MFR PAPER 1268

What Is A Tuna?

W. L. KLAWE

W. L. Klawe is a Senior Scientist with the Inter-American Tropical Tuna Commission, Scripps Institution of Oceanography, La Jolla, CA 92037.

The word "tuna" is applied to certain members of the family Scombridae, a group of marine fishes containing also bonitos, mackerels, seerfishes (or Spanish mackerels) and the butterfly kingfish. "Tuna" is a newcomer to the English language. It seems to have come into use in the second half of the last century but it is not clear why it replaced the older name "tunny." Most likely "tuna" as a name for fish originated in California with immigrant fishermen. There is evidence that the Spanish-speaking Californians, prior to 1848, used the word "tuna" only as the name of a fruit of an edible cactus. Lyman (1970), argues in favor of an Italian origin of the word as applied to fish. He postulates that in southern California the word tuna was applied to the bonito, *Sarda chiliensis,* by fishermen originating in the Ligurian Sea area, and that the name eventually was transferred to other fish which had been known as tunny. It should be pointed out, however, that Lyman overlooked two important facts: 1) That at the time we think the name tuna was adopted by the English-speaking Californians, there were indeed in California fishermen originating from the Dalmatian coast of Yugoslavia (formerly part of the Austro-Hungarian monarchy), and their native name for tunny was "tuna"; 2) The name tuna could also have been brought to southern California during the second half of the nineteenth century by people from the Iberian Peninsula, i.e., the Spaniards, Portuguese, and Basques, whose names for tuna included tunnina, tonina, tohinha, or atuna, among others. The English word tuna may have been derived from these. Thus for the time being, we must conclude that the process by which the word "tuna" gained entry into American usage is unknown[1].

To ichthyologists, the biologists who study fishes including their classification, tuna is any of 13 species of the tribe Thunnini within the family Scombridae. Species, genera, tribes, families, and all other taxonomic units used by scientists to classify all the animals and plants are in Latin, and this biological classification is organized so that it reflects the relationship of organisms, both extinct and present, to each other. In other words, this classification attempts to account for the evolutionary history of the organisms in question. The relationship among the present members of the family Scombridae is shown in Figure 1. The tribe Thunnini corresponds to what ichthyologists consider to be the tunas, and this tribe is comprised of the following species:

Bullet tuna	*Auxis rochei*
Frigate tuna	*Auxis thazard*
Kawakawa	*Euthynnus affinis*
Little tunny	*Euthynnus alletteratus*
Black skipjack	*Euthynnus lineatus*
Skipjack tuna	*Katsuwonus pelamis*
Albacore	*Thunnus alalunga*
Yellowfin tuna	*Thunnus albacares*
Blackfin tuna	*Thunnus atlanticus*
Southern bluefin tuna	*Thunnus maccoyii*
Bigeye tuna	*Thunnus obesus*
Northern bluefin tuna	*Thunnus thynnus*
Longtail tuna	*Thunnus tonggol*

These species, together with the rest of the scombrids, are listed in Table 1, where the scientific as well as the common names are given. The geographical distribution is also given for each of the species. The common names used in Table 1 are those names which are currently used by the fishermen, scientists, international fisheries bodies, trading companies, fish processors, and other people who concern themselves

[1]Klawe, W. L. 1976. *Tuna* as an English word for a scombrid fish. Inter-Am. Trop. Tuna Comm., La Jolla, CA 92037 (Unpubl. manuscr.).

Figure 1.—The subfamilies, tribes, genera, and number of species of the family Scombridae (based on Collette and Chao, 1975).

