.

It is difficult to differentiate large specimens of *Exocoetus volitans* (*sic*, see below) and *monocirrhus*. The latter seems to be the commoner off the west coast of tropical America.

We follow Meek and Hildebrand and recent authors here in using *Exocoetus* for the "two-winged" flying fishes (*Halocypselus* Weinland), but not without protest. *Exocoetus volitans* Linnaeus (1758), the type of *Exocoetus*, may be unidentifiable, but was presumably a form with posterior ventrals as earlier stated by Artedi ("Pinnae ventralis non longe ab ano, satis longae"), and later figured by Cuvier and Valenciennes. Nor is there any sufficient reason for synonymizing *Exocoetus evolans* Linnaeus (1766) with *volitans*, inasmuch as he calls attention to the very short ventrals of the former (characteristic of *Halocypselus*), and presumably had the two common groups of flying fishes, "two-winged" and "four-winged" in mind as *evolans* and *volitans*. That a specimen of *evolans* was many years afterwards misidentified as the "type" of *volitans* should not alter the case; in fact it makes the sanctity of "identified types" absurd.

"CAROLA" MATERIAL: Two young of about 22 mm. and 26 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941;

taken at night while surface drifting with a light and net, as were also a small *Parexocoetus* and several specimens of a species of *Cypselurus*.

Meek and Hildebrand list only one *Exocoetus*, cosmopolitan *E. volitans*, from Panama, perhaps following various recent authors who have considered the genus monotypic. Those who have made a careful study of young flying fishes, however, such as Lütken (1876), Nichols and Breder (1928), and Bruun (1935), recognize at least two species. Since Bruun has pointed out, as confirmed by Breder (1938), that young Atlantic *E. obtusirostris* does not have a barbel, at least three species seem to be demanded by the facts.

These two young, with barbel, are presumably *obtusirostris*, Nichols and Breder (1928, not of Günther), which reference as well as the "Carola" specimens we here identify as *E. monocirrhus* Richardson (1846, China). Closely related species thus far described are *E. georgianus* Cuvier and Valenciennes (1846, eastern Indian Ocean) and *borodini* Nichols and Breder (1932, Mauritius). There may be several recognizable forms of this type in the Indo-Pacific, or, as we are at present writing inclined to believe, only one. It should be noted that Jordan and Evermann (1896, p. 730) give a wrong locality for *georgianus*, naming west, instead of east, longitude.

Parexocoetus brachypterus (Solander,
in Richardson)

"CAROLA" MATERIAL: One small specimen, 70 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net, as were also two young *Exocoetus monocirrhus*, and several specimens of a species of *Cypselurus*.

It has two small barbels at the chin.

Cypselurus nigripennis (Cuvier and
Valenciennes)

"CAROLA" MATERIAL: Seven specimens, one of 26 mm., five of 55 to 70 mm., and one of 110 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net, as

were also a small *Parexocoetus* and two young *Exocoetus monocirrhus*.

This species (Cuvier and Valenciennes, 1846, p. 108; Weber and De Beaufort, 1922, p. 192) has first ray of pectoral simple, second divided, third and fourth longest. It is characterized by large eye, very broad interorbital which slants down in the center to the very short snout so as to emphasize its concavity and the convex supraorbitals, long ventrals, black fins (except the caudal which is pale), and young without barbels. This seems to be the first time it has been identified from the eastern Pacific. Measurements of our largest specimen follow.

Length to base of caudal, 110 mm. Depth in this length, 5.5; width, 6; head, 4.2; pectoral, 1.6; ventral, 2.6. Eye in head, 2.7; snout, 4.5; interorbital, 2.5; longest dorsal rays, 2. Dorsal rays, 11; anal, 7. Scales in entire lateral line, 54. Body squarish, little compressed forward of the ventrals; snout from above blunt, broadly rounded; mouth small. Dorsal rather high; pectorals reach axil of dorsal; ventrals reach base of caudal, their origin equidistant from base of caudal and front of opercle. Scales not very firm, many lacking.

Brown above, pale, with large punctulate brown spots below. Paired fins, dorsal and anal black or blackish. Pectoral with outer rays barred with pale, inner rays pale, and a few faintly pale marks on the fin; ventral with inner and outer margins paler; anal somewhat paler on front rays and base of hind ray. Caudal pale with a dark base and two distinct broad dark cross bands on the lower lobe, the inner band with a corresponding spot on the upper lobe, the outer beyond the tip of same.

Measurements of the 55- to 70-mm. specimens are: depth, 5.4 to 5.8; width, 6 to 6.1; head, 4.2 to 4.4; pectoral, 1.5 to 1.6; ventral, 2.4 to 2.6. Eye, 2.4 to 2.6; snout, 5 to 5.5; interorbital, 2.4 to 2.5. Dorsal rays, 10 to 12; anal, 7 to 8; only one with sufficient scales to count lateral line, about 58. Pectoral reaching from middle to axil of dorsal; ventrals reaching to, or not quite to, base of caudal, their origin equidistant from base of caudal and edge of preopercle to margin of opercle.

Three specimens of 65 to 70 mm. have body

color essentially like that of the 110-mm. example; one of 60 mm. has lower parts silvery, spots numerous but smaller than at larger sizes; one of 55 mm. is dark mottled silvery below, darker than above. The five lack pale markings on the pectoral, aside from pale bars on the outer rays in the three larger, indicated in the smallest, but absent in that of 60 mm. The 60-mm. specimen has very slightly paler margins to the ventral, lacking in the other four, and all have the anal uniform. The three larger have caudal markings fainter than that of 110 mm., and the 55-mm. specimen only a few dark punctulations on its base, but that of 60 mm. has the caudal bands bold and strong.

The 26-mm. specimen has depth, 5.8; width, 6.2; head, 4.2. Eye, 2; snout, 4; interorbital, 2. It is pale brown, punctulate above; somewhat darker, more silvery below; paired fins black, dorsal and anal slightly dusky; caudal pale.

FAMILY FISTULARIIDAE

CORNET-FISHES

Fistularia depressa Günther

"WILPET" 1942 MATERIAL: One small specimen, 136 mm. standard length, taken in a large seine along with much larger fishes at La Plata Island, Ecuador.

This is a widely distributed tropical Indo-Pacific species, apparently not previously recorded south of Panama on the American coast.

FAMILY SYNGNATHIDAE

PIPE-FISHES

Doryrhamphus californiensis Gill

"ASKOY" MATERIAL: One male specimen, 43. mm. standard length, showing pouch, (Station 104), from Ensenada de Guayabo Chiquito, southern Panama, May 20, from the interstices of coral brought up from a depth of 9 to 11 meters.

This rare species was described from Cape San Lucas, Lower California.

FAMILY ATHERINIDAE

SILVERSIDES

Kirtlandia pachylepis (Günther)

"ASKOY" MATERIAL: Thirty-two specimens, 58 to 73 mm. standard length (Station 100), from Puerto Utria, Colombia, May 15.

All were captured with a seine on a sandy beach of this beautiful and little-known landlocked harbor.

This record gives us an intermediate station for this silverside, previously known from Panama Bay and Guayaquil, Ecuador.

Eurystole eriarcha (Jordan and Gilbert)

"ASKOY" MATERIAL: One specimen, 53 mm. standard length (Station 1), from Pacheca Island, Pearl Islands, Gulf of Panama, February 10. Seined on a small sandy beach on the northern coast of Pacheca.

This handsome, aberrant species is apparently scarce over its wide north-south range, covering some 39 degrees of latitude. It was named from Mazatlán in 1881; collected at Cape San Lucas, also at Santa Catalina Island, Gulf of California (north of 25° N.) in 1911, by the Townsend "Albatross" expedition (Osburn and Nichols, 1916, p. 156); collected at North Chincha Island, Peru (south of 13° S.) in 1919, by R. C. Murphy (Nichols and Murphy, 1922, p. 506); and there is a specimen in the Museum collected at Manzanillo, Colima, Mexico, in 1941 by Donald Erdman. But the "Askoy" specimen seems to be the first record for Panama, the species not being mentioned by Meek and Hildebrand.

FAMILY MUGILIDAE

MULLETS

Mugil curema Cuvier and Valenciennes

"ASKOY" MATERIAL: Two specimens, 32 and 80 mm. standard length (Station 102), from Limón Bay, Gulf of Cupica, Colombia, May 17.

Seined on a beach beaten by surf.

FAMILY POLYNEMIDAE

THREADFINS

Polynemus approximans Lay and Bennett

"ASKOY" MATERIAL: Fifty-seven specimens, 31 to 68 mm. standard length (Stations 9, 30, 80, 102), from Santelmo Bay, Isla del Rey, Pearl Islands, Gulf of Panama, February 15; Ensenada de Guayabo Chiquito, southern Panama, March 4; Limón Bay, Gulf of Cupica, Colombia, May 17; La Plata Island, Ecuador, April 12. Seined on sandy beaches.

Polynemus were taken most abundantly at

Santelmo Bay, where they were furnishing the principal food of brown pelicans. The stomachs and gullets of four pelicans collected were crammed with examples of this fish.

"CAROLA" MATERIAL: Four young, 25 to 31 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net. The young must be more or less pelagic at this size.

***Polynemus opercularis* (Gill)**

"ASKOY" MATERIAL: Five specimens, 47 to 60 mm. standard length (Station 9), from Santelmo Bay, Isla del Rey, Pearl Islands, Gulf of Panama, February 15. Seined with a much larger number of *P. approximans*.

FAMILY AMMODYTIDAE

SAND LANCES

***Bleekeria lucasanus* (Beebe and Tee-Van)**

This is possibly a synonym of *Bleekeria gilli* Bean (1895, p. 629), type locality uncertain. It is not *Bleekeria gilli*, Fowler (1928, p. 426), figured from Oceania. Whereas the tropical Indo-Pacific genus *Bleekeria* has notable differences from the northern genus *Ammodytes*, we see no justification for placing two such similar fishes in different families.

"ASKOY" MATERIAL: Two specimens, 56 and 78 mm. standard length (Station 87), from off northwestern Ecuador, latitude 01° 07' N., longitude 79° 53' W., April 17.

Dredged from hard bottom, with rock and corallines, at a depth between 10 and 30 meters. This is the second known station for the species, Beebe and Tee-Van's material being taken from the stomachs of large fishes and of a cormorant, at Cape San Lucas.

FAMILY HOLOCENTRIDAE

SQUIRREL-FISHES

***Holocentrus suborbitalis* Gill**

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 160 mm. standard length, from Santa Elena, Ecuador, February 15, 1925, Murphy and Heilner, has been compared with specimens from Clarion Islands.

This squirrel-fish is recorded from the Galápagos Islands, but Meek and Hildebrand give no mainland locality for it south of Panama.

"CAROLA" MATERIAL: Six pelagic young squirrel-fishes, 22 to 33 mm. standard length, are presumably this species. They are approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net, as were also various other fishes. They are bright bluish silvery in color, dark along the back, and with a dark spinous dorsal.

FAMILY SCOMBRIDAE

MACKERELS

***Scomber japonicus* Houttuyn**

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 74 mm. standard length, from Santa Elena, Ecuador, February 13, 1925, Murphy and Heilner.

***Katsuwonus pelamis* (Linnaeus)**

"ASKOY" MATERIAL: A kodachrome photograph of a good-sized specimen at Manta, Ecuador, in April, one of many seen in fishermen's boats there. The oceanic bonito is a staple food fish along the outer coast of Ecuador. We have no information regarding this species in the warmer water to the north; and although Meek and Hildebrand list it on *a priori* grounds, they had no record from either coast of Panama.

On the high seas *Katsuwonus* seems to be most plentiful in the trade-wind belts and to prey to a considerable extent on flying fishes which abound there. We recognize no difference between the Atlantic fish, *K. pelamis*, and that credited to the Indo-Pacific, *K. vagans* (Lesson).

***Scomberomorus sierra* Jordan and Starks**

"ASKOY" MATERIAL: A kodachrome photograph of a good-sized specimen captured in the entrance of the Bay of Málaga, Colombia, on March 19. Another was taken on a hand line off Buenaventura on March 12, 1941. This mackerel is a common food fish of the area and is locally called the "sierra."

