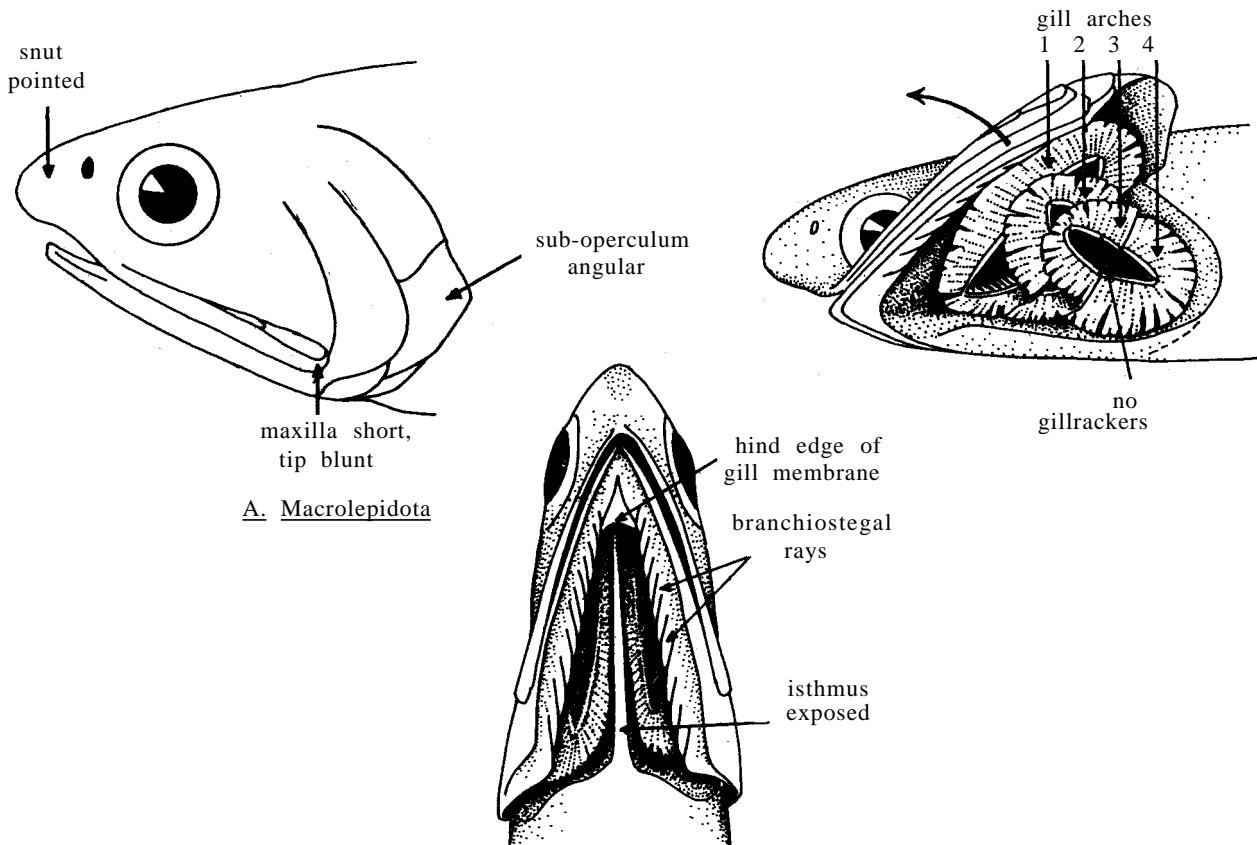


Anchovia Jordan & Evermann, 1895

ENGR Anchov

Anchovia Jordan & Evermann, in Jordan, 1895, *Proc.Acad.nat.Sci.*, (2)5:411, footnote; more fully in Jordan & Evermann, 1896, *Bull.U.S.natn.Mus.*, 46(1):499 (type: *Engraulis macrolepidota* Kner & Steindachner, 1865).

Diagnostic Features : Moderate-sized, rather strongly compressed anchovies (to 20 cm standard length). snout pointed; maxilla short or moderate (to or a little beyond front margin of pre-operculum); very fine denticulations on lower jaw; gillrakers fine and slender, increasing in larger fishes (lower gillrakers to 135 in some species); no gillrakers on hind face of third epibranchial. Dorsal fin origin at about midpoint of body; anal fin long (20 to 29 branched finrays), its origin below front or middle of dorsal fin base. Resemble species of *Cetengraulis*, but gill membrane normal (not broadly joined over isthmus) and branchiostegal rays 9 or more.



A. *Macrolepidota*

Biology, Habitat and Distribution : Marine, estuarine and fresh water; Atlantic and Pacific coasts and lower parts of rivers of North, central and South America. Filter-feeders on plankton.

Species : Whitehead (1973a:96) recognized 5 species, but *magdaleneae* and *rastralis* seem to be synonyms of the Pacific *A. macrolepidota*:

Atlantic :

- A. clupeioides* (Swainson, 1839) Caribbean to Brazil
- A. surinamensis* (Bleeker, 1866) Trinidad to Amazon

Pacific :

- A. macrolepidota* (Kner & Steindachner, 1865) Gulf of California to Peru.