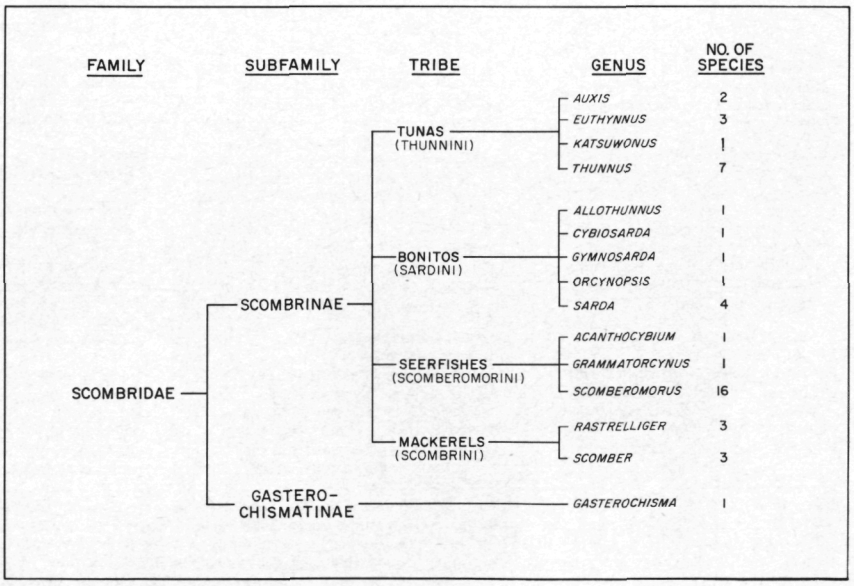


Table 1.—Alphabetical list of genera and species of scombrid fishes and the geographical distribution of each species.

Tunas, bonitos, seerfishes, butterfly kingfish, and mackerels
Family Scombridae

Acanthocybium Gill, 1862
Wahoo
Acanthocybium solandri (Cuvier *in* Cuvier and Valenciennes, 1831)
Tropical and subtropical waters of the Indian, Pacific, and Atlantic Oceans including the Mediterranean Sea.

Allothunnus Serventy, 1948
Slender tuna
Allothunnus fallai Serventy, 1948
Southern Ocean, south of lat. 20°S; one record from eastern Pacific.

Auxis Cuvier, 1829[1]
Bullet tuna
Auxis rochei (Risso, 1810)
Warm waters of the Indian, Pacific, and Atlantic Oceans, including the Mediterranean Sea.

Frigate tuna
Auxis thazard Lacépède, 1800)
Warm waters of the Indian, Pacific, and Atlantic Oceans.

Cybiosarda Whitley, 1935
Leaping bonito
Cybiosarda elegans (Whitley, 1935)
Northern ¾ of Australia.

Euthynnus Lütken *in* Jordan and Gilbert, 1883
Kawakawa
Euthynnus affinis (Cantor, 1849)
Warm waters of the Indian and Pacific Oceans; few records from the eastern Pacific Ocean.

Little tunny
Euthynnus alletteratus (Rafinesque, 1810)
Warm waters of the Atlantic Ocean including the Mediterranean Sea; sporadic occurrence in the Black Sea.

Black skipjack
Euthynnus lineatus Kishinouye, 1920
Warm waters of the eastern Pacific Ocean; stray specimens recorded from the central Pacific Ocean.

Gasterochisma Richardson, 1845
Butterfly kingfish
Gasterochisma malampus Richardson, 1845
Throughout the southern hemisphere, mostly between lat. 35°S and at least lat. 50°S; in the southeastern Indian Ocean as far north as lat. 26°S; distribution appears to parallel the zone of the West Wind Drift.

Grammatorcynus Gill, 1862
Double-lined mackerel
Grammatorcynus bicarinatus (Quoy and Gaimard, 1824)
Red Sea; absent from the Arabian Sea and Bay of Bengal; present off southeast Asia, Australia, Papua New Guinea, Philippines, Ryukyus, Marshalls, and Tonga.

Gymnosarda Gill, 1862
Dogtooth tuna
Gymnosarda unicolor (Rüppell, 1838)
Red Sea and East Africa eastward to Australia, Papua New Guinea, Marshalls, Society Islands, and Marquesas; sporadic in Japanese waters.

Katsuwonus Kishinouye, 1915
Skipjack tuna
Katsuwonus pelamis (Linnaeus, 1758)
Cosmopolitan in warm waters; absent from the Black Sea.

Orcynopsis Gill, 1862
Plain bonito
Orcynopsis unicolor (Geoffroy St. Hilaire, 1817)
West coast of Africa northward from Gulf of Guinea, and in the Mediterranean Sea.

Rastrelliger Jordan and Starks *in* Jordan and Dickenson, 1908
Short mackerel
Rastrelliger brachysoma (Bleeker, 1851)
Malaysia, Indonesia, Papua New Guinea, Solomons, and Fiji Islands.

Island mackerel
Rastrelliger faughni Matsui, 1967
Philippines, Taiwan, Papua New Guinea, and Indonesia.

