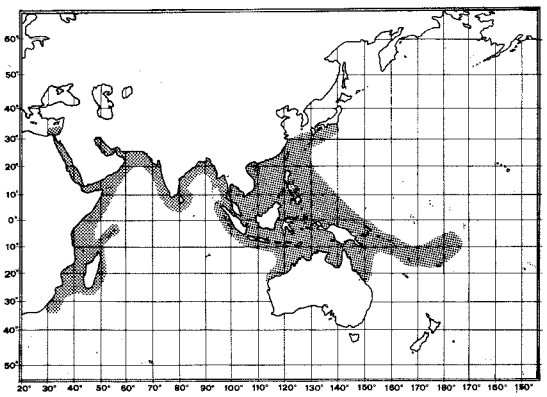
Geographical Distribution : Widespread in the Indo-West Pacific from South Africa, Seychelles and Red Sea east through Indonesia and off northern Australia to Melanesia, Micronesia, Samoa, China and the Ryukyu Islands. It has entered the eastern Mediterranean Sea through the Suez Canal.



Habitat and Biology : An epipelagic, neritic species occurring in areas where surface water temperatures are at least 17° C. Schooling is by size. The spawning season around India seems to extend from March through September. Spawning is in several batches.

Juveniles feed on phytoplankton (i.e. diatoms) and small zooplankton such as cladocerans, ostracods, larval polychaetes, etc. With growth they gradually change their dietary habits, a process that is reflected in the relative shortening of their intestine. Hence, adult Indian mackerel prey primarily on macroplankton such as larval shrimps and fish. Longevity is believed to be at least 4 years.

Size : Maximum fork length is 35 cm, common to 25 cm; in Philippine waters, length at first maturity is about 23 cm.

Interest to Fisheries : Indian mackerel is a very important species in many parts of its range. Catches are usually recorded as Rastrelliger spp. or combined with R. brachysoma. The world catch for R. kanagurta alone fluctuated between about 96 000 metric tons in 1975 and 128 000 metric tons in 1981, peaking at about 186 000 metric tons in 1978; that of Rastrelliger spp. between about 162 000 and 220 100 metric tons respectively (FAO, 1983). Indonesia, Thailand, India, Malaysia, and the Philippines reported most of the landings. Indian mackerel is caught with purse seines, encircling gillnets, lift nets, and bamboo stake traps, and marketed fresh, frozen, canned, dried salted, and smoked.

Local Names: AUSTRALIA: Long-jawed mackerel; BURMA: Indian mackerel; INDIA: Ayala, Ayila (Malayalam), Ailai; Augalai (Tamil), Bangada (Canarese); Indian mackerel, Kaula gedar (Marathi), Kanagurta (Telugu) Kanangeluthi (Tamil), Kannangadatha (Telugu), Kumla (Tamil), Karan-kita (Oriya), Oibia gedar (Sindhi); Andaman Islands: Bangadi (Hindi); INDONESIA: Banjar, Kembung, Kembunglelaki; JAPAN: Agifurakiya, Gurukunmuchji, Naha; KAMPUCHEA: Cá bac ma, Cá be lau, Cá nung nuc, Trey kamong; MALAYSIA: Kedah, Kembong, Kuala muda; PAKISTAN: Surmai; PHILIPPINES: Alumahan (Tagalog), Bunatan (Ilokano), Burau (Bikol), Buyaw (Visayan-Banton), Chub mackerel: Hasa-hasa, Kabalyas (Panga-Sinan), Lumahan (Tagalog), Mataan (Ilokano), Striped mackerel, Salimburaw (Kuyano and Tagbanwa); SAUDI ARABIA: Bagha; SINGAPORE: Kembong; SOMALIA: Bagha (Mij); Burei (Kism); Carmu, Numa (Baj); SOUTH AFRICA: Langkaak-makriel, Longjaw mackerel; SRI LANKA: Ailai (Tamil), Indian mackerel, Karung kuluttan, Kumbala (Tamil), Kumbalava, Maha kara bolla (Sinhalese); THAILAND: Pla-long, Pla-thu, Tu; USSR: Kanagurta, Indijskaya okeanicheskaya skumbriya, Makrelchab, Odnoglachaya makrel, Polosataya makrel; VIET NAM: Cá bac ma, Cá be lau, Cá nung nuc, Trey kamong.

Literature : Jones & Silas (1964a); Jones & Rosa, Jr (1967); Fischer & Whitehead, eds (1974, Species Identification Sheets, Eastern Indian Ocean/Western Central Pacific).

Remarks : Some local names listed here may in fact be associated with R. faughni, a species recognized only in 1967, or be in use for both.

Sarda Cuvier, 1829

SCOMBR Sarda

Genus with reference : Sarda Cuvier, 1829:199. Type-species: Scomber sarda Bloch, 1793, by monotypy.

Diagnostic Features : Body elongate and slightly compressed. Mouth moderately large; 12 to 30 large, conical teeth in upper jaw, 10 to 25 in lower jaw; no teeth on tongue; 8 to 21 small conical teeth in a row on the palatine; vomerine teeth present or absent; 8 to 27 gillrakers on first arch; laminae of olfactory rosette 21 to 39. Interorbital width 21.3 to 30.2% of head length. Dorsal fins close together, the first with 17 to 23 spines, its margin straight; the second with 13 to 18 rays followed by 7 to 9 finlets; anal fin with 12 to 17 rays followed by 6 to 8 finlets; pectoral fins short, with 22 to 27 rays; interpelvic process small and bifid. Lateral line single, gradually curving down toward caudal peduncle. Body completely covered with very small scales posterior to the corselet; caudal peduncle slender, with a well developed lateral keel between 2 smaller keels on each side. Swimbladder absent; spleen large and prominent in ventral view, located in the posterior half of the visceral cavity; liver-with elongate left and right lobes and a short middle lobe.

Habitat and Biology : All four species of this genus are epipelagic in neritic waters and school by size. Bonitos feed opportunistically on a variety of small schooling fishes, squids and shrimps. Both, the juveniles and the adults may be cannibalistic.

Interest to Fisheries : The world catch of 2 of the 4 bonito species recently reached about 1% of the total for all scombrids while the other 2 lack importance. About 36 000 metric tons were taken in 1975, steadily increasing to 57 000 metric tons in 1981 (FAO, 1983). The Mediterranean countries and Peru have reported the highest catches. Bonitos are taken with purse seines, hook-and-line, trolling lines, set nets, trap nets, trammel nets, beach seines as well as on hook-and-line in the recreational fisheries, and are marketed fresh, frozen or processed.

Literature : Collette & Chao (1975); Yoshida (1980, species synopsis).

