

THE CLUPEOID FISHES DESCRIBED
BY BLOCH AND SCHNEIDER



BY

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By P. J. P. WHITEHEAD

INTRODUCTION

THIS is the fourth in a series of studies (Whitehead, Boeseman & Wheeler, 1966; Whitehead, 1966, 1967) dealing with a fundamental problem in the systematics of clupeoid fishes—the problem of poor original descriptions relating to material that has rarely been re-examined. The clupeoid species described by Bloch and by Schneider are particularly important because they provide some of the oldest names still in use and because the types have not been redescribed in the modern era of clupeoid systematics, that is to say since Regan's pioneering studies of some 40 years ago.

The Bloch & Schneider types have been in the Zoologisches Museum in Berlin for nearly 170 years, but damage during the 1939–45 war and subsequent curatorial difficulties in restoring the large collection to a workable state has led to the loss or misplacement of specimens. Thorough search produced 4 clupeoid types but one could not be found (*Clupea malabaricus*) and a neotype is recommended. Certain other specimens are commented on here since misidentifications have led to errors in the literature.

Marcus Elieser Bloch (1723–99) published about a dozen ichthyological papers, but his major work was a 12-volume compilation entitled *Allgemeine Naturgeschichte der Fische*, 1782–95 (which was made up of the 3 parts of his *Oeconomische Naturgeschichte der Fische Deutschlands*, 1782–85 and the 9 parts of his *Naturgeschichte der ausländischen Fische*, 1783–95; the 432 plates were numbered as a continuous series). A French translation of this work (by Laveau) appeared in 12 parts in 1785–88 and 1797, and a cheap edition by Castell in 10 volumes was published in 1801 in "Suites à Buffon" (volumes 32–41), with Bloch's plates copied and reduced by de Sève.

After Bloch's death, Johann Gottlob Schneider (1750–1822) completed his colleague's work by compiling a synopsis of all described species under the title *M. E. Blochii, . . . Systema Ichthyologiae, iconibus ex illustratum*, published in 1801. In this work Schneider marked with an asterisk those species represented by specimens in the Museum Blochiana. Those not marked were thus unavailable to Bloch and the description either follows earlier authors or must be attributed to Schneider (who often wrote "Schn." after his additions to Bloch descriptions).

Bloch listed 12 species under the Linnaean genus *Clupea* (see Table 1). All but one are clupeoids (8 Clupeidae, 3 Engraulidae but 1 Megalopidae) and three were new species (*C. africana*, *C. nasus* and *C. malabaricus*). In addition to Bloch's 12 species, Schneider listed a further 10 and proposed a new clupeoid genus, *Gnathobolus* (= *Odontognathus* Lacepède). Of Schneider's additional species, 4 are not clupeoids

TABLE I
THE CLUPEOID FISHES OF BLOCH AND SCHNEIDER

Bl. Page and volume number in *Oecon. Nat. Fische Deutsch.* or *Nat. austr. Fische.*
Schn. Page number in *Syst. Ichth. Blochii.*
Plate. Plate numbers in Bloch's works (which were numbered consecutively).
(new names in **bold face**)

A. CLUPEOID SPECIES

	Bl.	Schn.	Plate	Identification
CHIROCENTRIDAE				
1. Clupea dentex Forssk.	—	428	—	<i>Chirocentrus dorab</i> (Forsskål, 1775)
CLUPEIDAE				
2. <i>Clupea harengus</i> L.	I 186	422	29 (1)	<i>Clupea harengus</i> Linnaeus, 1758
3. <i>Clupea sprattus</i> L.	I 206	423	29 (2)	<i>Sprattus sprattus</i> (Linnaeus, 1758)
4. <i>Clupea pilchardus</i>	IX 40	425	406	<i>Sardina pilchardus</i> (Walbaum, 1792)
5. <i>Clupea trissa</i> (i.e. <i>thrissa</i> L.)	IX 35 —	— 424	— 404	Figure = <i>Opisthonema oglinum</i> (Le Sueur, 1817), text composite (see p. 266)
6. <i>Clupea alosa</i> L.	I 209	432	30 (2)	<i>Alosa alosa</i> (Linnaeus, 1758)
7. <i>Clupea sinensis</i> L.	IX 38	424	405	<i>Hilsa kelee</i> (Cuvier, 1829)
8. Clupea africana Bloch	IX 45	425	407	<i>Ilisha africana</i> (Bloch, 1795)
9. Clupea melastoma Schn.	—	427	—	<i>Ilisha melastoma</i> (Schneider, 1801)
10. <i>Gnathobolus [mucronatus]</i> Lac.	—	556	—	<i>Odontognathus mucronatus</i> (Lacepède, 1801)
11. Clupea nasus Bloch	IX 116	426	429 (1)	<i>Nematalosa nasus</i> (Bloch, 1795)
ENGRAULIDAE				
12. <i>Clupea encrasicolus</i> L.	I 212	423	30 (2)	<i>Engraulis encrasicolus</i> (Linnaeus, 1758)
13. <i>Clupea atherinoides</i> L.	IX 46	427	408 (1)	<i>Pterengraulis atherinoides</i> (Linnaeus, 1766)
14. <i>Clupea baelama</i> Forssk.	—	429	—	<i>Thryssa baelama</i> (Forsskål, 1775)
15. Clupea malabaricus Bloch	IX 115	425	432	<i>Thryssa malabarica</i> (Bloch, 1795)
16. Clupea mystax Schn.	—	426	(pl. 83)	<i>Thryssa mystax</i> (Schneider, 1801)
17. <i>Clupea setirostris</i> Brouss.	—	428	—	<i>Thryssa setirostris</i> (Broussonet, 1782)
18. <i>Clupea mystus</i> L.	—	428	—	<i>Coilia mystus</i> (Linnaeus, 1758)

B. NON-CLUPEOID SPECIES

ALBULIDAE				
19. Clupea brasiliensis Marc.	—	427	—	<i>Albula vulpes</i> (Linnaeus, 1758)

	Bl.	Schn.	Plate	Identification
MEGALOPIDAE				
20. <i>Clupea thrissoides</i> Schn.	—	424	—	<i>Megalops cyprinoides</i> (Broussonet 1782)
21. <i>Clupea cyprinoides</i> Brouss.	IX 32	—	403	<i>M. cyprinoides</i>
NOTOPTERIDAE				
22. <i>Clupea synura</i> Schn.	—	426	—	<i>Notopterus notopterus</i> (Pallas, 1769)
DOUBTFUL				
23. <i>Clupea brunnichii</i> Schn.	—	424	—	? (see p. 274)

(Table 1) and of the remainder (1 Chirocentridae, 2 Clupeidae and 4 Engraulidae) 2 were described as new (*C. melastoma* and *C. mystax*).

The older jars in Berlin usually bear small rectangular labels about 50 mm. long. The labels fall into 3 groups whose relative ages can be inferred from instances where a second or third label was pasted over an older one (as in the case of *Clupea melastoma*—see p. 270).

Type a label. Plain white paper, less than 25 mm. broad, without border, writing in flowing script. It is not certain if these date from Bloch (see under *Clupea melastoma*, p. 270).

Type b label. Thicker paper, about 25 × 50 mm., with characteristic printed border of 2 black lines thickened along the lower and right edges of the outer border (and reverse for inner border) to give inset effect. Species name, locality and "Bl." are printed by hand in heavy Gothic script. Register numbers appear to have been added later. The labels are sometimes coloured green, blue, yellow, etc., possibly in accordance with geographical areas.