Indian mackerel
Rastrelliger kanagurta (Cuvier, 1817)
East coast of Africa, Seychelles, Arabian Sea, eastward through Indonesia and off northern Australia to Melanesia and Micronesia, Samoa, coast of People's Republic of China, and Ryukyus; recently recorded from the Mediterranean Sea.

Sarda Cuvier, 1829
Australian bonito
Sarda australis (Macleay, 1880)
Distribution limited to southeastern coast of Australia from the Tropic of Capricorn south to Tasmania and at Norfolk Island.

Eastern Pacific bonito
Sarda chiliensis (Cuvier *in* Cuvier and Valenciennes, 1831)
Eastern Pacific Ocean from Vancouver Island to Baja California; absent from truly tropical waters of Middle America and then present again from Peru to northern Chile.

Indo-Pacific bonito
Sarda orientalis (Temminck and Schlegel, 1844)
Coastal regions of the Indian and Pacific Oceans; also present around many of the islands; east coast of Africa, Red Sea, Arabian Sea, Gulf of Bengal, western Australia, Indonesia, People's Republic of China, Formosa, Japan, occasionally in Hawaiian waters; in the eastern Pacific, Middle America to Ecuador, including the Galapagos Islands.

Atlantic bonito
Sarda sarda (Bloch, 1793)
Atlantic Ocean, Mediterranean and Black Seas.

Scomber Linnaeus, 1758
Spotted chub mackerel
Scomber australasicus Cuvier *in* Cuvier and Valenciennes, 1831
Western Pacific Ocean, off Australia, New Zealand, People's Republic of China, Japan, Hawaii, and Revillagigedos in the eastern Pacific.

Chub mackerel
Scomber japonicus Houttuyn, 1782
Temperate and warm waters of both hemispheres, present in the Mediterranean Sea.

Atlantic mackerel
Scomber scombrus Linnaeus, 1758
Temperate and near-temperate waters of the Atlantic Ocean, including the Mediterranean and the Black Seas.

Scomberomorus Lacépède, 1802[2]
King mackerel
Scomberomorus cavalla (Cuvier, 1829)
Tropical western Atlantic Ocean.

Narrow-barred king mackerel
Scomberomorus commerson (Lacépède, 1800)
Indian and western Pacific Oceans, Cape of Good Hope, east Africa, Red Sea eastward to Malaysia, Australia, Indonesia, Fiji, Philippines, People's Republic of China, Formosa, and Japan; recent immigrant to the Mediterranean Sea.

Monterey Spanish mackerel
Scomberomorus concolor (Lockington, 1879)
Gulf of California, formerly abundant in Monterey Bay, California.

Indo-Pacific king mackerel
Scomberomorus guttatus (Bloch and Schneider, 1801)
Indian and Pacific Oceans from Japan to India.

Korean seerfish
Scomberomorus koreanus (Kishinouye, 1915)
Indian and Pacific Oceans from Korea to India.

Streaked seerfish
Scomberomorus lineolatus (Cuvier *in* Cuvier and Valenciennes, 1831)
Coastal waters of India and Ceylon eastward to Southeast Asia and Indonesia.

Atlantic Spanish mackerel
Scomberomorus maculatus (Mitchill, 1815)
Tropical and subtropical waters of the western Atlantic Ocean from Massachusetts to Rio de Janeiro; absent from the West Indies.

Papuan seerfish
Scomberomorus multiradiatus Munro, 1964
Shallow waters of Gulf of Papua off the mouth of the Fly River.

Japanese Spanish mackerel
Scomberomorus niphonius (Cuvier *in* Cuvier and Valenciennes, 1831)
Korea, Japan, China, Papua New Guinea, and Australia.

Kanadi kingfish
Scomberomorus plurilineatus Fourmanoir, 1966
Along the east African coastline from Kenya to South Natal; along the west coast of Madagascar.

Queensland school mackerel
Scomberomorus queenslandicus Munro, 1943
East and west coasts of Australia.

Cero
Scomberomorus regalis (Bloch, 1793)
Tropical and subtropical waters of the western Atlantic Ocean, particularly in the West Indies.

Broad-barred king mackerel
Scomberomorus semifasciatus (Macleay, 1884)
Off Queensland and the Northern Territory of Australia, southern Papua New Guinea.

