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Tunas of the Genus *Thunnus* of the Northern Caribbean

BY HARVEY R. BULLIS, JR.,[1] AND F. J. MATHER, III[2]

During Cruise 30 of the United States Fish and Wildlife Service exploratory fishing vessel "Oregon," in April, 1955, six species of tuna were caught on longlines in the northern Caribbean. The species of tunas taken at the 11 stations occupied (see fig. 1) are listed in table 1. Additional information on the distribution of tunas was obtained from Captain Archie Cross of the M/V "Santo Antonino" and Captain Ed Saarinen of the M/V "Hermes II," who have been fishing with longlines in this area.

The yellowfin tuna, *Thunnus*[3] *albacares* (Bonnaterre), the blackfin tuna, *Thunnus atlanticus* (Lesson), and the oceanic bonito, *Katsuwonus pelamis* (Linneaus), are well-known indigenes of the region (Beebe and Tee Van, 1928, 1936; Rivas, 1951; Mather and Schuck, 1952; Rawlings, 1953). Most reports of the albacore, *Thunnus alalunga* (Gmelin), have been based on *T. atlanticus,* and there are no records of this species, substantiated by specimens, from the western North Atlantic (Rivas, 1951, pp. 220, 222, 223). Specific data on the presence of bluefin tuna, *Thunnus thynnus* (Linneaus), in the Caribbean area are lacking, although there is one known capture from the northern coast of Jamaica (personal communication). We know of no previous records of the Atlantic big-

[1] United States Fish and Wildlife Service, Pascagoula, Mississippi.

[2] Woods Hole Oceanographic Institution, Woods Hole, Massachusetts (Contribution No. 774, Woods Hole Oceanographic Institution).

[3] We have followed Fraser-Brunner (1950) and Rivas (1951) in considering the genera *Neothunnus, Parathunnus,* and *Germo* as either synonyms of the genus *Thunnus* or subgenera of that genus.

TABLE 1

CATCHES OF TUNA BY STATIONS

"Oregon" Station Number	Date April, 1955	North Latitude	West Longitude	*Thunnus obesus*	*Thunnus alalunga*	*Thunnus thynnus*	*Thunnus albacares*	*Thunnus atlanticus*	*Katsuwonus pelamis*
1286	11	21° 15′	84° 05′	—	—	—	—	1	—
1287	12	20° 01′	81° 50′	—	—	1	—	—	—
1288	14	18° 15′	78° 30′	—	—	—	—	—	—
1289	19	17° 10′	74° 20′	—	1	—	10	—	1
1290	20	16° 15′	73° 30′	—	6	—	3	—	—
1291	21	17° 50′	72° 00′	2	1	—	4	—	—
1292	22	18° 08′	74° 35′	—	—	—	—	—	—
1293	23	19° 55′	74° 10′	—	2	8	10	—	—
1295	24	19° 45′	74° 45′	—	2	8	3	—	—
1296	25	19° 30′	76° 50′	—	1	3	7	7	1
1297	28	20° 50′	86° 10′	—	—	1	—	1	—

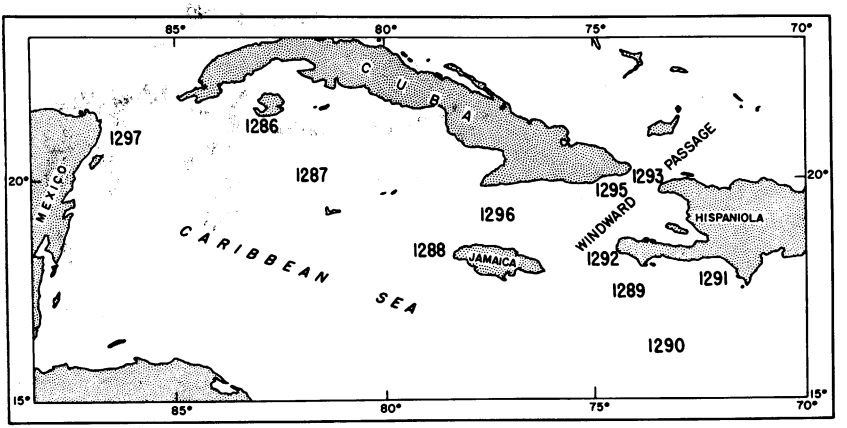

FIG. 1. Positions of longline stations in the northern Caribbean.

eye tuna, *Thunnus obesus* (Lowe), from west of the Azores. The listing of this little-known species among the fishes of Port-au-Prince Bay by Beebe and Tee Van (1928) was later (1936) placed in the synonymy of *T. atlanticus* by those authors. Morice and Cadenat (1952) and Morice (1953) synonymized *T. atlanticus* with *T. obesus,* and it appears that the species to which they refer as occurring off the West Indies was the former.