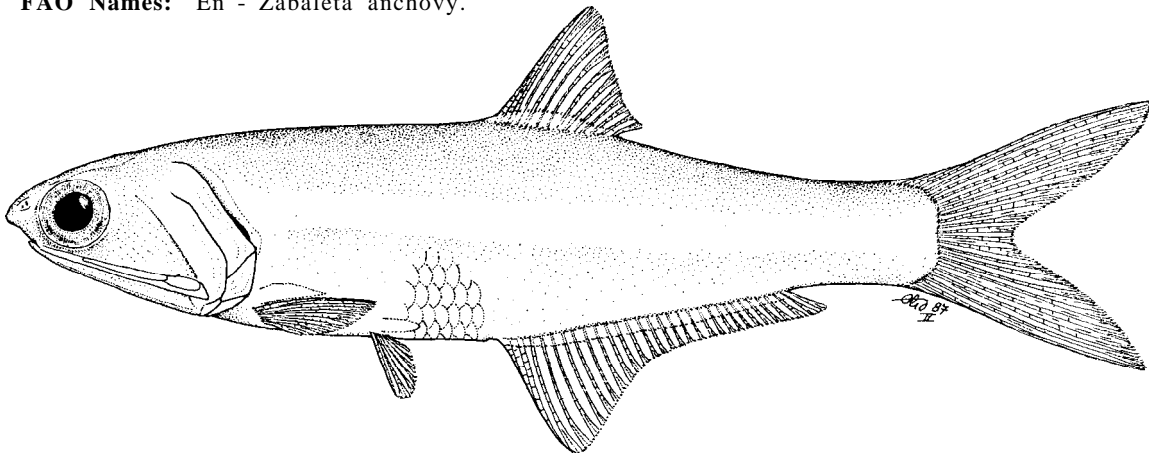
Anchovia clupeioides (Swainson, 1839)

ENGR Anchov 1

Engraulis clupeioides Swainson, 1839, *Nat.hist.anim.*, 2:388 (Pernambuco, Brazil).

Synonyms : *Engraulis productus* Poey, 1866:380 (Matanzas, Cuba); *Anchovia nigra* Schultz, 1949:39 (Lake Maracaibo only); FWNA, 1964:158, fig.26 (Lake Maracaibo); Cervigón, 1969:202 (Lake Maracaibo); Greenfield & Greenfield, 1977:102, figs 1-2, tab.1 (compared with *A. clupeioides*); *Anchovia nattereri*: Jordan & Seale, 1926:413 (Pará Brazil); *Stolephorus clupeioides*: Eigenmann, 1910:45 (Surinam to Rio Grande do Sul, Brazil); *Anchovia clupeioides*: Jordan & Seale, 1926:412 (Cuba, Puerto Rico, Pernambuco); Fowler, 1931b:393 (Quaima River, Trinidad); *Idem.*, 1941b:134 (listed); Campos, 1942:208, fig.20 (compiled, *A. surinamensis* included in synonymy, but not description); Hildebrand, 1943:27, fig.9 (Puerto Rico to Brazil); Fowler, 1948:18, fig.9 (compiled); Nomura & Menezes, 1964:352 (compiled); FWNA, 1964:155, fig.25 (synopsis); Cervigón, 1969:200, fig.1 (Venezuela; Brazil south to Rio de Janeiro); Dahl, 1971:162, fig.198 (Colombia); Eskinazi, 1971:290 (Santa Cruz canal, Pernambuco); Whitehead, 1973a:97, fig.34 (Trinidad); Roux, 1973:53, fig.10 (Anchieta beach, Brazil - about 21°S); Perez *et al.*, 1975:228 *et seq.*, figs 1-4 (electrophoretograms), tab.1 (analysis of proteins, relationships, Venezuela); Figueiredo & Menezes, 1978:27, fig. 34 (compiled; to São Paulo, but rare); Cervigón, 1980:223, fig.2.74 (photo) (synopsis of biology). **Note**: a number of additional early references are included in FWNA, 1964:157.

FAO Names: En - Zabaleta anchovy.



Diagnostic Features: Body rather deep and compressed, its depth 3 to 4 times in standard length. Snout short and pointed, its tip at about eye centre; maxilla moderate, tip pointed and reaching onto pre-operculum (but not beyond), extending beyond end of second supra-maxilla; sub-operculum with angular hind margin, but not formed into a triangular projection; lower gillrakers increasing in larger fishes, about 40 at 5 cm standard length, 100 to 116 at 13 to 17 cm standard length. Anal fin long, with iii 25 to 32 finrays, its origin below front few dorsal finrays. A silver stripe along flank, disappearing in larger fishes. Resembles *A. surinamensis*, which has a shorter and blunt maxilla not reaching to pre-operculum, nor beyond end of second supra-maxilla; also, branched anal finrays 20 to 25. Confused with *Cetengraulis edentulus*, which has the gill membranes united across the isthmus and only 8 branchiosteoal rays (13 in *A. clupeioides*). Atlantic species of *Anchoa* have a pointed maxilla, but gillrakers not more than 30. See ENGR Anchov 1, Fishing Area 31.