Type c label. Similar to the above but the outer border thick on all 4 sides and the inner border thin. Information on label in fine flowing script. A label bearing the name *Chatoessus* shows that these were in use after Cuvier's proposal of that name in 1829. Register numbers on these labels appear to be contemporary with the label. The labels are sometimes coloured.

Some of the jars also bear a small, square label (about 10 × 10 mm.) with a number written in heavy strokes as in type *b* labels. The numbers occasionally match the species numbers used by Bloch (or by Schneider) but this appears to be coincidence.

The specimens preserved in alcohol are in good condition although often rather flaccid. The dry specimens, of which many seem to have been lost, are in poor condition. The specimens are listed in a catalogue dated 1860; the entries were probably copied from an older catalogue which no longer exists.

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THE CLUPEOID FISHES OF BLOCH AND SCHNEIDER

CHIROCENTRIDAE

1. *Clupea dentex*= *Chirocentrus dorab* (Forsskål, 1775)*Clupea dorab* Forsskål, 1775, *Descript. Animal.* : xii, 72.*Clupea dentex* Schneider, 1801, *Syst. Ichth. Bloch.* : 428 (Red Sea).

Schneider merely proposed a new name for Forsskål's species.

CLUPEIDAE

2. *Clupea harengus*= *Clupea harengus* Linnaeus, 1758*Clupea harengus* Linnaeus, 1758, *Syst. Nat.*, 10th ed. : 317; Bloch, 1782, *Oecon. Naturg. Fische Deutsch.*, 1 : 186, pl. 29 (1); Schneider, 1801, *Syst. Ichth. Bloch.* : 422.3. *Clupea sprattus*= *Sprattus sprattus* (Linnaeus, 1758)*Clupea sprattus* Linnaeus, 1758, *Syst. Nat.*, 10th edition : 318; Bloch, 1782, *Oecon. Naturg. Fische Deutsch.*, 1 : 206, pl. 29 (2); Schneider, 1801, *Syst. Ichth. Bloch.* : 423.4. *Clupea pilchardus*= *Sardina pilchardus* (Walbaum, 1792)*Clupea pilchardus* Walbaum, 1792, in Artedi, *Gen. Pisc.* : 38; Bloch, 1795, *Naturg. ausl. Fische*, 9 : 40, pl. 406; Schneider, 1801, *Syst. Ichth. Bloch.* : 425.5. *Clupea trissa* (or *thrissa*)

(Pl. 1a)

= *Opisthonema oglinum* (Le Sueur, 1817)[*Halex festucosus*—Plumier MS name on drawing, see below].[*Clupea minor*, radio ultimo pinnae dorsalis longissimo—Brown, 1756, *Civil Nat. Hist. Jamaica* : 443].[*Cailleu-Tassart des Antilles* Duhamel, 1772, *Traité Général Pêches.*, 3 (2) : 548, pl. 31 (3)—on Barbotteau].*Clupea trissa* Bloch, 1795, *Naturg. ausl. Fische*, 9 : 35 (emendation of *thrissa*).*Clupea thrissa* (non Linnaeus, 1758) Bloch, *idem*, 1795, pl. 404; Schneider, 1801, *Syst. Ichth. Bloch.* : 424.*Megalops oglina* Le Sueur, 1817, *J. Acad. nat. Sci. Philad.*, 1 : 359.

Bloch's plate 404 is a copy of a drawing by Father Plumier (see Plate 1b), almost certainly the one entitled *Halex festucosus* now in the Bibliothèque Centrale in Paris (MS. 24, pl. 4). Bloch based his description entirely on the drawing, which shows the Western Atlantic *Opisthonema oglinum*.

The name *thrissa* (*trissa*, *triza*, etc.) stems from the description of a Chinese gizzard shad (i.e. *Clupanodon thrissa*) by Osbeck (1757) which was first published as a valid name by Linnaeus (1758). Unfortunately Linnaeus and many subsequent authors

included the Western Atlantic *Opisthonema* in their descriptions or synonymies of the Chinese *Clupanodon*. Thus Linnaeus (1758) not only made reference to Brown's *Clupea minor* from Jamaica, but also identified a specimen of *Opisthonema oglinum*, sent by Charles Blagden from Carolina, as *Clupea thrissa* (Günther, 1899—specimen in Linnean Society collection, London). Considerable confusion arose because " *thrissa* " was claimed as type of both the Chinese *Clupanodon* of Lacepède and the American *Opisthonema* of Gill, the filamentous last dorsal ray being a feature common to the two genera.

Although Bloch's description of *Clupea trissa* clearly refers to the American *Opisthonema oglinum*, Bloch mentioned the Chinese records of Osbeck and Linnaeus as well as the excellent description and figure of *Clupanodon thrissa* by Broussonet (1782).

6. *Clupea alosa*

= *Alosa alosa* (Linnaeus, 1758)

Clupea alosa Linnaeus, 1758, *Syst. Nat.*, 10th ed. : 318; Bloch, 1782, *Oecon. Naturg. Fische Deutsch.*, 1 : 209, pl. 30 (1); Schneider, 1801, *Syst. Ichth. Bloch.* : 423.

7. *Clupea sinensis*

(Pl. 1c)

= *Hilsa kelee* (Cuvier, 1829)

? *Clupea sinensis* Linnaeus, 1758, *Syst. Nat.*, 10th ed. : 319; Bloch, 1795, *Naturg. ausl. Fische*, 9 : 38, pl. 405; Schneider, 1801, *Syst. Ichth. Bloch.* : 424.

Clupea chinensis Cuvier, 1817, *Règne Animal*, 1st ed. : 174 (on Bloch—omitted from 2nd ed.).

Clupea kelee Cuvier, 1829, *Règne Animal*, 2nd ed., 2 : 320 (on *Keelee* of Russell).

Clupeonia blochii Valenciennes, 1847, *Hist. Nat. Poiss.*, 20 : 353 (on Bloch's *Clupea sinensis*).

SPECIMENS. A skin, right side only, with label on reverse " *Clupea sinensis* ", mounted on stand on base of which is a label (without border) " *Clupea sinensis* Lin. M. Bl. Bl. t. 405 " and a smaller label " 98. " pasted below. The specimen has the catalogue number 21893. It is probably the one sent from Tranquebar by the Rev. John.

Description. The specimen is in poor condition, but the following measurements were possible.

S.L. 161 mm.; tot. l. 205 mm.; body depth 69.3 mm.; head length 51.9 mm.; pectoral length 30.3 mm.; pre-dorsal distance 80.2 mm.; pre-pelvic distance 94.4 mm.

IDENTIFICATION. The notched upper jaw, striated maxilla, presence of frontoparietal striae and deep body identify the fish as *Hilsa kelee* (diagnosis in Whitehead, 1965 : 132). The characteristic black spots along the flanks, retained in some preserved specimens of *H. kelee*, are absent and all black markings appear to be dirt.

The specimen was twice examined by Prof. Peters, first for Günther and then for Day. Day (1878 : 641) believed the specimen to be *Hilsa toli* (Valenciennes), but Günther (1868 : 446) identified it as *Hilsa ilisha* (Ham. Buch.); most of Günther's *ilisha* material was, however, *H. kelee* (Whitehead, 1965 : 145).