Beebe and Tee Van (1936) showed clearly that *T. atlanticus* (placed in the genus *Parathunnus* by them) was a valid species. Fraser-Brunner (1950) incorrectly placed it in the synonymy of *T. alalunga.* Having examined freshly caught specimens of *T. obesus, T. atlanticus,* and *T. alalunga,* we have no doubt that they are different and valid species. A decisive character in separating *T. atlanticus* from the others is its gill-raker count. Beebe and Tee Van counted the gill rakers on both the left and right arches of 58 blackfins and found the following range of counts: for the lower limb, 15 to 18; for the upper limb, four to six; total number, 20 to 24. One of us (Mather) has taken gill-raker counts from many *T. atlanticus* captured between Rio de Janeiro and Cape Cod. These are in very close agreement with those of Beebe and Tee Van, ranging from 15 to 18 for the lower limb, four to seven for the upper, and from 20 to 23 in total number. Rivas (1951) gives a slightly higher range of lower rakers (15–19), but states that his studies are in complete accord with those of Beebe and Tee Van. In contrast, the count given by Fraser-Brunner for *T. obesus* is 18 to 25 lower, and eight to 13 upper, and that for *T. alalunga* by Letaconnoux (1950) is 18 to 22 lower, seven to 10 upper, and 26 to 31 total. The counts obtained by us are consistent

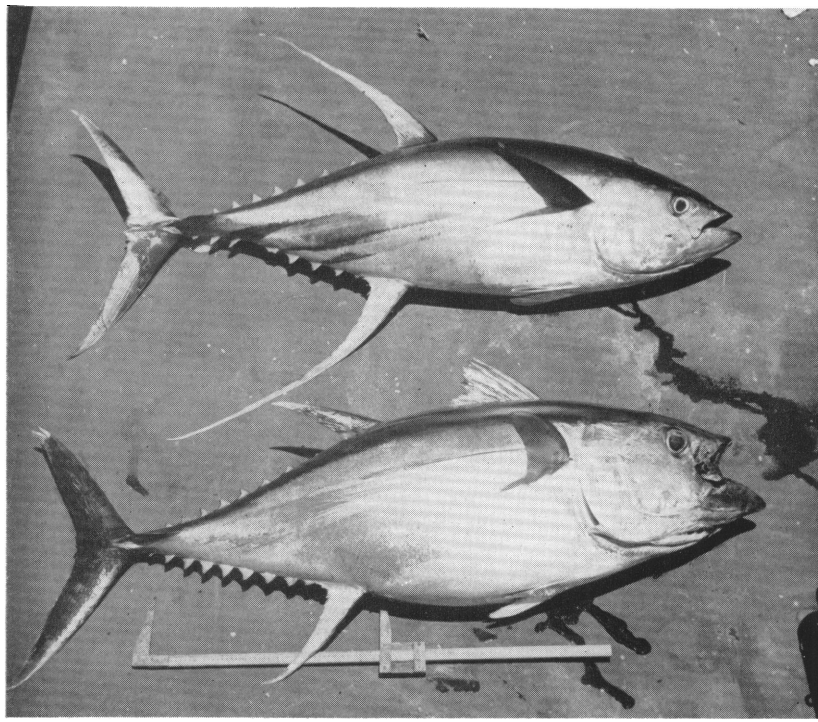

FIG. 2. A yellowfin tuna, *Thunnus albacares* (upper), compared with the heavier big-eye tuna, *Thunnus obesus* (lower). The fork length of each fish is approximately 150 cm.

with these figures, being 19 lower, eight to nine upper, and 27 to 28 total for *T. obesus,*[1] and 19 to 22 lower, seven to nine upper, and 27 to 31 total for *T. alalunga.* Thus *T. atlanticus* is readily separable from both *T. obesus and T. alalunga* on the basis of total gill-raker counts, and in most cases by the lower limb count.