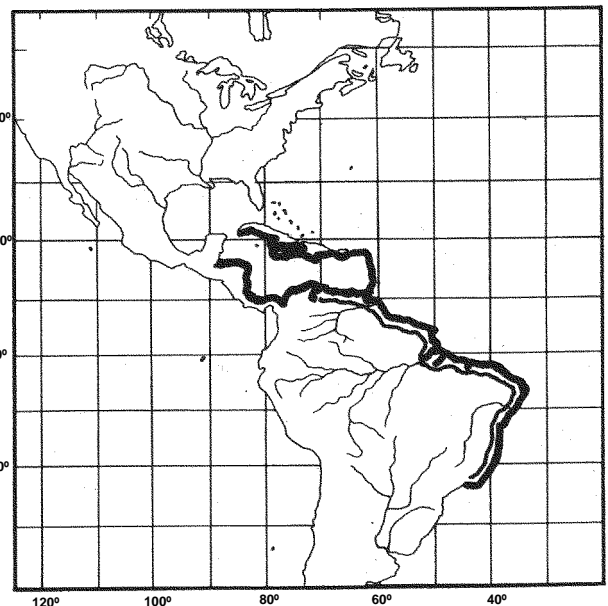
Geographical Distribution: Western central and South Atlantic (Antilles, from Cuba and perhaps throughout; Guatemala south and east to Venezuela and Trinidad, south to just north of Rio de Janeiro, Brazil).

Habitat and Biology: Inshore and estuarine, schooling; enters mangrove and other lagoons, estuaries and penetrates into almost fresh water (salinities of 4.9 to 32.25‰ in Santa Cruz canal, Pernambuco *vide* Eskinazi, 1972:290). Feeds on plankton filtered by the numerous and fine gillrakers. No data on spawning.

Size: To about 20 cm standard length.

Interest to Fisheries: Forms quite large schools and is locally abundant and exploited, but rarely in great quantities.

Local Names: BRAZIL: Boca torta.



Literature:

Remarks :Whitehead (1973a:99-100) concluded that the Lake Maracaibo nigra of Schultz (1949) did not merit separation as a distinct species. Greenfield & Greenfield (1977) re-examined the question, with 11 Lake Maracaibo fishes and 92 from elsewhere; the former had 40 vertebrae and the latter (40 or 41) 42 mostly (43 some). If this is confirmed in more specimens, and if clupeoides also occurs in Lake Maracaibo, then probably two species are present.

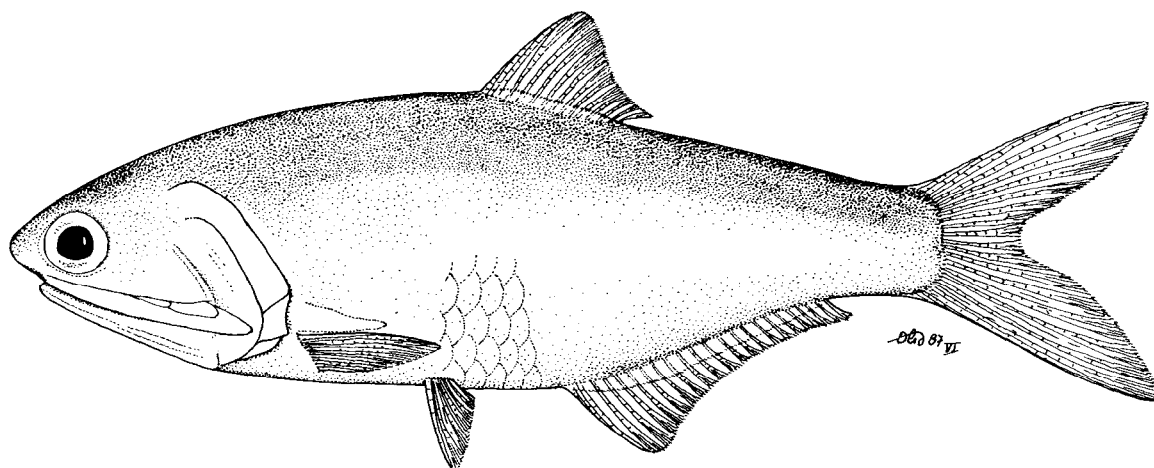
Anchovia macrolepidota (Kner & Steindachner, 1865)

ENGR Anchov 3

Engraulis macrolepidotus Kner & Steindachner, 1865, Abh.Bayer Akad.Wiss., 10:21, pl.3, fig.2 (Rio Bayano, Panama); Steindachner, 1876, Sber.Akad.Wiss.Wien, 72:587 (Panama).

