

MAP SHOWING THE REGION OF WOODS HOLE, MASS.

3.—THE FISHES FOUND IN THE VICINITY OF WOODS HOLE.

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Since the establishment of the United States Commission of Fish and Fisheries in 1871, systematic fish collecting has been carried on at Woods Hole, Massachusetts, by Commission assistants. In the year named, Prof. Spencer F. Baird studied the fish fauna of the region and later published a list of the species then observed which has served as a valuable guide in subsequent investigation.

For more than a quarter of a century almost daily observations, based on collections, have been made and recorded, and it may be safely asserted that nowhere else in the United States has such long-continued and comprehensive work of this character been done. The duty of collecting specimens and recording information has fallen chiefly to the lot of Mr. Vinal N. Edwards, of the Fish Commission, to whose assiduous labors the principal additions to the fish fauna are due.

The collection of specimens has been done chiefly with fine-meshed bag seines, about 150 feet long, hauled from the shore in harbors and coves and on the beaches in Vineyard Sound and Buzzards Bay. This has been supplemented by the setting of fyke nets in suitable localities, by the employment of surface tow nets and dip nets, and by the use of hand lines. The traps or pound nets of the commercial fishermen in Buzzards Bay and Vineyard Sound have also been regularly visited and have yielded many interesting specimens.

Professor Baird's "List of fishes collected at Woods Hole"¹ has remained the only list of the kind. It gives the names of 121 species taken in 1871, two of which have since been shown to be identical, leaving 120 species known from the region at that time. In the twenty-seven years that have since elapsed the list has been augmented almost annually by one or more fishes and has grown to the large proportions here shown.

In the Report of the U. S. Fish Commission for 1882, Dr. Tarleton H. Bean published a "List of fishes collected by the U. S. Fish Commission at Woods Hole, Mass., during the summer of 1881." It mentions about 114 species, but less than half of this number were fishes actually obtained in the vicinity of Woods Hole, the others being deep-sea or offshore fishes, like the tilefish, pole flounder, and hagfish, brought to the station by exploring vessels.

The present list is based on the collections of Woods Hole fishes at the station, in the U. S. National Museum, and at the laboratory of the Fish Commission in Washington, on the yearly records kept by Mr. Edwards, and on personal observations by the writer in 1897.

¹ Report U. S. Fish Commission, 1871-2, pp. 823-827.

Partly on account of the systematic collecting, and partly because of the very favorable geographical position of Woods Hole, an unexpectedly large number of fishes have been ascertained to inhabit the region as permanent residents, regular seasonal migrants, casual visitants, or stragglers. There is probably no other locality in the United States, with the exception of southern Florida, in which so many species have been detected. Excluding the fresh-water fishes, more than 200 species have been obtained at Woods Hole. The section is interesting as marking the northern limit of distribution of many common fishes, and, on the other hand, the southern limit of a number of northern species.

The most striking feature of the fauna is the extent to which species characteristic of the West Indies or Florida are represented. This enrichment of the fauna is directly traceable to the Gulf Stream, which is within about 100 miles of Woods Hole. Most of the southern fishes are very young, the adults of many species being either entirely absent or quite rare; and it is apparent that their presence in the waters of southern New England is involuntary. Falling within the influence of the Gulf Stream, the small fishes are passively carried northward. A common medium of transfer is the gulf-weed or sargasso-weed (*Sargassum bacciferum*), under which the fishes congregate for protection. The patches of floating weed are often of large size, affording ample shelter and at the same time furnishing food to the fishes beneath and among them. Winds from the south, southeast, east, or northeast dislodge the weed from the Gulf Stream and distribute it along the shores of the United States. The configuration of the shore of southern New England forms a kind of huge pocket in which the drift is concentrated, in Buzzards Bay and Vineyard Sound, from a wide expanse of sea. The weed appears in this section every year and is distributed by winds and tides in Buzzards Bay and Vineyard Sound. It is most abundant after southerly winds. The fishes which it shelters gradually become dispersed in the inshore waters as the weed is driven ashore or dies and sinks.

There is every reason to believe that practically all the young fishes which do not get out of the Gulf Stream before it has ascended very far along the east coast of the United States must inevitably perish, since their small size makes their return to southern waters almost impossible. Those which are blown ashore on the Middle and North Atlantic coasts in spring, summer, and early fall doubtless find the surface water not uncongenial, and survive until winter, while those which are carried out of the Gulf Stream in winter must very quickly succumb to the cold. The Gulf Stream is, in fact, a great highway along which a continuous body of fish and other animals, in infinite variety, is being carried from their natural habitat in the south to almost certain destruction in the north.

During July, 1897, there was an unusual prevalence of southerly, southeasterly, and southwesterly winds. Toward the end of the month the weed drifted into Vineyard Sound and Buzzards Bay in large quantities, and was distributed by the tide in long, straggling lines. To this circumstance may be attributed the capture during the subsequent summer and fall months of a number of fishes that were either very rare or wholly unknown in the region heretofore. On July 24, in the course of two hours, 15 species were obtained in gulf-weed off Great Harbor, by means of small dip nets operated from a sailboat. Among these were the marbled angler (*Pterophryne histrio*), Bermuda chub (*Kyphosus sectatrix*), log perch (*Palinurichthys perciformis*), rudder-fish (*Seriola zonata*), dolphin (*Coryphæna hippurus*), trigger-fish (*Balistes vetula*), sobaco

(*Canthidermis asperimus*), and filefish (*Monacanthus hispidus*). A single piece or mass of gulf-weed was sometimes found to harbor a number of species of fishes.