Being very familiar with *Scomberomorus maculatus* from New York to Florida, we cannot agree with Meek and Hildebrand that this is the same fish. Its spots (as shown in the photograph) are more numerous and regular, shape of body and position of fins more as in *S. regalis*, of the Atlantic.

Acanthocybium solandri (Cuvier and Valenciennes)

"WILPET" 1942 DATA: "Common [at La Plata Island, Ecuador]. Frequently seen at the surface in schools of up to about eight, with dorsal and upper caudal lobe protruding through surface. At a little distance they look somewhat shark-like in this aspect. Generally of large size" (Breder).

Meek and Hildebrand did not obtain this widely distributed mackerel in Panama, but it is recorded from the west coast of Mexico, Hawaiian Islands, and South Seas.

UNIDENTIFIED YOUNG SCOMBRIDAE

"ASKOY" MATERIAL: Five specimens, 19 to 28 mm. standard length (Station 49), from latitude 04° 01' N., longitude 80° 26' W., March 24; taken by dipnet at the surface. They are not identifiable without an upwardly graded series for comparison, but may be the fry of *Euthynnus*.

FAMILY ISTIOPHORIDAE

SAILFISH AND MARLINS

Istiophorus gladius greyi Jordan and Evermann

Sailfish, rising high out of water to slither along the surface on their flanks, were observed twice during the field work, namely, off the southern tip of San José Island, Pearl Islands, on September 9, 1937; and near "Askoy" Station 15, in the Gulf of Panama south of the Pearl Islands, February 22, 1941.

The genus *Istiophorus* is circumtropical, with more or less rather slight geographical variation, and several species described on characters which seem to be referable to age. We follow Hunt (1935, chap. 1) in considering all recognized Indo-Pacific forms to be races of *I. gladius* (Bloch) of East Indian waters.

The nomenclatural history of the Atlantic and Pacific species of *Istiophorus* is beset with uncertainties, hazards, and error. Forms belonging to this genus were known to, but poorly described and not differentiated by, pre-Linnaean writers. Broussonet (1786, pp. 450, 455, pl. 10) gives an excellent description and figure of a sailfish, based on an East Indian specimen, which he considers more closely related to a mackerel (*Scomber*) than to a swordfish [*Xiphias*], but entitled to recog-

nition as a genus distinct from either. However, he does not suggest either generic or specific name for it. *Scomber gladius* Bloch, 1793 (p. 81, pl. 345), is the first tenable specific name proposed for a sailfish. Under it he has compiled references which apply to sailfish, from that of Marcgrave, 1648, Brazil, to that of Broussonet, 1786, East Indies, making his species cosmopolitan. Cuvier and Valenciennes (1831) differentiate East Indian, based on Broussonet (p. 308, pl. 229), and Atlantic, based on Marcgrave (p. 303), sailfish, as *indicus* and *americanus*, thus setting aside Bloch's name and nullifying their revision. Day (1878-1888) assumes that *gladius* Bloch is based on Broussonet's fish. He goes further and credits Bloch's name *gladius* to Broussonet (and to Broussonet's article, in which it does not occur), citing *indicus* Cuvier (1817) and Cuvier and Valenciennes (1831) as a synonym. However, he again gives *gladius* a cosmopolitan range, though recognizing another species of this genus as confined to the Indian Ocean.

Very likely Day considered sailfish descriptions prior to Broussonet's as inadequate and negligible, and Bloch's composite of them equally so, except for its reference to Broussonet whose description was good, and based on a specimen in the British Museum. It may also be noted that Broussonet does in effect say his fish is a mackerel, *Scomber*, with a sword; and Bloch calls it "Schwerdtmakrele" [Sword-mackerel] *Scomber gladius*. This, and matter in Bloch's description obviously drawn from Broussonet, though not so credited, may be the reason why Day attempted to throw Bloch's name to Broussonet, or he may at the time have had other evidence which he thought justified him in so doing. In any event, Jordan and Evermann (1926, p. 38), in a nomenclatural revision of the genus, follow Day in this matter, and state of *gladius*, "The species belongs to the Indian fauna, and is apparently not rare."

Finally Fowler (1928, p. 136) writes: "The description and figure by Broussonet are not accompanied by any specific name,"—which is correct. "The *Scomber gladius* Bloch . . . the next [or rather first] name," also correct, "though a composite is largely referred to *Xiphias*," certainly incorrect if *Xiphias*

Linnaeus, the broadbill swordfish, is meant. Bloch assigns to his *Scomber gladius* all the important differences a sailfish shows from a swordfish, and correctly compares the spear thereof with the sword of the swordfish.

Makaira sp.

"Swordfish" of this type were twice observed in the area, at close range, and under circumstances which brought the body of the fish into full view. The first occasion was in the ocean west of the Bay of Manta, Ecuador, on March 13, 1929, the second near "Askoy" Station 73, southwest of Esmeraldas, Ecuador, in April, 1941.

The Pacific black marlin, *Makaira ampla marlina*, and the striped marlin, *M. mitsukurii*, are both to be expected in these waters (see Nichols and LaMonte, 1941, p. 8). We have a photograph of an example of the former species weighing 378 pounds, taken by John Smidt at the Pearl Islands in September, 1937.

FAMILY NEMATISTIIDAE

ROOSTER-FISH

Nematistius pectoralis Gill

MATERIAL FROM PREVIOUS EXPEDITIONS: A photograph of a specimen weighing 25 pounds, caught by Heilner in the Bay of Santa Elena, Ecuador, on February 14, 1925.

On February 17, schools of these fishes were seen in rapid progress at the surface, near La Plata Island. They appeared to be pursuing prey, and their high "foreheads" were out of water much of the time.

Meek and Hildebrand record the range of this species as extending no farther south than Panama.

FAMILY CARANGIDAE

CREVALLYS AND POMPANOS

Trachurops crumenophthalmus (Bloch)

Meek and Hildebrand place this fish in the genus *Selar*, but *Selar* properly belongs to a subgenus of *Caranx* (Nichols, 1942, p. 266).

MATERIAL FROM PREVIOUS EXPEDITIONS: Three specimens, 75 to 90 mm. standard length, from Santa Elena, Ecuador, February 20, 1925, Murphy and Heilner.

These agree with the standard, cosmopolitan form of *crumenophthalmus*, as does a larger specimen from Panama, previously

examined. They show no resemblance to the race recognized from the North Pacific as *T. c. torva*, or to two varieties described from the Gulf of California (Nichols, 1935, p. 1), but it may be that such small specimens would not yet have developed their peculiarities.

Hemicaranx leucurus (Günther)

"ASKOY" MATERIAL: One small specimen, 28 mm. standard length (Station 91), from latitude 02° 48' N., longitude 78° 11' W., April 24. Taken by dipnet at the surface during a night station halfway between Gorgona Island and the mouth of the River Charco, Colombia.

This species, previously known from Panama, is sufficiently different from *Hemicaranx rhomboides* Meek and Hildebrand of the Atlantic, which is the young of *Hemicaranx amblyrhynchus* (Cuvier and Valenciennes), not to be confused with it, although some of the characters given by Meek and Hildebrand to separate the two seem to be age characters. *H. leucurus* is very likely also the young, but of a larger fish than *amblyrhynchus*. Our specimen has pigment less developed than one would expect in *H. amblyrhynchus* of comparable size, and may be briefly described as follows:

Length to base of caudal, 28 mm. Depth in this, 2.3; head, 2.7. Eye in head, 3.5; snout, 3.5; maxillary, 2.5; interorbital, 3; longest dorsal and anal rays, 2; pectoral, 1.5; ventral, 1.7. Curve in straight part of lateral line, 2; depth of same in its length, 2.5. Soft dorsal and anal with convex margins and well-developed basal sheaths; caudal weakly forked for about one-fourth its length, the lobes rounded and about equal; pectoral rounded. Scutes little developed.

Color pale, with a sub-vertical, diamond-shaped black blotch occupying most of the opercle; body with sharply marked dark punctulations of mixed sizes, densest toward the soft vertical fins, the breast with widely spaced large ones only. Dorsals and anal slightly dusky.

Caranx sexfasciatus Quoy and Gaimard, ssp.

"ASKOY" MATERIAL: One specimen, 155 mm. standard length (Station 88), from Tu-

maco, Colombia, April 19. Obtained from fishermen.

Length, standard (to base of caudal), 155 mm. Depth in this, 2.7. Eye in head, 3.75. Dorsal soft rays, 20; anal, 16. Scutes, 33. Gill rakers, 4+14. Much enlarged scutes on peduncle, weak canines, and dark speck at upper corner of gill slit, characteristic of *C. sexfasciatus*, but profile less arched than usual in this species. A rather dark fish, with dorsal, anal, and scutes darker than the body, caudal becoming blackish posteriorly.

"WILPET" 1942 MATERIAL: Three small specimens, 78 to 98 mm. standard length, from La Plata Island, Ecuador, taken in coarse seine.

Length to base of caudal, 78 to 98 mm. Depth in this, 2.3 to 2.6. Eye in head, 3.4 to 3.6. Dorsal soft rays, 20 (all three); anal, 16 to 17. Scutes (developed), 22 to 28. Gill rakers (lower limb), 14 to 15. All have broad scutes on peduncle, very slight canines, dark speck at upper corner of gill cleft, characteristic of *C. sexfasciatus*, and four or five broad dark cross bands on the body faintly suggested. In the smallest the top of the dorsal lobe is blackish. This also has the arched profile usual in *sexfasciatus*; in the two larger (of 85 and 98 mm.) it is somewhat straighter.

The senior author has examined material and has recognized five poorly defined races of this well-marked circumtropical species: (1 and 2) from the East and West Indies, (3 and 4) from Brazil, and the Pacific Coast of America (Mazatlan to Panama, Ecuador, *C. s. marginatus*), and (5) from the Hawaiian Islands (1938, pp. 1-6). Some of the differences between the three categories as grouped above may be due to each occupying a somewhat different ecological niche.

To our surprise, none of these specimens fit our concept of *marginatus*. For one thing their fin rays are too numerous. They seem rather to resemble *C. s. fallax* of the West Indies and *C. s. sexfasciatus* of the East Indies (which two are particularly close to one another and unsatisfactorily differentiated), with resemblances also to *C. s. elacate* of the Hawaiian Islands. The dark color of the 155-mm. Colombia fish we are familiar with only in *elacate*. The rather small eye of this specimen is almost the only feature in any of them

suggestive of *marginatus* and out of the way for intermediates between *elacate* and *fallax*. The material is insufficient to describe a new form, or even be sure whether the young Ecuadorian specimens, at larger size, would or would not be distinguishable from the Colombian. It may be noted also that Ecuadorian *C. s. marginatus* specimens previously examined are presumably from the Gulf of Guayaquil, a locality which may differ somewhat both faunally and ecologically.

Caranx crysos caballus Günther

"WILPET" 1942 MATERIAL: One specimen, 405 mm. standard length, from La Plata Island, Ecuador, where Breder found this species common.

Meek and Hildebrand recognize *C. caballus* as a full species, distinct from *crysos*, but the two are very close, and their alleged differences, mostly age characters, do not hold.

Vomer setapinnis declivifrons Meek and Hildebrand

MATERIAL FROM PREVIOUS EXPEDITIONS: Two specimens, 45 and 46 mm. standard length, from Santa Elena, Ecuador, February 13, 1925.

We here follow Meek and Hildebrand in referring West Coast *Vomer* to their *declivifrons*, which probably has slight average differences from *setapinnis* Mitchill (New York) although we do not believe these differences worth taxonomic recognition. This opinion is based on 17 specimens from the Bay of Panama, 39 to 260 mm. standard length, borrowed from the United States National Museum and studied in 1918, eight specimens of 48 to 59 mm. in the Bingham Oceanographic Collection of Yale University, collected by the "Atlantis" at Panama City in 1934, examined in 1939, and the two mentioned above.