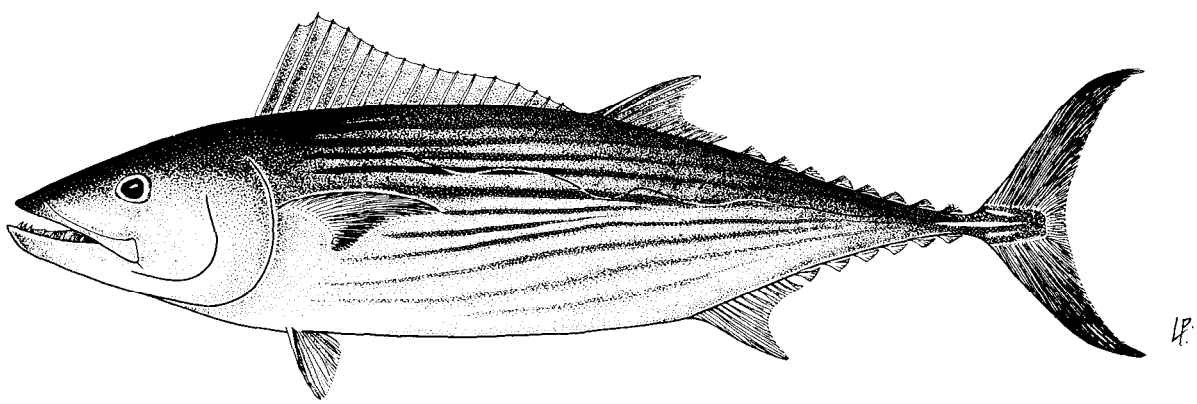
Sarda australis (Macleay, 1880)

SCOMBR Sarda 4

Pelamys australis Macleay, 1880, Proc.Linn.Soc.New South Wales, 5(4):557 (Sydney, Australia).

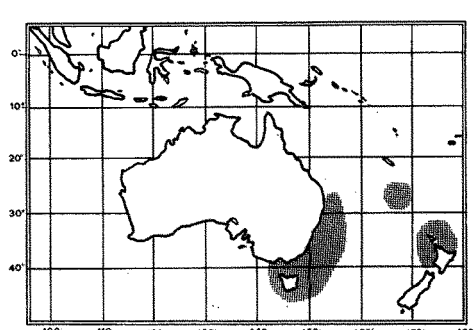
Synonymy : Pelamys schlegeli McCoy, 1888; Sarda australis - Walford, 1936; Sarda chiliensis australis - Roughly, 1951; Sarda chilensis australis - Silas, 1964.

FAO Names: En - Australian bonito; Fr - Bonite bagnard; Sp - Bonito austral.



Diagnostic Features : Upper jaw teeth 16 to 26; lower jaw teeth 11 to 20; vomerine teeth sometimes present; supramaxilla intermediate (Collette & Chao, 1975:fig. 32c); 19 to 21 gillrakers on first arch. First dorsal fin with 17 to 19 spines, length of fin base 31.5 to 34.3% of fork length; dorsal finlets usually 7; 14 to 17 rays in anal fin; anal finlets usually 6; pectoral fin rays 25 to 27, modally 26. Vertebrae 23 or 24 precaudal plus 21 or 22 caudal, total 45 or 46. Colour: dorsal stripes closer to being horizontal than in other species of Sarda and extending onto belly in some specimens.

Geographical Distribution : Restricted to southeastern Australia (Southern Queensland, New South Wales, Victoria, Tasmania) and Norfolk Island (Collette & Chao, 1975:fig. 70) and recently reported from New Zealand (James & Habib, 1979).



Habitat and Biology : An epipelagic, neritic species schooling by size and maturing from January through April. Because of its limited commercial interest, the biology of this species is almost completely unknown.

Size : Maximum fork length about 100 cm, commonly caught at 40 to 45 cm fork length and 1.8 to 2.3 kg weight. The all-tackle angling record is a 9.4 kg fish with a fork length of 101 cm taken in Montague Island, New South Wales in 1978.

Interest to Fisheries : There is no well-developed fishery for S. australis and landings have fluctuated from nil to 9 metric tons per year over the period between 1955 and 1973 (Yoshida, 1980). It is sold in the Sydney fish market. Australian bonito incidentally caught by trolling or sportfishing is used as bait for snappers, billfishes and sharks. The flesh is light-coloured, of delicate flavour and good canning quality (Marshall, 1966).

Local Names : AUSTRALIA: Australian bonito, Horse mackerel, Little bonito; USSR: Avstralijskaya pelamida.

Literature : Collette & Chao **(**1975**);** Yoshida (1980).

Remarks : A number of workers have considered S. australis as a synonym or subspecies of S. chiliensis but Collette & Chao (1975) clearly showed the validity of S. australis.

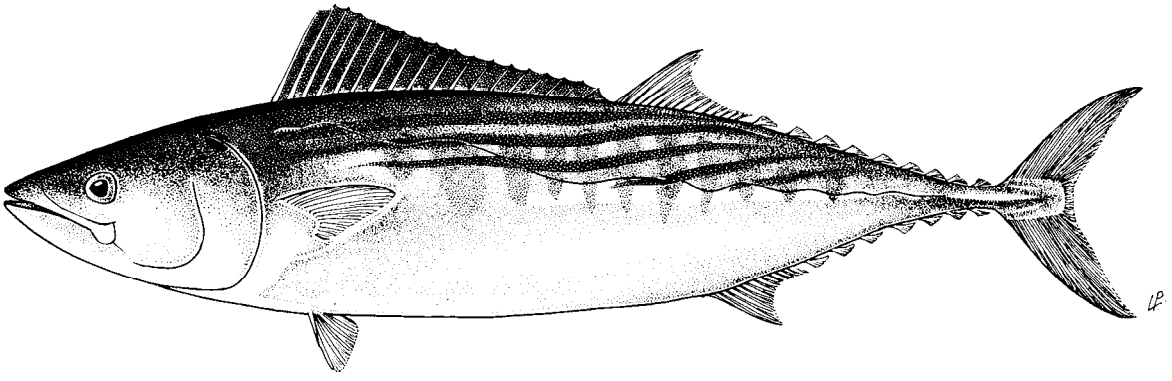
Sarda chiliensis (Cuvier, 1831)

SCOMBR Sarda 3

Pelamys chiliensis Cuvier in Cuvier & Valenciennes, 1831, Histoire Naturelle des Poissons, 8:163 (Valparaiso, Chile).

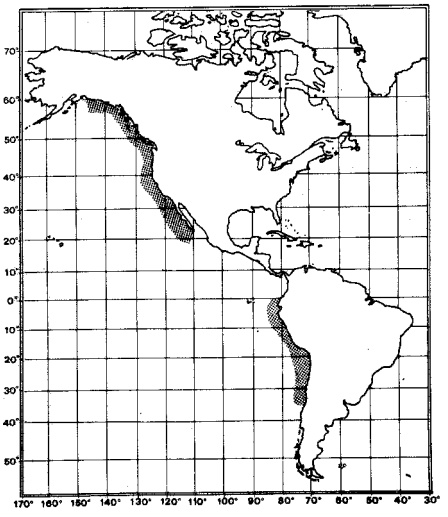
Synonymy : Pelamys lineolata Girard, 1859; Pelamys chilensis Günther, 1860; Sarda chilensis - Jordan & Gilbert, 1882; Sarda chiliensis - Waiford, 1936; Sarda lineolata - Waiford, 1936; Sarda stockii David, 1943; Sarda sarda chiliensis - De Buen, 1958; Sarda chilensis chilensis - Vildosa, 1963; Sarda chilensis lineolata - Vildosa, 1963; Sarda sarda chilensis - Sanchez & Lam, 1970; Sarda chiliensis chiliensis Kuo, 1970; Sarda chiliensis lineolata -Kuo, 1970.

