

A REVIEW OF THE FISHES OF THE FAMILY BATHYCLUPEIDAE*

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ABSTRACT

Presumably the Bathyclupeids branched off from the early Beryciformes to the Perciformes in the Cretaceous. Fossil remains indicate the Bathyclupeids were well established by this period. From their probable origin in the Indian Ocean the path of migration led through the East Indies, across the Pacific and the still open waters of the Isthmus of Panama to the Caribbean and Gulf of Mexico. There has been much debate as to where the Bathyclupeids belong in the family tree of fishes. Alcock (1891), who first described the genus, believed it belonged in the order Isospondylii, family Clupeidae. Goode and Bean (1896), referred the genus to the order Teleocephali (Berycoidei in part) and raised the group to family status, Bathyclupeidae. Norman (1938-44), in his draft analysis considered the Bathyclupeids in the order Perciformes, and Berg (1958), erected the order Bathyclupeiformes. Patterson (1964), placed it with the Perciformes, as have Greenwood, Rosen, Weitzman and Myers (1966). It is now generally accepted that the Bathyclupeids belong in the order Perciformes, sub-order Percoidae, family Bathyclupeidae. The family is limited to one genus with six described species, *Bathyclupea hoskynii* Alcock 1891, Andaman Sea; *B. argentea* Goode and Bean 1896, Caribbean Sea; *B. malayana* Weber 1913, Flores Sea; *B. megaceps* Fowler 1938, Philippines; *B. gracilis* Fowler 1938, Philippines; and *B. schroederi* Dick 1962, Caribbean Sea.

INTRODUCTION

AFTER many years of indecision concerning the status of *Bathyclupea*, it is now generally accepted that Bathyclupeids are Acanthopterygians belonging in the order Perciformes, sub-order Percoidae.

The Ctenothrissiformes, a group, with possible recent exceptions, confined to the Cenomanian and lower Turonian, is often cited as possibly ancestral to the Acanthopterygians. Berg (1940) made the Ctenothrissidae the type of a new sub-order of Clupeiformes, Ctenothrissoidei, and suggested a similarity to *Bathyclupea*, the only member of his order Bathyclupeiformes. Bertin and Arambourg (1958) went further than Berg in extending the relationships of *Bathyclupea* and included the Ctenothrissidae in the order Bathyclupeiformes. A new order, Ctenothrissiformes, was erected (Patterson, 1964) to replace the Bathyclupeiformes. The Ctenothrissids differ strongly from the Bathyclupeids by their lack of fin spines, ventrals with 15 rays, the possession of 2 supramaxillaries, 17 branched caudal rays and 9 branchiostegals. In general body form the two groups superficially agree. The Ctenothrissiformes can be considered a separate branch from the Beryciform line, from which the Perciforms are considered to have been derived. The Beryciform foramen is still found in some primitive Perciformes.

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SYSTEMATIC POSITION OF THE GENUS *Bathyclupea* ALCOCK

Patterson examined the skeleton of *Bathyclupea hoskynii* and agreed that Tate Regan was correct in placing the genus *Bathyclupea* among the Perciformes rather than in any more primitive group. Alcock (1891), who first described the genus, believed it to have internal and external clupeoid characters, although the position of the ventral fins caused him to hesitate in bringing *Bathyclupea* within the physosotomus group. Alcock finally elected to place *Bathyclupea* in the family Clupeidae, believing it to be between the Clupeina and the Dussumieriina. Goode and Bean (1890) following Gill, thought *Bathyclupea* to be more closely related to the Berycidae, on the basis of a belief that a persistent ductus pneumaticus was present, but gave it familial status, Bathyclupeidae. Boulenger (1904) and Weber (1915) thought *Bathyclupea* to be closely related to *Pempheris*, but agreed with Jordan and Evermann in giving it familial status, in the order Berycoidei. Norman (1957) in his draft analysis, placed *Bathyclupea* in the Percoidei. Berg (1958) considered that Bathyclupeids constituted an order, Bathyclupeiformes. Patterson (1964) placed it with the Perciformes, sub-order Percoidei, as have Rosen, Greenwood, Weitzman and Myers (1966) and McAllister (1968).

