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SYNOPSIS OF BIOLOGICAL DATA ON THE FRIGATE MACKEREL
Auxis thazard (Lacépède) 1802 (WESTERN ATLANTIC)

Exposé synoptique sur la biologie de l'auxide
Auxis thazard (Lacépède) 1802 (Atlantique Ouest)

Sinopsis sobre la biología de la melva
Auxis thazard (Lacépède) 1802 (Atlántico Occidental)

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1 IDENTITY

1.1 Taxonomy

1.1.1 Definition

Phylum Vertebrata
 Subphylum Craniata
 Superclass Gnathostomata
 Series Pisces
 Class Teleostomi
 Subclass Actinopterygii
 Order Perciformes
 Suborder Scombroidei
 Family Scombridae
 Genus Auxis Cuvier and Valenciennes 1831
 Species Auxis thazard (Lacépède) 1802

1.1.2 Description

Genus Auxis

"Body robust, fusiform almost cylindrical in cross section, only slightly compressed. Head large, tapering rapidly to a pointed snout. Mouth moderately oblique, end of maxillary not covered by preorbital. Teeth small, pointed, present on jaws. Occasionally few teeth on vomer, gill rakers close set, long and slender. Lateral line without a distinct arch, slightly curved and with small undulations. Caudal peduncle with small lateral keels. Body scaled anteriorly, forming a corselet. Corselet with a posterior prolongation of scales along lateral line. Fins small, first dorsal fin roughly triangular in shape and not continuous or closely adjoining second dorsal. Second dorsal and anal each followed by eight or seven finlets." (Wade, 1949).

Auxis thazard

"Head 3.8; depth 4.4; eye 6; snout 3.7; mandible 2.2; interorbital 3.2; D. x - 12 - VIII; A. 13 - VII; pectoral 1.8; ventral 2.25; caudal 1.4.

Body elongated, robust, scaleless, save for a corselet of moderate and very small scales about anterior part of trunk and along lateral line; caudal peduncle long and slender, with lateral keel; weak conical teeth in jaws only; first dorsal of flexible spines, the first three elevated, the rest graduated to last, which is very short; soft dorsal and anal small somewhat falcate, followed by detached finlets; caudal widely forked.

Color in spirits: Bluish above very deep purple, almost black, on upper part of head; oblique dark bars and stripes, somewhat as in Scomber, on sides of back; silvery white below; several large, regular, dark blotches, not sharply circumscribed, on the lower part of side of trunk anteriorly; pectoral and ventral purple, black on inner side, on outer side pectoral paler, ventral white." (Evermann and Marsh, 1900).

1.2 Nomenclature

1.2.1 Valid scientific names

Auxis thazard (Lacépède) 1802^{1/}

1.2.2 Synonyms

Scomber rochei Risso, 1810
Scomber bisus Rafinesque, 1810
Thynnus rocheanus Risso, 1826
Auxis vulgaris Cuvier & Valenciennes 1831
Auxis tapeinosoma Bleeker, 1854
Auxis thynnoides Bleeker, 1855
Auxis rochei, Günther, 1860
Auxis thazard, Jordan and Evermann, 1896 (Evermann and Marsh, 1900; Rivas, 1951).

1.2.3 Standard common names and vernacular names

Standard common names

United States	Frigate mackerel
Canada	Frigate mackerel
Brazil	Bonito cachorro
Haiti	Maquereau
Mexico	Bonito
Cuba	Albacora; comevivere
British Guiana	Frigate mackerel

Vernacular names

British Guiana	Blowgoat
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(from Rosa, 1950; Suarez Caabro and Duarte Bello, 1961).

1/ Fitch & Roedel (1962) indicated that the name rochei should be applied to the Atlantic form.