The pectoral of the albacore is usually much longer (1 to 1.6[2] times head length) than that of the blackfin tuna (0.8 to 1.2 times head length), but the species intergrade in this respect.

In addition, the color of the finlets distinguishes *T. atlanticus* from the other species. All the finlets of *T. obesus* and the dorsal ones of *T.*

[1] Rivas obtained counts of 20 to 22 lower, nine upper, and 29 to 31 total for two eastern Atlantic specimens (personal communication).

[2] From measurements of Bay of Biscay specimens 51 to 80 cm. long (Navaz, 1950). For the larger specimens measured by us, the pectoral varied from 1.35 to 1.6 times head length.

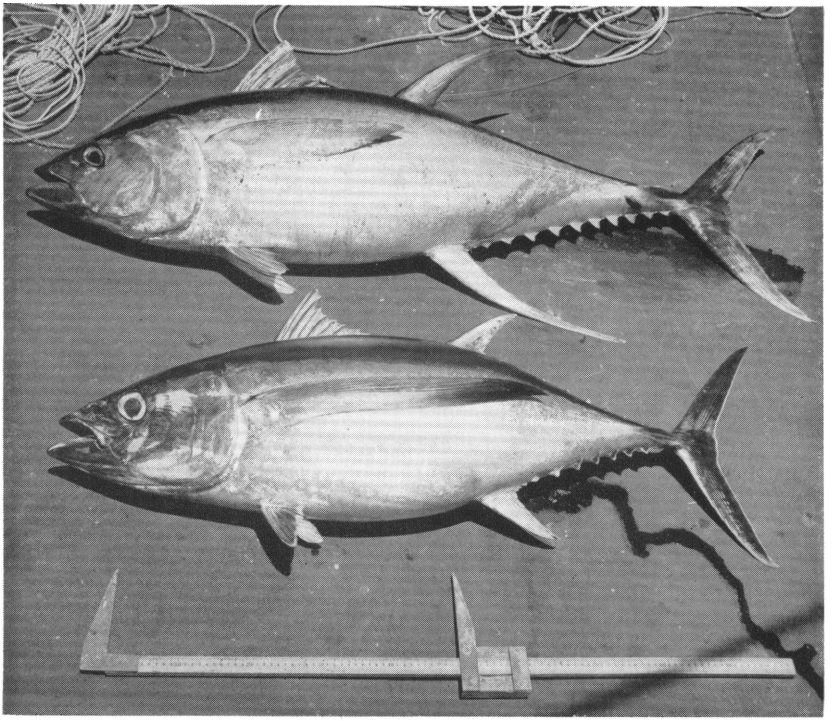

FIG. 3. A yellowfin tuna (upper) compared with an albacore, *Thunnus alalunga* (lower). The yellowfin is about 100 cm., and the albacore about 96 cm., in fork length.

alalunga are predominantly yellow. Those of *T. atlanticus* are not yellow, the dorsal ones usually being of a dusky brown color, and the anals dusky steel.

The total size range of *T. atlanticus* also appears to preclude the possibility that it is identical with *T. obesus*. The maximum size attributed to *T. atlanticus* is 60 pounds (Mowbray, 1935), but our own observations lead us to believe that individuals weighing over 25 pounds are very rare. On the other hand, our specimens of *T. obesus* weighed about 175 pounds each, and Frade (1931) examined individuals up to 188 cm. long, probably weighing about 275 pounds. In addition to this disparity in recorded sizes, the fact that *T. atlanticus* spawns at a very small size (less than 10 pounds) suggests that its maximum size cannot compare with that attained by *T. obesus*.

We believe that the capture of two Atlantic big-eye tunas at Station 1291 off the south central coast of Hispaniola constitutes the first record

TABLE 2

MEASUREMENTS (IN PERCENTAGE OF FORK LENGTH) OF TUNAS FROM THE NORTHWESTERN CARIBBEAN[a]
(Measurements were taken with calipers following the method of Marr and Schaefer, 1949, except that the orbit was measured instead of the iris.)