Synonyms : Stolephorus rastralis Gilbert & Pierson, 1398:2811 (Panama); Anchovia rastralis:Meek & Hildebrand, 1923:209 (tide streams at Corozal and Balboa, Panama); Hildebrand, 1943:25, fig.8 (El Salvador, Panama,Colombia); Chirichigno, 1963:16, fig.8 (photo) (Puerto Pizarro, Puerto Rico, Peru); Stolephorus branchiomelas Eigenmann, 1917:682 (mouth of Rio Dagua, Colombia); Idem., 1922:179, pl. 28, fig.1 (same); Anchovia magdalenae Hildebrand, 1943:23, fig.7 (Magdalena Bay, Pacific coast of Baja California); Anchovia macrolepidota-Jordan & Evermann, 1896:449 (compiled); Gilbert & Starks, 1904:47 (Panama); Meek & Hildebrand, 1923:211 (tide streams at Balboa and Panama market); Fowler, 1939:2 (Guayaquil, Ecuador); Hildebrand, 1943:21, fig.6 (Gulf of California to Ecuador); Peterson,1956:152 (Gulf of Nicoya, Costa Rica); Cobo & Massay, 1969:8 (Ecuador, listed); Whitehead, 1970:39, fig.4 (gill cover), pl.3b (macrolepidotus-type); Chirichigno, 1976:60, fig.19 (3°41'S, 80°40'W, off Zorritos, Gulf of Guayaquil, Peru).

FAO Names: En - Bigscale anchovy.



Diagnostic Features :Body rather deep and compressed, its depth about 2.5 to 3 times in standard length (the young more slender). Snout moderate and pointed, the tip at or just above eye centre; maxilla moderate, tip pointed and reaching onto pre-operculum (but not beyond), extending beyond end of second supra-maxilla; sub-operculum with a distinct triangular projection on hind margin (near base of first pectoral finray); lower gillrakers increasing in larger fishes, about 70 at 5 cm standard length, about 100 at 8 to 13 cm, and about 120 to 135 in large fishes, fine and slender. Anal fin long, with iii 26 to 29 finrays, its origin below about middle of dorsal fin base. A silver stripe along flank, probably disappearing in larger fishes. Closely resembles Cetengraulis mysticetus, which has the gill membranes united across the isthmus and only 8 branchiostegal rays (14 in A. macrolepidota). Pacific species of Anchoa have a pointed maxilla, but gillrakers not more than 32.

Geographical Distribution : Eastern central and South Pacific (Gulf of California at San Felipe Bay; Pacific coast of Baja California at Magdalena Bay; south to Panama, Colombia, Ecuador and northern Peru, i.e. Gulf of Guayaquil).

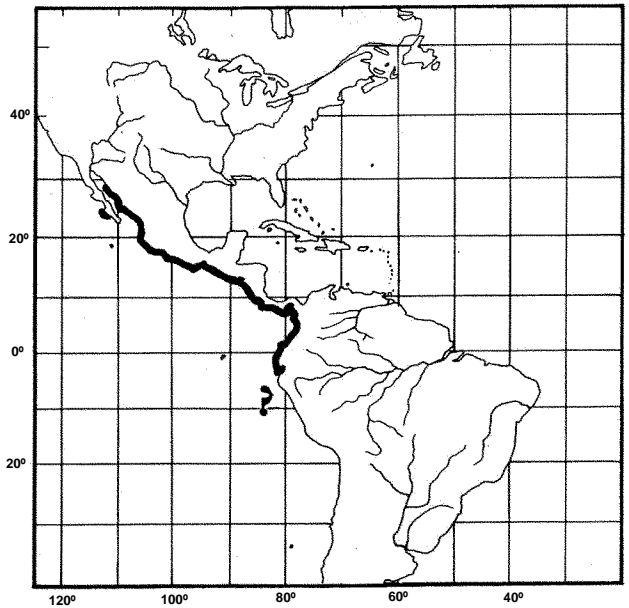
Habitat and Biology: Marine, inshore, along sandy beaches, also in tide streams (Hildebrand, 1943), forming large schools (Peterson, 1956); juveniles to about 7 cm occur on beaches and in bays, thereafter further from the shore (Peterson, *loc.cit.*). Feeds on a mixture of plant and animal plankton filtered by the numerous and fine gill-rakers. Probably spawns throughout year, mainly February to October (Gulf of Nicoya, Costa Rica); mature at 10.5 to 11 cm standard length. Eggs oval.

Size : To about 15 cm standard length.

Interest to Fisheries : May contribute to artisanal fisheries, but of negligible use as a baitfish (Peterson, 1956).

Local Names : ECUADOR: Chuhueco, Carduma.

Literature: Peterson (1956 - habitat, food, growth, spawning).