2 DISTRIBUTION

2.1 Delimitation of total area of distribution and ecological characterization of this area

Rivas (1951) says "This cosmopolitan species is very erratic in its occurrence off the western Atlantic coasts. It may not be seen for years and will occasionally appear in large numbers." This is confirmed by Mather & Gibbs (1957) who failed to find any frigate mackerels off Martha's Vineyard in the period 1947-1953 despite extensive fishing, but who caught four specimens in late July and early August 1954 and 1955.

The frigate mackerel occurs from New England to Florida on the east coast of the United States; in the Gulf of Mexico; the Bahama Islands, the Caribbean Sea; to Brazil.

It has been reported in Cuba, Haiti, Puerto Rico, Jamaica, Dominican Republic, Mexico, Trinidad and Tobago, British Guiana and Brazil.

The northernmost record is apparently off Barnstable, Massachusetts in the Gulf of Maine (Mather and Gibbs, 1957).

2.2 Differential distribution

- 2.2.1. Areas occupied by eggs, larvae and other junior stages: annual variations in these patterns, and seasonal variations for stages persisting over two or more seasons. Areas occupied by adult stages: seasonal and annual variations of these

- Juveniles

Juveniles have been reported in the Gulf of Mexico (Klawe and Shimada, 1959) and the Straits of Florida (Klawe, 1961). A juvenile about 10 mm was taken from off the mouth of Delaware Bay by de Sylva and Smith, MS.

2.3 Behaviouristic and ecological determinants of the general limits of distribution and of the variations of these limits and of differential distribution

Off Miami and in the eastern Bahamas Auxis is taken from the stomachs of wahoo, sailfish, white marlin, blue marlin, dolphin and barracuda during the winter and spring. Specimens measuring 29 to 39 cm have been taken from stomachs of these fishes from October through January, and in April and May (de Sylva, unpublished data). Adults have been taken from stomachs of blue marlin taken off Bimini, Bahamas in July (Krumholz and de Sylva, 1958), and off Puerto Rico (Erdman, 1962). As far as is known, none are taken by anglers in the intensive Florida sport fishery. Since fishes which feed on them are not typically surface feeders, frigate mackerel are believed to swim in somewhat deeper water.

3 BIONOMICS AND LIFE HISTORY

3.1 Reproduction

3.1.1 Sexuality (hermaphroditism, heterosexuality, intersexuality)

Heterosexual.

3.1.6 Spawning

3.1.7 Spawning grounds

Klawe and Shimada (1959) report the capture of juveniles of Auxis thazard from a large number of stations spread widely over the Gulf of Mexico, indicating a large area of spawning. Most captures were southeast of the Mississippi delta. This may reflect sampling intensity rather than the distribution of young forms, but apparently the north-central Gulf region is definitely a spawning locality for the species. Young were collected in the Gulf of Mexico in March, April, June, July and August. In the Straits of Florida young of this species were collected in May, June and August (Klawe, 1961).

3.2 Larval history

Klawe and Shimada (1959) examined 533 young frigate mackerels from the Gulf of Mexico, ranging in size from 5.5

to 145 mm. Body shape and separation between the dorsal fins makes the recognition of this species easy. Pigmentation is a useful diagnostic character for fish so small that the fins are undeveloped.

Klawe and Shimada (1959) found gill raker counts falling within those for fish from the Pacific (9-12 + 1 + 30-36 = 40-49) (Godsil, 1954) and from the Mediterranean (total counts 40-45) (Postel, 1956), but no counts for Gulf of Mexico specimens approached the upper limits of gill raker numbers observed in the Pacific mackerel.

3.3 Adult history

3.3.4 Predators

Frigate mackerel have been found in the stomachs of blue marlin, white marlin, sailfish, barracuda, wahoo, and dolphin (de Sylva, unpublished data; Krumholz and de Sylva, 1958; Erdman, 1962).

3.3.6 Greatest size

The largest example seen by the junior author is 39 cm fork length, weighing 2 3/4 pounds, taken from a stomach of a dolphin caught off Miami in January, 1953.