In naming *declivifrons*, Meek and Hildebrand presumably compared it, not with true *setapinnis*, but with the deeper-bodied, more tropical Atlantic form, *V. s. cubensis* Nichols (1918, p. 672; Cienfuegos). We identify their figure of *setapinnis* with the latter.

Chloroscombrus orqueta Jordan and Gilbert

"ASKOY" MATERIAL: Six young, one 23 mm. standard length (Station 7), from south

passage of the Pearl Islands, Gulf of Panama, February 13; captured in a townet drawn from depth of 30 meters to the surface. Five of 15 to 42 mm. (Station 91), from latitude 02° 48' N., longitude 78° 11' W., halfway between Gorgona Island and the Colombian coast, April 24; captured at night beneath a large rhizostome jellyfish (*Stomolophus melagris*) common in the coastal waters of tropical South America.

MATERIAL FROM PREVIOUS EXPEDITIONS: Three specimens, 39 to 45 mm. standard length, from Santa Elena, Ecuador, collected by Murphy and Heilner, February 20, 1925.

This genus, like *Hemicaranx*, is notable for seeking drifting jellyfish as a hover in its younger stages, as the common Hawaiian species of the *Selar* group of *Caranx* does, and from this group both these genera likely are derived. Meek and Hildebrand report the range of *C. orqueta* as no farther south than Panama, but it doubtless extends south to the limit of the warm surface drift from off shore, and no farther.

Trachinotus rhodopus Gill

"ASKOY" MATERIAL: Fifty-nine young, 23 to 96 mm. standard length (Stations 30, 80), from Ensenada de Guayabo Chiquito, southern Panama, March 4 (one of 23 mm.) and La Plata Island, Ecuador, April 12 (58 of 28 to 96 mm.); seined on sandy cove beaches with threadfins and other fishes.

"WILPET" 1942 MATERIAL: One specimen, 158 mm. standard length, from La Plata Island, Ecuador, where Dr. Breder found this pompano fairly common. It has characteristic dark cross bars, which are lacking in all the smaller "Askoy" specimens.

This species is not recorded south of Colombia by Meek and Hildebrand. In their plate of *T. glaucus* and *paloma*, the names are presumably reversed.

Seriola mazatlana Steindachner

"ASKOY" MATERIAL: One specimen, 65 mm. in standard length (Station 49), from latitude 04° 00' N., longitude 80° 26' W., well offshore west of Colombia and south of Panama, March 24.

At this notable midnight station far at sea on the section between the Colombian coast

and Malpelo Island, numerous small "rudder-fishes" were seen hanging head downward from the surface, as though dead. When the dipnet was used, however, the fishes leaped out and escaped, but this single example was finally captured.

As noted above, many depth organisms were at the surface on this evening, and the ocean was troubled by vertical waves in completely calm weather. It is possible that the posture of the rudder-fishes was a rheotropic reaction due to marked upwelling. On the other hand, Breder has described to us smaller *Oligoplites* behaving in much the same way in shallow coastal waters of west Florida, for which there must be an entirely different explanation.

The correct identification of this single specimen, referred to the little-known *Seriola mazatlana*, is somewhat of a problem. It can hardly be the young, which we have not seen, of the common large West Coast species, *Seriola dorsalis*, because we are familiar with that of the closely related Atlantic fish. *Seriola peruana* named from Callao and *S. colburni* from Lower California are described from much larger, not very comparable specimens but have very little in common with it. It seems fairly intermediate between the somewhat larger type of *S. mazatlana* as described (from Mazatlán), and several smaller specimens from Panama provisionally referred to *mazatlana* by Meek and Hildebrand. The most significant differences seem to be fewer gill rakers (than the Panama specimens) and absence of any cross markings. This is probably a small species for the genus.

A brief description of our specimen follows:

Length to base of caudal, 65 mm. Depth in this, 2.9; head, 3.1 (very slightly longer than deep). Eye in head, 4; snout, 3; longest dorsal spine, 4.6, ray, 2.3, anal ray, 2.7; pectoral, 2; ventral, 1.5.

Dorsal rays, VII-I, 32; anal II—22. Gill rakers about 5+17.

Well compressed, back moderately elevated. Spinous dorsal low; soft dorsal high, but its margin even, anterior rays not at all elevated; anal with anterior rays slightly elevated so that the corner projects very slightly.

Uniform dark brown, somewhat paler be-

low; a short darker band slanting backward from eye, otherwise no markings. Caudal grayish; dorsals, anal, and ventrals dusky, darker than body.

There is a photograph of a larger "amberjack," very likely *Seriola dorsalis* (Gill), captured on a hand line by the junior author at Gorgona Island, Colombia, September 17, 1937, which shows peculiar dark specking (color marking or infection) on its back and sides. Near the same island, on April 20, 1941, an amberjack was observed rubbing repeatedly against a small floating log, and occasionally flipping half out of water in the process. (Pl. 18, fig. 1.)

FAMILY CORYPHAENIDAE

DOLPHINS

Coryphaena hippurus Linnaeus

The Panama Bight is all "dolphin water," at least outside the somewhat murky coastal zone of the Chocó lowland, where flying fishes are scarce. Dolphins, identifiable by their large size as this species, were seen all the way from the Gulf of Panama to the latitude of Point Santa Elena, Ecuador. Captured examples were also determined to be *hippurus* by the pattern of the lingual tooth patches. They were most common in blue water, well offshore, and an example taken near "Askoy" Station 35, on March 9, 1941, is represented by a kodachrome photograph.

Near Station 72, on April 2, 1941, the junior author sighted a large dark object which was moving actively and jerkily at the surface of the ocean. It looked as though it might be a whale-shark or an ocean sun-fish. The course of "Askoy" was changed with the purpose of investigating, and the object proved to be a floating log against which four large dolphins were vigorously rubbing their backs and flanks, producing the motion which had been noted at long range. A color motion picture was obtained of one of the fishes in action.

"CAROLA" MATERIAL: Twenty-six young, 27 to 118 mm. standard length (not counting a series which was sent to Mr. Al Pfluger at Miami), approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

This area is obviously an important nursery ground of the dolphin.

FAMILY APOGONIDAE

CARDINAL-FISHES

Apogon dovii Günther

"ASKOY" MATERIAL: Seven specimens, 17 to 50 mm. standard length (Stations 89, 104), from Ensenada de Guayabo Chiquito, southern Panama, May 20, and Gorgona Island, Colombia, April 22.

Obtained from the interstices of coral from depths of 4 to 11 meters.

The specimens from Colombia, which extend the known range of this species southward, are all of small size, and their identification not entirely satisfactory.

FAMILY NOMEIDAE

SEA-MULLETS

Cubiceps carinatus, new species

Figure 4

A peculiar deep-sea fish which has ventrals close together, with one spine and five soft rays; first (of weak, fragile spines) and second dorsal fins narrowly separated; vomer with numerous small teeth; gill openings wide, gill membranes free and separate; pseudo-branchiae well developed; one opercular spine, small, flat, weak and flexible; anal spines two; lateral line curved upward and running high, following the outline of the back. The jaws are box-like, with a single row of small, firm, comb-like teeth, suggesting *Tetragonurus*, and the maxillary slips under, and is concealed by, the preorbital; the ventrals are subabdominal, inserted well behind the pectoral, their origin about twice as far from the anal as from the pectoral origin, and the breast has a sharp keel; second dorsal and anal are moderately long, with 14 or 15 soft rays. The eye is large; pectorals are notably long, reaching the vent (which is placed immediately before the anal) or beyond; body covered with large, smooth, deciduous, imbricated scales, which are marked with numerous small, silvery pits.

"CAROLA" MATERIAL: Two specimens of 91 and 103 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken

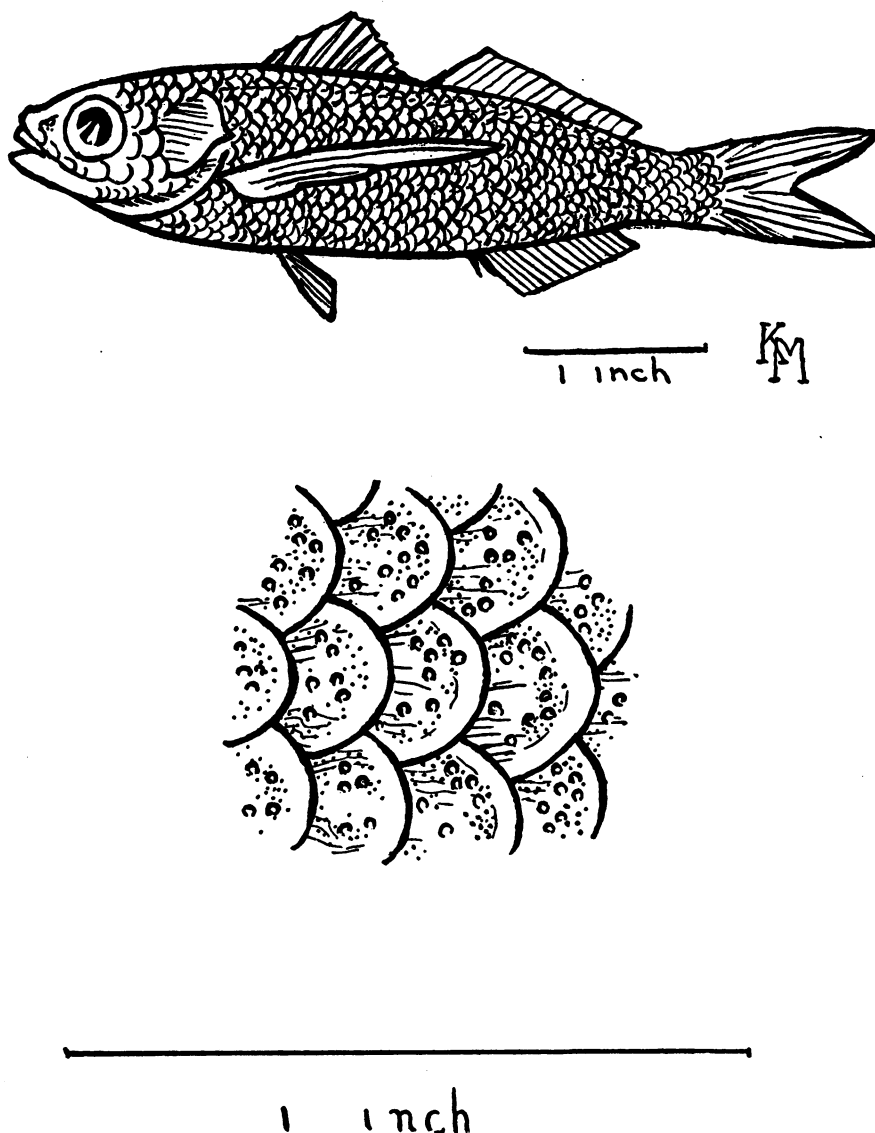


FIG. 4. *Cubiceps carinatus*, new species. Scales of same enlarged.

at night while surface drifting with a light and net.

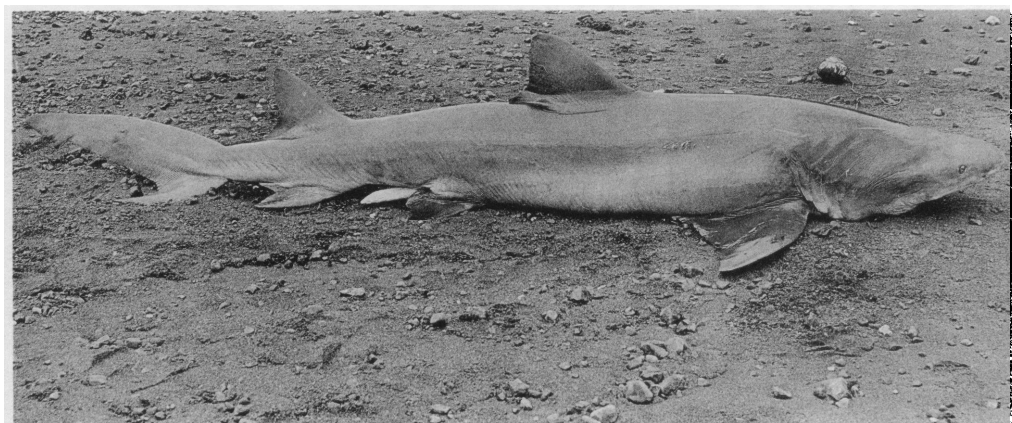
DESCRIPTION OF TYPE: A.M.N.H. No. 16165, collected approximately 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941, by Leon Mandel.