There is a second and smaller specimen of *Clupea sinensis* in the collections in Berlin. This fish, 93 mm. S.L. and 125 mm. tot. l., is preserved in alcohol. The jar bears a type *c* label (see Introduction, p. 265) "*Clupea sinensis* Bl.* Indischer Oz. 3846 A $\frac{3}{16}$ l.l. 50/D [?]" and beneath this a type *b* label "*C. sinensis* Lin. 3.4.15 Ind. Oc. 3846 Bl." The significance of the asterisk is not now known.

This juvenile fish has no striae along the maxilla, a barely developed cleithral lobe, few fronto-parietal striae, 18 + 13 scutes, pectoral fin tips just reaching to pelvic base, caudal lobes less than head length, the pseudobranch attenuated and with a groove below it, and an operculum twice as deep as broad. This clearly identifies it as *Hilsa ilisha*.

Bloch (in the Castel edition of 1801) stated that he received *Clupea sinensis* from the Rev. John of Tranquebar under the name *poiken* or *nannalai*, a fact not given in the original edition of 1795 (in which Bloch records Japan and Tranquebar, as well as American coasts, as localities.) Although the juvenile specimen mentioned above bears a type *b* label, it seems unlikely that such a small fish was used for Bloch's figure or description.

Bloch's figure of *Clupea sinensis* (pl. 405) formed the basis for *Clupeonia blochii* Valenciennes. Although the standard length of the larger specimen is 64 mm. shorter than that of the figure, Bloch's drawings were not necessarily life size (the pilchard is 12 inches long, for example) and the present specimen is quite likely model for the drawing and can be considered the type of *Clupeonia blochii*. According to Day (1878), Prof. Peters also believed this fish to have been the basis of the drawing.

Clupea sinensis Linnaeus has been discussed as a possible senior synonym of *Hilsa toli*, but no conclusion was reached (Whitehead, 1965 : 144). The Linnaean species might have been the same as Bloch's (i.e. *Hilsa kelee*) although Hong Kong appears to be at the limit of the range of that species (no record in the literature but four juveniles in British Museum collection). The name *sinensis* suffered various interpretations (e.g. Lacepède's *Clupanodon sinensis*—see Whitehead, 1967 : 57) and was finally abandoned until revived by Fowler (1941 : 631) as a senior synonym of *Hilsa toli*. The type is not in Uppsala (Lönnberg, 1896; Holm, 1957) nor in London (Günther, 1899) and in the absence of better evidence of its identity than the original description, the name *Clupea sinensis* Linnaeus is best rejected as a *nomen dubium*.

8. *Clupea africana*

(Pl. 2a)

= *Ilisha africana* (Bloch, 1795)

Clupea africana Bloch, 1795, *Natwrg. ausl. Fische*, 9 : 45, pl. 407 (Accra; Br. St. 5, D 18, P 16, V 6, A 46); Schneider, 1801, *Syst. Ichth. Bloch.* : 425.

TYPE. A specimen in alcohol in a jar bearing a green type *b* label "*C. africana*. Bl. Aethiop. M. 3874 Bl." to which the name *Pellona Iserti* V. has been added at a later date.

DESCRIPTION. *Holotype*, a fish of 154.2 mm. S.L. (193 mm. tot. l.), in fair condition but snout damaged, belly split below pectoral fin, back damaged behind head and scales shed, ZMB. 3874.

Br. St. 6, Diii 13, P i 12, V i 5 (or i 6), A iii 43, g.r. 23, scutes 26 + 7 (or 8).

In percentages of standard length: body depth 33.1, body width 5.2, head length 26.8; snout length 7.9, eye diameter 8.1, upper jaw length 13.2, lower jaw length 12.5; pectoral fin length 17.8 (damaged, estimated 19.1), pelvic fin length 3.0 (damaged, estimated 3.9), length of anal fin base 41.3; pre-dorsal distance 53.8, pre-pelvic distance 46.0, pre-anal distance 57.8.

Body strongly compressed, its width 5 times in depth, the latter greater than head length; belly keeled, scutes trenchant, especially behind pelvic fins. Snout a little shorter than eye diameter. Lower jaw strongly projecting with 3 (right) and 5 (left) conical teeth on either side of the symphysis. About 10 small teeth on each pre-maxilla. Two supra-maxillae (anterior one missing on right side), the posterior with ventral bulge and tapering posterior tip which just fails to reach tip of maxilla; the latter blunt posteriorly and with a series of fine teeth along ventral margin. No hypo-maxilla present.

Pseudobranch present, exposed, with 18 filaments the longest being $\frac{1}{2}$ eye diameter. Gillrakers moderate, the longest $\frac{1}{2}$ eye diameter, the corresponding gill filaments half that length. Dorsal surface of head with 2 prominent longitudinal ridges on each side, the outer one interrupted behind eye, and a third short ridge above the temporal foramen.

Dorsal fin origin nearer to snout than to caudal base by $\frac{1}{3}$ eye diameter, in advance of vertical from anal origin by $\frac{1}{4}$ eye diameter. Pectoral tips reaching to beyond vertical from pelvic base; base of first ray on a level with lower border of eye. Pelvic base $1\frac{1}{2}$ eye diameters in front of anal origin. The latter equidistant between eye centre and caudal base and below vertical from sixth branched dorsal ray.

COLOUR. Upper $\frac{1}{5}$ of body brown, remainder silvery; no marks on body or fins.

IDENTIFICATION. This is the only member of the *Pristigasterinae* known from West Africa and the long anal fin and projecting lower jaw make it unmistakable. The types of the following nominal species have been examined and found to be conspecific (Whitehead, 1967 : 112).

Pellona gabonica Duméril, 1858

Pristigaster dolloi Boulenger, 1902

Ilisha melanota Derscheid, 1924

TYPE STATUS. The label on the jar (type *b*) suggests that this specimen was from the Museum Blochiana, although Schneider (1801 : 425) did not place an asterisk against it, possibly in error. Again, the locality given (Aethiopian Sea) is curious because Bloch (1795 : 45) specifically states Acara (i.e. Accra). But it seems preferable to regard these as errors and to recognize the specimen as the holotype of *Clupea africana* Bloch.

Valenciennes (1847 : 307) may have based his description of *Pellona iserti* on specimens but this is not clear from the description; there are no such specimens in

Paris (Whitehead, 1967 : 112). He cited Bloch's name and quoted Bloch's meristic figures but proposed a new name because of differences between his material (or drawing or notes by Dr. Isert) and Bloch's figure (profile of the back more convex but belly less so, etc.). Valenciennes' species is clearly the same as Bloch's, and since only a single West African species of *Ilisha* is known, no point would be served in providing a type for *Pellona iserti*.

9. *Clupea melastoma*
= *Ilisha melastoma* (Schneider, 1801)

Clupea melastoma Schneider, 1801, *Syst. Ichth. Bloch.* : 427 (Indian Ocean, near Coromandel; Br. St. 6, D15, P14, V6, A34).

Pellona micropus Valenciennes, 1847, *Hist. Nat. Poiss.*, 20 : 320.

Ilisha brachysoma Bleeker, 1852, *Verh. Bat. Gen.*, 24 : 22.

TYPE. A specimen in alcohol in a jar with a yellow type *c* label "*Pellona melastoma* Bl. Schn. Indisch. Oz 3842 Bloch", beneath which is a type *b* label "*C. melastoma* Bl. S Ind. Oc. Bl.", beneath which is yet a third label (type *a*) "*Clupea melastoma* (Kutta Wai Bl) Bl." A very small square label on the jar is inscribed "10".

