

Table of proportionate measurements.

Locality.....	Point Reyes, Cal.	
	Inches and 100ths.	100ths of length.
Extreme length.....	7. 60	-----
Length to base of middle caudal rays.....	6. 35	100
Body:		
Greatest height.....		26
Least height of tail.....		7
Length of caudal peduncle.....		15
Preopercular spine.....		4
Head:		
Greatest length to tip of opercular spine.....		41
Distance from snout to nape.....		28
Greatest depth at occiput.....		22
Width of interorbital area.....		7
Length of snout.....		15½
Length of operculum to end of spine.....		14½
Length of maxillary.....		16
Length of mandible.....		20
Occipital process.....		7¼
Diameter of orbit.....		8½
Dorsal:		
Distance from snout.....		36½
Length of base.....		25½
Height at third spine.....		17
(Soft) length of base.....		28
Height at longest ray.....		15
Height at last ray.....		7
Anal:		
Distance from snout.....		62
Length of base.....		26
Height at longest ray.....		11½
Caudal:		
Length of middle rays.....		21
Length of external rays.....		25
Pectoral:		
Upper appendage.....		25
Second appendage.....		21
Third appendage.....		17½
Length.....		47½
Ventral:		
Distance from snout.....		32
Length.....		25
Branchiostegals.....		VII
Dorsal.....		X-12
Anal.....		1-10
Pectoral.....		13-III
Number of scales in lateral line.....		54

SAN FRANCISCO, CAL., November 15, 1880.

THE FRIGATE MACKEREL, *AUXIS ROCHEI*, ON THE NEW ENGLAND COAST.**By G. BROWN GOODE.**

The United States Fish Commission has obtained numerous specimens of a fish before entirely unknown in the Western Atlantic. This is the frigate mackerel, *Auxis Rochei*, twenty-eight barrels of which were taken in a mackerel-seine ten miles east of Block Island, on the 3d of August, by the schooner "American Eagle", Capt. Josiah Chase, of Provincetown, Mass.

The frigate mackerel resembles, in some particulars, the common mackerel; in others, the bonito—the genus *Auxis* being intermediate in

its character between the *Scomber* and the related genera *Pelamys* and *Oreynus*. It has the two dorsal fins remote from each other, as in *Scomber*, and the general form of the body is slender, like that of the mackerel. The body is, however, somewhat stouter, and, instead of being covered with small scales of uniform size, has a corselet of larger scales under and behind the pectoral fins. Instead of the two small keels upon each side of the tail, which are so noticeable in the mackerel, it has the single, more prominent keel of the bonito and the tunny. Its color is grayish blue, something like that of the pollack, the belly being lighter than the back. Under the posterior part of the body, above the lateral line, are a few cloudings or maculations resembling those of the mackerel. The occurrence of a large school of this beautiful species in our waters is very noteworthy, for the fish now for the first time observed are very possibly the precursors of numerous schools yet to follow. It is not many years since the bonito became an inhabitant of our waters, and the distribution and habits of the frigate mackerel are supposed to be very similar to those of the bonito, *Sarda pelamys*, and the little tunny, *Oreynus thynnus*, which also first came on the coast in 1871, and have since been found in considerable numbers.

The frigate mackerel has been observed in the West Indies and other parts of the tropical Atlantic, as well as on the coast of Europe. In Great Britain it is called the "plain bonito". It is not unusual in the Bermudas, where it is called the "frigate mackerel", a name not inappropriate for adoption in this country, since its general appearance is more like that of the mackerel than the bonito, while in swiftness and strength it is more like the larger members of this family.

Since the first appearance of this fish many new observations of its abundance have been received. These fish seem to have come in immense schools into the waters between Montauk Point and George's Bank; and from Mr. Clarke's statements it appears that they have been observed in small numbers by fishermen in previous years. Several vessels have come into Newport recently reporting their presence in immense numbers in the vicinity of Block Island. It will interest the "ichthyophagists" to know that several persons in Newport have tested the fish, and pronounce it inferior to the bonito. Part of the flesh, that on the posterior part of the body, is white, but behind the gills it is black and rank, while the meat near the backbone is said to be of disagreeable, sour flavor.

It is hard to predict what its influence will be upon other fishes already occupying our waters. Its mouth is small and its teeth feeble, so that it is hardly likely to become a ravager, like the bonito and the bluefish. There is little probability, on the other hand, that its advent will be of any special importance from an economical point of view, for its oil does not seem to be very abundant, and it would hardly pay at present to capture it solely for the purpose of using its flesh in the manufacture of fertilizers.