Sierra
Scomberomorus sierra Jordan and Starks *in* Jordan, 1895
Eastern Pacific Ocean, from California south to Peru and around the Galapagos Islands.

Chinese seerfish
Scomberomorus sinensis (Lacépède, 1800)
Western Pacific Ocean from Japan to South Viet-Nam; present also in Cambodia in the Mekong system (does not reproduce in fresh water).

Western African Spanish mackerel
Scomberomorus tritor (Cuvier *in* Cuvier and Valenciennes, 1831)
Eastern Atlantic, off west coast of Africa; rare in the Mediterranean Sea.

Thunnus South, 1845
Albacore
Thunnus alalunga (Bonnaterre, 1788)
Temperate and tropical waters of all oceans, including the Mediterranean Sea.

Yellowfin tuna
Thunnus albacares (Bonnaterre, 1788)
Tropical and subtropical waters of the Indian, Pacific, and Atlantic Oceans.

Blackfin tuna
Thunnus atlanticus (Lesson, 1830)
Western Atlantic Ocean, off Martha's Vineyard, Massachussetts, southward through the Caribbean Sea to Brazil.

Southern bluefin tuna
Thunnus maccoyii (Castelnau, 1872)
Subtropical and temperate waters of the southern region of the Indian, Pacific, and Atlantic Oceans.

Bigeye tuna
Thunnus obesus (Lowe, 1839)
Warm waters of the Indian, Pacific, and Atlantic oceans.

Northern bluefin tuna
Thunnus thynnus (Linnaeus, 1758)
Subtropical and temperate waters of the north Pacific Ocean, south and north Atlantic Oceans, and in the Mediterranean and Black Seas.

Longtail tuna
Thunnus tonggol (Bleeker, 1851)
Indian and west Pacific Oceans, from southern Japan where it is rare, south to Australia (north, east and west coasts); throughout most of the Indian Ocean, including the Red Sea but absent from most of the east African coast.

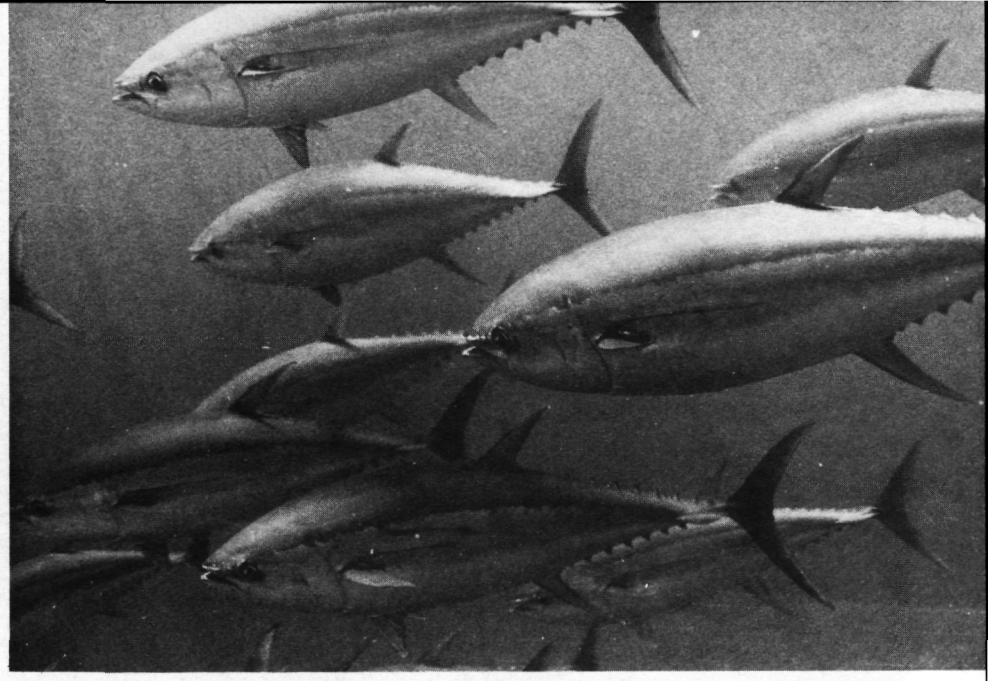
[1]The common name used by American tuna fishermen for both species of *Auxis* is "bullet." The names "bullet tuna" and "frigate tuna" employed in this list conform with the recommendation of the Ad Hoc Committee of Specialists to Review the Biology and Status of Stocks of Small Tunas (Anonymous, 1976). This recommendation was directed to countries as well as to international fisheries organizations. The use of "frigate tuna" and "bullet tuna" as common names may be of some controversy because for a long time the English language scientific literature has been employing the name "frigate mackerel" for *Auxis thazard* (i.e., Goode, 1884). It may be added that "bullet mackerel," on the other hand, is of recent coinage (Richards and Randall, 1967).
[2]At the time of writing, the taxonomy of the genus *Scomberomorus* is being critically reviewed and additional species are being described. Bruce B. Collette, Systematics Laboratory, National Marine Fisheries Service, NOAA, National Museum of Natural History, Washington, DC 20560, personal communication.