DESCRIPTION. *Holotype*, a fish of 118.9 mm. S.L. (154.9 mm. tot. l.), caudal tips complete but tips of pelvics, pectorals and dorsal damaged, as also belly below pectorals, ZMB. 3842.

Br. St. 6, D iv 13 (last ray double), P i 14, V i 5, A ii 35, g.r. 23, scutes 8 [+ 2] 8 + 9.

In percentages of standard length: body depth 37.8, head length 28.2; snout length 6.8, eye diameter 10.0, length of upper jaw 13.6, length of lower jaw 14.0; pectoral fin length 18.7, pelvic fin length (tip broken) 4.9, length of anal base 33.8; pre-dorsal distance 49.2, pre-pelvic distance 48.1, pre-anal distance 65.1.

Body strongly compressed, deeper than head length, belly sharply keeled. Snout a little shorter than eye diameter. Lower jaw strongly projecting, about 5 small conical teeth on either side of symphysis. Small granular teeth present on tongue. Pre-maxilla with a single row of small conical teeth giving way towards the centre of the upper jaw to a row of small papillae. Two supra-maxillae, the anterior 5.7 mm. long with narrow anterior shaft, the posterior with expanded portion 6.3 mm. long, with ventral bulge but tapering posteriorly to reach tip of maxilla (which extends to vertical from anterior margin of pupil); maxilla with minute teeth along lower edge. No hypo-maxilla.

Pseudobranch present, exposed, with 21 filaments the organ about $\frac{1}{2}$ eye diameter in both length and breadth. Dorsal surface of head with a continuous ridge on each side flanked by a second ridge (discontinuous behind eyes) and two smaller ridges on parietal region.

Dorsal origin nearer to snout than to caudal base by $\frac{1}{4}$ eye diameter, behind vertical from pelvic base by $\frac{3}{4}$ eye diameter. Pectoral tips just reaching to pelvic base. The latter slightly nearer to pectoral base than to anal origin; no axillary scale. Anal origin under last dorsal ray.

Scales with 2 (anterior) to 4 (posterior) continuous vertical striae and 6 striae interrupted (anterior) or overlapping (posterior) in front of this; posterior margin of scale slightly crenulated and bearing fine, short horizontal striae.

IDENTIFICATION. Norman (1923), Fowler (1941) and Whitehead, Boeseman & Wheeler (1966 : 92) believed that Schneider's *Clupea melastoma* was a species of *Pellona* (i.e. *Pellona ditchela* Valenciennes), chiefly because of the low anal count (34 *vide* Schneider; 33-37 in *Pellona* and 37-52 in species of *Ilisha*). Schneider's statement that "*marginè ossium maxillarum ensiformium anteriore toto crenulato*" was taken as further evidence for *Pellona* since it suggested the toothed hypomaxilla present in *Pellona* but absent in *Ilisha*. In the list of corrigenda, however, Schneider substituted *labialum* for *maxillarum*, and the resemblance to *Pellona* is further diminished by the higher anal count found in the specimen (37 not 34).

The identity of *Clupea melastoma* is problematical. In the key given by Whitehead *et alii* (1966 : 93) it lies between the deep-bodied *Ilisha brachysoma* (Bleeker) and the more slender *I. megaloptera* (Swainson). So also does the holotype of *Ilisha micropus* (Valenciennes) (Whitehead, 1967 : 116). These 3 nominal species may merely represent growth forms of a single widespread and variable species, in which case Schneider's *Clupea melastoma* should be included.

The name *melastoma* has not been used for over 50 years as a senior synonym and under Rule 23 (b) it should be rejected as a *nomen oblitum*. This is unfortunate because the next oldest name, Swainson's *megaloptera*, lacks a type and the description is poor. Use of the name *melastoma* would not conflict greatly with usage and application will be made to retain it.

10. *Gnathobolus* [*mucronatus*]

(Pl. 2b)

= *Odontognathus mucronatus* (Lacepède, 1800)

Odontognathus mucronatus Lacepède, 1800, *Hist. Nat. Poiss.*, 2 : 220, 221, pl. 7 (2).

Gnathobolus [*mucronatus* inferred] Schneider, 1801, *Syst. Ichth. Bloch.* : 556.

Valenciennes (1848 : 87), in a particularly uncharitable passage, pointed out that had Lacepède not been so dominated by his own ideas of systematics and had he consulted his material instead of following Gmelin, he would have discovered that the curious toothed "horns" curving forward on either side of the mouth of his *Odontognathus mucronatus* were nothing else but the maxillae bent forwards. Schneider (1801), with only Lacepède's description and bizarre figure by de Sève (see Pl. 2b), recognized the "horns" as pieces of the upper jaw and proposed what he felt to be a more appropriate name (*Gnathobolus*). Cuvier (1829 : 321) acknowledged that the jaw position was an artifact, but continued to use the name *Gnathobolus*, as also did Valenciennes (*loc. cit.*).

II. *Clupea nasus*

(Pl. 2c)

= *Nematalosa nasus* (Bloch, 1795)

Clupea nasus Bloch, 1795, *Naturlg. ausl. Fische*, 9 : 116, pl. 429 (1) (Tranquebar; Br. St. 4, D 16, P 13, V 6, A 20); Schneider, 1801, *Syst. Ichth. Bloch.* : 426.

TYPE. A specimen in alcohol in a jar with a type *c* label "*Chatoessus nasus* Bl. Indisch. Oc. 3898 Bloch." and a small square label "12".

DESCRIPTION. *Holotype*, a fish of 110.0 mm. S.L. (147.1 mm. tot. l.), in fair condition, pelvic tips broken and tenth post-pelvic scute damaged, ZMB. 3898. Probably sent by the Rev. John of Tranquebar.

Br. St. 6, D iv 14, P i 15, V i 7, A iii 20, g.r. (numerous), scutes 17 + 12.

In percentages of standard length: body depth 38.3, head length 26.8; snout length 6.3, eye diameter 8.0, upper jaw length 8.3, lower jaw length 9.7; pectoral fin length 22.4, pelvic fin length 10.3 (damaged, 10.9 estimated), dorsal filament length 36.6, length of anal base 22.1; pre-dorsal distance 46.4, pre-pelvic distance 46.6, pre-anal distance 72.0.

Body compressed, belly keeled, especially behind pelvic base, body depth greater than head length. Snout shorter than eye diameter. Lower jaw inferior, edge of dentary flared outwards. Upper jaw short, maxilla reaching to vertical from anterior pupil border, hind end of maxilla rounded; a single (posterior) supra-maxilla with short anterior shaft, curving downwards posteriorly. No teeth in jaws.

Pseudobranch present, exposed, with 22 filaments, the base of the organ ridged with a small groove below. Gillrakers fine, short, about $\frac{1}{2}$ diameter of pupil, corresponding gill filaments twice as long, the anterior and posterior hemibranchs equal. Cleithral lobe present but small. Lower edge of second suborbital in contact with upper margin of pre-operculum and reaching forward to articulation of lower jaw before rising at an angle of about 20° to the vertical to reach a point beneath the anterior pupil border.

Dorsal fin with last ray filamentous, its length almost equal to body depth, dorsal origin nearer to snout than to caudal base by $1\frac{3}{4}$ eye diameter and before vertical from pelvic base by $\frac{1}{3}$ eye diameter. Pectoral tips just reaching beyond pelvic base. Pelvic base below 2nd unbranched dorsal ray, nearer to pectoral base than to anal origin by $\frac{2}{3}$ eye diameter. Anal origin nearer to pelvic base than to caudal base by $\frac{3}{4}$ eye diameter.

