2.4 FAMILY XIPHIDAE

XIPH

Synonymy : None.

Remarks : This family includes a single species, Xiphias gladius, which is easily distinguished from the istiophorids by its flat bill, the absence of jaw teeth and scales in adults, the short-based dorsal fin which is well separated from the second dorsal in adults, the absence of pelvic fins, and the presence of a single median keel on each side of the caudal peduncle.

Xiphias Linnaeus, 1758

XIPH Xiph

Genus : Xiphias Linnaeus, 1758, Systema naturae, ed.10:248.

Type Species : Xiphias gladius Linnaeus, 1975 by monotypy.

Synonymy : Ziphius Hector, 1875 (?misspelling); Ziphias Cheeseman, 1876 (?misspelling); Phaethonichthys Nichols, 1923 (based on incomplete juvenile specimen from stomach of a red-tailed tropic bird).

Remarks : This genus is monotypic.

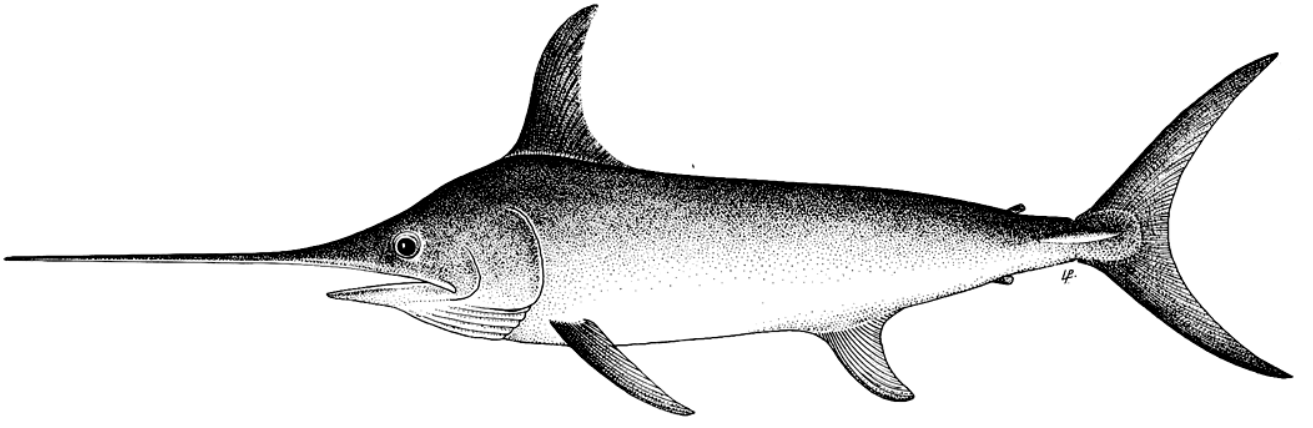
Xiphias gladius Linnaeus, 1758

XIPH Xiph 1

Xiphias Gladius Linnaeus, 1758, Syst.Nat., 10:248 (Habitat in Oceano Europae).

Synonymy : Xiphias gladius-Bloch, 1786; Xiphias imperator Bloch & Schneider, 1801; Xiphias rondeletti Leach, 1818; Phaethonichthys tuberculatus Nichols, 1923; Xiphias estara Phillips, 1932; Terapterus imperator-Rohl, 1942; Xiphias thermaicus Serbetis, 1951; Xiphias gladius estara- Whitley, 1964.