FAO Names: En - Eastern Pacific bonito; Fr - Bonite du Pacifique oriental; Sp - Bonito del Pacifico oriental.



Diagmstic Features : Upper jaw teeth 18 to 30; lower jaw teeth 14 to 25; vomerine teeth absent; supramaxilla wide (Collette & Chao, 1975:fig. 32d); 23 to 27 gillrakers on first arch. First dorsal fin with 17 to 19 spines, length of fin base 26.7 to 31.4% of fork length ; dorsal finlets usually 8; 12 to 15 rays in anal fin; anal finlets usually 6 or 7; pectoral fin rays 22 to 26, usually 24 or 25. Vertebrae 22 to 24 precaudal plus 20 to 23 caudal, total 42 to 46, usually 44 or 45. Colour: dorsal stripes slightly oblique.

Geographical Distribution : Restricted to the eastern Pacific Ocean (Collette & Chao, 1975:fig. 70). Its geographical range includes a northern and a southern subspecies separated by a tropical population of S. orientalis. The southern subspecies, S. chiliensis chiliensis, occurs from Mancora, Peru, just south of the Gulf of Guayaquil southward to Talcahuano, Chile. The northern subspecies, S. chiliensis lineolata (Girard) occurs from off the coast of Alaska 60°16'N, 145°32'W) southward to Cabo San Lucas at the tip of Baja California (22°20'N, 112°27'W) and in the Revillagigedo Islands).



Habitat and Biology : An epipelagic, neritic species attaining sexual maturity at about 2 years of age. In the southern hemisphere, spawning occurs in nearshore waters between September and December. In the northern hemisphere, spawning begins in early March (southern populations) progressing northward in the following months as a function of increasing temperature. Evidence suggests that even 1 year old S. chiliensis lineolata may spawn in cold-water areas influenced by thermal discharges. Older bonito mature earlier in the season and tend to live further offshore as compared to younger fish. Spawning is in batches, and the number of eggs shed in one season by a 3 kg specimen has been estimated at about half a million. Fecundity increases exponentially with size.

Size : Maximum fork length is at least 79 cm in the sauthern hemisphere, and 102 cm in the northern hemisphere, where the fish may reach 11.3 kg of weight. The all-tackle angling record is a 10.07 kg fish with a fork length of 91.4 cm taken off Malibu, California in 1978. The smallest mature individuals recorded range between 47 and 53 cm fork length.

Interest to Fisheries : In California, eastern Pacific bonito is taken commercially by purse seiners, but is more important to the recreational hook and line fishery operating from private and party boats, piers and jetties, and from the shore (Yoshida, 1980:42). In the mid-sixties, the Chilean bonito fishery between Iquique and Antofagasta expanded from an almost entirely artisanal activity with floating gillnets and small purse seines to an industrial operation with specialized bonito/tuna vessels (Yoshida,1980:42). The landings of the northern subspecies (S. c. lineolata) in California and Mexico have fluctuated greatly over the last 50 years from less than 1 000 metric tons to nearly 14 000 tons in the early seventies, ranking in 13th place (4 003 metric tons worth $1 222 000) in total California landings of 1976. The Peruvian landings of the southern subspecies (S. c. chiliensis) increased from almost nil in 1940 to a peak of 110 000 metric tons per year in the early sixties, thereafter gradually dropping off to 40 000 tons in the mid-seventies (Yoshida, 1980:44). The world catch for the species as a whole was down to between 10 219 in 1976 and 15 936 metric tons in 1981, reaching 21 308 metric tons in 1977 (FAO, 1983).

Local Names : CHILE: Bonito; COLOMBIA: Bonito; MEXICO: Bonito; PERU: Aguadito, Bonito, Cerrajón, Chaucha, Chauchilla (for 1 year old), Monillo, Monito, Mono; SWEDEN: Chilensk bonit; USA: Pacific bonito; USSR: Chilijskaya pelamida, Vostochnaya pelamida.

Literature : Ancieta (1964); Kuo (1970); Yoshida (1980, species synopsis); Collins & Mac Call (1977).

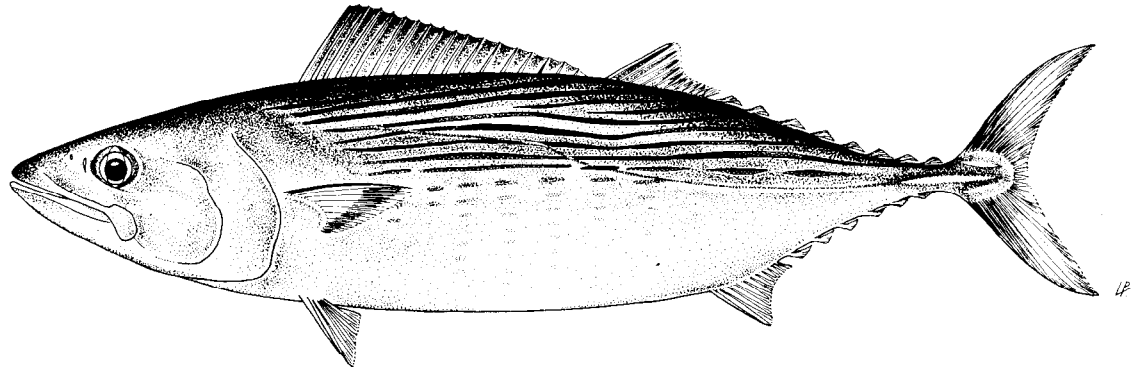
Remarks : For the scope of this catalogue the species is treated as a whole, although some information pertaining to the northern and southern subspecies is given separately.

Sarda orientalis (Temminck & Schlegel, 1844) SCOMBR Sarda 2

Pelamys orientalis Temminck & Schlegel, 1844, Pisces in Von Siebold, Fauna Japonica, 3:99, pl. 52 (Japan).

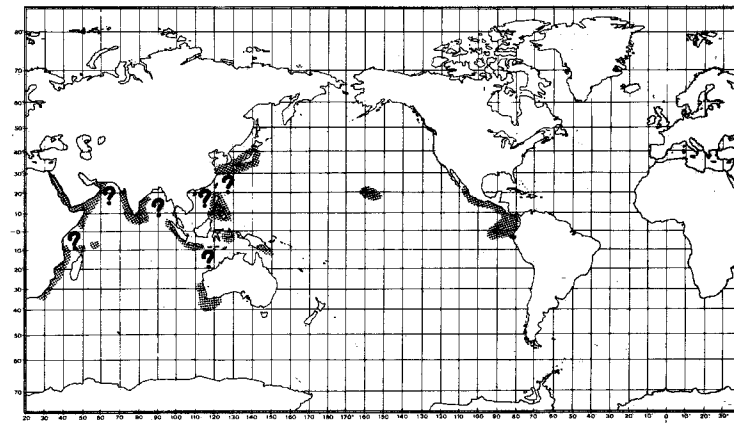
Synonymy : Sarda orientalis - Jordan & Snyder, 1900, Sarda velox Meek & Hildebrand, 1923; Sarda orientalis serventyi Whitley, 1945.