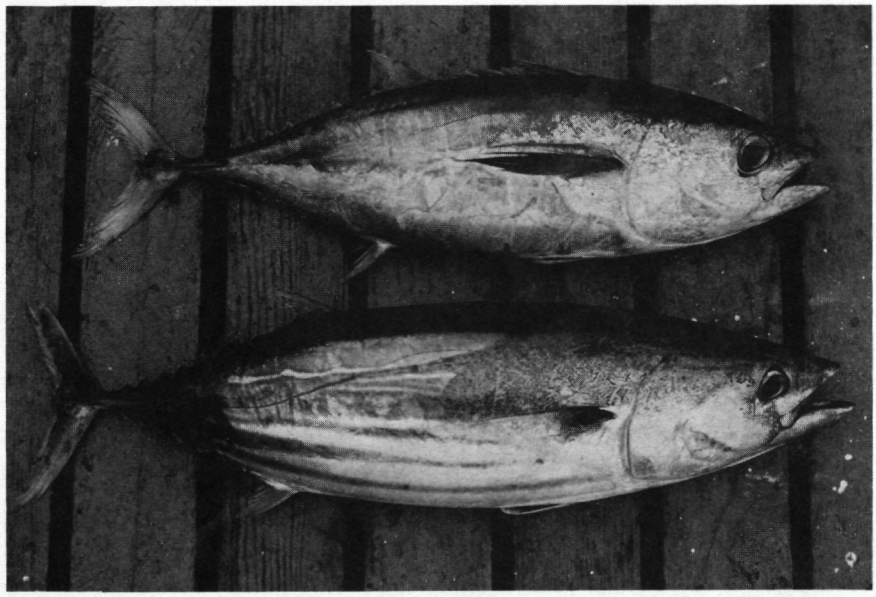
with tunas. If we examine the common names we discover that other scombrids, such as *Allothunnus fallai* and *Gymnosarda unicolor,* the slender tuna and dogtooth tuna, are also called "tunas." However, as seen in the outline of the family Scombridae (Fig. 1) they are actually bonitos. This is easily understood when we consider the fact that common names do not follow strict rules (Cohen, 1974), such as are used by scientists studying the relationship of the subfamilies and tribes within the family Scombridae. In Table 1, the scientific name of each genus and species, i.e., *Katsuwonus pelamis,* is followed by a name and a year. Sometimes the name is enclosed in parentheses, and sometimes not. In the case of *Katsuwonus pelamis,* it is followed by "(Linnaeus, 1758)." This indicates that this species was described by the Swedish naturalist Carl Linné in 1758 who, according to the custom of the period, Latinized his name to "Carolus Linnaeus." The parentheses denote that when Linné described the species he placed it in a different genus, the original name being *Scomber pelamis.* When the parentheses are omitted, it indicates that the author, in his description of the species, used the generic name still in use for a given species. Thus, if we look up *Allothunnus fallai* Serventy, 1948 in Table 1, we discover that the species was originally described in the genus *Allothunnus.*

Although each of the species in Table 1 has one listed common name, in reality some of the fish have many such names. *Katsuwonus pelamis,* or skipjack tuna, is known in some parts of the English-speaking world as "bonito" or "oceanic bonito," but in Hawaii it is often referred to as "aku," which is a Polynesian name. In Table 1, we also note that the name "mackerel" is applied to many species of the seerfishes. Further, the name mackerel is even used for members of families other than the Scombridae. Of course, all this results in a certain degree of confusion stemming from the use of common names.