The sparsity of examples and few species of *Bathyclupea* make any conclusions concerning the dispersal pattern very hazardous. Fossil records indicate that the group was well established by the late Cretaceous, therefore there has been ample time for the diversity of their distribution. The possibility of the movement of the Bathyclupeids to have been from the Indian Ocean eastward is certainly not to be discounted. Dr. H. Barraclough Fell (1968) has cited several examples of Indian Ocean fauna in the Caribbean, both past and present. Four examples of *Bathyclupea hoskynii*, (Fig. 1a) the genotype, were collected by the 'Investigator' in the Andaman Sea at 3302 meters. Silas (1969) has recently recorded this species from the continental slope along the South West Coast of India. Two specimens of *Bathyclupea maylayana* Weber came from the Flores Sea at 694 and 538 meters. *Bathyclupea gracilis* (Fig. 1b) and *Bathyclupea megaceps* Fowler (Fig. 1c) from the Philippines in 512 and 741 meters. In the Caribbean Sea there are at present two known species, *Bathyclupea argentea* Goode and Bean (Fig. 1d) and *Bathyclupea schroederi* Dick (Fig. 1e) from several depths primarily below 400 meters. So far no specimens have been reported from the West Coast of North America although it will not be astonishing if they are eventually found in this area.

SPECIES OF THE GENUS *Bathyclupea* ALCOCK

Bathyclupeidae is limited to one genus and six named species, all from deep water.

The Bathyclupeids are moderately elongate, compressed, the head about 1/3 the total length of the body. The mouth is sub-vertical, oblique, with small villiform teeth on the jaws, palatines and vomer, the vomer extending to or beyond the snout, the lower jaw prominent. The mouth is continued by the broad maxillaries, which have a supplemental bone. The premaxillaries are long, reaching as far back as the supramaxillaries. There are large mucous cavities in the naked head, and the crown is flattish, excavated. The gill membranes are wide, not united and free from the isthmus. There are seven branchiostegals and large pseudobranchiae. The nostrils are small, almost superior and contiguous. Scales are large, cycloid and deciduous except along the nearly straight, distinct lateral line. The short dorsal fin is post