FAO Names : En - Striped bonito; Fr - Bonito oriental; Sp - Bonito mono.



Diagnostic Features : Upper jaw teeth 12 to 20; lower jaw teeth 10 to 17; vomerine teeth absent; supramaxilla narrow (Collette & Chao, 1975:fig. 32e); 8 to 13 gillrakers on first arch. First dorsal fin with 17 to 19 spines, length of first dorsal fin base 28.2 to 32.7% of fork length; dorsal finlets usually 8; 14 to 16 rays in anal fin; anal finlets usually 6; pectoral fin rays 23 to 26, usually 24 or 25. Vertebrae 23 to 25 precaudal plus 20 to 22 caudal, total 44 or 45. Colour: dorsal stripes oblique.

Geographical Distribution : Widespread in tropical and sub-tropical waters of the Indo-Pacific (Collette & Chao, 1975:fig. 70). In the western Pacific, it occurs northward to the northern end of Honshu, Japan (about 41°N), is rare in the Indo-Australian Archipelago, but is found in northwestern and southwestern Australia. There are recent records from off the west coast of Sumatra, south of Java, and near Bali (T. Gloerfelt-Tarp, pers. comm.) from Ambon (Indonesia) and the Gulf of Papua. Further east, it occurs around the Hawaiian Islands and along the Pacific coast of America to Cabo San Lucas at the southern tip of Baja California and the Tres Marias Islands southward to the Galapagos Islands and the Gulf of Guayaquil.



Habitat and Biology : An epipelagic, neritic species occurring in waters of 13.5º to 23°C, schooling with small tunas. Off the southwest coast of India fully mature striped bonito are found from May to September, followed by juveniles from October to November. Off south and southwest Sri Lanka it occurs throughout the year, with mature fish prevailing between September and February. Juveniles are encountered off the west coast of Sri Lanka from June to August. Striped bonito prey upon cIupeids, other fishes, cephalopods and decapod crustaceans.

Size : Maximum fork length in the Indian Ocean is 101.6 cm, common 30 to 50 cm fork length; in Japanese waters to about 80 cm and 3.0 kg. The all-tackle angling record is a 10.65 kg fish with a fork length of 89.5 cm taken in Mahe, Seychelles, in 1975.

Interest to Fisheries : Fisheries for striped bonito are not well developed in most parts of its range (Yoshida, 1980:43). In Japan, it is taken often together with other scombrids by various types of gear including trolling lines, pole-and-line, purse seines, and set nets. There is a minor trap fishery for the species in the Philippines, and small-scale drift net operations around Sri Lanka and off southwestern India.

Local Names : AUSTRALIA: Oriental bonito; COLOMBIA: Bonito; COSTA RICA: Mono; ECUADOR: Bonito sierra; INDIA: Oriental bonito, Vari choora (Malayalam); JAPAN: Hagatsuo, Hosan, Kitsune, Kitsune-gatsuo, Sabagatsuo, Shimagatsuo, Sujigatsuo, Tozan; MAURITIUS: Brasse à dents; MEXICO: Bonito; PANAMA: Bonito; PERU: Bonito, Mono; SEYCHELLES: Brasse à dents; SOMALIA: Sinufa; SOUTH AFRICA: Streep-bonito, Striped bonito; SRI LANKA: Thora-baleya; USA: Bonito, Striped bonito; USSR: Vostochnaya pelamida, Prodolnopolosaya bonita; VIET NAM: Ca ngv'o phuo'ng dong.

Literature : Kikawa et al. (1963a); Silas (1963b, species synopsis); Fischer & Whitehead, eds (1974, Species Identification Sheets, Eastern Indian Ocean/Western Central Pacific); Yoshida (1980, species synopsis).

Remarks : Several authors have erroneously considered S. orientalis as a synonym of S. chiliensis.

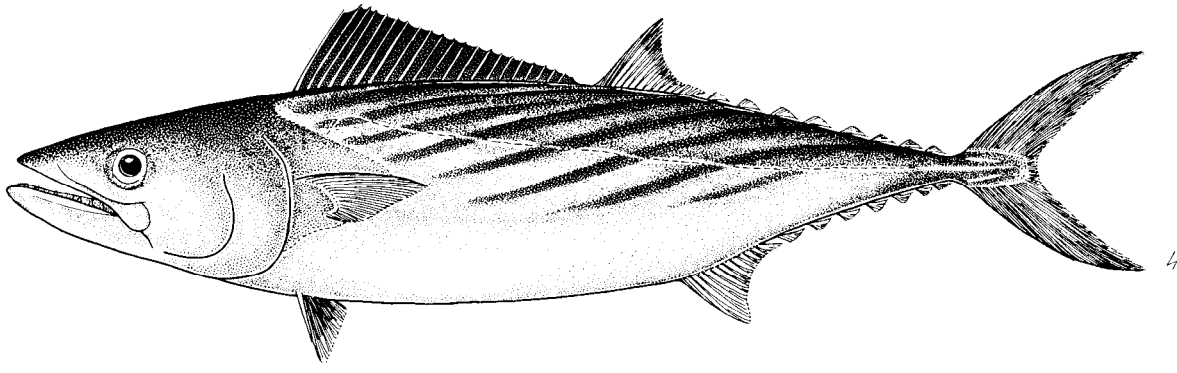
Sarda sarda (Bloch, 1793)

SCOMBR Sarda 1

Scomber sarda Bloch, 1793, Naturgeschichte der ausländischen Fische, 7:44-48, pl. 334 (Europe).

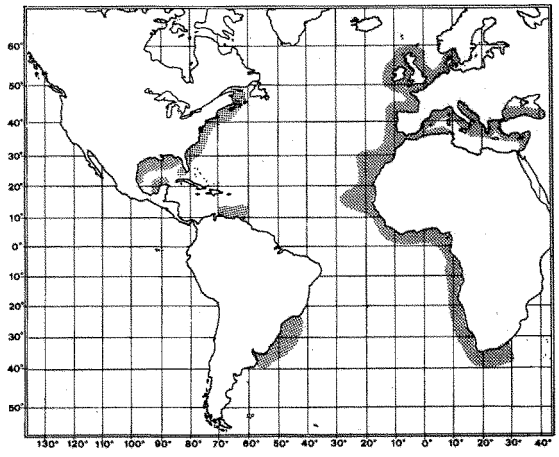
Synonymy : Scomber mediterraneus Bloch & Schneider, 1801; Scomber palamitus Rafinesque, 1810; Scomber ponticus Pallas, 1811; Thynnus sardus - Risso, 1826; Thynnus brachypterus Cuvier, 1829; Sarda sarda - Cuvier,1829; Pelamys sarda - Cuvier in Cuvier & Valenciennes, 1831; Palamita sarda - Bonaparte,l831; Pelamis sarda - Valenciennes, 1844; Sarda pelamys - Gill, 1862; Sarda mediterranea - Jordan & Gilbert, 1882.