Scales (about 45 in lateral series) with one continuous and 0 (anterior) to 3 (posterior) interrupted striae, the scale border slightly crenulated and bearing short horizontal striae.

IDENTIFICATION. *Nematalosa nasus* is distinguished from other members of this genus by the shape of the second suborbital (Whitehead, 1962). In other species the lower edge of this bone does not reach forward as far as the lower jaw articulation before rising at an angle of 45°, leaving an exposed trapezoidal space on the cheek (Text-fig. 1a). In *N. nasus* the lower edge of the 2nd suborbital reaches the lower

jaw articulation and then rises quite steeply (20° in the type, but often almost vertical), leaving little of the cheek exposed (Text-fig. 1b). The species is otherwise very similar to *N. come* (Richardson).

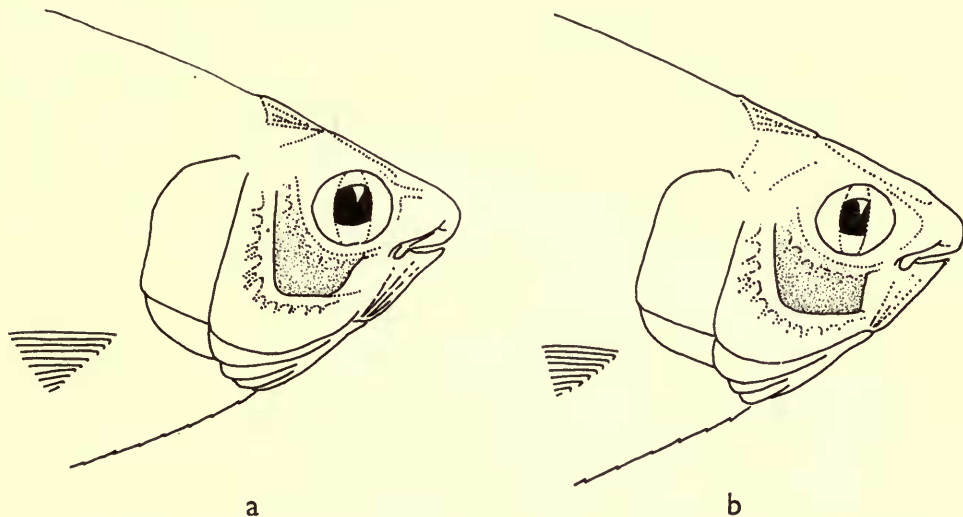


FIG. 1. Shape of 2nd sub-orbital (stippled) in species of *Nematalosa*. a. *Nematalosa come*, 128 mm. S.L., BMNH. 1844.2.21.69. b. *Nematalosa nasus*, 135 mm. S.L., BMNH. 1881.2.7.1880.

ENGRAULIDAE

12. *Clupea encrasicolus*

= *Engraulis encrasicolus* (Linnaeus, 1758)

Clupea encrasicolus Linnaeus, 1758, *Syst. Nat.*, 10th ed. : 318; Bloch, 1782, *Oeconom. Naturg. Fische Deutsch.*, 1 : 212, pl. 30 (2).

Clupea encrasicolus : Schneider, 1801, *Syst. Ichth. Bloch.* : 423.

Variations in the spelling of the species name still persist. Linnaeus (1735) first used *encrasicolus*, but the spelling in the 10th edition is definitive.

13. *Clupea atherinoides*

(Pl. 3a)

= *Pterengraulis atherinoides* (Linnaeus, 1766)

Clupea atherinoides Linnaeus, 1766, *Syst. Nat.*, 12th ed. : 523 (Surinam); Bloch, 1795, *Naturg. ausl. Fische*, 9 : 46, pl. 408 (1) (Surinam; Br. St. 12, D 11, P 14, V 8, A 35); Schneider, 1801, *Syst. Ichth. Bloch.* : 427.

SPECIMEN. A specimen in alcohol, 141.1 mm. S.L. (174.5 mm. tot. l.), in a jar bearing a green label "*Engraulis atherinoides* L. Surinam 3838 Bloch". The fish is in fair condition, rather soft, the silver lateral stripe visible but the body darkened and the scales black.

IDENTIFICATION. The specimen is clearly the South American *P. atherinoides* as described and figured by Hildebrand (1964); Bloch's description and figure may well have been based on the present specimen. Bloch, however, believed the Mediterranean *Clupea maxilla superiore longiore, fascia laterali argentea* of Brunnich (1768 : 1801) to be this species and also identified a Tranquebar specimen as *Clupea atherinoides*. The latter was most likely *Stolephorus indicus* (van Hasselt), while the former resembles *Engraulis encrasicolus* (the only Mediterranean anchovy species) except in its high anal count of 24 (about 17-19 in *E. encrasicolus*, including the three small unbranched rays) and low branchiostegal count (8, cf. 12). For this Brunnich species Schneider (1801 : 424) proposed the name *Clupea brunnichii*, but it cannot be positively identified with any known Adriatic clupeid (*Alosa*, *Sprattus*, *Sardina* and *Sardinella* have rather short maxillae quite unlike *Engraulis*, while an anal count of 24 would be exceptional even in *Alosa*).

14. *Clupea baelama*

= *Thrissina baelama* (Forsskål, 1775)

Clupea baelama Forsskål, 1775, *Descript. Animal.* : 72 (Djidda); Schneider, 1801, *Syst. Ichth. Bloch.* : 429.

Bloch ignored this Forsskål species although he was well aware of Forsskål's work.

15. *Clupea malabaricus*

(Pl. 3b)

= *Thryssa malabarica* (Bloch, 1795)

Clupea malabaricus Bloch, 1795, *Naturg. ausl. Fische*, 9 : 115, pl. 432 (Tranquebar; Br. St. 8, D 8, P 14, V 7, A 38); Schneider, 1801, *Syst. Ichth. Bloch.* : 425.

TYPE. Despite intensive search, no Bloch specimen of this species could be found, either in alcohol or in the dry collection. The genus *Thryssa* requires revision and the provision of types for those nominal species that have hitherto been known only by poor original descriptions would help to remove a great deal of existing confusion. A specimen has, therefore, been chosen which can stand as putative neotype pending a full revision.

DESCRIPTION. *Putative neotype*, a ripe female of 158.2 mm. S.L. (197 mm. tot. l.) in good condition except belly slit on left side, *ex* Madras (Day collection), BMNH. 1868.10.25.27.

Br. St. 12, D I iii 11, P i 12, V i 6, A iii 36, g.r. 14 + 17, scutes 15 + 9.

In percentages of standard length: body depth 36.5, width of body 10.0, head length 24.9; snout length 5.1, eye diameter 6.0, length of upper jaw 24.7, length of lower jaw 17.6; dorsal fin height 21.3, pectoral fin length 18.8, pelvic fin length 9.2, height of anal fin (greatest) 12.2, length of anal fin base 33.0; pre-dorsal distance 51.7, pre-pelvic distance 43.9, pre-anal distance 65.8; depth of caudal peduncle 10.7.

Body compressed, its width 3.6 times in its depth, head length less than body depth. Snout a little smaller than eye diameter. Mouth at an angle of about 15°

to the horizontal. Lower jaw with a single series of close-set teeth. Upper jaw with a single series of small teeth along entire edge; maxilla reaching gill opening and projecting 0.9 mm. beyond (10.3 mm. behind end of posterior supra-maxilla); the latter with slender anterior shaft expanding posteriorly to form a rounded ventral lobe 3.1 mm. long; anterior supra-maxilla round, minute (1.15 mm. long) (Text-fig. 2).