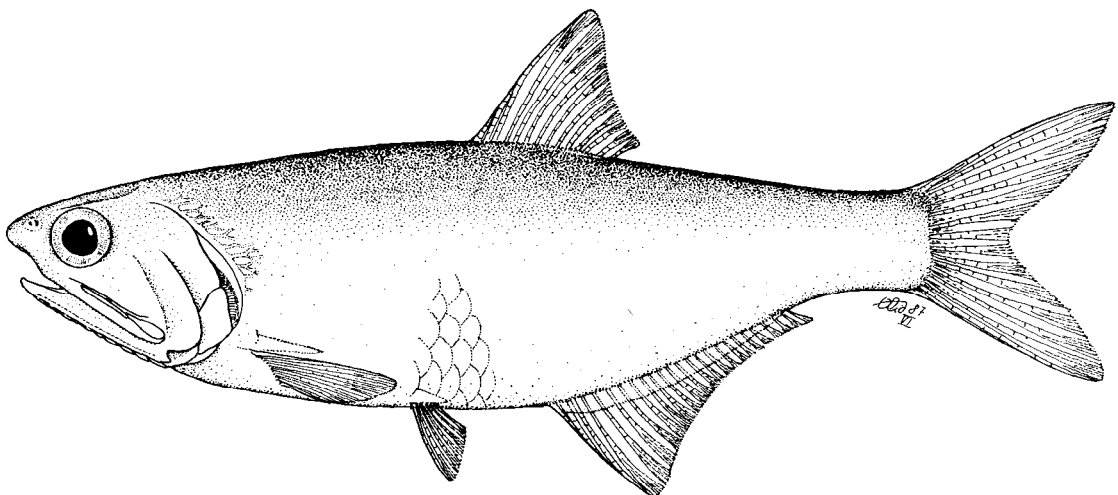
Anchovia surinamensis (Bleeker, 1866)

ENGR Anchov 2

Stolephorus surinamensis Bleeker, 1866, *Ned.Tijdschr.Dierk.*, 3:178 (Surinam).

Synonyms : *Anchovia pallida* Starks, 1913:9, p1.1 (Pará, Brazil); *Anchoviella pallida*:Fowler, 1941b:126 (Ceará, Brazil); Hildebrand, 1943:134, fig.56 (*pallida*-type only); Fowler, 1948:22, fig.15 (compiled); Schultz, 1949:48 (Venezuela); Carvalho, 1951:59, p1.2, fig.2 (Pará); FWNA, 1964:221, fig.48 (synopsis); Cervigón, 1966:146 (Caño de Guanoco, mouth of Rio San Juan, Venezuela); *Anchoviella venezuelae* Fowler, 1931b:406, fig.2 (Caño de Guanoco, mouth of Rio San Juan, Venezuela); *Anchoviella potiana* Schultz & Menezes, 1951:235 (Poti and Parnaiba Rivers, Brazil); *Stolephorus surinamensis*:Eigenmann, 1912:448 (Bartica Rocks, Guyana); Puyo, 1945:103, fig.2 (French Guiana); *Idem*, 1949:155, fig.78 (repeat); *Engrantis surinamensis* (misspelt):Kappler, 1887:157 (Surinam, compiled);? *Anchoviella surinamensis*:Fowler, 1931b:392 (Icacos Beach,Trinidad); *Anchovia surinamensis*:Whitehead, 1973a:100, figs 36, 37 (head, fontanelles) (Trinidad, Guyana, Surinam, French Guiana); Cervigon, 1982:214 (Pedernales and Caño Mánamo, Orinoco delta).

FAO Names: En - Surinam anchovy.



Diagnostic Features: Body rather deep and compressed, its depth 3 to 3.5 times in standard length. Snout moderate and pointed, its tip well above centre of eye; maxilla short, tip blunt, failing to reach articulation of lower jaw by about 1/3 eye diameter, not extending behind end of second supra-maxilla; sub-operculum with angular hind margin, but not formed into a triangular projection; lower gillrakers (47) 51 to 62, fine and slender. Anal fin moderate, with iii 20 to 25 finrays, its origin below about middle of dorsal fin base. A silver stripe along flank, up to 1.5 eye diameters at widest. Resembles *A. clupeioides*, which has a longer and pointed maxilla reaching onto pre-operculum and beyond end of second supra-maxilla; also, branched anal finrays 25 to 32. Confused with *Cetengraulis edentulus*, which has the gill membranes united across the isthmus and only 8 branchiostegal rays (10 to 13 in *A. surinamensis*). Species of *Anchoviella* have a short, blunt maxilla, but usually a less deep body, also gillrakers not more than 35.

Geographical Distribution: Western central and South Atlantic drainage (lower parts of rivers from Trinidad and eastern Venezuela south to Para, Brazil).