FAO Names : En - Atlantic bonito; Fr - Bonite à dos rayé; Sp - Bonito atlantico.



Diagnostic Features : Upper jaw teeth 16 to 26; lower jaw teeth 12 to 24; vomerine teeth sometimes present; supramaxilla intermediate (Collette & Chao, 1975:fig. 32f); 16 to 23 gillrakers on first arch. First dorsal fin with 20 to 23 spines, length of fin base 29.1 to 33% of fork length; dorsal finlets usually 8; 14 to 17 rays in anal fin; anal finlets usually 7; pectoral fin rays 23 to 26, usually 24 or, 25. Vertebrae 26 to 28 precaudal plus 23 to 27 caudal, total 50 to 55, more than in any other species of Sarda. Colour: dorsal stripes oblique, with a greater angle than in other species of Sarda.

Geographical Distribution : Tropical and temperate coasts of the Atlantic Ocean, including the Gulf of Mexico and the Mediterranean and Black seas (Collette & Chao, 1975:fig. 70). In the western Atlantic, it has been taken at several localities along the outer coast of Nova Scotia but its usual northern limit is Cape Ann, Massachusetts. It is uncommon around southern Florida, present in the northern Gulf of Mexico, but apparently absent from most of the Caribbean Sea. It is known from Colombia and Venezuela and is much more common south of the Amazon River to northern Argentina. In the eastern Atlantic, it has been taken from near Oslo, Norway south to Port Elizabeth, South Africa.



Habitat and Biology : An epipelagic, neritic, schooling species that can adapt to gradual but not sudden changes in the environment and may occur in water temperatures between 12° and 27°C and salinities between 14 and 39°/oo S, entering estuaries such as Miramichi and the Gulf of St. Lawrence. In most parts of the Mediterranean, spawning occurs between May and July, but off Algeria it extends from March to May. In the eastern Atlantic, it occurs from December to June, including peaks in January and April, off Dakar, and from June to July in Moroccan waters. In the northwestern Atlantic, bonitos spawn in June and July. Adults prey primarily on small schooling fishes, the choice of species depending on the locality. In the Gulf of Mexico, it was also found to feed on a number of invertebrates like squid and shrimps. It can swallow relatively large prey, and both the juveniles and the adults are known to be cannibalistic.

Size : Maximum fork length in the Black Sea is 85 cm and 5 kg weight; in the western Atlantic, the largest fish caught is reported as measuring 91.4 cm fork length and weighing 5.4 kg; common to 50 cm fork length and about 2 kg weight. The all-tackle angling record is a 7.6 kg fish with a fork length of 78 cm taken in the Canary Islands in 1980. Minimum length at first maturity is about 39.5 cm in males and 40.5 cm in females.

Interest to Fisheries : There are fisheries of various sizes throughout most of the range of S. sarda. The species is particularly important in the Mediterranean and Black seas where it is taken by trap net-ring net, gillnet, trammel net, purse seine, beach seine, and hook and line (Demir, 1963). In the period from 1978 to 1981, 11 countries reported catches of S. sarda from Fishing Area 37, steadily increasing from 9 400 to about 29 400 metric tons per year (FAO, 1983). Fishing in the Black Sea peaks between May and October, while in the Mediterranean it may vary from area to area or even extend throughout the year. The yearly world catch reported for the species in the above period tended upwards from 14 892 to 41 385 metric tons (FAO, 1983). Fishing in the eastern tropical Atlantic takes place between October and May, while it extends throughout the year off Morocco. In the Bay of Biscay, the season is much shorter, from mid-April to mid-May, however, Spanish vessels may extend their operation through November. Peak fishing of the Spanish fleet all around the peninsula is in late spring and in fall. In the western Atlantic (Gulf of Maine), Atlantic bonito is taken between June and October.

Local Names : ALBANIA: Palamiti; ALGERIA: Bonite, Bonite à dos rayé, Palamita, Rsela; ARGENTINA: Bonito; BRAZIL: Sarda; BULGARIA: Lakerda, Palamud, Turuk. COLOMBIA: Bonito; CUBA: Bonito; DENMARK: Rygstribet Pelamide; FRANCE: Bonite à dos rayé, Bonicou, Boniton, Boussicon, Boussicou, Conite, Pélamide, Pelamide commun, Pelamido; GERMANY FR: Pelamide, Unechter Bonito; GREECE: Doriki, Koini, Palamida, Ternata, Toriki, Touliki; ICELAND: Rákungur; ISRAEL: Sarda; ITALY: Bonnicou, Cavaritu imperiali, Cuvarita, Pelamide, Palamitu maiaticus, Paamie, Palametto, Palamia, Palamita, Parantuni, Pelamida, Pilamitu, Pirantuni, Pisantuni, Sangulu, Scurma, Sgamiru, Sgonfietto, Strombo, Tombarello, Tunnacchiu; JAPAN: Hagatsuo, Kitsungegatsuo; LIBYA: Balamit, Blamto; MALTA: Palamia, Palamit, Palamita, Plamitu, Plamtu; MARTINIQUE: Bonite; MONACO: Palamida, Paramida, Piramida; MOROCCO: Bonito, Cerda; NETHERLANDS: Atlantische boniter; POLAND: Pelamida; PORTUGAL: Bonito, Serra; Madeira: Cerda; ROMANIA: Lacherda, Pelamida; SOUTH AFRICA: Atlantiese bonito, Atlantic bonito, Bonito, Katonkel, Sarrajao; SPAIN: Bonito, Bonito, Bonitu, Cerda; SWEDEN: Pelamide, Rygstrimmig pelamid; SYRIA: Palamet; TUNISIA: Balamit, Palamid, Rsela, Toumbrel; TURKEY: Palamut, Torik; UK: Belted bonito, Pelamid, Stripe-backed pelamis; URUGUAY: Bonito; USA: Atlantic bonito, Bloater, Bone jack, Bonito, Boston mackerel, Common bonito, Skipjack; USSR: Atlanticheskaya pelamida, Lacherda, Pelamida; VENEZUELA: Cabaña blanca, Cabaña cariba, Cabaña de diente; YUGOSLAVIA: Palovnic, Pastrica, Polanda, Polandra, Sargasto, Sarica, Tombarel, Trup lacherda.