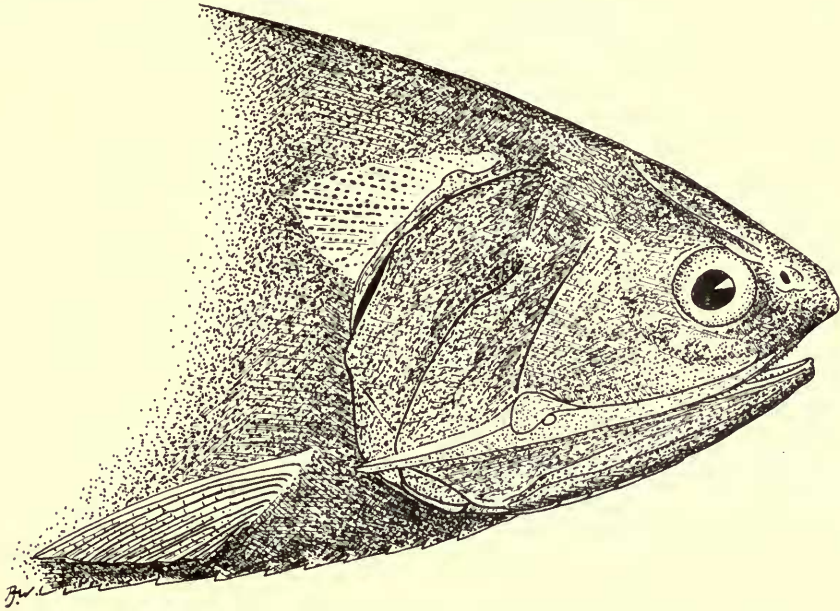


FIG. 2. *Thyrysa malabarica*, 158.2 mm. S.L., putative neotype, BMNH. 1868.10.25.27.
Maxilla extends 0.9 mm. beyond gill opening.

Pseudobranch present, concealed. Gillrakers short, the longest just over eye diameter, the corresponding gill filaments a little shorter (5.3 mm.); gillraker serrae not clumped; 6 short gillrakers present on posterior face of 3rd epibranchial. Vomer with two clumps of teeth (left 1, right 3); a line of granular teeth on edges of palatine and endo-pterygoid and patch of granular teeth on ecto-pterygoid. Sterno-hyoideus muscle reaching forward to beyond hind border of branchiostegal membrane. Posterior frontal fontanelles present, triangular. Venulose flap of skin behind operculum bearing about sixteen horizontal rows of dark brown dots.

Dorsal preceded by scute-like plate bearing a small spine, base of fin invested in low scaly sheath; dorsal origin about equidistant between snout and caudal base and above vertical from pelvic tips. Pectoral tips reaching to pelvic base; axillary scale present, just over $\frac{1}{2}$ length of fin. Pelvic base nearer to pectoral base than to anal origin by just over 1 pupil diameter; axillary scale present, a little more than half length of fin. Anal origin $\frac{3}{4}$ pupil diameter behind vertical from last dorsal ray, nearer to caudal base than to pectoral base by $\frac{3}{4}$ pupil diameter; fin covered to half its height by scaly sheath.

Scales with exposed portion bearing reticulated striae; unexposed portion with up to 8 vertical striae, the anterior striae becoming interrupted in the centre of the scale in the more posterior scales.

COLOUR. Upper $\frac{1}{3}$ of body brown, remainder silver, fins yellowish. Dark brown speckled pigmentation on pectoral fins, maxilla (except second supra-maxilla, which shows up white), margin of anal fin and venulose humeral region (a similar but much more intense pattern of pigmentation was described for Arabian Sea specimens (Whitehead, 1968) but in addition to the areas mentioned the dark pigments also occurred on the last unbranched dorsal and anal rays and on the margins of these fins and also on the caudal margin).

IDENTIFICATION. The most recent key to the species of *Thryssa* (Whitehead, 1968) makes a major separation of species on the length of the maxilla, i.e. reaching to gill opening, to just beyond, to pectoral base, to pectoral tip or beyond. But species with a short maxilla failing to reach the pectoral base may yet prove to be mere ontogenetic forms of the long maxilla group (see below under *Clupea mystax*). For *Clupea malabaricus*, Bloch's figure shows the maxilla just reaching the gill opening (see Pl. 3b) whereas in the specimen selected here the maxilla projects 0.9 mm. beyond. The difference is small and in fact is very much less than is found between individuals of other species (e.g. *T. dussumieri* and *T. vitrirostris*—Whitehead, 1968). Closely related to *T. malabarica* is *T. kempii* (Chaudhuri) of Lake Chilka in which the maxilla projects beyond the gill opening and about half-way to the pectoral base (photograph of holotype No. F. 8782/1 in the collection of the Zoological Survey of India kindly sent by Mr. M. Babu Rao). This species may prove to be *T. malabarica*.

16. *Clupea mystax*

(Pl. 3c)

= *Thryssa mystax* (Schneider, 1801)

Clupea mystax Schneider, 1801, *Syst. Ichth. Bloch.* : 426, pl. 83 (Malabar: Br. St. 5, D14, P14, V5, A34—the Br. St. clearly an error, as also the pelvic count).

TYPE. A fish preserved in alcohol in a jar bearing a type *b* label "C. mystus Lin. Ind. Oc. 3884 Bl." and a small square label "16", matching an entry in the register "Engraulis mystus L. Ind. Ocean Bloch." Schneider (1801 : 426) did not indicate a Bloch specimen (by means of an asterisk) for this species although one is noted for *Clupea mystus* (a Linnaean species of *Coilia*—see Whitehead, 1967 : 141). The present specimen so closely matches Schneider's figure, however, that it must be presumed the type.

DESCRIPTION. *Holotype*, a fish of 134.7 mm. S.L. (160.7 mm. tot. l. but caudal tips damaged, estimated ca. 165 mm.), in poor condition, especially broken caudal tips, belly (split behind pectoral), right maxilla (tip loose) and loss of scales, *ex* Malabar, ZMB. 3884.

Br. St. 13, D I iii 12, P i 12, V i 6, A iii 33, g.r. 11 + 14, scutes 17 + 10.

In percentages of standard length: body depth 26.4, width of body 8.1, head length 25.7; snout length 4.9, eye diameter 5.9, length of upper jaw 30.4, length of lower jaw 19.6; length of pectoral fin 17.7, length of pelvic fin 8.8, length of anal base 30.2; pre-dorsal distance 53.0, pre-pectoral distance 27.2, pre-pelvic distance 41.8, pre-anal distance 63.4.

Body compressed, its width $3\frac{1}{3}$ times in its depth, belly sharply keeled, head length about equal to depth. Snout a little shorter than eye diameter. Lower jaw inferior, with a single series of fine conical teeth. Mouth slightly oblique, set at $15-20^\circ$ from the horizontal. Upper jaw long and entirely toothed, maxilla projecting 3.7 mm. beyond pectoral base and 14.9 mm. beyond second supra-maxilla; the latter with slender anterior shaft followed by an expanded portion 2.8 mm. long and about as deep; anterior supra-maxilla present, 1 mm. long.