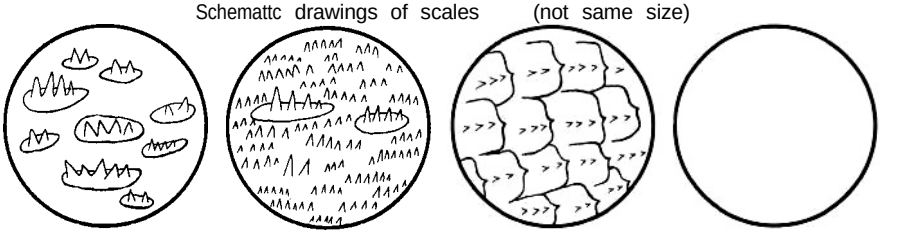
FAO Names: En - Swordfish; Fr - Espadon; Sp - Pez espada

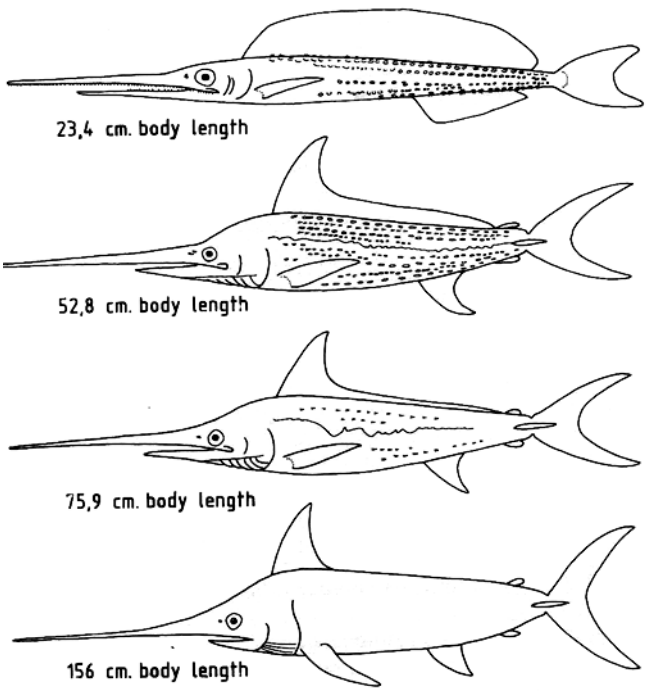


Field Marks : Bill extremely long, its cross-section flat; no teeth in jaws, in adults a large single median caudal keel on each side; no pelvic fins; body without scales.

Diagnostic Features : Body elongate and cylindrical. Upper jaw prolonged into a long bill, flat-oval in cross-section (but both jaws prolonged into long bills in immature individuals); eyes large; mouth not protrusible; fine, file-like teeth present in specimens of about 1 m (body length), disappearing with growth; gill openings wide, gill membranes united only basally and free from isthmus; no gillrakers. Two widely separate dorsal fins in adults (continuous in immature specimens), the first much larger than the second; first dorsal with 34 to 49, second dorsal with 4 to 6 rays; two separate anal fins in adults (continuous in immature specimens) the first much larger than the second; first anal with 13 or 14, second anal with 3 or 4 rays; position of second anal fin slightly more forward than that of second dorsal fin; pectoral fins falcate, a little rigid and situated low on body sides, with 16 to 18 rays; pelvic fins and pelvic girdle absent; caudal fin large and lunate. Caudal peduncle with a large keel present on each side and a deep notch on both the dorsal and ventral surfaces; anus situated near first anal fin origin. Lateral line absent in adults, but recognizable in specimens to about 1 m body length as wavy line, disappearing with growth. Adults scaleless but scales with small spines present in specimens to about 1 m body length. Vertebrae 26 (15 or 16 precaudal and 10 or 11 caudal). Colour: back and sides of body blackish-brown, gradually fading to light-brown on ventral side; fin membrane of first dorsal fin dark blackish-brown; other fins brown or blackish-brown.