Length to base of caudal, 103 mm. Depth in this length, 3.7; head, 3.2; pectoral, 2.6. Eye in head, 3.1; snout, 3.8; maxillary, 3.4; width of mouth, 4.6; interorbital, 3.1; greatest width (at back of head), 2.3; depth of peduncle, 3, its length, 2.5; pectoral, 0.8; ven-

tral, 2.4; longest dorsal spine, 2.8; dorsal ray, 3; distance between the dorsals, 6.7; longest anal ray, 3; caudal lobe, 1.1.

Dorsal rays, IX or X, 15; anal, II, 14 or 15. Scales, about 38. Gill rakers (lower limb), 15.

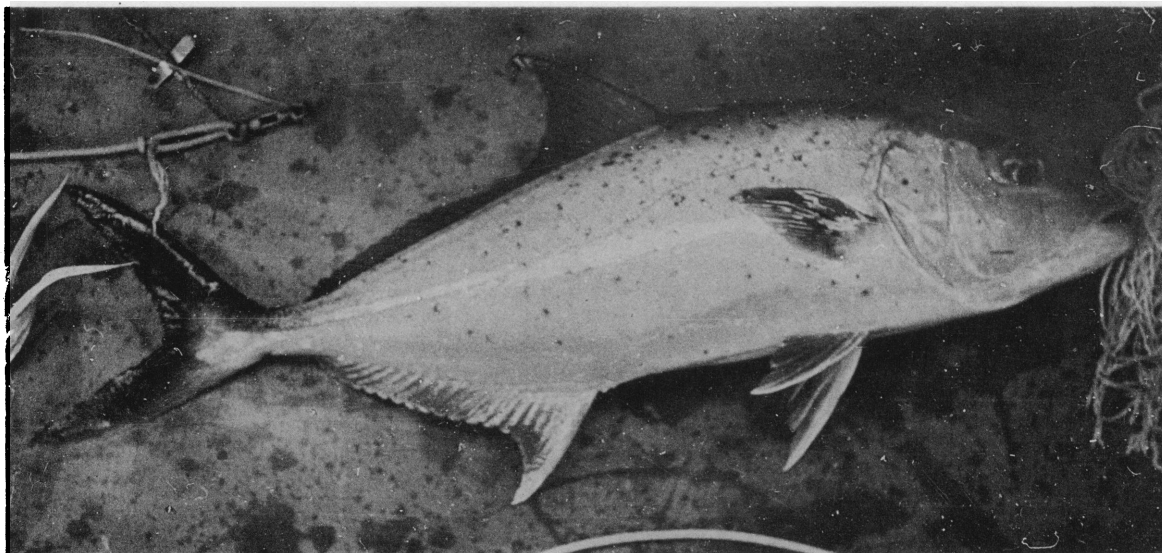
Moderately compressed, the back not elevated, the breast keeled before the ventrals, vent close to front of anal. Interorbital very slightly convex, and orbital rim slightly raised. Mouth small, somewhat oblique; the jaws equal, box-like, with a single row of small, firm, comb-like teeth, maxillary slip-



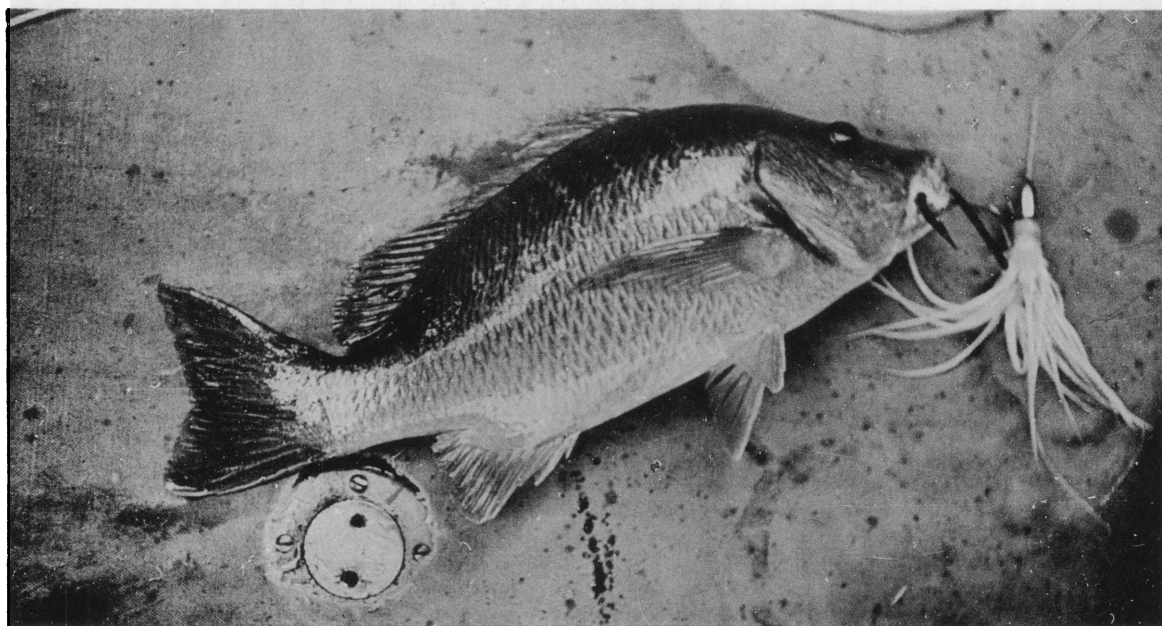
Hypoprion brevirostris Poey, 8 feet 7½ inches total length, from La Plata Island, Ecuador



Tylosurus fodiator Jordan and Gilbert, head of a specimen about 5 feet long, from Point Santa Elena, Ecuador



Seriola sp., from Gorgona Island, Colombia, see text



Lutianus sp., weight 7 pounds, from Gorgona Island, Colombia, see text

ping under and concealed by preorbital, not quite reaching to under front of eye; preopercular angle produced in a broadly rounded, serrate-edged membrane. Gill openings wide, the membranes free and separate; gill rakers moderate or rather small; a triangular striate plate under the scales above base of pectoral. First dorsal spine short, the second considerably longer; the dorsals narrowly separated; caudal deeply forked, its base with conspicuous precurrent rays above and below; pectoral long, narrow, pointed, to just past front of anal; ventrals reaching slightly more than halfway to anal. Body covered with large, smooth, firm, deciduous scales, silvery on their exposed surfaces which are spotted with numerous brighter pit marks. Entire body and top of head to well forward of eye, but not to over nostrils, scaled. Scales on top of snout small, those over front of eye pointed. Scales on preopercle large, on lower jaw, and behind eye small, tip and sides of snout, preorbital, and opercle apparently scaleless. The lateral line (separated by two or three scale rows from the spinous, only a row or two from the soft dorsal) extends backward beyond the axil of soft dorsal, but not enough scales remain on the peduncle to say whether or not it is complete; they are still present in considerable patches on the sides of the body, and on the head.

Inside of mouth dark, of gill cavity blackish.

In the smaller specimen the scales had been lost almost completely; but the edge of the gill cover was in better condition, showing the weak, flat, opercular spine; as was also the front of spinous dorsal, about the fourth spine the longest. The posterior spines are low, one or more possibly broken and missed in both specimens. This smaller individual also has slight proportional differences, a relatively smaller eye (3.4), longer snout (3.5), shorter pectoral (3 in length, only reaching vent). It shows traces of a median lateral line with slight upcurve at the shoulder (absent in the posterior few scale marks), but the scales covering this area in the type have no trace of a lateral line.

Director A. E. Parr of the American Museum, from his considerable knowledge of deep-sea fishes, has pointed out to us the close

relationship of this species to confusing forms currently assigned to *Cubiceps*. The combination of long pectoral and rather short dorsal and anal fins is shared by certain others. The keeled breast and large, peculiar deciduous scales seem to be unique. We propose a new subgenus *Mandelichthys* for it in honor of its discoverer, Leon Mandel of Chicago, well known big-game angler and patron of ichthyology.

It is evident that *Mulichthys* Lloyd, 1909 (*M. squamiceps*, p. 158, fig. 4; Arabian Sea), which that author places in the Tetragonuridae, is related, and less aberrant from *C. gracilis* (Lowe), the type of *Cubiceps* Lowe, than is *C. carinatus*. *Cubiceps gracilis*, deep-bodied *Psenes cyanophrys* (the type of *Psenes* Cuvier and Valenciennes), and *Ariomma lucida* (type of *Ariomma* Jordan and Snyder) are three very unlike fishes, though doubtless closely related. We are not so confident of their relationship to other species grouped in the Nomeidae.

FAMILY SERRANIDAE

SEA BASSES

A head of a grouper-like fish, most likely *Promicrops ataiara* (Lichtenstein), which would itself have nearly filled a barrel, was seen on the beach at the mouth of the River Coredó, Colombia, on May 18, 1941. The fishermen who had caught the fish said that it had measured seven feet in length. They called it a *mero* and stated that the species was common in the neighborhood. Incidentally, a point of land on the seaward side of the river mouth is known as Punta Mero.

Paranthias furcifer (Cuvier and Valenciennes)

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 177 mm. standard length, from Santa Elena, Ecuador, February 20, 1925, Murphy and Heilner.

"WILPET" 1942 MATERIAL: One specimen, 145 mm. standard length.

Breder tells us he found this species fairly common at La Plata Island, Ecuador.

Mycteroperca xenarcha Jordan

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 225 mm. standard length, from Santa Elena, Ecuador, February 20, 1925, Murphy and Heilner.

This specimen has the color markings characteristic of *M. bouleengeri* Jordan and Starks, reported from Mazatlán to Panama, though these are faint and would likely be lost at a larger size. It is probable that *bouleengeri* is a synonym of *xenarcha*, but the former may have a more rounded caudal fin and slightly different preopercular margin.

***Dermatolepis punctatus* Gill**

"WILPET" 1942 DATA: Breder reports this grouper fairly common at La Plata Island, Ecuador, "all too large to get in the limited preserving cans." We find no previous record for it south of Mexico and adjacent islands.

***Epinephelus labriformis* (Jenyns)**

"WILPET" 1942 MATERIAL: Two specimens, 210 and 225 mm. standard length, from La Plata Island, Ecuador, where Breder found this sea bass abundant.

***Prionodes fasciatus* Jenyns**

"ASKOY" MATERIAL: Two specimens, 21 and 30 mm. standard length (one, Station 110, and one with label lost); the larger from Contadora Island, Pearl Islands, Gulf of Panama, May 25. Obtained from coral brought from a depth of 11 meters.

***Cratinus agassizii* Steindachner**

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 227 mm. standard length, from Santa Elena, Ecuador, February 13, 1925, Murphy and Heilner.

***Rhegma thaumasium* Gilbert**

"ASKOY" MATERIAL: Four specimens, 18 to 38 mm. standard length (Station 89), from Gorgona Island, Colombia, April 20 to 22. Three were obtained from masses of coral from depths between 4 and 7 meters, one, the smallest, taken from an abandoned *cayuco*, or dugout canoe, found adrift a short distance off the coast of the island. It had presumably been hiding in holes in the wood.

This very small specimen is of a general olive color with darker fins, and its head is more brightly patterned than that of larger individuals. Its dark opercular blotch is bordered broadly with pale and again narrowly with dark, and a pale band bordered above and below with dark lines extends

backward over the preopercle from the lower part of the eye.

According to Meek and Hildebrand, this species is known only from Panama. Gorgona Island, in about 3° N. latitude, would extend that range some four degrees down the South American coast.