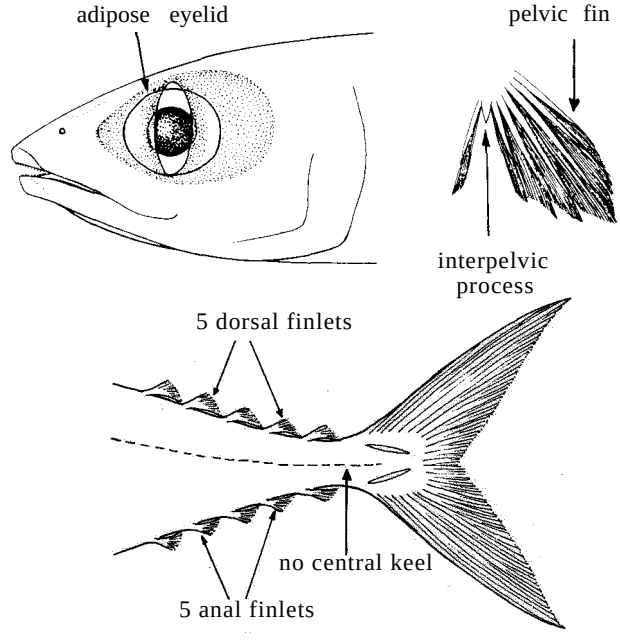
Literature : Demir (1963, species synopsis); Fischer, ed. (1973, Species Identification Sheets, Mediterranean and Black Sea); Yoshida (1980, species synopsis); Collette (1978, Species Identification Sheets, Western Central Atlantic; 1981, Species Identification Sheets, Eastern Central Atlantic); Rodriguez-Rodu (1981).

Scomber Linnaeus, 1758

SCOMBR Scom

Genus with reference : Scomber Linnaeus, 1758:297. Type-species: Scomber scombrus Linnaeus, 1758, by subsequent selection of Gill, 1862.

Diagnostic Features : Body elongate and rounded. Snout pointed; front and hind margins of eye covered by an adipose eyelid; teeth in upper and lower jaws small and conical; teeth also present on vomer and palatine bones (roof of mouth); gillrakers shorter than gill filaments, barely visible through open mouth, 25 to 35 on lower limb of first arch. Two widely separated dorsal fins, the first with 8 to 13 spines; second dorsal and anal fins with 12 rays; anal spine fairly stiff and strong; 5 dorsal and 5 anal, finlets; interpelvic process small and single; pectoral fin short, with 18 to 21 rays. Entire body covered with rather small scales; scales behind head and around pectoral fins larger and more conspicuous than those covering rest of body, but no well developed corselet. Two small keels on each side of caudal peduncle (at base of caudal fin lobes), but no central keel between them. Swimbladder present or absent. Vertebrae 31. Last branchiostegal ray slightly flattened but not forming a wide plate. Colour: back steel-blue crossed by faint wavy lines; lower sides and belly silvery-yellow unmarked or with numerous dusky, rounded blotches; no rows of spots along the back next to dorsal fin bases as in Rastrelliger.



Habitat and Biology : The 3 species of the genus are primarily epipelagic and neritic, but the absence of a swimbladder permits S. scombrus to vary its depth rapidly. Although there is overlap in the occurrence, one species tends to dominate in a given geographical area. Except for stray individuals encountered in warmer and even tropical waters the genus Scomber seems to be basically confined to temperate water, being replaced by Rastrelliger towards the tropic-regions of the Indo-West Pacific. Schooling behaviour (by size) is strongly developed and begins in the postlarval and juvenile stages. Mixed schools may include i.e. jack mackerel and Pacific sardine.

Mackerels are plankton feeders filtering copepods and other crustaceans out of the water, but adults also prey on small fish and squids. Predators include large tunas, yellowtail, billfishes, sharks, dolphins, sea lions and pelicans. The larvae are cannibalistic up to the onset of schooling behaviour (Hunter & Kimbrell, 1980).

Interest to Fisheries : The genus by far dominates quantitatively the scombrid catches. In 1981, the world catch of Scomber was estimated at about 2.4 million metric tons (S. japonicus alone accounted for 1.76 million metric tons) as compared to some 1.65 million metric tons for all tunas (FAO, 1983). Japan and the USSR reported highest individual catches. Mackerels are most commonly caught with purse seines. Other gear retaining some relevance include lampara nets, set nets, gillnets, trolling lines, longlines, hand lines, midwater trawls, and beach seines. They are marketed fresh, frozen, canned, smoked and salted.

Literature : Matsui (1967).

Scomber australasicus Cuvier, 1831

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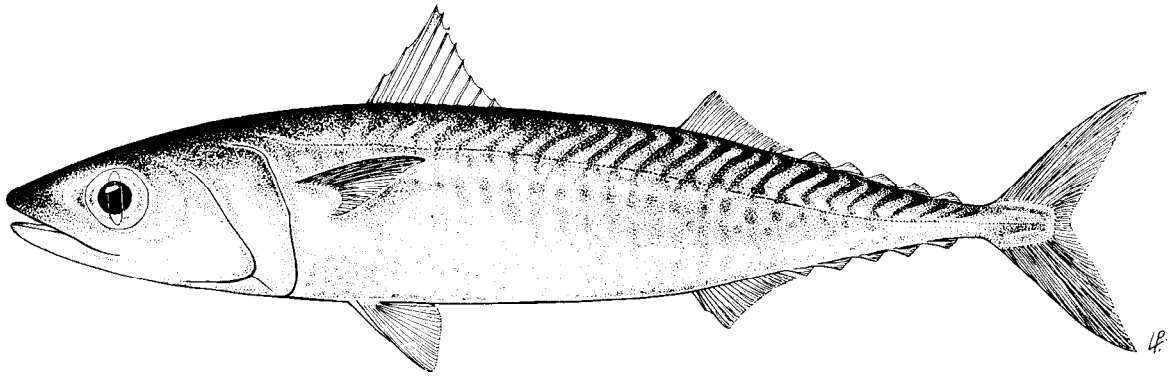
Scomber australasicus Cuvier in Cuvier & Valenciennes, 1831, Histoire Naturelle des Poissons, 8:49 (King George's Sound, Western Australia).

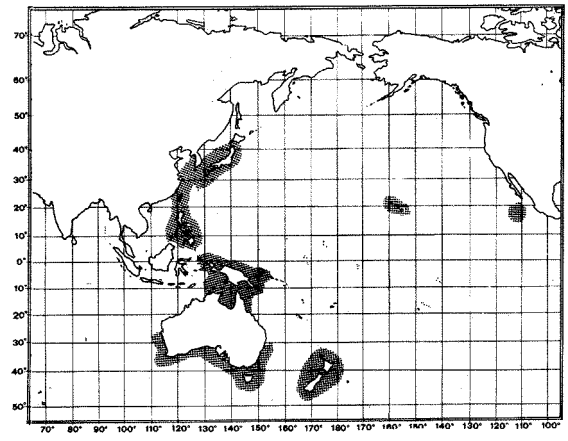
Synonymy : Scomber tapeinocephalus Bleeker, 1854; Scomber antarcticus Castelnau, 1872; Pneumatophorus tapeinocephalus - Murakami & Hayano, 1956; Pneumatophorus japonicus tapeinocephalus - Abe & Takashima, 1958.

FAO Names : En - Spotted chub mackerel; Fr - Maquereau tacheté; Sp - Caballa pintoja.



Diagnostic Features : Palatine narrow, palatine teeth in single or double rows; when double, the rows are close and running into each other. First dorsal fin with 10 to 13 spines; space between first dorsal fin groove and second dorsal fin approximately equal to length of groove; distance from 10th spine to origin of second dorsal fin clearly greater than distance between first and 10th spine; anal fin origin clearly more posterior than that of second dorsal fin, approximately opposite 4th ray of second dorsal; anal fin spine independent from anal fin. Swimbladder present. Vertebrae 14 precaudal plus 17 caudal; first haemal spine posterior to first interneural process; 15 to 20 interneural bones under first dorsal fin. Colour: markings on back oblique lines which zigzag and undulate; belly pearly-white marked with thin, wavy, broken lines which in places appear as speckling.