Schemattc drawings of scales (not same size)

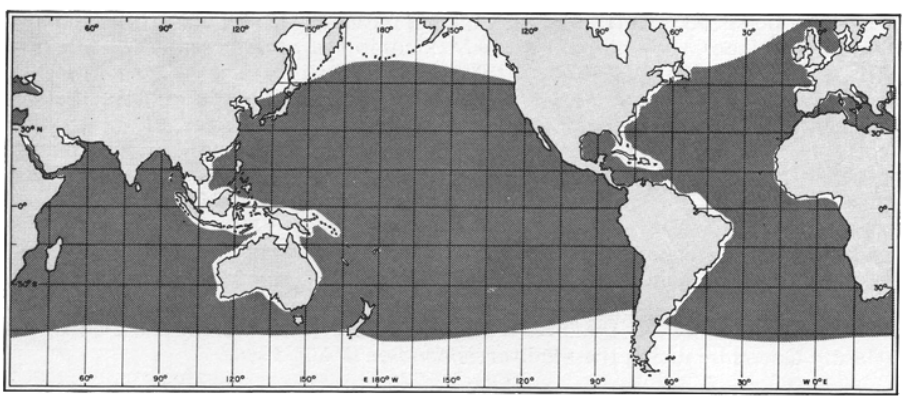




Body changes of swordfish with growth (schematic)

In its preadult stage, the swordfish undergoes drastic morphological changes with growth, which affect the body shape, the bill and particularly the dorsal, anal and caudal fins.

Geographical Distribution : Cosmopolitan in tropical, temperate and sometimes cold waters of all oceans, including the Mediterranean Sea, the Sea of Marmara, the Black Sea, and the Sea of Azov. Based on data from commercial longliners' catches, the latitudinal range of this species extends from 50°N to 45°S In the western Pacific, from 50°N to 35°S in the eastern Pacific, from 25°N to 45°S in the Indian Ocean, from 50°N to 40°-45°S in the western Atlantic, and from 60°N to 45°-50°S in the eastern Atlantic.



Habitat and Biology : This is an epi-and mesopelagic, oceanic species, usually found in surface waters warmer than 13°C, the optimum temperature range being 18° to 22°C in the northwestern Pacific Ocean. The swordfish has the greatest temperature tolerance among billfishes, ranging from 5° to 27°C. Based on records of forage organisms taken by this species, its depth distribution in the northwestern Pacific ranges normally from the surface to about 550 m depth. It is believed, however, to descend occasionally into waters of 5° to 10°C and to depths of at least 650 m.

The swordfish is primarily a warm-water species and, generally speaking, its migrations consist of movements toward temperate or cold waters for feeding in summer and back to warm waters in autumn for spawning and overwintering. There are two hypotheses on the migration of the swordfish in the northwestern Atlantic: (1) they migrate to the north and east along the edge of the continental shelf during summer and return to the south and west in autumn, or (2) there are different groups of swordfish migrating from deep waters toward the continental shelf in summer and moving back to deep waters in autumn.

Larvae are more frequently encountered at temperatures above 24°C. In the Atlantic, spawning apparently occurs throughout the year in the Caribbean, the Gulf of Mexico, and in the waters off Florida, with the peak of the spawning season from April through September. In the Pacific Ocean, it occurs in spring and summer (March through July) in the central part, in spring (September to December) in the western South Pacific, and alI the year round in equatorial Pacific waters. The best known spawning grounds of the swordfish are found in the Mediterranean Sea, off the southern part of the Italian Peninsula and Sicily, the main spawning concentrations occurring in the Straits of Messina. Adults are present on these spawning grounds in all months except January and February, and spawning is most intensive from the end of June to August, when males are often observed pursuing females. Eggs of this species have been found from June to September, and young swordfish up to 5 kg have been recorded from October to December. Large numbers of juveniles occur throughout the Mediterranean from November to March. Female gonads contain 2 to 5 million eggs. In the Atlantic Ocean swordfish spawn in the upperwater layer at depths between 0 and 75 m, at temperatures around 23°C, and salinity of 33.8 to 37.4°/₀₀.