FAMILY LOBOTIDAE

TRIPLE-TAILS

***Lobotes pacificus* Gilbert, *in* Jordan and Evermann**

"CAROLA" MATERIAL: Two young, 75 and 100 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

FAMILY LUTIANIDAE

SNAPPERS

***Evoplites viridis* (Valenciennes)**

"WILPET" 1942 MATERIAL: One specimen, 220 mm. standard length, from La Plata Island, Ecuador, where Breder found this species abundant.

***Lutianus guttatus* (Steindachner)**

"ASKOY" MATERIAL: One specimen, 40 mm. standard length (Station 32), from Aguacate Bay, Colombia, March 6. Dredged in a depth of 25 meters.

***Lutianus argentiventris* (Peters)**

"ASKOY" MATERIAL: Two specimens, 75 and 130 mm. standard length (Stations 102, 88), from the estuary of the River Limón, Gulf of Cupica, and from Tumaco, Colombia.

The larger was obtained from fishermen. The smaller, from the River Limón, was seined in wholly fresh water with a strong slope and current, a short distance above where the small river crosses the beach into Limón Bay.

Like its relative *Lutianus griseus* of the Atlantic, this is a shallow-water fish and enters tidal streams. Both this species and the preceding are known from Mexico to Ecuador, and according to Meek and Hildebrand they are the commonest snappers on the Pacific coast of Panama.

There is a photograph of a 7-pound "red" snapper taken with a hand line at Gorgona Island, Colombia, on September 17, 1937,

and a larger example was purchased for the ship's mess from fishermen at Tumaco, Colombia, on April 19, 1941. The photograph does not match descriptions of *L. colorado* Jordan and Gilbert, and it is possible these fish represent a form of *L. argentiiventris*. (Pl. 18, fig. 2.)

***Xenichthys xanti* Gill**

"WILPET" 1942 MATERIAL: One specimen, 103 mm. standard length, from La Plata Island, Ecuador, where Breder found this species fairly common.

The specimen matches this mainland form, which seems not have been recorded previously south of Panama, rather than *X. agassizii* of the Galápagos Islands.

UNIDENTIFIABLE YOUNG

A young fish, not in good condition, 20 mm. in standard length (Station 30), from Ensenada de Guayabo Chiquito, southern Panama, dredged from a depth between 25 and 64 meters, March 4, is very puzzling. It has a pattern of stripes and blotch on caudal base very like that of *Bathystoma rimator* and approached by various young haemulids. Such a pattern is described for young *Xenichthys xanti*, but the specimen is too slender, with too large and a not sufficiently oblique mouth for that species. It is perhaps the young of *Xenocys jessiae* Jordan and Bollman, but that species, down to 45 mm. (the smallest we have for comparison), has a slightly smaller mouth and no caudal blotch.

FAMILY HAEMULIDAE

GRUNTS

***Orthostoechus maculicauda* Gill**

"WILPET" 1942 MATERIAL: Two specimens, both 165 mm. standard length, from La Plata Island, Ecuador, where Breder found this grunt common.

Apparently not recorded previously south of Panama.

***Lythrolon flaviguttatum* (Gill)**

"ASKOY" MATERIAL: One specimen, 245 mm. standard length (Station 30), from Ensenada de Guayabo Chiquito, southern Panama, March 4.

Many examples were caught at night on hand lines in the cove.

***Pomadasys leuciscus* (Günther)**

"ASKOY" MATERIAL: One young specimen, 42 mm. standard length (Station 9), from Santelmo Bay, Isla del Rey, Pearl Islands, Gulf of Panama, February 15; seined on a sandy beach with numerous young threadfins.

"WILPET" 1942 MATERIAL: One specimen, 125 mm. standard length, from La Plata Island, Ecuador, where Breder found this species fairly common, in schools with the much more numerous *Orthostoechus*.

FAMILY GERRIDAE

MOJARRAS

***Eucinostomus californiensis* (Gill)**

"ASKOY" MATERIAL: Three young gerrids, 23 to 30 mm. standard length (Station 3), in poor condition, are probably referable to this species. They are from Saboga Island, Pearl Islands, Gulf of Panama, February 12; seined on a sandy beach on the eastern coast of the island, with numerous young *Albula*, to which they bear a certain superficial resemblance at this size.

Eucinostomus californiensis elongatus

Meek and Hildebrand

"WILPET" 1942 MATERIAL: Four specimens, 77 to 83 mm. standard length, from La Plata Island, Ecuador.

These specimens are unlike any form of the genus with which we were previously familiar, including *E. c. californiensis* (with a somewhat smaller but comparable specimen of which they have been compared) and agree with *elongatus* as recently figured and described from Taboga Island. Their scales are almost completely lost, except on the breast, apparently more deciduous than in other Atlantic and Pacific material examined. Meek and Hildebrand synonymize Pacific *dowii* and Atlantic *harengulus* and *pseudogula* with *californiensis*, but we do not confirm this. These forms are exceedingly variable and apparently vary into one another, but we are rather of the opinion that two (possibly more) are worth recognizing in each ocean.

FAMILY KYPHOSIDAE

RUDDER-FISHES

Kyphosus elegans (Peters)

"CAROLA" MATERIAL: Two young, 40 and 60 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

Sectator ocyurus (Jordan and Gilbert)

"WILPET" 1942 MATERIAL: One specimen, 295 mm. standard length, from La Plata Island, Ecuador. "Schools of up to about a dozen to be seen cruising about near the anchorage, giving the very distinct impression of Carangids" (Breder).

We know of no previous record of this fish south of Panama.

FAMILY CIRRHITIDAE

CIRRHITIDS

Cirrhitichthys corallicola Tee-Van

"ASKOY" MATERIAL: Fourteen specimens, 20 to 47 mm. standard length (Stations 80, 89, 100, 104), from La Plata Island, Ecuador; Gorgona Island and Puerto Utria, Colombia; Ensenada de Guayabo Chiquito, southern Panama; April 12 to May 20; from coral brought up from depths of 2 to 11 meters.

This extends the range of this little fish, a recently described American representative of a tropical Indo-Pacific genus, formerly known from southern Mexico (north of 17° N. latitude) to Colombia, south to southern Ecuador (south of 1° S. latitude). It seems unlikely that it occurs much farther north without having been collected there, or much farther south on account of lower water temperatures.

FAMILY POMACENTRIDAE

DEMOISELLES

Pomacentrus rectifraenum Gill

"ASKOY" MATERIAL: Two specimens, 53 and 71 mm. standard length (Station 2), from Saboga Island, Pearl Islands, Gulf of Panama, February 11. Rock-pool examples, obtained from a fisherman.

Abudefduf saxatilis (Linnaeus)

"WILPET" 1942 DATA: Breder tells us that specimens which were evidently this were

seen about piling at Salinas, Ecuador, as well as a smaller number of some species which looked like *A. analogus*. He also reports a bright blue pomacentrid in tide pools at La Plata Island, which he thought was *Pomacentrus leucurus* Gilbert.

We here follow Meek and Hildebrand in synonymizing closely related fishes, recognized by recent authors from different oceans, with East Indian *Abudefduf saxatilis*, but are of the impression there are at least racial differences between them which will hold.

Nexilarius concolor (Gill)

MATERIAL FROM PREVIOUS EXPEDITIONS: Four specimens, 75 to 140 mm. standard length, from Santa Elena, Ecuador, February 13, 1925, Murphy and Heilner.

Meek and Hildebrand record this species south only to Panama and the Galápagos Islands.

"WILPET" 1942 MATERIAL: One, 27 mm. standard length, from tide pools at La Plata Island, Ecuador, is somewhat small for positive identification.

Microspathodon bairdii (Gill)

"ASKOY" MATERIAL: One specimen, 33 mm. standard length (Station 103), from Ensenada Coredó, Colombia, May 19. Obtained under stones of a pebbly beach, near low-water mark.

This is the farthest south that this form has been recorded. It is credited to Panama by Jordan and Evermann (1898), but not included in Meek and Hildebrand's Panama list (1925), though the latter authors give the range of *M. dorsalis* to Acapulco, Panama, and the Galápagos Islands. Both species were described from Cape San Lucas by Gill (1862, p. 147, *dorsalis*; p. 149, *bairdii*). Ours is a bicolored specimen, agreeing best with descriptions of *bairdii*. Meek and Hildebrand may have considered the two indistinguishable, but they do not synonymize them.

UNIDENTIFIABLE YOUNG

"ASKOY" MATERIAL: Two specimens of 15 and 21 mm. standard length (Station 103) we believe to be the young of *Nexilarius concolor* (Gill). They were taken with the *Microspathodon* (above) under stones of a pebbly beach at Ensenada Coredó, Colombia.

Of two young pomacentrids, 12 mm. standard length (Station 80), even the genus is uncertain. These are from La Plata Island, Ecuador, April 13. Their color pattern is unlike that of any species with which we are familiar; pale with a broad dark shade from nape to pectoral, and another dark shade from soft dorsal to anal axil, leaving a broad, more or less vertical, colorless area between.

FAMILY LABRIDAE

WRASSES

Bodianus diplotaenia (Gill)

"WILPET" 1942 MATERIAL: One specimen, 200 mm. standard length, from La Plata Island, Ecuador, where Breder found this wrasse abundant.

Halichoeres sellifer Gilbert

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 275 mm. standard length, from Santa Elena, Ecuador, February 14, 1925, Murphy and Heilner.

Meek and Hildebrand record this wrasse as ranging south to Panama only.

Pseudojulis notospilus Günther

"ASKOY" MATERIAL: One small specimen, 45 mm. standard length (Station 103), from Ensenada Coredó, Colombia, May 19. Found under stones of a pebbly beach, near low-water mark.

Previously known from Mazatlán to Panama.

Thalassoma lucasanum (Gill)

"ASKOY" MATERIAL: One small specimen, 19 mm. standard length, without data (label lost).

The wrasses are a dominant family on most tropical shores (West Indies, Oceania, East Indies), but apparently not so on the west coast of America.

FAMILY CHAETODONTIDAE

BUTTERFLY AND ANGEL FISHES

Holocanthus passer Valenciennes

"WILPET" 1942 MATERIAL: One specimen, 215 mm. standard length, from La Plata Island, Ecuador.

"Common in restricted areas where the coral growth was good" (Breder).

Known from the Galápagos Islands, but we know of no previous record south of Panama on the continental shore.

FAMILY BALISTIDAE

TRIGGER-FISHES

Several trigger-fishes were observed darting about, as if in play, under the bilges of "Askoy," near Station 58, south of Malpelo Island, on March 27, 1941.

Balistes naufragium Jordan and Starks

"CAROLA" MATERIAL: One young, 28 mm. standard length, approximately from 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

Two parasitic copepod crustaceans, one of them with a long tail and eggs, were clinging one to either side of this specimen near the base of its anal fin.

FAMILY MONACANTHIDAE

FILE-FISHES

Large schools of file-fish were observed oscillating in the swell of coves under the steep walls of Malpelo Island, on March 26, 1941.

Alutera scripta (Osbeck)

"CAROLA" MATERIAL: One small specimen, 75 mm. standard length, approximately 180 miles southwest, 5° west, of Cape Mala, Panama, August, 1941; taken at night while surface drifting with a light and net.

FAMILY TETRAODONTIDAE

SWELLFISHES

Spheroides annulatus (Jenyns)

"ASKOY" MATERIAL: Forty-seven specimens, young, 12 to 33 mm. standard length (Station 9), from Isla del Rey, Pearl Islands, Gulf of Panama, February 15, seined along the sandy shore of a cove of Santelmo Bay, close to the mouth of a stream; one of 18 mm. (Station 30), from Ensenada de Guayaibo Chiquito, southern Panama, March 4, dredged from depths between 25 and 64 meters; one of 40 mm. (Station 32), from Aguacate Bay, Colombia, March 6, dredged from a depth of 25 meters.