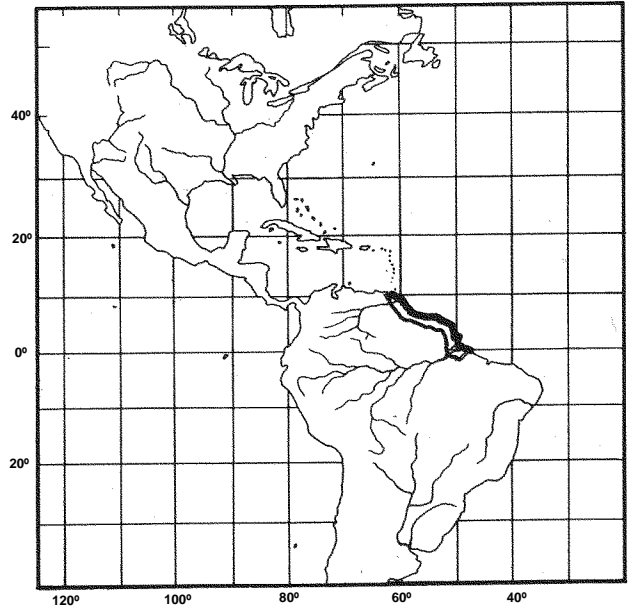
Habitat and Biology: Estuarine (no data on salinities tolerated) and riverine (to above Manaus and into Rio Janaperi at least 80 km above its junction with the Rio Negro).

Size: To 12.4 cm standard length.

Interest to Fisheries: Presumably contributes to artisanal river catches, but no special fishery.

Local Names:

Literature:

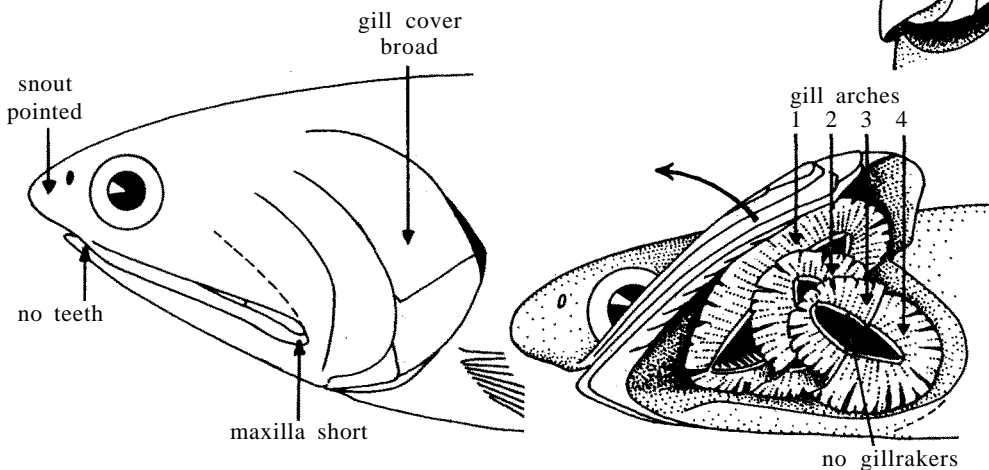
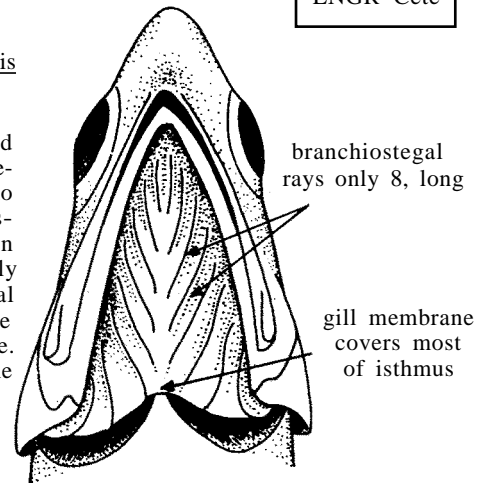


Cetengraulis Günther, 1868

ENGR Cete

Cetengraulis Günther, 1868, *Cat.fish.Brit.Mus.*, 7:383 (type: *Engraulis edentulus* Cuvier, 1829).

Diagnostic Features: Moderate-sized, rather strongly compressed anchovies (to 17 cm standard length). Snout rather pointed; maxilla moderate, tip blunt, not reaching to beyond front margin of pre-operculum; no teeth or denticulations on lower jaw; gillrakers fine and numerous, increasing in larger fishes (lower gillrakers to 105 in one species); no gillrakers on hind face of third epibranchial. Branchiostegal (gill) membrane broadly joined across isthmus and almost completely covering it; branchiostegal rays 8, long. Dorsal fin origin at about midpoint of body; anal fin moderate (17 to 24 branched finrays), its origin under last third of dorsal fin base. Resemble species of *Anchovia*, but in no other anchovy genus does the branchiostegal membrane cover the isthmus in this manner.



Biology, Habitat and Distribution : Marine, pelagic, forming quite large schools, but tolerating brackish water; Atlantic and Pacific coasts of North, central and South America. Filter-feeders, with well-developed epibranchial organs.