To illustrate further the vagaries of common names, we may consider the fact that in Australia the name "northern bluefin tuna" is applied not to *Thunnus thynnus,* but to *Thunnus tonggol.* Among the Australian tunas, there are two similar species—*Thunnus maccoyii,* which occurs off the southern coast and is known as the southern bluefin tuna, and *Thunnus tonggol,* which occurs off the northern coast of Australia and is called northern bluefin tuna. Thus it is not surprising that scientific names were devised to help scientists avoid the ambiguities arising from the use of common names. Each generic name is unique. No other species of fish (or of any other animal) may have the same combination of generic and species (trivial) names. Since scientific names are accepted around the world, they assure that the global scientific community can communicate about the particular organisms involved.

However, even scientific names change with time. Changes in the scien-





Yellowfin tuna, top, photographed inside a tuna seine. Below is a small yellowfin tuna (above) and a skipjack tuna (beneath). Photographs by William L. High, Northwest and Alaska Fisheries Center, NMFS, NOAA, Seattle, Wash.

SCIENTIFIC NOMENCLATURE		VERNACULAR NOMENCLATURE	
CURRENT USAGE	FDA USAGE	CURRENT USAGE	FDA USAGE
Thunnus thynnus	*Thunnus thynnus* *Thunnus orientalis*	Northern Bluefin Tuna	Bluefin Tuna Oriental Tuna
Thunnus maccoyii	*Thunnus maccoyii*	Southern Bluefin Tuna	Southern Bluefin Tuna
Thunnus alalunga	*Thunnus germo*	Albacore	Albacore
Thunnus atlanticus	*Thunnus atlanticus*	Blackfin Tuna	Blackfin Tuna
Thunnus obesus	*Parathunnus mebachi*	Bigeye Tuna	Big-eyed Tuna
Thunnus albacares	*Neothunnus macropterus*	Yellowfin Tuna	Yellowfin Tuna
Thunnus tonggol	*Neothunnus rarus*	Longtail Tuna	Northern Bluefin Tuna
Katsuwonus pelamis	*Katsuwonus pelamis*	Skipjack Tuna	Skipjack
Euthynnus affinis	*Euthynnus yaito*	Kawakawa	Kawakawa
Euthynnus alletteratus	*Euthynnus alletteratus*	Little Tunny	Little Tunny
Euthynnus lineatus	*Euthynnus lineatus*	Black Skipjack	Little Tunny

Figure 2.—Tunas, as defined by the U.S. Food and Drug Administration.

tific nomenclature are the results of continuous research on the identity of various species and their relationships to each other. Much taxonomic research has been done on the family Scombridae, including tunas, over the past 25 years. As a result, many changes have been made in the names already in existence and many species of tunas, which were believed to be distinct from each other, have been proven to be the same species.

To illustrate this, consider the northern bluefin tuna, which inhabits both the Atlantic and Pacific Oceans (Table 1). A few years ago, scientists considered *Thunnus thynnus* to be divided into three distinct, geographically separated species: *Thunnus thynnus, Thunnus saliens,* and *Thunnus orientalis*. Northern bluefin tuna off California and Baja California were known as *Thunnus saliens* and those from the western Pacific Ocean as *Thunnus orientalis*. On the basis of experiments with plastic tags affixed to living fish, scientists demonstrated interchange of *Thunnus saliens* and *T. orientalis* between the eastern and western Pacific, concluding from this that only one species was involved. Further research based on anatomy indicated that the bluefin from the north Pacific and from the Atlantic belong to the same species. However, Gibbs and Collette (1967), who conducted these studies concluded that there were enough differences between the Pacific and Atlantic populations of the northern bluefin tuna to consider them different on a subspecific level. These fish therefore are sometimes referred to as *Thunnus thynnus thynnus* and *Thunnus thynnus orientalis*. Thus we may say that *Thunnus saliens* and *Thunnus orientalis* are synonyms of *Thunnus thynnus*. In reference to the variability of common names, and to the synonyms of scientific names the following saying carries a great deal of truth: "Common names change from place to place, whereas scientific names change from time to time."