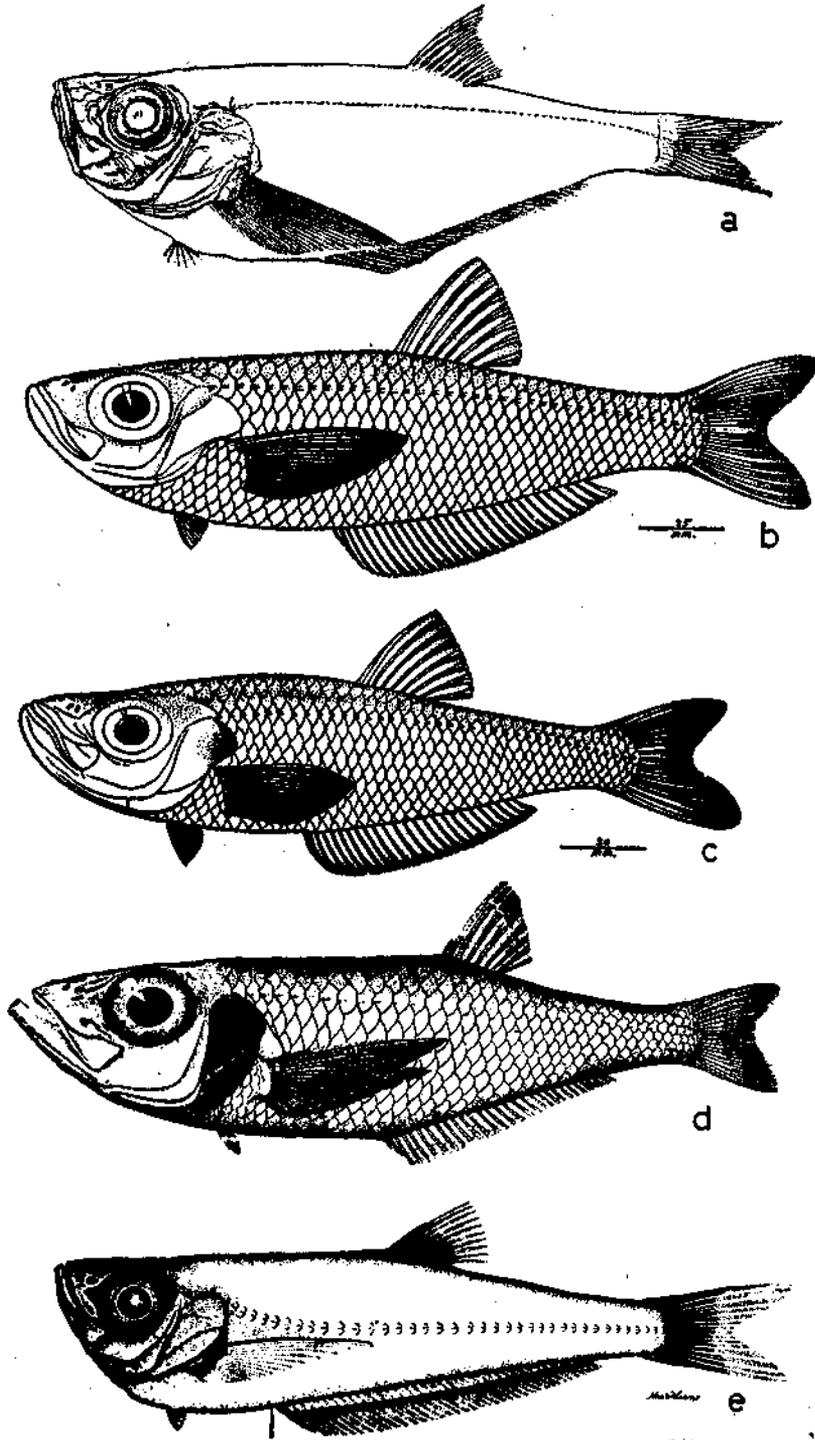


Fig. 1. a. *Bathyclupea hoskynii*, b. *B. gracilis*, c. *B. megaceps*, d. *B. argentea*, and e. *B. schroederi*.

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median, the anal fin is relatively long. The ventral fins are subjugular, small, and the pectorals are large, pointed, with the upper rays longest. The caudal is furcate.

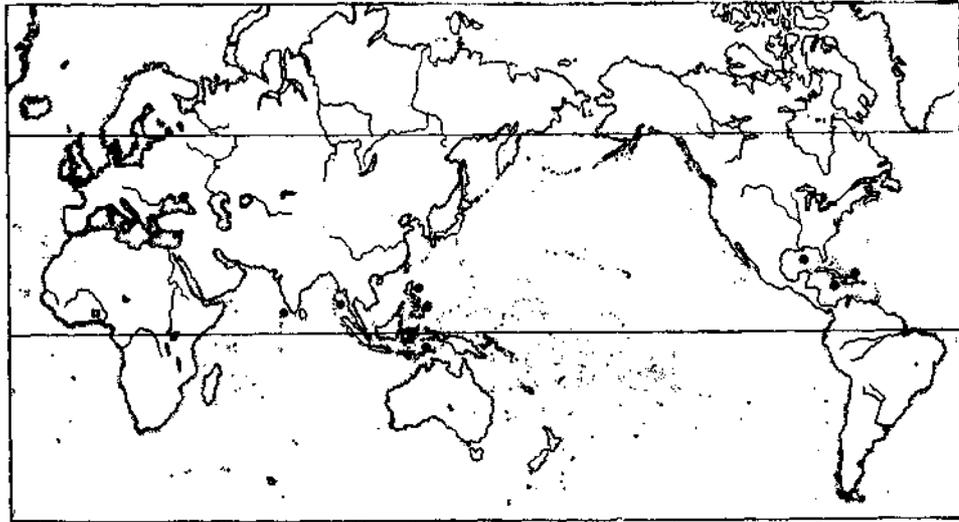


Fig. 2. Distribution (●) of fishes of the genus *Bathyclupea* Alcock.