Measurements	*Thunnus albacares*					*Thunnus obesus*		*Thunnus alalunga*				*Katsuwonus pelamis*
Fork length in mm.	1006	1281	1523	1550	1699	1503	1519	958	969	1025	1050	801
Snout to first dorsal	.286	.268	.250	.269	.279	.294	.292	.322	.326	.310	.327	.342
Snout to second dorsal	.509	.495	.480	.492	.485	.529	.535	.576	.591	.563	.576	.625
Snout to anal	.567	.549	.545	.540	.536	.595	.600	.625	.641	.630	.626	.684
Snout to ventral	.295	.280	.305	.282	.284	.342	.339	.326	.340	.342	.325	.350
Head	.260	.250	.252	.255	.258	.294	.296	.287	.302	.296	.288	.305
Maximum depth	.241	.244	.259	.258	.269	.296	.292	.279	.282	.270	.277	.281
Maximum width	.183	.193	.199	.201	.191	.212	.211	.219	.221	.212	.212	.231
Largest first dorsal spine	.109	.115	.123	.135	.122	.120	.127	.111	.123	.119	.113	.162
Base first dorsal	.232	.230	.223	.224	.219	.238	.246	.252	.262	.239	.246	.281
Length second dorsal	.199	.290	.390	.386	.290	.168	.161	.132	.127	.140	.139	.115
Base second dorsal	.093	.095	.088	.101	.093	.090	.090	.094	.094	.101	.101	.092
Length anal	.210	.314	.411	.465	mut.	.198	.179	.127	.130	.128	.137	.108
Base anal	.075	.080	.086	.088	.084	.070	.071	.074	.093	.094	.077	.085
Pectoral	.293	.258	.246	.258	.220	.262	.244	.409	.412	.428	.450	.156
Ventral	.117	.102	.110	.115	.103	.119	.114	.109	.102	.099	.097	.121
Caudal spread	.350	.379	.378	.414	.433	.416	.404	.336	.369	.361	.369	.308
Longest dorsal finlet	.033	.036	—	.039	.037	.035	—	.031	.033	.032	.034	.036
Ventral insert to vent	.283	.271	.260	.266	.268	.278	.283	.310	.312	.309	.313	.334
Least depth caudal peduncle	.024	.025	.023	.026	.024	.028	.026	.023	.024	.024	.024	.021
Maximum width at caudal keels	.093	.101	.093	.098	.093	.094	.099	.079	.073	.079	.074	.071
Snout	.088	.091	.087	.092	.092	.106	.104	.094	.102	.098	.100	.101

TABLE 2—(*Continued*)

Measurements	*Thunnus albacares*					*Thunnus obesus*		*Thunnus alalunga*				*Katsuwonus pelamis*
Maxillary	.101	.096	.095	.099	.098	.117	.117	.103	.115	.106	.105	.118
Interorbital	.093	.094	.102	.101	.103	.122	.113	.095	.099	.094	.100	.089
Diameter orbit	.036	.032	.032	.031	.029	.045	.045	.049	.054	.050	.056	.037
Longest gill raker	.033	.030	.039	—	—	.047	.049	.037	.035	.035	.039	.039

[a]The 1699-mm. *T. albacares* was taken in May, 1955, in the Gulf of Mexico.

TABLE 3

COUNTS OF TUNAS FROM THE NORTHWESTERN CARIBBEAN

Counts	*Thunnus albacares*					*Thunnus obesus*		*Thunnus alalunga*				*Katsuwonus pelamis*
First dorsal spines	14	14	14	14	14	14	14	14	14	13	13	15
Second dorsal spines and rays	14	14	14	15	14	14	14	15	15	15	15	14
Dorsal finlets	9	9	9	8	9	9	9	8	8	8	8	7
Anal spines and rays	13	14	14	14	14	11	13	15	15	15	14	14
Anal finlets	9	9	8	8	9	9	9	7	7	7	8	7
Pectoral	36	35	36	36	35	34	33	33	34	34	33	27
Upper gill rakers	10	9	8		9	9	8	8	9	8	7	16
Lower gill rakers	22	20	21		20	19	19	19	20	19	20	35