This last Colombian specimen is aberrant. Its prickles are obsolete, skin everywhere

smooth; the skin folds along the sides of the ventral surface posteriorly, and before the pectorals, are unusually prominent; and there is a row of six or seven rather large dark spots (about one-third the diameter of eye) along the lower side behind the pectoral. Its short, steep snout, large eye, and rather narrow interorbital suggest *S. fürthii* (Steindachner), and the upper corner of its caudal projects somewhat more than usual in *annulatus*, making the posterior margin of that fin slightly concave, though the lower corner is rounded. It has the color pattern of *S. annulatus*, however, dark blotches separated by narrow pale lines which tend to be concentric, and the caudal somewhat dusky on its posterior half. Depth in standard length, 3.8; width, 3.2; head (to upper corner of gill opening), 2.7. Eye in head, 3.4; snout, 2.5; interorbital, 3.5; the bone, 6.8.

There may be an undescribed form here, but in view of the variability of *Spheroides annulatus* it seems unwise to establish such on the basis of a single young specimen.

The Pearl Islands specimens, when expanded, were approximately the size of grapes. Larger puffers were observed in most of the rivers along the coast, but no examples were captured. In the River Limón, Colombia, they were common in rapid fresh water, and in the River Coredó they were noted fully a mile above tide water.

The native name of fishes of this type throughout the Panama Bight is *tambortn* or *tamborero*.

FAMILY DIODONTIDAE

PORCUPINE FISHES

Diodon holacanthus Linnaeus

"ASKOY" MATERIAL: Three specimens, 110, 135, and 240 mm. standard length (Stations 104, 110), from Contadora Island, Pearl Islands, Gulf of Panama, May 24 (the two smaller), and Ensenada de Guayabo Chiquito, southern Panama, May 20 (the largest specimen).

The 135-mm. specimen was captured by a man-o'-war bird near the anchorage and was dropped on the beach. The largest was speared by Armstrong while diving.

Fishes of the genus *Diodon*, cosmopolitan in warm seas, are so variable with size and

otherwise that they have never been satisfactorily differentiated into species or races. Two species, *D. hystrix* Linnaeus and *D. holacanthus*, with equivalent world-wide range, are sometimes recognized, or sometimes *holacanthus* is made a synonym of *hystrix*. We have nothing to contribute to this discussion here, except to note that our three specimens have frontal spines longer than the post-pectoral, the criterion used by Meek and Hildebrand for *D. holacanthus*.

FAMILY MOLIDAE

OCEAN SUNFISHES

Mola mola (Linnaeus)

"WILPET" 1942 DATA: Breder reports this species common about La Plata Island, Ecuador, "several good views of large and intermediate specimens, all upright and swimming normally. Possibly a few, not seen so well, were *Ranzania*."

As the ocean sunfish is not uncommon off California and apparently unrecorded from Panama, it may inhabit the periphery rather than the breadth of the tropical area.

FAMILY SCORPAENIDAE

SCORPION OR ROCK-FISHES

Scorpaena mystes Jordan and Starks

"WILPET" 1942 MATERIAL: One specimen, 205 mm. standard length, from La Plata Island, Ecuador.

Previously known south to Panama.

Scorpaena spp.

UNIDENTIFIABLE YOUNG

"ASKOY" MATERIAL: Three specimens, 16 to 29 mm. standard length (Stations 30, 93), from Ensenada de Guayabo Chiquito, southern Panama, and Cueva Bay, Colombia, March 4 and May 11. Dredged at depths between 10 and 128 meters, from indeterminate, gray sand, and green sand and mud bottoms. These may be *Scorpaena histrio* Jenyns. They are dark in color, the fins especially dark, except the caudal which has basal, central, and subterminal dark bands.

One specimen, 23 mm. standard length (Station 87), from off northwestern Ecuador, latitude 01° 07' N., longitude 79° 53' W., April 17. Dredged from a depth of 10 to 30 meters. This is possibly *Scorpaena russula*

Jordan and Bollman. It is pale in color, the pectoral with two broad dark bands, the lower fins more or less dark; caudal with a basal and broad central band on its lower half. Dorsal spines low, lower than the rays; caudal very obliquely truncate, upper rays shorter.

***Scorpaenodes xyris* (Jordan and Gilbert)**

"ASKOY" MATERIAL: Fifty-eight specimens, 13 to 38 mm. standard length (label lost on 10 specimens; others, Stations 80, 89, 110, 111), from Contadora and Saboga Islands, Pearl Islands, Gulf of Panama, May 25 and 26; Gorgona Island, Colombia, April 22; La Plata Island, Ecuador, April 12. The Pearl and Gorgona Island specimens are from masses of coral, the two from La Plata Island from a source not stated. The majority (37 specimens) are from Saboga at a depth of 4 meters, seven from Gorgona at a depth of 4 to 7 meters, two from Contadora at a depth of 11 meters.

Meek and Hildebrand give the range of this species as from the Pacific coast of Mexico to the Galápagos Islands and Panama. It has been suggested that *Sebastodes chincha* Nichols and Murphy from Peru is the same thing, and this is possible, for *chincha* is definitely a related *Scorpaenodes*, and the differences noticed in comparing the above material with our series of *chincha* are rather intangible, though the latter looks quite different. We have only one specimen of *chincha* (of 37 mm.) which is strictly comparable, the next smallest measuring 56 mm. In *chincha* the back is more elevated, long pectoral rays less exerted, and color less finely and sharply marked; there is a large, oval dusky spot on the gill cover immediately behind the preopercular spines (absent in all the above *xyris*), and dark spots at the upper and lower corners of the caudal base (usually conspicuous in our *xyris*) are lacking.

FAMILY GOBIIDAE

GOBIES

***Bathygobius soporator* (Cuvier and Valenciennes)**

"ASKOY" MATERIAL: Twelve specimens, 42 to 75 mm. standard length (Stations 2, 103, 110), from Saboga and Contadora Islands, Pearl Islands, Gulf of Panama, February 11

and May 24, collected in rock pools; and from Ensenada Coredó, Colombia, May 19, obtained under stones of a pebbly beach, near low-water mark.

The two specimens (of 36 and 53 mm.) from the last-mentioned locality are paler than the others, especially the fins. They have a chain of dark markings along the side, and suggestions of a dark saddle at the spinous dorsal. In all the Pearl Islands specimens the fins are very dark, the body more or less dusky, especially in the larger, so as to obscure similar markings.

"WILPET" 1942 MATERIAL: Fifteen specimens, 22 to 70 mm. standard length, from La Plata Island, Ecuador. Great numbers were present in tide pools, where 13 of these were captured December 9.

The majority, of 44 mm. and over, are very dark in color, paler below but markings faint or wanting. Four smaller specimens are somewhat paler, with dark marks along the side, especially one of 42 mm., which also has the caudal fin sharply barred.

The colors of this goby are changeable in life. There also seems to be geographic variation, and these specimens are quite different from what we are most familiar with in the Florida Keys, Cuba, and Puerto Rico. As Breder has recorded the pattern of this fish on the northwest coast of Florida, it may be somewhat different again, the dorsal saddle more emphasized.

We follow Meek and Hildebrand in synonymizing Pacific *Mapo fuscus*, Evermann and Goldsborough (Taboga Island), which may be, as supposed by the latter authors, the same as *Gobius fuscus* Rüppel (Red Sea), with Atlantic *Gobius soporator* Cuvier and Valenciennes (Martinique). But it is still probable that this abundant circumtropical species is made up of recognizable, if difficult, races. That preserved specimens we have seen from various parts of the Pacific do tend to be darker in color, may justify placing Indo-Pacific material in *Bathygobius fuscus fuscus*, and using *B. f. soporator* for the Atlantic fish only.

***Bollmannia chlamydes* Jordan**

"ASKOY" MATERIAL: Two specimens, 53 and 80 mm. standard length (Station 101),

from Solano Bay, Colombia, May 16; dredged from a black mud bottom in the outer part of the bay at a depth between 40 and 60 meters. Five young, 29 to 42 mm. standard length (Station 32), from Aguacate Bay, Colombia, March 7; dredged in the mouth of the bay, in a depth of 25 meters.

This species was described from off the coast of "Colombia," but what is now Panama, 7° 56' N., in the Gulf of Panama, being the most southerly station. Our material matches more nearly *B. ocellata* Gilbert from the northern part of the Gulf of California, which we assume to be a synonym of *chlamydes*. There is probably considerable sexual, as there certainly is age, variation. The young are much more slender; the fin rays more lengthened and head broader in larger specimens.

For comparison, our 42-mm. fish has depth in standard length, 5.6; longest dorsal spine, 2.5 (reaching to axil of soft dorsal); dorsal soft ray, 4.5; caudal, 3.1. Width of head in its length, 2.

The 53-mm. specimen has depth, 4.7; longest dorsal spine, 2.2 (to axil of soft dorsal); dorsal soft ray, 3.5; caudal, 2.8. Width of head in its length, 2.

That of 80 mm. has depth, 4.1; longest dorsal spine, 1.7 (to beyond base of caudal); dorsal ray, 2.6; caudal, 1.8. Width of head in its length, 1.5.

Evermannia zosterura (Jordan and Gilbert)

"ASKOY" MATERIAL: Seven young, 18 to 23 mm. standard length (Station 103), from Ensenada Coredó, Colombia, May 19. Taken from slender, cylindrical burrows in a sandy beach just above the wash of the surf at half tide.

Previously known from Mazatlán and Panama.

FAMILY MALACANTHIDAE

BLANQUILLOS

Caulolatilus princeps (Jenyns)

"WILPET" 1942 MATERIAL: One specimen, 280 mm. standard length, from La Plata Island, Ecuador, where Breder found this fish abundant.

FAMILY DACTYLOSCOPIDAE

SAND STAR-GAZERS

Dactyloscopus zelotes Jordan and Gilbert

"ASKOY" MATERIAL: Two specimens, 35 and 52 mm. standard length (Station 87), from off northwestern Ecuador, latitude 01° 07' N., longitude 79° 53' W., April 17. Dredged from a hard bottom, with rock and corallines but no coral, in a depth of 10 to 30 meters.

This species was described from Panama and apparently has not since been recorded elsewhere.

FAMILY BATRACHOIDIDAE

TOAD-FISHES

Thalassophryne dowi Jordan and Gilbert

"ASKOY" MATERIAL: Thirteen specimens, 63 to 112 mm. standard length (Station 93), from Cueva Bay, Colombia, May 11. Dredged from gray mud, with included sandstone nodules, off the mouth of the River Jeya, in depths of 10 to 40 meters.

More fluviatile *T. gerringi* Rendahl from the mouth of the San Juan River is quite different. Our specimens do not agree in some respects with *T. dowi* as described by Meek and Hildebrand. Their head is broader, fin rays average fewer. In nine specimens counted, dorsal rays are 28 to 31 (average, 30), anal, 28 to 30 (average, 29). They have characteristic white lateral line and white flecking on the dark of the sides. It is possible that with material for comparison *T. dowi* as here understood could be subdivided.

Porichthys margaritatus (Richardson)

"ASKOY" MATERIAL: Five specimens, 45 to 85 mm. standard length (Stations 19, 30, 32), from Piñas Bay, February 23, and Ensenada de Guayabo Chiquito, March 4, southern Panama; Aguacate Bay, Colombia, March 6. Dredged from bottoms varying from gray sand to green mud, in depths between 25 and 66 meters.

FAMILY BLENNIIDAE

BLENNIES

Enneapterygius carminalis (Jordan and Gilbert)

"ASKOY" MATERIAL: One specimen, 15 mm. standard length (Station 111), from

Saboga Island, Pearl Islands, Gulf of Panama, May 26. Obtained from coral at a depth of 4 meters, with numerous *Scorpaenodes xyris*.

In so far as can be determined from this small fragile specimen, it matches *E. carminalis* (from Mazatlán). Its scales are too large for *E. storeyae* (from Cape San Lucas) and its fin rays too few for *E. corallicola* (from the Galápagos Islands), according to Brock (1940, p. 33).

***Malacoctenus zonifer* (Jordan and Gilbert)**

"ASKOY" MATERIAL: Two specimens, 46 and 51 mm. standard length (Station 103), from Ensenada Coredó, Colombia, May 19. Captured under stones of a pebbly beach, near low-water mark.

Meek and Hildebrand give the range of this species as south only to Panama.