Pseudobranch present, concealed. Gillrakers short, the longest $\frac{2}{3}$ eye diameter, the corresponding gill filaments $\frac{1}{2}$ eye diameter; gillraker serrae not clumped; 7 small gillrakers on posterior face of 3rd epibranchial. Sterno-hyoideus muscle reaching forward to beyond hind border of branchiostegal membrane. Posterior frontal fontanelles present, triangular, 3.2 mm. long.

Dorsal preceded by small scute-like plate bearing a spine, base of fin invested in low scaly sheath; dorsal origin nearer to snout than to caudal base by $\frac{1}{2}$ eye diameter, behind vertical from pelvic base by $1\frac{3}{4}$ eye diameters. Pectoral tip projecting 3.8 mm. beyond pelvic base; axillary scale present, half length of fin. Pelvic base nearer to pectoral base than to anal origin by $1\frac{3}{4}$ eye diameters; axillary scale present, almost equal to fin length. Anal origin nearer to pectoral base than to caudal base by $\frac{1}{4}$ eye diameter; base of fin invested in low scaly sheath.

Scales with unexposed portion bearing 1 large and about 6 finer and more irregular striae the most anterior of which sometimes fail to meet in the centre of the scale; exposed portion becoming reticulated posteriorly.

IDENTIFICATION. According to the most recent key (Whitehead, 1968), *Thryssa mystax* most closely resembles *T. purava* (Ham. Buch.) but differs in having a lower anal count (35-41; cf. 43-49), a higher number of pre-pelvic scutes (17-19; cf. 14-17) and a less oblique mouth. Schneider's description is poor, but his figure (shown here, Pl. 3c) is adequate except that the maxilla is shown projecting too far beyond the pectoral base, the anal base is slightly too long and the origins of the dorsal, pelvic and anal fins are too advanced.

Elsewhere (Whitehead, 1966 : 43) it was suggested that maxilla length may vary with size of fish and that larger fishes with shorter maxillae (*C. hamiltonii* of authors) may be *C. mystax*.

17. *Clupea setirostris*

= *Thryssa setirostris* (Broussonet, 1782)

Clupea setirostris Broussonet, 1782, *Ichthyologia*, 1 : no pagination (Tanna I., Pacific).

Clupea setirostris: Schneider, 1801, *Syst. Ichth. Bloch.* : 428.

This Broussonet species is not mentioned by Bloch, but Schneider cited the original description and quoted the then MS name of J. R. Forster, *Clupea mystacina*

(published some 40 years after Forster's death by Lichtenstein, 1844). The very long maxilla in this species, to beyond pelvic base, makes *T. setirostris* unmistakable.

18. *Clupea mystus*

= *Coilia mystus* (Linnaeus, 1758)

Clupea mystus Linnaeus, 1758, *Syst. Nat.*, 10th ed. : 319; Schneider, 1801, *Syst. Ichth. Bloch.* : 428.

This was another species not included by Bloch. The synonymy of *C. mystus* has been discussed recently (Whitehead, 1967 : 149).

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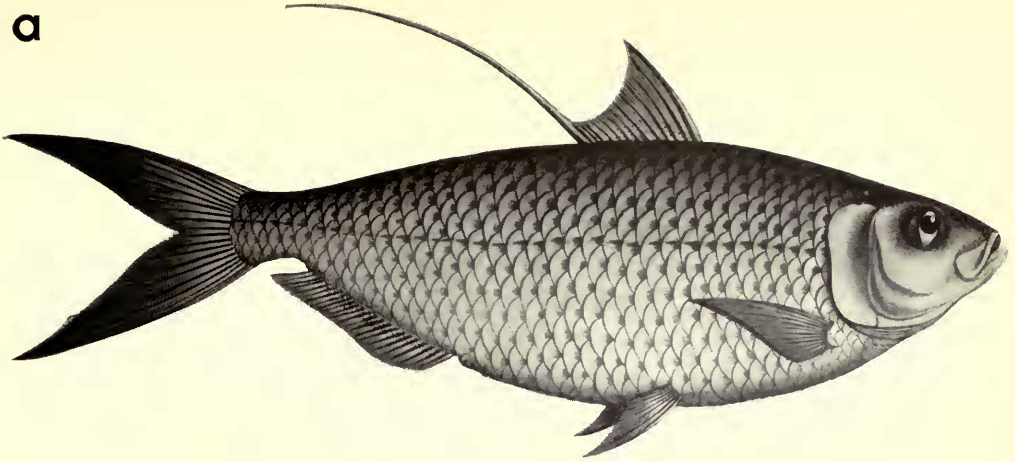
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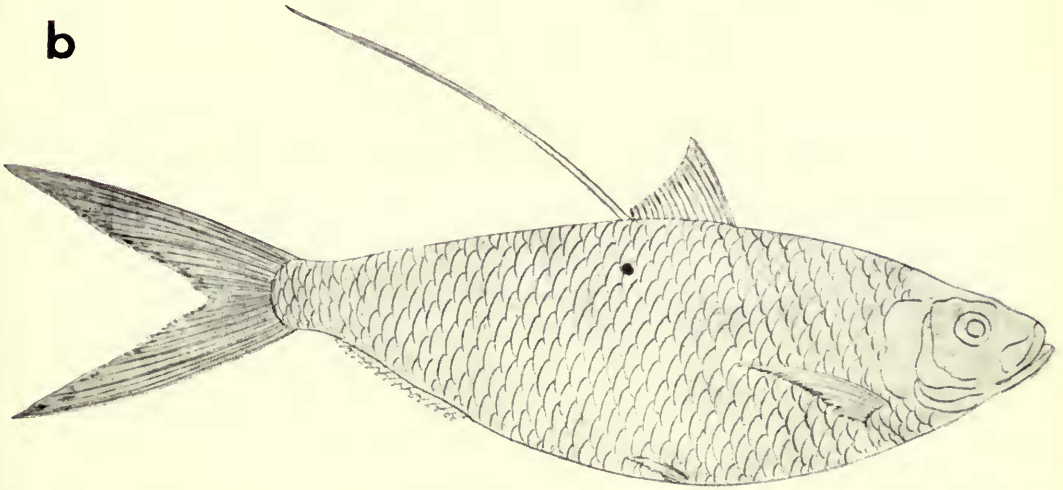
PLATE I

- a. *Clupea thrissa* from Bloch, pl. 404 (= *Opisthonema oglinum*—see p. 266).
- b. "Halex festucosus". Plumier drawing on which the Bloch figure was based—see p. 266 (= *Opisthonema oglinum*).
- c. *Clupea sinensis* from Bloch, pl. 405 (= *Hilsa kelee*—see p. 267).