Geographical Distribution : Western Pacific Ocean from Australia and New Zealand, north to China and Japan and east to the Hawaiian Islands but relatively rare in tropical waters. Also occurs at Socorro Island, off Mexico in the eastern Pacific Ocean.



Habitat and Biology : An epipelagic, neritic species, schooling by size. Its biology is little known.

Size : Maximum fork length is 40 cm, common to 30 cm.

Interest to Fisheries : Although there are important fisheries for this species in Japan, Australia, and New Zealand, no catch data identified as S. australasicus are reported by these countries. Some of the catch is probably reported as S. japonicus. In Australia, it is important in the southern part of the country, from southern Queensland southward to New South Wales, Victoria, and Tasmania, and westward to South Australia and Western Australia.

Local Names : AUSTRALIA: Slimy mackerel; JAPAN: Gomasaba, Marusaba; NEW ZEALAND: Blue mackerel, Japanese mackerel; USSR: Avstralijskaya skumbraya.

Literature : Abe & Takashima (1958); Fischer & Whitehead, eds (1974, Species Identification Sheets, Eastern Indian Ocean/Western Central Pacific).

Remarks : The name Scomber australasicus was used by Manacop (1958) for Rastrelliger faughni.

Scomber japonicus Houttuyn, 1782

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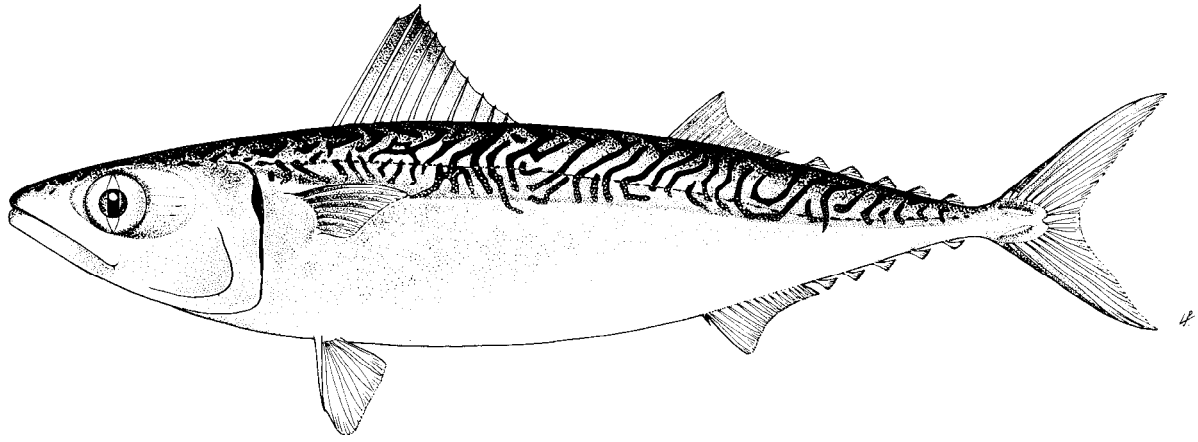
Scomber japonicus Houttuyn, 1782, Verh.Holl.Maatsch.Wet. Haarlem 20(2):331 (Japan).

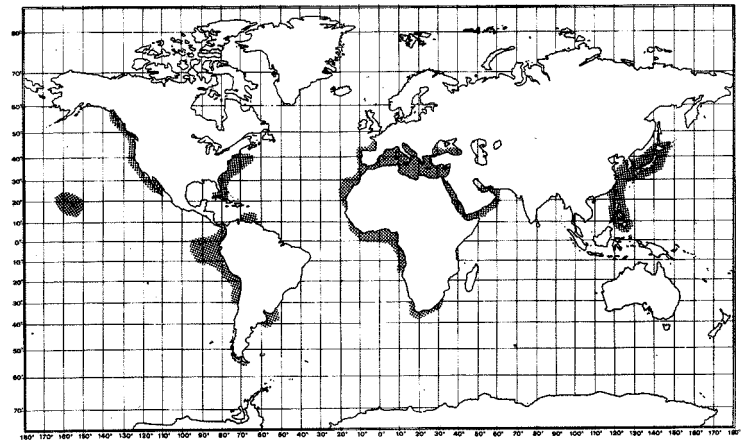
Synonymy : Scomber colias Gmelin, 1789; Scomber pneumatophorus Delaroche, 1809; Scomber macrophthalmus Rafinesque, 1810a; Scomber grex Mitchill, 1815; Scomber capensis Cuvierin in Cuvier & Valenciennes, 1831; Scomber maculatus Couch, 1832; Scomber undulatus Swainson, 1839; Scomber gracilis Swainson, 1839; Scornber saba Bleeker, 1854; Scomber janesaba Bleeker, 1854; Scomber dekayi Storer, 1855; Scomber diego Ayres, 1857;Pneumatophorus japonicus - Starks, 1922; Pneumatophorus colias - Starks, 1922; Pneumatophorus grex - Jordan & Hubbs, 1925; Pneumatophorus diego - Jordan & Hubbs, 1925; Pneumatophorus peruanus Jordan & Hubbs, 1925; Scomber gigas Fowler, 1935; Pneumatophorus japonicus marplatensis López, 1955; Scomber japonicus colias - Padoa, 1956; Scomber peruanus - Fitch & Craig, 1964.

FAO Names: En - Chub mackerel; Fr - Maquereau espagnol; Sp - Estornino.



Diagnostic Features : Palatine bone (on roof of mouth) narrow, palatine teeth in single or double rows, when double, rows close and running into each other. First dorsal fin with 9 or 10 spines; space between first and second dorsal fin less than first dorsal fin base; anal fin origin opposite that of second dorsal fin or somewhat more posterior; anal fin spine conspicuous, clearly separated from anal rays but joined to them by a membrane. Swimbladder present. Vertebrae 14 precaudal plus 17 caudal; first haemal spine posterior to first interneural process; 12 to 15 interneural bones under first dorsal fin. Colour: back with oblique lines which zigzag and undulate; belly unmarked (Pacific populations) or marked by spotting or wavy broken lines (Atlantic populations).

Geographical Distribution : Cosmopolitan, inhabiting the warm and temperate transition waters of the Atlantic, Indian, and Pacific oceans and adjacent seas.



Habitat and Biology : A primarily coastal pelagic species, to a lesser extent epipelagic or mesopelagic over the continental slope, occurring from the surface to about 250 or 300 m depth. Seasonal migrations may be very extended, the fish in the northern hemisphere moving further northward with increased summer temperatures, and southwards for overwintering and spawning. The reverse pattern generally applies to populations in the southern hemisphere. Schooling by size is well developed and initiates at approximately 3 cm. Schools of adults are the most compact and structured. Multispecies schooling in the Northeastern Pacific may occur with eastern Pacific bonito (Sarda chiliensis), jack mackerel (Trachurus symmetricus), and Pacific sardine (Sardinops sagax).