Adult swordfish are opportunistic feeders, known to forage for their food from the surface to the bottom over a wide depth range. Over deep water, they feed primarily on pelagic fishes, including tunas (Thunnus), dolphinfishes (Coryphaena), Alepisaurus, Gempylus flyingfishes (Exocoetidae), barracudas (Sphyraenidae) and others, and pelagic squids (Ommastrephes, Loligo, Illex and others), while in relatively shallow waters they take chiefly neritic pelagic fishes (mackerels, herrings, anchovies, sardines, sauries, needlefishes, etc.). Large adults often make feeding trips to the bottom where the temperatures may be 5° to 10°C and feed on demersla fishes (hakes, Bramidae, trichiurids, gempylids, redfish, lanternfishes (Myctophydae), Gonostomatidae, Sternoptychidae etc.). Based on stomach contents from X. gladius, it is most likely true that the swordfish uses its sword to kill some of its prey, particularly squids and cuttlefishes, as is shown by the slashes on the bodies of prey found in swordfish stomachs.

Size : This species reaches a maximum size of 445 cm total length and about 540 kg weight. The size range of fish taken by the commercial swordfish longliners is 120 to 190 cm body length in the northwestern Pacific; the average weight in the Mediterranean Sea ranges from 115 to 160 kg. Usually females are larger than males, and most swordfish over 140 kg are females. Adults grow over 230 kg (rarely) in the Mediterranean, up to 320 kg in the western Atlantic, and up to 537 kg in the southeastern Pacific. The all-tackle-angling record for this species is a 536.15 kg (1182 lb) fish caught off Iquique, Chile in 1953.

There is little information on biological minimum size and age and some of the data are contradictory. X. gladius first spawns at 5 to 6 years of age and 150 to 170 cm eye-fork length (which is 85 to 88% of body lenght) in the Pacific and Indian oceans (Yabe et al., 1959). Males reach sexual maturity at a length of around 100 cm and females at a length of 70 cm in the Atlantic (Ovchinnikov, 1970). However, recent research conducted on swordfish off the southeast coast of the United States indicates that males mature at a smaller size than females (at about 21 kg for males and 74 kg for females) (E. Houde, pers.comm., cited from Palko, Beardsley & Richards, 1981). Kume and Joseph (1969) regarded swordfish of less than 130 cm eye-fork length as immature.

Interest to Fisheries : There are important fisheries for X. gladius in the Atlantic, Indian and Pacific oceans. Catches have been reported from 14 FAO Fishing Areas (21, 27, 31, 34, 41, 47, 51, 57, 61, 67, 70, 77, 81 and 87) by about 30 countries (major fishing nations: Japan, USA, Italy, Spain, Canada, Republic of Korea, China (Taiwan Province), the Philippines and Mexico) in the period from 1978 to 1982. The world catch was 40 279 t in 1978, 37 992 t in 1971, 36 402 t in 1980, 37 726 t in 1981 and 40 321 t in 1982. Only 1 439 t of the 1981 catches were taken in the Indian Ocean, while the rest were distributed in halves between the Pacific and Atlantic oceans (including the Mediterranean Sea), particularly in Fishing Area 61 (northwestern Pacific) with 8 085 t predominantly by Japan, and secondly by China (Taiwan Province), Fishing Area 37 (Mediterranean) with 6 584 t predominantly by Italy and Spain, and Fishing Area 77 (eastern central Pacific) with 5 210 t predominantly by Mexico and Japan. More than 2 000 t were reported in 1981 from 5 other Fishing Areas, i.e., Fishing Area 21 (northwestern Atlantic) with 2 315 t predominantaly by USA, Fishing Area 27 (northeastern Atlantic) with 2 163 t predominantly by Spain, Fishing Area 31 (western central Atlantic) with 2 548 t predominantly by USA, Fishing Area 34 (eastern central Atlantic) with 2 117 t by some 10 countries, and Fishing Area 71 (western central Pacific) with 2 940 t predominantly by the Philippines (FAO, 1983). Of the 1982 world catch (40 321 t), only 3.7% (1 500 t) were taken in the Indian Ocean, 43.9% (17 705 t) in the Pacific Ocean, and 52.4% (21 116 t) in the Atlantic Ocean including the Mediterranean Sea (FAO, 1984).