***Starksia cremnobates* (Gilbert)**

"ASKOY" MATERIAL: Twelve specimens, 15 to 30 mm. standard length (Stations 80, 89, 91). Nine are from Gorgona Island, Colombia, April 22, two from La Plata Island, Ecuador, April 13, from masses of coral at depths between 4 and 7 meters. The twelfth (of 21 mm.) was captured with other small fishes, beneath a large jellyfish, between Gorgona Island and the Colombian mainland, at latitude 02° 48' N., longitude 78° 11' W., April 24.

This species was described from the Gulf of California in much deeper water. We count 20 spines, no more in the spinous dorsal, which has no appreciable notch in front, but a strong one behind, and find no filaments on the head or nape of our specimens, except a well-developed filament over one eye of one of those from Ecuador. These discrepancies are not sufficient to separate them from the Gulf of California fish, but comparable series may show them to be different. Their vertical fins are more or less sharply barred with dark.

***Hypsoblennius brevipinnis* (Günther)**

"ASKOY" MATERIAL: Twenty-six specimens, 14 to 19 mm. standard length (Stations 80, 89), from Gorgona Island, Colombia, April 20, and La Plata Island, Ecuador, April 12 or 13.

Twenty-four specimens of 14 to 17 mm. were captured in an abandoned *cayuco* or

dugout canoe, adrift off Gorgona Island. We notice that about half of these are abruptly pale posteriorly, with the characteristic pattern showing only on the head and shoulders. As Breder suggests, this may be because they had been occupying small holes in the wood of the *cayuco*, with only the head and shoulders exposed.

The two La Plata Island specimens of 14 and 19 mm. were from masses of coral at a depth of 6 meters.

Meek and Hildebrand give the range of this species as south only to Panama.

***Rupiscartes atlanticus* (Cuvier and Valenciennes)**

"WILPET" 1942 MATERIAL: One specimen, 50 mm. standard length, from La Plata Island, Ecuador, in a tide pool.

***Acanthemblemaria askoy*, new species**

Figure 5

"ASKOY" MATERIAL: One small specimen, the type, 23 mm. standard length (Station 80), from La Plata Island, Ecuador, April 13. Taken with two other species of small blennies from masses of coral at a depth of 6 meters.

DESCRIPTION OF TYPE: A.M.N.H. No. 15959, collected at La Plata Island, Ecuador, April 13, 1941, by the "Askoy" Expedition.

Length to base of caudal, 23 mm. Depth in this length, 6.5; head, 3.8. Eye in head, 3; snout, 5, maxillary, 1.8; interorbital, 6; depth of head, 1.7; pectoral, 1.5; ventral, 2; caudal, 1.6.

Dorsal and anal rays cannot be counted accurately, on account of the small size and condition of the specimen.

Profile of head rounding down steeply, eye placed high; jaws about equal, mouth large, about horizontal, teeth strong; maxillary to slightly behind posterior margin of eye. A ridge of blunt spines over the eye, fused to a smooth-edged ridge behind and below the eye. The interorbital between the supra-orbital ridges deeply concave with one or more longitudinal series of small spines on each side of its trough. A series of blunt spines crosses the top of snout from its sides, and low spines or warts extend back onto the front part of a triangular bony shelf below the eye. Small, low spines or warts extend across

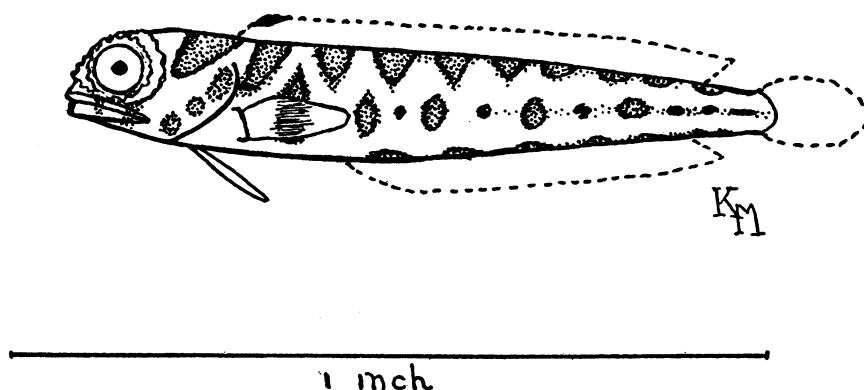


FIG. 5. *Acanthemblemaria askoy*, new species. Type.

the top of the head behind the eye. Dorsal and anal are long, low, free from caudal. Dorsal origin over preopercle; anal origin about under tip of pectoral.

Color pale. A large, slightly darker, darker-edged hourglass-shaped area across the nape extends on the sides of head to about lower level of eye. Of three dark blotches on the gill cover near its margin, the middle one is largest. A dark band across chin. Eight dark blotches crossing the midline of back; the first five saddle-shaped, extending on the side, decreasing in size posteriorly, the sixth oval and the last two linear. A series of eight to ten dark rounded marks on the middle of sides, a larger blotch alternating more or less regularly with a small spot, the blotches decreasing in size posteriorly, the last more linear. A series of seven more or less linear blotches at the anal base. A conspicuous black spot on the front of the dorsal fin.

Recently three or four of the peculiar little blennies which constitute this genus have been described on the West Coast from Mexico to Panama. This young specimen from Ecuador seems sufficiently distinct from any of them, as might be expected. It may be a geographical representative of *H. hancocki*, described from Panama.

FAMILY OPHIDIIDAE

CUSK EELS

Otophidium indefatigabile Jordan
and Bollman

"ASKOY" MATERIAL: Two specimens, 50 and 58 mm. standard length (Station 76),

from 3 miles west of the light on Point Santa Elena, Ecuador, April 10.

Two small, spotted cóngricos, dredged from a sandy bottom at a depth of 41 meters.

This species has been recorded from Panama and the Galápagos.

FAMILY CARAPIDAE

PEARL-FISHES

Carapus dubius (Putnam)

"ASKOY" MATERIAL: Three specimens, one 57 mm., two 96 mm. long (Stations 32, 110). The smaller from Aguacate Bay, Colombia, March 6, from inside a pelecypod mollusk, dredged from a gray sand bottom in the mouth of the bay, at a depth between 24 and 28 meters. The two larger from Contadora Island, Pearl Islands, Gulf of Panama, May 25; taken from a large bivalve (*Pinna*) at a depth of 10 meters.

This pearl-fish is known from Lower California to Panama, but apparently has not previously been recorded from the Pacific coast of Colombia.

FAMILY PLEURONECTIDAE

FLOUNDERS

Platophrys leopardinus (Günther)

"ASKOY" MATERIAL: One specimen, 34 mm. standard length (Station 30), from Ensenada de Guayabo Chiquito, southern Panama, March 4. Dredged from a gray sand bottom at a depth between 25 and 64 meters, with other small flat-fishes.

We identify this specimen with *P. leopardinus* of the Gulf of California advisedly, rather

than with *P. constellatus* known from the Galápagos and Panama. Its profile before the eyes is straight, rendered appreciably concave by the projecting mouth, and we have compared it with small (though somewhat larger) specimens, one of *leopardinus* from Cape San Lucas, collected by the Townsend "Albatross" expedition, and one of *constellatus* from the Galápagos, collected by a Beebe expedition.

***Syacium ovale* (Günther)**

"ASKOY" MATERIAL: Three specimens, 43 to 72 mm. standard length (Stations 8, 30), from Isla del Rey, Pearl Islands, Gulf of Panama, February 14, dredged in Santelmo Bay at a depth of 15 meters; and Ensenada de Guayabo Chiquito, southern Panama, March 4, dredged from a gray sand bottom at a depth between 25 and 64 meters.

There are also seven young flounders, 18 to 27 mm. standard length (Stations 30, 32),

from Ensenada de Guayabo Chiquito, southern Panama, March 4, and Aguacate Bay, Colombia, March 6; dredged from gray sand bottoms at depths between 25 and 128 meters. These we are only able to refer provisionally to this genus and species.

***Citharichthys gilberti* Jenkins
and Evermann**

"ASKOY" MATERIAL: One specimen, 76 mm. standard length (Station 81), from off the River Cojimies, Ecuador, April 14. Dredged from a bottom of shell fragments and gray sand, at a depth of 20 meters, with four examples of *Symphurus atricaudus*.

This flounder is known from Lower California to Peru.

***Etropus crossotus* Jordan and Gilbert**

"ASKOY" MATERIAL: One specimen, 52 mm. standard length (Station 93), from Cueva Bay, Colombia, May 11. Dredged from

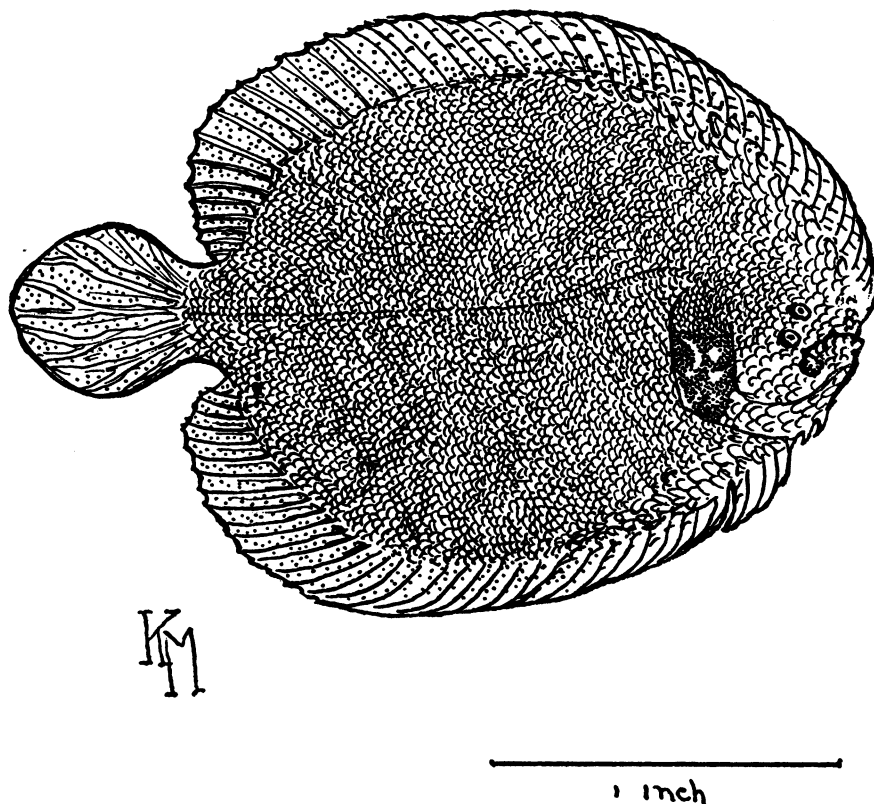


FIG. 6. *Achirus opercularis*, new species. Type.

a green sand and mud bottom at a depth between 10 and 40 meters.

Meek and Hildebrand consider this widely distributed small flounder identical on the Atlantic and Pacific coasts of America. In the Pacific they report it south only to Panama.

FAMILY **SOLEIDAE**

SOLES

Achirus opercularis, new species

Figure 6

"ASKOY" MATERIAL: One specimen, 47 mm. standard length, the type (Station 93), from Cuevita Bay, Colombia, May 11. Dredged from a green sand and mud bottom at a depth between 10 and 40 meters.

DESCRIPTION OF TYPE: A.M.N.H. No. 15958, collected at Cuevita Bay, Colombia, May 11, 1941, by the "Askoy" Expedition.

Length to base of caudal, 47 mm. Depth in this length, 1.5; head, 3.4. Eye in head, 12; snout, 2.8; interorbital, 9, width of body, 2.8; longest dorsal ray, 1.6; anal ray, 1.7; caudal, 1.

Dorsal rays, 48; anal, 34. Scales, about 80.

Body dextral, deep and narrowly compressed, eyes small, the upper slightly the more advanced, cleft of the crooked mouth to under the lower eye. No trace of pectoral fins. Vertical fins high; caudal long and much rounded, its outer rays short; dorsal and anal quite distinct from, but almost in contact with, the caudal. Scales strongly ctenoid, enlarged on the front of the head. A considerable scaleless area occupies the lower part of the opercle on both colored and blind sides. Short, pale filaments on the ventral edge of the head behind the mouth, and smaller ones on the posterior blind-side edge of anterior fin rays; no filaments elsewhere.