The Food and Drug Administration (FDA), a branch of the U.S. Department of Health, Education, and Welfare, includes among its various activities the development of standards for foods, including canned tuna. In the Code of Federal Regulations, FDA defines and gives standards of identity for fish which may be processed into a canned product labeled "tuna." The FDA's list contains several scientific and common names which are no longer in use, and therefore these names have been updated in Figure 2. It should be noted that *Auxis rochei* and *Auxis thazard,* or the bullet and frigate tunas, are not included on the FDA list of tunas, and thus a canned product made from these species cannot bear the label "tuna."

The various bonitos of the genus *Sarda,* when canned, resemble canned tuna in taste and appearance. Such products, however, must be sold in the United States as "bonito." In some other countries, Canada for example, canned bonito is sold as tuna and is labeled as "tuna (bonito)." This statement should not be taken as criticism of the FDA or of the equivalent organization in Canada, but only as a statement of fact.

Nearly all tunas in the United States are consumed in the canned form although small amounts are sold as fresh fish in some parts of the country. In Hawaii the aku, or skipjack tuna, is used in preparation of traditional Polynesian dishes. Because of the large population of Americans of Japanese ancestry in Hawaii there is also a considerable demand for fresh tuna to prepare a traditional Japanese hors d'oeuvre known as sashimi, sliced raw fish, which is dipped in a spicy sauce before eating. Another product used in Japanese cooking is the so-called katsuobushi, usually referred to as "dried bonito" and imported from Japan to the United States under the latter name. However, the term "dried bonito" is misleading, as the product is not bonito, but skipjack tuna. The fish is a highly processed product in which the fish first is boiled, the loins are separated and all bones are removed. The loins are then smoke-dried over a period of many days, after which mold is gradually permitted to grow on the loins. The finished product is produced by converting the fish loins into shaven flakes which are used mainly for making a soup stock. Katsuobushi is mentioned here to point out that one branch of the U.S. Government may consider *Katsuwonus pelamis* to be a tuna (FDA), whereas another may consider it to be a bonito (Bureau of Customs).

Do the various definitions of tuna in the English language correspond to a similar range of meanings for the same word in other languages? In some instances there is a close correspondence

Table 2.—Alphabetical list of genera and species of billfishes and the geographical distribution of each species.

Sailfish, marlins, and spearfishes
Family Istiophoridae

Istiophorus Lacépède, 1802
Sailfish
Istiophorus platypterus (Shaw and Nodder, 1791)
Widely distributed throughout tropical and subtropical waters of the world oceans; usually more abundant near land masses and some of the islands.

Tetrapturus Rafinesque, 1810
White marlin
Tetrapturus albidus Poey, 1861
Tropical and temperate waters, found only in the Atlantic and the Mediterranean.

Shortbill spearfish
Tetrapturus angustirostris Tanaka, 1914
An Indian and Pacific Ocean species found in warm waters; open-sea fish seldom encountered in coastal waters.

Striped marlin
Tetrapturus audax (Philippi, 1887)
An Indian and Pacific Ocean species found in warm waters; relatively rare in equatorial region of the central and western Pacific.

Mediterranean spearfish
Tetrapturus belone Rafinesque, 1810
Mediterranean Sea.

Roundscale spearfish
Tetrapturus georgei Lowe, 1840
In the Atlantic off Portugal and Spain, in the Mediterranean off Sicily.

Longbill spearfish
Tetrapturus pfluegeri Robins and de Sylva, 1963
Open waters of the tropical and subtropical Atlantic.

Makaira Lacépède, 1802
Black marlin
Makaira indica (Cuvier *in* Cuvier and Valenciennes, 1831)
Mainly a species of the Indian and Pacific Oceans, sporadic occurrence in the Atlantic Ocean; tropical fish much more abundant in coastal waters than in waters of the open sea, where it is present only in small numbers.

Blue marlin
Makaira nigricans Lacépède, 1802
Widely distributed throughout the Indian, Pacific, and Atlantic Oceans; especially abundant in the tropical regions.