of the species, substantiated by adequate descriptive data, from the western Atlantic. These fish and four yellowfin tuna which were caught along with them all fell within a size grouping of 150.0 to 154.6 cm. (fork length), and, when compared side by side, the two species were readily distinguishable (see fig. 2). The Atlantic big-eyes could be quickly separated by their much shorter second dorsal and anal fins, much wider and deeper bodies, and larger eyes.[1] The second dorsal and anal showed dull yellow in the distal portions only, and just a trace of yellow was present on the first dorsal and ventrals. The finlets had a heavy band of glossy black edging, centrally a dull yellow turning to a sienna brown proximally, and black along the base. The finlets of the yellowfin were uniformly bright lemon yellow, with thin black edging. Three of the yellowfin and one big-eye were caught on adjacent hooks, indicating mixed schooling of large individuals of the two species. Captain Cross told us that he has occasionally found these two species mixed in his catches taken south of Ponce, Puerto Rico, and in the vicinity of St. Croix.

Thirteen albacore were taken at seven stations in the area south of and between western Hispaniola and eastern Cuba, and north and east of Jamaica. Their lengths ranged from 95 to 105 cm. Furthermore, Cross had been catching albacore at a rate of one or two per 100 hooks south of Ponce, Puerto Rico, and in the vicinity of St. Croix, from January through April. Thus this valuable species appears to have been fairly abundant and widely distributed in the northern Caribbean from midwinter through April. The albacore were easily distinguishable from yellowfin (fig. 3). Several differences in proportions between the species are indicated by table 2. Among the most notable were the longer pectorals, shorter and more posteriorly located second dorsal and anal fins, larger eye, and deeper and wider body of the albacore. The species also differed markedly in coloration. The albacore showed little yellow on its fins, except the dorsal finlets, and the median area of its body had a brownish bronze tint rather than the golden yellow of a fresh yellowfin. The finlets of the yellowfin were, as mentioned above, a bright lemon yellow, thinly edged with black. The dorsal finlets of the albacore were of a much darker yellow, with a wider black anterior edge and a clear whitish area beyond the black at the tip and along the posterior edge. The anals were usually of dull metallic hue, with the same whitish tips and posterior edges as the dorsals. On some individuals, however, one or

[1] Tables 2 and 3 list caliper measurements and counts (by the method of Marr and Schaefer, 1949) of tunas of various species taken during this cruise.

two of the largest anal finlets were similar in color to the dorsals. In addition to the finlets, the caudal, the second dorsal, the anal, the ventrals, and the proximal part of the pectorals all had clear whitish posterior edges. This was especially noticeable on the caudal, and this character seems sufficient to separate the albacore from all other western Atlantic members of the genus *Thunnus,* in cases where the length of the pectoral of the albacore[1] fails to do so. The albacore also differed notably in body form from the yellowfin, being heavy posteriorly and tapering abruptly to the caudal peduncle, in a manner reminiscent of *Katsuwonus,* in contrast to the very long and gradual taper of the posterior half of the yellowfin.

Twenty-one giant bluefin tuna were caught at five stations, 19 of them in the Windward Passage and its southwestern approaches, one 45 miles northwest of Grand Cayman Island, and one 30 miles northeast of Cozumel Island. The fish ranged from 209 to 245 cm., with most of them near 225 cm. in length, or about 475 pounds in weight. Gear damage indicated that at least as many more were hooked and lost. In addition, Saarinen reported releasing a giant bluefin 65 miles northwest of South Negril Point, Jamaica, April 16. He believed, on the evidence of lost equipment, that several more had been hooked. Thus it appears that in April giant bluefins were abundant in the Windward Passage and off Guantanamo, moderately abundant from there to a point somewhat west of Jamaica, and scattered from there to the Yucatan Peninsula. The estimated numbers of bluefins hooked in the respective areas are 3.5, 1.3, and less than 0.5, per 100 hooks. Thirteen of the fish taken at Stations 1293, 1295, and 1296 were opened. Ten of them were females, and three were males. The testes of a 245-cm. bluefin taken April 12 weighed 26 pounds and appeared to be fully ripe and ready for spawning.[2] Some milt ran without external pressure from two of the males taken April 24–25. The testes of one of these weighed 12 pounds.

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[1] The data of Navaz (1950) indicate that the pectorals of small albacore taken in the Bay of Biscay are sometimes as short as those of some western Atlantic yellowfins.