Spawning most often occurs at water temperatures of 15° to 20° C, which results in different spawning seasons by regions, for example: off Peru, from January through May and in September; off northeastern Japan, from April to August with a peak in May, but initiating in March further south; off California and Baja California, from March through October with peaks between April and August. Spawning occurs in several batches of about 250 to 300 eggs per g of fish with the total number of eggs per female ranging from approximately 100 000 to 400 000.

The chub mackerel is believed to be in food competition with the species it schools with, such as the eastern Pacific bonito, the jack mackerel and others. Its feeding is opportunistic and non-selective, the diet of adults ranging from copepods and other crustaceans to fish and squid. Its predators include tunas, billfishes, white seabass (Cynoscion nobilis), yellowtail (Seriola lalandi) and other fishes, as well as sea lions, sharks and pelicans.

Size : Maximum fork length 50 cm, common to 30 cm (a fish of 47.6 cm fork length weighed 1.1 kg).

Interest to Fisheries : In 6 out of 11 FA0 Fishing Areas (34, 41, 47, 61, 77 and 87) chub mackerel supports important commercial fisheries. Forty countries have been reporting catches of S. japonicus between 1978 and 1981. The most prominent catches are generated in Fishing Area 61, where they fluctuate between 1.3 and 2.2 million metric tons, most of which are taken by Japanese vessels. In Fishing Area 34, yearly catches often exceeded 100 000 metric tons, while in each of Areas 41, 47, 87, and 77, more than 10 000 metric tons per annum were captured in the last few years. The nominal world catch decreased steadily after the record year 1978,

when 2 861 264 metric tons were reported to FAO. While in 1980 it still amounted to over 2 million metric tons a low of 1 765 024 metric tons was registered in 1981 (FAO, 1983). Among the countries sharing this catch, the USSR ranked second behind Japan; Chile and Peru occupied the third and fourth places respectively.

At present the principal method of fishing chub mackerel is purse-seining, even though other types of gear are still being used, for example, lampara nets, set nets, trap nets, gillnets, large lift nets, spoon nets, trolling gear, balance nets, stake lines, longlines, and even trawls. Such gear is mostly used in small-scale fisheries. Between 1971 and 1974 more chub mackerel were taken in the sports fishery than in commercial operations off California (Schaefer, 1980).

Some countries have management schemes and local regulations to protect the stocks.

Local Names : ARGENTINA: Caballa; AUSTRALIA: Common mackerel; BRAZIL: Cavalinha; CHILE: Caballa; COLOMBIA: Caballeta, Salmonete; CUBA: Caballa; ECUADOR: Caballa, Macarela; EGYPT: Scomber; FRANCE: Maquereau espagnol; GERMAN DM RP: Japanische Makrele; GREECE: Koliós; GUATEMALA: Caballa; ISRAEL: Kolias; ITALY: Lanzardo, Scombro macchiato, Sgombro cavallo; JAPAN: Hirasaba, Masaba; MALTA: Kavall; MEXICO: Cachorreta, Macarela de1 Pacífico; MONACO: Cugüu; MOROCCO: Kabaila; PACIFIC ISLANDS TRUST TERRITORIES: Smaach; PERU: Caballa, Verle; PHILIPPINES: Alumahan, Lumahan (Tagalog), Japan mackerel; POLAND: Makrela kolias; PORTUGAL: Cavalinha; ROMANIA: Colios; SOUTH AFRICA: Mackerel, Makriel; SPAIN: Estornino; SWEDEN: Spank makrill; TUNISIA: Sqoumri; TURKEY: Kolyoz; UK: Chub mackerel; URUGUAY: Caballa; USA: Chub mackerel; California: Pacific mackerel; Hawaii: Opelu palahu, Saba; USSR: Afrikanskaya skumbriya, Atlanticheskaya skumbriya, Kalifornijskaya skumbriya, Vostochnaya skumbriya, Yuzhnaya skumbriya; VENEZUELA: Cachorreta, Macarela; VIET NAM: Cá thu Nhât-bán; YUGOSLAVIA: Bilica, Juja, Lancarda, Plavica.

Literature : Kramer (1969); Fischer, ed. (1973, Species Identification Sheets, Mediterranean and Black Sea); Sidwell et al. (1974, information on composition of edible portion); Schaefer (1980, species synopsis); Collette (1978, Species Identification Sheets, Western Central Atlantic; 1981, Species Identification Sheets, Eastern Central Atlantic).

Scomber scombrus Linnaeus, 1758

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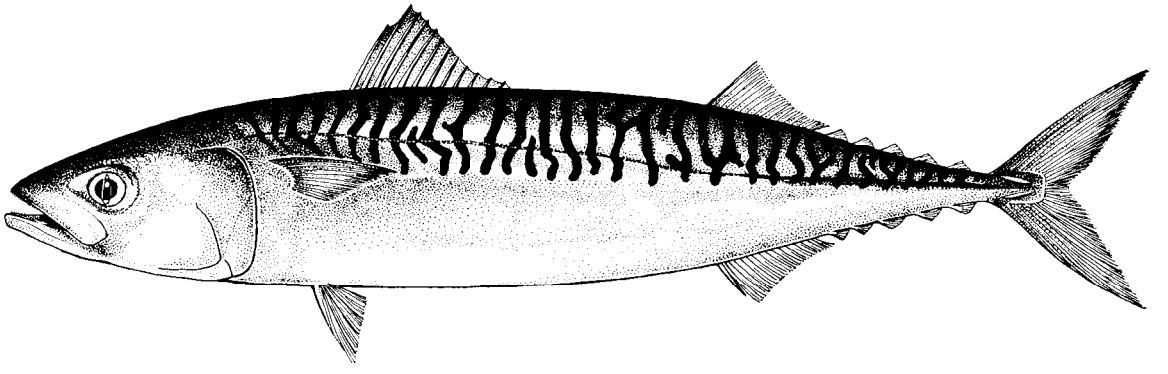
Scomber scombrus Linnaeus, 1758, Systema Naturae, ed. x:297 (Atlantic Ocean).

Synonymy : Scomber scomber - Brünnich, 1768; Scomber vernalis Mitchill, 1815; Scomber vulgaris S.D.W., 1849; Scomber scriptus Couch, 1867.

FAO Names: En - Atlantic mackerel; Fr - Maquereau commun; Sp - Caballa del Atlantico.



Diagnostic Features : Palatine wide, teeth in two widely spaced rows. Space between first dorsal fin groove and second dorsal fin clearly greater (approximately 1.5 times) than length of groove; anal fin origin opposite that of second dorsal fin or nearly so; anal fin spine conspicuous, joined to the fin by a membrane but clearly independent of it. Swimbladder absent. Vertebrae 13 precaudal plus 18 caudal; first haemal spine anterior to first interneural process; 21 to 28 interneural bones under first dorsal fin. Colour: markings on back oblique to near vertical, with relatively little undulating; belly unmarked.