Swordfish
Family Xiphiidae

Xiphias Linnaeus, 1758
Swordfish
Xiphias gladius Linnaeus, 1758
Widely distributed throughout the temperate and the tropical waters of the world oceans and the adjacent seas; found in coastal as well as in oceanic areas.

of meaning and in others there is not. The lack of agreement can be illustrated by the Japanese language. The Japanese consider the skipjack tuna to be a bonito, rather than a tuna. To the Japanese, the bullet and frigate tuna, the black skipjack, the kawakawa, and the little tunny are various kinds of bonitos, creating a kind of linguistic gap between the Japanese and English languages. To translate the word "tuna" (meaning members of the tribe Thunnini) into Japanese it is necessary to use a three-word expression katsuo to maguro. According to a Japanese-English dictionary this may be translated as "skipjack tuna and tunas" or "bonitos and tunas." Furthermore, we find that among the Japanese general population the word maguro, the closest equivalent to "tuna," may include not only all species of the genus *Thunnus,* but on occasion even billfishes. Another example of change in meaning from one language to another can be illustrated by the name "albacore," a word which has cognates in other languages. However, in some languages there is a shift of meaning. Thus, the French name albacore refers to the yellowfin tuna, *Thunnus albacares,* and not to *T. alalunga*. In Spain the albacore is usually called atún blanco although the name albacora is also used for this fish. In some other Spanish-speaking countries the name albacora may mean different fish. For example, in Cuba the blackfin tuna, *T. atlanticus,* is called albacora, whereas in Chile it is the swordfish, *Xiphias gladius*.

Other classifications used in connection with tunas are the terms "principal" and "secondary market species." The principal species, all seven species of the genus *Thunnus* and the skipjack tuna, *Katsuwonus pelamis,* are the ones which are most sought for canning purposes. The secondary market species encompass the genera *Auxis* and *Euthynnus* of the tunas, the butterfly kingfish, the bonitos, and seerfishes. Another term often used in conjunction with tunas is "tuna-like fishes." Usually the term "tuna and tuna-like fishes" applies to the billfishes and all scombrids with the exception of the true mackerels, *Rastrelliger* and *Scomber*. The mackerels are excluded because their mode of life, the nature of mackerel fisheries, and the marketing of mackerel catches are quite different from the other tuna-like fishes.

The billfishes derive their name from a sword-like or a spear-like projection of the upper jaw. Many of them are caught in conjunction with the fishery for tunas. The billfishes are comprised of two families, Istiophoridae and Xiphiidae. The family Istiophoridae encompasses 3 genera and 10 species. The family Xiphiidae contains only one member, the swordfish, *Xiphias gladius*. All of the species of billfishes are listed in Table 2, with the geographical distribution for each.

What then is a tuna? In our everyday speech we are not too careful with our choice of words and often, when naming things, we use words or terms which lack precision. Even these poorly defined names serve our purpose, however, as long as we can communicate by using them. However, some aspects of human affairs require that words and terms be defined so exactly that there is no room for the possibility of misunderstanding. The word tuna, in addition to being an everyday word which may be used in relation to such a mundane thing as a sandwich, often has precise meanings defined by scientists as well as lawmakers.

LITERATURE CITED

Anonymous. 1976. The biology and status of stocks of small tunas. Report of an *Ad Hoc* Committee of Specialists, Honolulu, Hawaii, U.S.A., 15-18 December 1975. FAO Fish. Tech. Pap. 154, 21 p.

Cohen, D. M. 1974. Names of fishes. Mar. Fish. Rev. 36(12):21-23.

Collette, B. B., and L. N. Chao. 1975. Systematics and morphology of the bonitos (Sardā) and their relatives (Scombridae, Sardini). Fish. Bull., U.S. 73:516-625.

Gibbs, R. H., and B. B. Collette. 1967. Comparative anatomy and systematics of the tunas, genus *Thunnus*. U.S. Fish Wildl. Serv., Fish. Bull. 66:65-130.

Goode, G. B. 1884. The fisheries and fishery industries of the United States. Section 1. Natural history of useful aquatic animals—text. U.S. Comm. Fish Fish., 895 p.

Lyman, J. 1970. Tuna. Romance Notes, (Univ. North Carolina) 12(1):1-5.

Richards, W. J., and J. E. Randall. 1967. First Atlantic records of the narrow-corseleted frigate mackerel, *Auxis thazard*. Copeia 1967:245-247.

MFR Paper 1268. From Marine Fisheries Review, *Vol. 39, No. 11, November 1977. Copies of this paper, in limited numbers, are available from D822, User Services Branch, Environmental Science Information Center, NOAA, Rockville, MD 20852. Copies of* Marine Fisheries Review *are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 for $1.10 each.*