[2] One of us (Mather) in a discussion delivered jointly with Howard A. Schuck on bluefin tuna at the Oceanic Fisheries Conference, Bermuda, June, 1951 (recorded but not published), stated that most of the giant bluefins taken off Bimini and Cat Cay in May and June probably had spawned somewhat earlier, possibly in April or early May, and not far south of these places. This opinion was based on the condition of the gonads of fish examined at Bimini, the direction in which the fish were observed to be traveling, and back calculations based on European data (Heldt, 1930) of the probable dates of hatching of juveniles. Rivas (1954) discussed the spawning of bluefins in the Straits of Florida.

Although the total number of yellowfins taken was small (37), some evidence of size segregation between the open Caribbean and the Windward Passage was noted. Seventeen fish from the open Caribbean averaged 148 cm. (fork length), while the 16 from the Windward Passage averaged only 112 cm. (four yellowfins were partially eaten by sharks, and lengths were unobtainable). Previous observations on longline catches by the "Oregon" in the Gulf of Mexico have also shown indications of size segregation, particularly during the summer months. The only school of tuna which appeared to be yellowfin was sighted on April 23 between Cape Maisi and Guantanamo Bay. The weight of these fish was estimated to be 10 to 20 pounds each, the same as that of yellowfins caught on longlines in that area. As the *Katsuwonus pelamis* from Station 1289 represents the largest specimen of the species we have seen, we have included its measurements in table 2.

Although the blackfin tuna is known to range widely throughout the area fished (Mather and Day, 1954) and supports a small tuna fishery on the southwestern coast of Cuba (Rawlings, 1953), few captures were made on longline gear (see table 1). Schools believed to consist of small blackfins were frequently sighted between the Windward Passage and the Yucatan Channel. These were seen surfacing and feeding on small carangids and nomeids that gathered under the buoys of the longline gear during fishing operations. In the vicinity of Station 1297 northeast of Cozumel Island, 10 small blackfins were caught on trolling lines. These ranged from 34.2 to 40.5 cm., fork length, and averaged 36.9.

One specimen of the Atlantic big-eye tuna has been placed in the collection of the United States National Museum (U.S.N.M. No. 157791), together with one of the albacore (U.S.N.M. No. 157790). The United States National Museum also has a short series of the blackfin and small bluefin tunas collected in the Gulf of Mexico on other "Oregon" cruises.

These observations show that all five species of the genus *Thunnus* known to occur in the Atlantic may be found in the Caribbean. Three of these, the yellowfin, the albacore, and the Atlantic big-eye, were encountered in sizes which may be fished efficiently by the longline method and utilized in canneries. This may be a factor of some importance to the new tuna industry that is being started in Puerto Rico, as dependence on a single species might result in serious fluctuations in supply. A further implication that may be drawn from these observations is that the yellowfin tuna, the albacore, and the Atlantic big-eye, which are known to be abundant in the eastern Atlantic as far west as the Azores, may be distributed all the way across the tropical and subtropical parts of that

ocean. This suggests the possibility of an extenive tuna resource in the tropical Atlantic.

We wish to thank Mr. W. C. Schroeder of the Woods Hole Oceanographic Institution and Prof. Luis Rivas of Miami University for their valued suggestions in regard to this paper.

TENTATIVE KEY TO FISHES OF THE GENUS *Thunnus* OF THE WESTERN ATLANTIC

1. Pectoral less than four-fifths[1] of head length, usually reaching to tenth to twelfth dorsal spine. Lower gill rakers, first arch, 24 to 28 . . . . . bluefin tuna, *thynnus*

   Pectoral more than four-fifths[1] of head length, usually reaching almost to second dorsal fin or beyond. Lower gill rakers, first arch, 15 to 22 . . . 2

2. Pectoral more than one and one-fifth[1] of head length, usually reaching to anal fin or beyond. Caudal distinctly edged with white posteriorly . . . . albacore, *alalunga*

   Pectoral less than one and one-fifth[1] of head length, usually not reaching anal fin. Caudal not edged with white posteriorly 3

3. Total gill-raker count on first arch 20 to 24 (usually 15–18 on lower limb). Finlets not yellow . . . . . blackfin tuna, *atlanticus*

   Total gill-raker count on first arch 24 to 33 (usually 18–22 on lower limb). Finlets predominantly yellow 4