Colored side, dorsal and anal, rather dark, uniform brownish gray, made up on the body of faint dense paler freckling with narrow darker interspaces; the caudal somewhat paler in tone than dorsal and anal. The scaleless opercular area, by contrast, with a conspicuous pattern of irregular dark and pale blotches. Blind side white.

Close to *Achirus fimbriatus*, which has at least a very different color pattern.

Achirus klunzingeri (Steindachner)

"ASKOY" MATERIAL: One specimen, 120 mm. standard length (Station 19), from Piñas Bay, southern Panama, February 24. Dredged

from a green sandy mud bottom in the outer part of the bay, at a depth between 15 and 33 meters.

Symphurus atricaudus (Jordan and Gilbert)

"ASKOY" MATERIAL: Five specimens, one of 40 mm. standard length (Station 101), from Solano Bay, Colombia, May 16; dredged in outer part of bay, at a depth between 40 and 60 meters. Four of 61 to 103 mm. (Station 81), from off the River Cojimies, Ecuador, April 14; dredged from a bottom of shell fragments and gray sand, at a depth of 20 meters.

Meek and Hildebrand state that this species is known from San Diego, California, to Panama Bay.

Symphurus williamsi Jordan and Culver

"ASKOY" MATERIAL: Two specimens, 45 and 46 mm. standard length (Stations 19, 32), from Piñas Bay, southern Panama, February 23, and Aguacate Bay, Colombia, March 6; dredged from green mud and gray sand bottoms at depths between 25 and 66 meters.

These specimens match *S. williamsi*, described from Mazatlán, and as described for that species the posterior fins are not dusky. They may, however, be the young of some form which we have not seen.

Symphurus

UNIDENTIFIABLE YOUNG

"ASKOY" MATERIAL: One specimen, 43 mm. standard length (Station 32), from Aguacate Bay, Colombia, March 6, dredged from a gray sand bottom at a depth of 25 meters, is probably *Symphurus elongatus* (Günther). It is appreciably more slender than *S. atricaudus*, the fins posteriorly decidedly blacker than in comparable small specimens of that species.

Two specimens of 30 and 32 mm. standard length (Station 30), from Ensenada de Guayabo Chiquito, southern Panama, March 4, dredged from a gray sand bottom at a depth between 25 and 64 meters, are slender (depth about 4), the posterior part of dorsal and anal alternating black and pale, most of posterior caudal rather abruptly pale. A third more or less larval specimen of 22 mm. taken with these seems to be the same. They are the young of some species we do not know.

FAMILY LOPHIIDAE

ANGLERS

Lophiomus setigerus (Vahl)

"ASKOY" MATERIAL: One specimen, 22 mm. standard length (Station 32), from Aguacate Bay, Colombia, March 7. Dredged from a gray sand and mud bottom at a depth between 24 and 28 meters.

This specimen is too small to show specific characters. Inasmuch as a somewhat larger one of 2½ inches, from off the tropical American coast, has been identified with this oriental species (Jordan and Evermann, 1898, p. 2714), the conservative course is to follow that determination, though it may not be correct.

FAMILY ANTENNARIIDAE

FROG-FISHES

Antennarius tagus Heller and Snodgrass

"ASKOY" MATERIAL: One small specimen, 27 mm. standard length (Station 80), from La Plata Island, Ecuador, April 13. Obtained from coral brought up from a depth of 6 meters.

MATERIAL FROM PREVIOUS EXPEDITIONS: One specimen, 64 mm. standard length, from Point Santa Elena, Ecuador, collected in the spring of 1938 by Mr. Thomas Black of the Anglo-Ecuadorian Oilfields, Guayaquil, and forwarded to Dr. Murphy after his 1937 expedition. It was captured on the piles of a pier.

The species, described from the Galápagos, had not been recorded from the mainland

coast until our earlier specimen was reported in Copeia (1939, p. 48).

Antennarius reticularis Gilbert

"ASKOY" MATERIAL: One specimen, 19 mm. standard length (Station 104), from Ensenada de Guayabo Chiquito, southern Panama, May 20. Obtained from coral brought up from a depth of 9 to 11 meters.

To identify a frog-fish of this size without a graded series for comparison is uncertain at best, but the specimen matches descriptions of *reticularis* from the Gulf of California, rather than other described forms. The first dorsal spine is very slender, appreciably shorter than the second, which is completely free, flexible. The third is adnate, not curved. The body is deep (depth about 1.6), well compressed behind the head; soft dorsal and anal high, with 12 and 7 rays, respectively. The color in preservative is pale, with scarcely appreciable darker marks and cloudings. Pectorals and ventrals have a dusky basal and better-defined black terminal band, the tips of the rays again pale; soft dorsal and anal show traces of similar pattern. The caudal has a narrow blackish hinder edge, with the tips of the rays pale; and a broad central dusky band occupying much of the fin (the band darkening to a blackish blotch at its upper and lower hind corners).

If this is the young of some better known species, such as *A. sanguineus*, *reticularis* is probably a synonym of the latter.

BIBLIOGRAPHY

- BEEBE, WILLIAM
1942. Atlantic and Pacific fishes of the genus *Dixonina*. Zoologica, vol. 27, no. 8, pp. 43-48, pls. 1-2.
- BEAN, T. H.
1895. Description of a new species of fish, *Bleekeria gilli*. Proc. U. S. Natl. Mus. (for the year 1894), vol. 17, pp. 629-630.
- BLOCH, M. E.
1793. Naturgeschichte der ausländischen Fische, Theil 7, die Schwerdtmakrele, pp. 81-85, pl. 345. Berlin.
- BROCK, V. E.
1940. Three new blennoid fishes from the west coast of Mexico. Stanford Ichthyological Bull., vol. 2, no. 1, pp. 29-36.
- BROUSSONET, P. M. A.
1786. Mémoire sur le voilier. Mém. Acad. Roy. Sci., Paris, pp. 450-455, pl. 10.
- BRUNN, A. F.
1935. Flying-fishes (Exocoetidae) of the Atlantic. Systematic and biological studies. Dana Report, no. 6, 108 pp., 30 figs., 7 pls.
- COLNETT, JAMES
1798. A voyage to the South Atlantic and round Cape Horn into the Pacific Ocean. London, 179 pp., pls., charts.
- CUVIER, GEORGES, AND ACHILLE VALENCIENNES
1831. Histoire naturelle des poissons. Paris, vol. 8.
1846. Histoire naturelle des poissons. Paris, vol. 19.
- DAY, FRANCIS
1878-1888. The fishes of India. London, vols. 1 and 2.
- FOWLER, H. W.
1928. The fishes of Oceania. Mem. Bernice P.

- Bishop Mus., Honolulu, vol. 10, iv + 540 pp., figs. 1-80, pls. 1-49.
- GILL, THEODORE
1862. Catalogue of the fishes of Lower California in the Smithsonian Institution, collected by Mr. J. Xantus. Proc. Acad. Nat. Sci. Philadelphia, vol. 14, pp. 140-151.
- HUNT, L. B.
1935. Sailfish. In Connett, E. V. [ed.], American big game fishing. New York, chap. 1, pp. 1-53.
- JORDAN, D. S., AND B. W. EVERMANN
1896-1900. The fishes of North and Middle America. Bull. U. S. Natl. Mus., vol. 47, pts. 1-4, pp. 1-3313, pls. 1-342.
1926. A review of the giant mackerel-like fishes, tunnies, spearfishes and swordfishes. Occas. Papers California Acad. Sci., no. 12, pp. 1-110, pls. 1-20.
- LLOYD, R. E.
1909. A description of the deep-sea fish caught by the R.I.M.S. ship "Investigator" since the year 1900, with supposed evidence of mutation in *Malihopsis*. Mem. Indian Mus., vol. 2, pp. 139-180, pls. 44-50.
- LÜTKEN, C. F.
1880. Bidrag til kundskab om formforandringer hos fiske under deres vaext og udvikling, særligt som nogle af Atlanterhavets Højsøfiske. Dansk. Vid. Selsk. Skr. Kjøbenhavn, ser. 12, vol. 5, pp. 409-613, 25 figs., 5 pls.
- MEEK, S. E., AND S. F. HILDEBRAND
1923-1928. The marine fishes of Panama. Publ. Field Mus. Nat. Hist., zool. ser., vol. 15, pt. 1 (1923), pp. i-xii, 1-330, pls. 1-24; pt. 2 (1925), pp. xiii-xx, 331-708, pls. 25-71; pt. 3 (1928), pp. xxi-xxx, 709-1046, pls. 72-102.
- MERIZALDE DEL CARMEN, BERNARDO
1921. Estudio de la costa Colombiana del Pacífico. Bogotá, 248 pp., illus.
- MOWBRAY, L. L.
1922. Habit note on the snipe eel. Copeia, no. 108, p. 49.
- MURPHY, R. C.
1941. The Askoy expedition of the American Museum of Natural History in the eastern tropical Pacific. Science, vol. 94, pp. 57-58.
1942. Pacific campaign of the schooner *Askoy*—Daríen, Colombia, Ecuador. Trans. Amer. Geophys. Union, pt. 2, pp. 336-338, fig. 1.
1944. To the Chocó in the schooner "Askoy." Nat. Hist., vol. 53, pp. 200-208, illus.
- NICHOLS, J. T.
1911. Notes on teleostean fishes from the eastern United States. Bull. Amer. Mus. Nat. Hist., vol. 30, pp. 275-278, fig. 1, pl. 11.
1918. On *Vomer dorsalis*, with a brief review of the genus. *Ibid.*, vol. 38, pp. 669-676.
1935. Variation in Pacific *Trachurops crumenophthalmus*. Amer. Mus. Novitates, no. 815, pp. 1-6, fig. 1.
1938. Notes on carangin fishes. *Ibid.*, no. 998, pp. 1-6.
1939. A frogfish, *Antennarius tagus* Heller and Snodgrass, from Ecuador. Copeia, no. 1, p. 48.
1942. *Selar* equals *Atule*, a subgenus of *Caranx*. *Ibid.*, no. 4, p. 266.
- NICHOLS, J. T., AND C. M. BREDER, JR.
1928. An annotated list of the Syntognathi—with remarks on their development and relationships—collected by the "Arcturus." Zoologica, vol. 8, no. 7, pp. 423-448, figs. 156-176.
- NICHOLS, J. T., AND F. R. LAMONTE
1941. Differences in marlins based on weights and measurements. Ichthyological Contributions. Internatl. Game Fish Assoc., vol. 1, no. 1, pp. 1-8, figs. 1-3.
- NICHOLS, J. T., AND R. C. MURPHY
1922. On a collection of marine fishes from Peru. Bull. Amer. Mus. Nat. Hist., vol. 46, pp. 501-516, figs. 1-2.
- NORMAN, J. R.
1935. A revision of the lizard-fishes of the genera *Synodus*, *Trachinocephalus* and *Saurida*. Proc. Zool. Soc. London, vol. 1, pp. 99-135, figs. 1-18.
1938. In Norman, J. R., and F. C. Fraser, Giant fishes, whales and dolphins. New York, xxvii + 361 pp., figs. 1-97, pls. 1-8.
- OSBURN, R. C., AND J. T. NICHOLS
1916. Shore fishes collected by the "Albatross" expedition in Lower California with descriptions of new species. Bull. Amer. Mus. Nat. Hist., vol. 35, pp. 139-181, figs. 1-15.
- TESSAN, U. DE
1844. In du Petit-Thouars, Abel, Voyage autour du monde sur la frégate "La Vénus" . . . commandée par Abel du Petit-Thouars. Paris, vol. 5, Physique, 472 pp.
- VALLAUX, CAMILLE
1933. Géographie générale des mers. Paris, 976 pp.
- WEBER, MAX, AND L. F. DE BEAUFORT
1922. The fishes of the Indo-Australian Archipelago. Leiden, vol. 4.