Species : Only two species are recognized:

Atlantic :

C. edentulus (Cuvier, 1829) - Caribbean to Brazil

Pacific :

C. mysticetus Günther, 1866 Gulf of California to Peru.

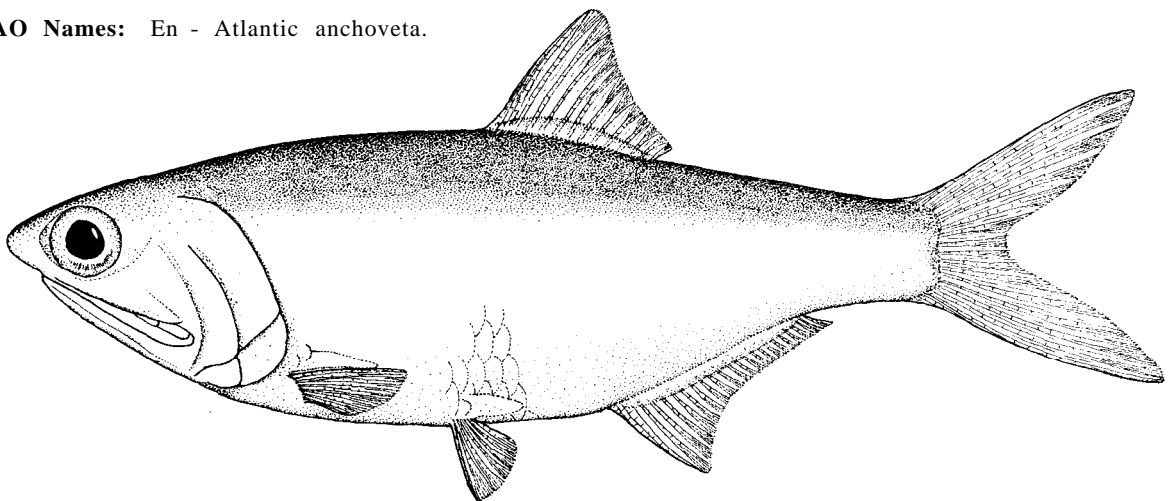
Cetengraulis edentulus (Cuvier,1829)

ENGR Cete 1

Engraulis edentulus Cuvier, 1829, Régne anim., 2nd ed., 2:323 (Jamaica, on Sloane's Harengus minor).

Synonyms : Harengus minor Sloane, 1725:282, p1.250, fig.2(1) (Jamaica - pre-Linnaean); Engraulis brevis Poey, 1866:379 (Cuba); Howell-Rivero, 1938:172 (type of brevis); Stolephorus robertsi Jordan & Rutter, 1897:95 (Jamaica); Jordan & Evermann, 1898:2815 (on Jordan & Rutter); Stolephorus gilberti Evermann & Marsh, 1900:352 (Palo Seco, Puerto Rico) and Idem., 1902:90, fig.15 (same); Jordan & Evermann, 1900:3146 (on Jordan & Rutter); Stolephorus garmani Evermann & Marsh, 1900:352 (Puerto Real, Puerto Rico) and 1902:89, fig.4 (same); Jordan & Evermann, 1900:3146 (on Evermann & Marsh); ? Stolephorus manjuba Ribeiro, 1908:unpaged (Rio de Janeiro; description inadequate); Anchoiella surinamensis:Fowler, 1931:392 (Trinidad); Lowe (McConnell), 1962:693 (Guyana); Hildebrandichthys setiger Schultz, 1949:49, fig.7 (Caño de Sagua, Sinamaica, Venezuela); FWNA, 1964:231, fig.53 (the type); Cetengraulis edentulus-Günther, 1868:383 (Jamaica); Jordan & Evermann, 1896:450 (synopsis); Meek & Hildebrand, 1923:214 (Colon Market and Fox Bay, Panama, also Jamaica and Rio de Janeiro); Jordan & Seale, 1926:414 (Cuba, Brazil); Fowler, 1942:135 (Brazilian records); Hildebrand, 1943:155 (Cuba, Jamaica, Puerto Rico, Panama, Venezuela, Brazil); Boeseman, 1956:185 (Surinam); FWNA, 1964:245, fig.59 (synopsis, refs); Simpson, 1965:1 et seq. (early life history); Silva, 1967:333 et seq. (meristics); Cervigón, 1966:147, fig.59 (Venezuela); Dahl, 1971:162 (Colombia); Gilbert & Kelso, 1971:23 (Tortuguero lagoon, Costa Rica); Eskinazi, 1972:291 (Santa Cruz canal, Pernambuco, Brazil); Whitehead, 1973a:107, fig.39 (Trinidad, Guyana, Surinam); Anon., 1976:70 (Mexico); Palacio, 1974:23 (Gulf of Urabá, Colombia); Perez et al., 1975:228 et seq., figs 1-4 (electrophoretograms), tab.1 (analysis of proteins, relationships, Venezuela); figuiredo & Menezes, 1978:27 (Brazil, compiled); Cervigón, 1980:233, fig.2.82 (synopsis); Nelson, 1984b:422, fig.1A,B, tabs 1,2 (Hildebrandichthys setiger = edentulus; gut, anal finrays, vertebrae).

FAO Names: En - Atlantic anchoveta.