Mr. A. Howard Clarke, in charge of the Fish Commission station at Gloucester, has communicated to Professor Baird some interesting facts regarding its abundance. From these statements it would also appear that the species has been observed occasionally in past years. He writes under date of August 10: "I have received this morning from the schooner 'Fitz J. Babson', just arrived from Block Island, a fish answering to your description of the *Auxis*, having a corselet of scales around the pectoral fin, as in the tunny. The captain of the vessel, Joshua Riggs, reports that about a week ago he had a hundred barrels in the seine at one time, and saw over twenty schools of them. He saw them as far east as Sow-and-Pig Light Ship. They are very easy to catch, flip like menhaden, do not rush, and are not frightened at the seine. They go in immense numbers; he thinks as many as one thousand barrels to a school. The day after the appearance of these fish the mackerel disappeared, but he does not know whether the mackerel were driven away by them or not. They feed on mackerel food. Mr. Daniel Hiltz, of the same vessel, says that he caught one of just the same kind, in February, 1879, on a haddock-trawl on the eastern part of the Middle Bank, in forty fathoms of water. He took it to Boston, where it was called a young bonito.

"Mr. John Henderson, of the schooner 'Sarah C. Wharf', says that two vessels caught such fish recently eastward of here. The schooner 'American Eagle', of Provincetown, took a number of barrels of them into Newport, and sold them for a dollar a barrel. Another Cape Cod vessel—he does not know her name—"took about fifty barrels of them and threw them away. All the mackerel-seiners from Block Island report seeing quantities of this new fish within the past fortnight. The captain of the schooner 'Sarah C. Wharf' says he first saw them a fortnight ago, some fifteen miles off Block Island. The captain and several of the crew of the 'Ella M. Johnson', of Newburyport, just arrived from Block Island, state they saw abundance of the *Auxis*, but did not know what it was until reports came from you at Newport. They opened one and found in its stomach the ordinary red-mackerel food. This crew differ with the crew of the schooner 'Fitz J. Babson', with regard to the ease of capturing them; think them rather difficult to take; say they flip like porgies, and do not rush like mackerel. They saw ten large schools of them on Saturday last, when some fifteen miles south of Block Island."

I hope that any reader of the American Naturalist who has seen this fish will mention it. Some may, perhaps, have an opportunity of studying its habits. The length of those I have seen ranges from 12 to 16 inches, and their weight from three-quarters of a pound to a pound and a half or more. Those sent to New York market were part of the lot taken by the schooner "American Eagle" and brought into Newport, whence they were shipped by Mr. Thompson, a fish-dealer of that place. It would require from eighty to one hundred of them to fill a barrel; so

the estimate of Captain Riggs, that there are a thousand barrels in one of the schools, shows how exceedingly abundant they must be. The name "frigate mackerel", used in Bermuda, would seem to be the best name for use in this country, since the fish resemble the mackerel more than they do the bonito or tunny.

Capt. N. E. Atwood, of Provincetown, Mass., the veteran fisherman-ichthyologist, has examined the specimens, and is satisfied that they belong to the same species with a fish which he found abundant in the Azores in 1840, when, led by the reports of Cape Cod whalers, he went to these islands in search of mackerel, the mackerel-fishing being poor at home. No mackerel were found except the frigate mackerel referred to in this note.

NOTACANTHUS PHASGANORUS, A NEW SPECIES OF NOTACANTHIDÆ FROM THE GRAND BANKS OF NEWFOUNDLAND.

By G. BROWN GOODE.

The United States Fish Commission has received from the schooner "Gatherer," of Gloucester, Captain Briggs Gilpatrick, a remarkable fish taken from the stomach of a ground-shark, *Somniosus brevipinnis*, on the Grand Bank of Newfoundland.

Notacanthus, Bloch.

Notacanthus, BLOCH.

Acanthouotus, BLOCH, Ichthyologia, xii, 1797, p. 113, pl. ccccxxxi. (No description separate from that of species *A. nasus*.)—SCHNEIDER, Bloch, Syst. Ichth. 1801, p. 390, pl. xlvi.

Notacanthus, LACÉPÈDE, Hist. Nat. Poiss. 1804.

Head and body much compressed, the body elongate, produced in a long pointed tail, shaped like that of *Macrurus* or *Fierasfer*. Snout produced, obtuse, rounded at its tip. The cleft of the mouth inferior. (The specimen is mutilated, but the maxillaries do not appear to be protractile. Dorsal fin almost rudimentary, consisting of very short, flexible spines, remote from each other and not connected by a membrane. Anal fin very long; its origin close behind the vent, which is situated nearly midway of the length of the body; its anterior portion is composed of separate flexible spines, without membrane, resembling those of the dorsal; these gradually lengthen, grading into the articulated branched rays. No caudal. Ventrals broad, with broad, peduncle-like bases, closely contiguous, separated only by a slight groove at the base, situated near the vent. Teeth acicular, in single rows upon maxillaries, in a double row upon mandibulars, villiform and in a double row upon the palatines. Vomerine teeth not apparent (?). Scales very numerous, of moderate size, round, thin, flexible. Branchiostegals about 8; gills 4.

Notacanthus phasganorus, new species.

The body is much compressed, its greatest width slightly more than one-third the height of the body at the vent, its width at the tail from