a



b



c

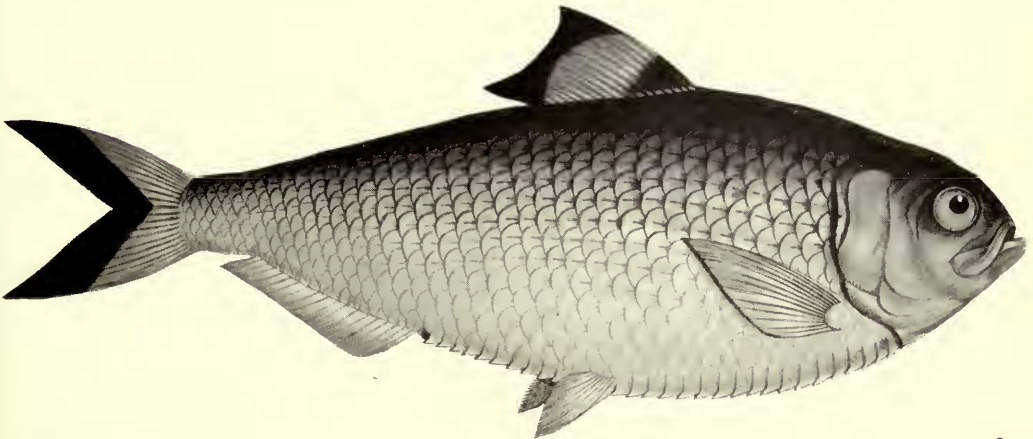
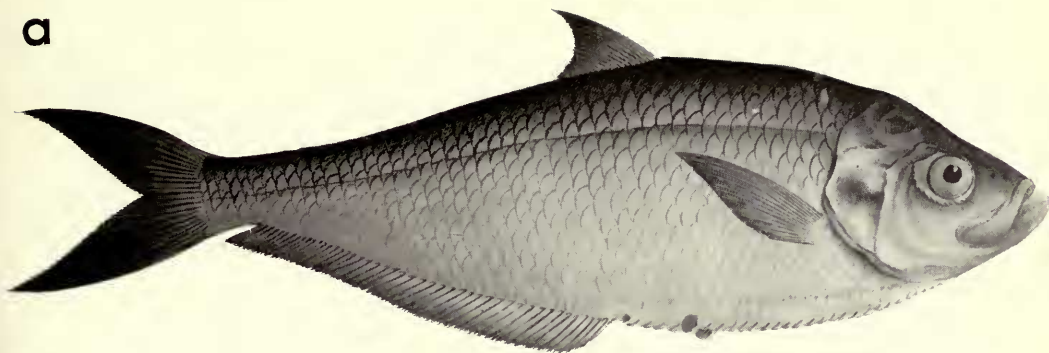


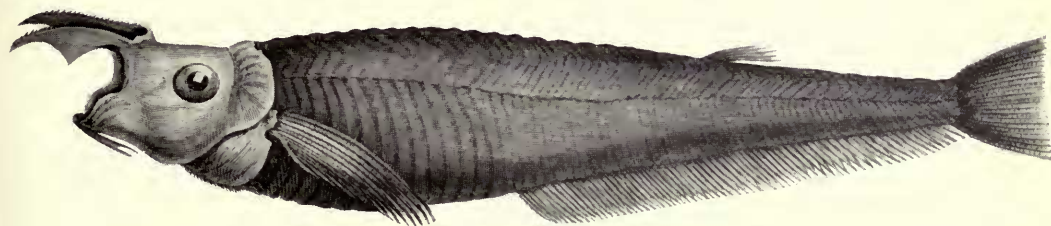
PLATE 2

- a. *Clupea africana* from Bloch, pl. 407 (= *Ilisha africana*—see p. 268).
- b. “*Odontognathe aiguillonne*” from Lacepède, vol. 2, pl. 7 (2), opp. p. 182 (= *Odontognathus mucronatus*—see p. 271).
- c. *Clupea nasus* from Bloch, pl. 429 (= *Nematalosa nasus*—see p. 272).

a



b



c

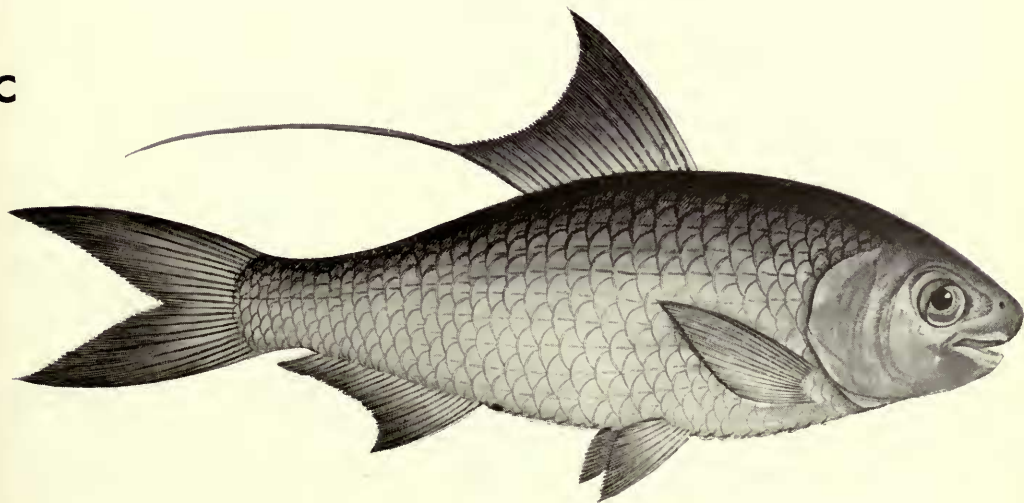
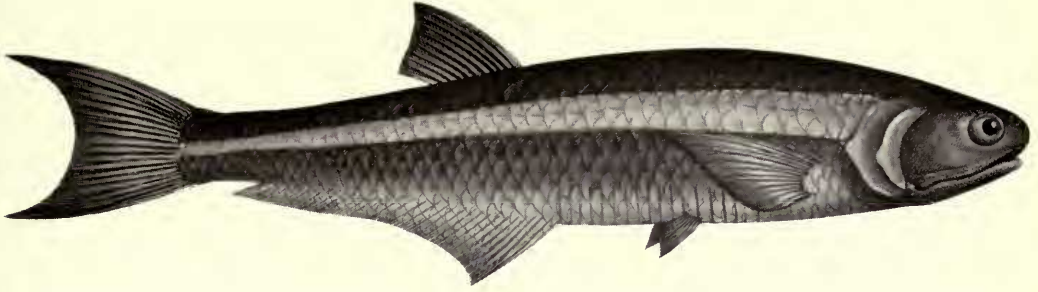


PLATE 3

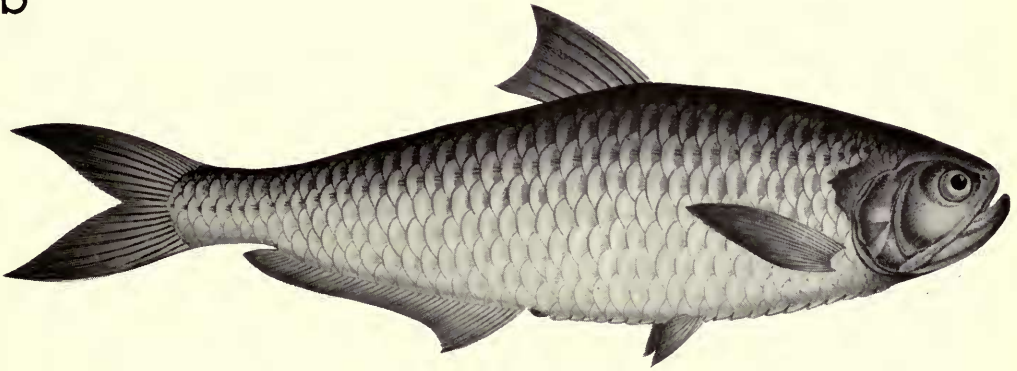
- a. *Clupea atherinoides* from Bloch, pl. 408 (1) (= *Pterengraulis atherinoides*—see p. 273).
- b. *Clupea malabaricus* from Bloch, pl. 432 (= *Thryssa malabaricus*—see p. 274).
- c. *Clupea mystax* from Schneider, pl. 83 (= *Thryssa mystax*—see p. 276).



a



b



c