Diagnostic Features : Body compressed and fairly deep, its depth a little over 3 times in standard length; head large and deep. Snout short and pointed, about 2/3 eye diameter; maxilla moderate, tip blunt, just failing to reach lower jaw articulation; lower gillrakers fine and numerous, increasing in large fishes, about 45 to 55 in fishes of 10 to 13 cm standard length (total to 105 in specimens of 13 cm - regression plotted by Silva, 1967:fig.5); no gillrakers on posterior face of 3rd epibranchial. Branchiostegal membrane broad, covering entire isthmus; branchiostegal rays 8, long and slender. Anal fin moderate, with iii 18 to 24 finrays, its origin under last third of dorsal fin base. A silver stripe along flank in smaller fishes, disappearing at about 10 cm standard length. Similar to Anchovia surinamensis in general appearance, but distinguished by the broad branchiostegal membrane (if split,

can still be found with forceps); this distinguishes it from all other Atlantic anchovies (which are usually more slender, have less deep heads, a longer maxilla, fewer gillrakers). See ENGR Cete 1, Fishing Area 31).

Geographical Distribution : Western central and South Atlantic (Antilles from Cuba southward; Costa Rica south and east to Colombia and Venezuela, Trinidad south to Itapema, Santa Catarina, Brazil).

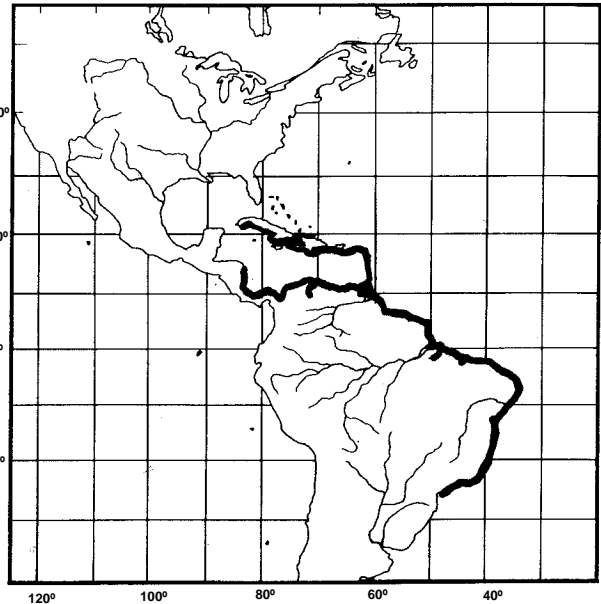
Habitat and Biology: Marine, pelagic, inshore and forming quite large schools; also entering brackish waters of lagoons and estuaries and tolerating salinities of 10.32 to 31.00‰ (Santa Cruz canal, Pernambuco - see Eskinazi, 1972:291). A filter feeder (fine and close-set gillrakers, large epibranchial organs), presumably on both plant and animal plankton. Spawns off the Araya Peninsula (opposite Margarita Island), Venezuela from October to January, with a distinct peak in mid-November; eggs oval (Simpson, 1965:figs 5,6), spawned at 02.30 to 05.00 hours along shore-line out to about 1.5 km, hatching about 20 to 24 hours later. The biology of this species is almost certainly very similar to that of the better known A. mysticetus of the eastern Pacific.

Size : To about 13 cm standard length, usually 10 to 12 cm.

Interest to Fisheries : Caught with beach seines, May to November (Venezuela). Fresh fishes little used for human consumption, but valued as a source of fishmeal for domestic animals (Venezuela). Total catch in 1982 was 5 930 t (Venezuela only).

Local Names : CUBA: Bocón; VENEZUELA: Rabo amarillo (yellow tail).

Literature : Simpson (1965 - early development, fishery in Venezuela), Silva (1967 - meristics).



Cetengraulis mysticetus (Günther, 1867)

ENGR Cete 2

Engraulis mysticetus Günther, 1867, Proc.zool.Soc.Lond., (3):604 (Panama).

Synonyms : Stolephorus opercularis Jordan & Gilbert, 1882:275 (Punta San Felipe, Gulf of California); Anchovia opercularis Gilbert & Starks, 1904:42 (Panama Bay); Cetengraulis engymen Gilbert & Pierson, 1898:2815 (Panama Bay); Cetengraulis mysticetus:Günther, 1868:383 (Panama); Meek & Hildebrand, 1923:212 (Panama); Jordan & Seale, 1926:416 (Panama); Hildebrand, 1943: 157, fig.72 (Panama, Guayamas, Mexico and Rio Piura, Peru); Idem., 1946:104 (Rio Piura); Howard, 1954:1 et seq. (populations); Peterson, 1956:172 (Gulf of Nicoya, Costa Rica - biology); Berdegué, 1958:1 et seq. (populations); Howard & Landa, 1958:1 et seq. (Panama - biology); Harder, 1958:365 et seq. (intestine); Simpson, 1959:447 et seq., figs 1-40, tabs 1-7 (breeding, eggs, larvae illustrated); Bayliff, 1969:1.1 et seq. (complete synopsis of biology); Cobo & Massay, 1969:8 (Mexico, listed); Erdman, 1971:62 (Gulf of Nicoya - decline in numbers); Miller & Lea, 1972:56 (California; to Los Angeles); Eschmeyer, Herald & Hamman, 1983:74 (compiled).

FAO Names : En - Pacific anchoveta.