4. Body robust (depth usually less than three and three-quarters in length), second dorsal and anal fins not greatly elongate (usually less than three-fifths of depth), fins without large yellow areas, finlets dull or brownish yellow, with extensive dusky edging. Posterior ventral margin of liver striated . . . . . Atlantic big-eye tuna, *obesus*

   Body slender (depth usually more than three and three-quarters in length in individuals over 2 feet long), fins with large yellow areas, finlets bright lemon yellow, with narrow dusky edging. Liver not striated . . . . . yellowfin tuna, *albacares*

BIBLIOGRAPHY

BEEBE, WILLIAM, AND J. TEE VAN

1928. The fishes of Port-au-Prince Bay, Haiti. Zoologica, vol. 10, pp. 1–279.

1936. Systematic notes on the Bermudian and West Indian tunas of the genera *Parathunnus* and *Neothunnus*. *Ibid.*, vol. 21, pp. 177–194.

FRADE, F.

1931. Données biométriques sur trois espèces de thon de l'Atlantique oriental. Rapp. Cons. Explor. Mer, Copenhagen, vol. 70, pp. 117–126.

FRASER-BRUNNER, A.

1950. The fishes of the family *Scombridae*. Ann. Mag. Nat. Hist., ser. 12, vol. 3, pp. 131–163.

[1] Proportions based on head length were measured with calipers. These may not hold for tunas less than 2½ feet long, which usually have relatively short pectorals. It is, therefore, especially important to use the gill-raker count and other characters for small individuals.

GINSBURG, ISAAC
1953. The taxonomic status and nomenclature of some Atlantic and Pacific populations of yellowfin and bluefin tunas. Copeia, no. 1, pp. 1–10.
HELDT, HENRI
1930. Le thon rouge et sa pêche (*Thunnus thynnus* L.) nouveaux aspects de la question. Bull. Sta. Océanogr. Salammbo, no. 18, pp. 1–69.
LETACONNOUX, R.
1950. Le germon (*Germo alalunga* Gmelin). Examen du nombre de branchiospines. Ann. Biol., Copenhagen, vol. 7, p. 63.
MARR, J. C., AND M. B. SCHAEFER
1940. Definitions of body dimensions used in describing tunas. Fish. Bull. U. S. Fish and Wildlife Service, no. 47, pp. 241–244.
MATHER, FRANK J., III, AND C. GODFREY DAY
1954. Observations of pelagic fishes of the tropical Atlantic. Copeia, no. 3, pp. 181–188.
MATHER, FRANK J., III, AND HOWARD A. SCHUCK
1952. Additional notes on the distribution of the blackfin tuna *Parathunnus atlanticus*. Copeia, no. 4, p. 267.
MORICE, JEAN
1953. Un essai systematique sur les familles des Cybiidae, Thunnidae, et Katsuwonidae, poissons Scrombroides. Rev. Trav. Inst. Sci. Tech. Pêches Maritimes, vol. 8, fasc. 1, pp. 35–63.
MORICE, JEAN, AND J. CADENAT
1952. Distribution of fish species in the French West Indies. *In appendix 5 of* Fisheries in the Caribbean. Report of the Fisheries Conference held at Kent House, Trinidad, March 24–28, 1952. Port-of-Spain, Kent House, no. 7, pp. 102–122.
MOWBRAY, LOUIS L.
1935. Description of the Bermuda large-eyed tuna *Parathunnus ambiguus*, n. sp. Bermuda, Government Aquarium. (Privately printed pamphlet of three pages, no page numbers.)
NAVAZ, JOSE MARIA
1950. Contribucion al estudio de las Escombridos de la costa vasca (atun, bonitos y melva). Bol. Inst. Español Oceanogr., no. 31, pp. 1–21.
RAWLINGS, JOHN E.
1953. A report on the Cuban tuna fishery. Comm. Fish. Rev., no. 15, pp. 8–21.
RIVAS, LUIS RENE
1951. A preliminary review of the western North Atlantic fishes of the family Scombridae. Bull. Marine Sci. Gulf and Caribbean, vol. 1, pp. 209–230.
1954. A preliminary report on the spawning of the western North Atlantic bluefin tuna (*Thunnus thynnus*) in the Straits of Florida. *Ibid.*, vol. 4, pp. 302–322.