Catch records from the high seas tuna longline fishery indicate that swordfish are taken almost throughout the range of that fishery. For the most part, however, swordfish catches are incidental to the tuna longline fishery, except for the Japanese swordfish longlines (nocturnal longlines) called in Japanese “Mekanawa” (=swordfish longline) or “Yonawa” (=night longline) which operate in the northwestern Pacific, from Japan eastward almost to 14O°W. Other important commercial fisheries directed at the swordfish are located in the western North Atlantic from the Grand and Georges Banks to the Gulf of Mexico (harpooning and longlining), in the eastern Atlantic, especially in the Gulf of Guinea and the Mediterranean Sea (longlining, harpooning and various kinds of trapping or setnetting), and in the South Atlantic off the coasts of Brazil and Uruguay (longlining).

Major sportingfishing areas for trolling and drifting baited lines are located off the east coast of the USA from New York to Texas, from off the coast of California to Ecuador, Peru and northern Chile, off the east coast of Australia and around New Zealand.

The quality of the flesh is excellent for steaks, canning or “Teriyaki” (grilled meat with sugar; soy-sauce and rice wine in the Japanese way). Marketed mostly fresh or frozen.

Local Names : ALGERIA: Pez espada; ARGENTINA: Pez espada; AUSTRALIA: Broadbill swordfish, Swordfish; BRAZIL: Espadarte, Peixe espada; BELGIUM: Espadon ; CANADA: Broadbill swordfish, Espadon, Swordfish; CHILE: Albacora, Pez espada ; CHINA: Chien-chi-yu, Ki-hi-khu, Tinmankhu; CUBA: Pez espada; DENMARK: Svaerdfisk; FRANCE: Espadon GERMANY (FED.REP.) Schwertfisch; GREECE: Xiphias; INDIA: Kuthira-meen (Lacadive Archipelago?), Mas-hibaru ; IRELAND: Luinniasc ; ITALY: Pesce spada; JAPAN: Andaachi, Dakuda, Ginzasu, Goto Hirakucha, Hyu, Io, Izasu, Kudamaki, Medara, Meka, Mekajiki, Mesara, Okizaara, Rakuda, Shiutome, Shutome, Suzu, Teppo, Tsun ; MALTA: Piscispat, Pixxi spad; MEXICO: Pez espada; NETHERLANDS: Zwaardvisch; NEW ZEALAND: Brodbill; NORWAY: Sverdfisk ;PERU: Pez espada; PHILIPPINES: Dugso Doguso, Lumod, Malasagi, Malasugi, Manumbuk, Mayaspus; PORTUGAL: Agulha, Agulhao, Espada, Espadarte, Peixe agulha, Peixe espada; REPUBLIC OF KOREA: Whang-Sae-chi; ROMANIA: Reste cuspada; SOUTH AFRICA: Broadbill, Swaardvis, Swordfish; SPAIN: Ajai para, Chichi spada, Emperador, Espada, Espardarte, Pez espada ; SRI LANKA: Kadu kpooara ; SWEDEN: Swardfisk; TUNISIA: Bou sif ; UNITED KINGDOM: Swordfish ; USA: Broadbill, Broadbill swordfish, Swordfish ; USSR: Mechenos, Mech-ryba, Meshvenosouiye; VENEZUELA: Pez espada; VIET NAM: Ho cá mui kiem ; YUGOSLAVIA: Babljan, Iglun, Igo, Jaglun, Macokljun, Sablijck.

Literature: Nakamura et al., 1951; Yabe et al., 1959; Tibbo, Day and Doucet (1961); Ovchinnikov, 1970; Palko, Beardsley and Richards (1981); Nakamura, 1983.

Remarks : The local name “Albacore” is used for Xiphias gladius in Chile, while “albacore” is commonly used for the longfin tuna, Thunnus alalunga in many English speaking countries. In the French speaking countries, the yellowfin tuna, Thunnus albacares is called “Albacore”.

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