Contrary to the belief held by previous investigators the author found the ductus pneumaticus to be absent. This has been confirmed by Dr. McAllister (1968) who suggests that the presence of numerous blood vessels in this area may have been the cause of this misconception.

The colour pattern of the bathyclupeids is typically that of pelagic fishes, the dorsal surface dark and the ventral surface silvery.

As the small teeth would indicate this is not apparently a predatory fish, and the stomach contents of those examined in general confirm this as the commonest food present has been penaeid shrimps and other small crustaceans.

The four specimens of *Bathyclupea hoskynii* Alcock measure from 6.5" to 8", one male and 3 females. One specimen has been skeletonized. The soft tissues are fragile and the bone structure quite delicate. The proportionately large head occupies about one-third of the standard length of the body, and is equal to the greatest depth of the body. The eye is one-third the length of the head, and the interorbital space half the diameter of the eye. The small nostrils are almost superior.

The wide mouth is nearly vertical, with the upper jaw having five-sixths of its margin formed by the premaxillae and one-sixth by the maxillae. A mucous channel is beneath the lower jaw. The premaxillae, mandible and palatine have villiform teeth in narrow bands, and there is an inconspicuous V-shaped patch on the vomer. The tongue is large and bilobed.

The gill cleft is wide with the membranes not united. All the opercular bones are well developed. The pseudobranchiae are large. Large cycloid deciduous

scales cover the body and the nape, but the head is naked. The scales on the lateral line have pockets on the inner side that open externally with several small pores.

The dorsal fin commences very nearly midway between the tip of the snout and the tip of the upper lobe of the caudal fin, and is roughly triangular in outline, the length of the base equal to the length of the snout. There is no adipose dorsal. The anal commences slightly in advance of the dorsal and extends very nearly to the base of the forked caudal. The pectorals are large and long, the ventrals rudimentary. At the present time very little is known of the biology of *Bathyclupea* as is unfortunately true of so many of the rather scarce deep water fishes.

The six known species of *Bathyclupea* do not differ radically from *hoskynii*, however, the differences do seem to be sufficient to consider each species valid. *Bathyclupea argentea* Goode and Bean 1896, originally described from a single specimen 13 inches in length, taken off Neirs, West Indies, at a depth of 677 meters. This species has since been collected from several stations in the Caribbean and, recently, in the Gulf of Mexico. So far no immature specimens have been reported, as is true of all the species. *Argentea* differs from *hoskynii* in having the height of the body at the vent less than the length of the head and having the origin of the anal fin in the posterior half of the body.

Bathyclupea maylayana Weber 1913, represented by the two type specimens measuring 240 mm and 230 mm, from the Flores Sea, in depths of 694 and 230 meters. In these the eye is larger than that of *hoskynii*, being $2\frac{1}{2}$ - $2\frac{1}{3}$ in the head length as against 3 in *hoskynii*.

Bathyclupea megaceps Fowler 1938, the type 238 mm, and 2 paratypes from Uigan Bay (Mindanao) Philippines, in 512 and 741 meters. Characterised by a very large head and orbital socket. The advanced position of the anal fin separates it from *hoskynii* and *maylayana*.

Bathyclupea gracilis Fowler 1938. The holotype, 230 mm and 20 paratypes from Makyan Island, Philippines, in 501 meters. This species has a proportionately smaller head than *megaceps*, and a smaller eye. The position of the origin of the anal fin is in the anterior half of the body, which sets it apart from *hoskynii*.

Bathyclupea schroederi Dick 1962, the holotype, 140 mm, from 23° 23' N, 79° 39' W, 512 meters, and 9 paratypes also from the Caribbean. The anal fin has 37-39 rays, a character that separates it from the five previous species which had 33 rays or less in the anal fin. In view of the extensive collecting done during the International Indian Ocean Expedition it is rather perplexing as to why specimens of *Bathyclupea* were not found. This is not an exceptionally rare fish, as is evidenced by the numbers taken in the Caribbean, and the author sincerely hopes that in the not too distant future more of these interesting creatures will be found both in the Indian Ocean and the Pacific.

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