The information hereafter presented consists of the following parts:

- I. Annotated list of fishes known to inhabit the Woods Hole region.
- II. Fishes of the Woods Hole region not previously reported so far north or south.
- III. Fishes obtained in the Woods Hole region which have not yet been found elsewhere on the United States coasts.
- IV. Fishes recorded from adjacent localities which may be looked for near Woods Hole.
- V. Fresh-water fishes collected in the vicinity of Woods Hole.

A map is appended covering the region within a radius of about 25 miles of Woods Hole and showing the places referred to in the accompanying lists.

The visits of many biological students annually to Woods Hole and the continuation of systematic collecting by the Commission warrant the expectation of a number of additions to the fish fauna in the next few years. The use of a small purse seine offshore in Vineyard Sound and Buzzards Bay and the employment of a small beam trawl on suitable bottom in the same waters will undoubtedly result in bringing to light fishes new to the region. That there is still something to be learned regarding the fish life of this section may be readily inferred from the outcome of the collections in 1897, when, twenty-six years after systematic work was begun, five species, including one species new to science, were added to the list.

This paper is presented chiefly as a basis for future inquiry; it contains but little information concerning the fishes mentioned, with the exception of a statement of their abundance and the times when they are found. The daily observations that have been made regarding the fishes of the region, supplemented by meteorological data and the very valuable fish-cultural records of the station, afford material for a comprehensive account of the fish fauna which it is hoped will shortly be prepared.

I.—ANNOTATED LIST OF FISHES KNOWN TO INHABIT THE WOODS HOLE REGION.

In the following list there are arranged in systematic order, by families, all species of fishes known to have been found in the vicinity of Woods Hole. In nomenclature and sequence of species, the "Check List of the Fishes and Fish-like Vertebrates of North and Middle America"¹ has been followed. The local names which the fishes bear in this region are indicated by means of quotation marks. The existence in collections of specimens from this section is for convenience and brevity designated for each species by means of signs; an asterisk (*) referring to the fish collection of the U. S. National Museum in Washington, a dagger (†) to the local museum of the Fish Commission at Woods Hole, and a section mark (§) to the laboratory of the Fish Commission at Washington. The fishes enumerated represent 88 families, 160 genera, and 209 species. The families having a noteworthy number of species are the *Clupeidæ*, 9 species; the *Scombridæ*, 11 species; the *Carangidæ*, 18 species; the *Sciænidæ*, 7 species; and the *Gadidæ*, 9 species.

PETROMYZONIDÆ. The Lampreys.

1. *Petromyzon marinus* Linnæus. *Great Sea Lamprey*; "*Lamprey Eel*"; "*Lamper Eel*." (* †)
Not abundant. Taken in traps in Buzzards Bay in May and June.

GALEIDÆ. The Requiem Sharks.

2. *Mustelus canis* (Mitchill). *Smooth Dogfish*; "*Dogfish*"; "*Switchtail*." (* †)
Very abundant from about June 1 to November. Feeds mostly on crabs. The largest examples are 5 feet long, the usual length being 3 feet.
3. *Galeocerdo tigrinus* Müller & Henle. *Tiger Shark*; "*Spotted Shark*." (*)
Present every year in variable abundance, and caught in traps in Vineyard Sound and Buzzards Bay. The last species of shark to appear in this region, rarely coming before August. It remains until October. Usual length, 5 feet.
4. *Prionace glauca* (Linnæus). *Great Blue Shark*. (*)
Very rare, apparently only one having been taken; this was obtained from a trap in July, 1877.
5. *Carcharhinus obscurus* (LeSueur). *Dusky Shark*; "*Shovel-nose*." (* †)
Very common, but less so than the sand shark. Taken in traps and on lines fished from wharves. Comes about June 1 and remains through a part of November. The largest observed here are 12 to 14 feet long; the average are 8 or 9 feet, and the smallest are 2½ feet.
6. *Carcharhinus milberti* (Müller & Henle). *Blue Shark*. (*)
Given by Professor Baird in his 1871 list. Four examples about 4 feet long were taken in a trap at the breakwater, on August 8, 1873, and sent to Washington. None has since been observed. Their color is described by Mr. Edwards as being an intense, almost indigo, blue.
7. *Carcharhinus limbatus* (Müller & Henle). *Spotted-fin Shark*. (*)
Observed on only one occasion. In 1878 at least 20 were taken in traps at the breakwater and Quisset Harbor during a period of three weeks. All were about 4 feet long, and all were found dead in the traps. The "stray specimen taken at Woods Hole, Mass.," referred to in several lists of American fishes, was one of the foregoing lot that was sent to Washington.

SPHYRNIDÆ. The Hammer-headed Sharks.

8. *Sphyrna zyggæna* (Linnæus). *Hammer-headed Shark*; "*Hammerhead*"; "*Rakehead*." (* †)
Usually common; some years abundant. Taken in traps from July to October, being most numerous in July and August. Generally swims with its dorsal and caudal fins out of the water. The largest ones taken here are 7 or 8 feet long; the smallest are under 1½ feet, and the average are 4 feet. The name "rakehead" is an old local designation of this species

¹ Report U. S. Fish Commission, 1895.

ALOPIIDÆ. The Thresher Sharks.**9. *Alopias vulpes* (Gmelin). *Thresher*; "*Thrasher*;" *Swingle-tail*. (*)**

Common in Vineyard Sound in vicinity of Menemsha; also found in Buzzards Bay. Not infrequently caught in the fish traps. In fall the boat cod fishermen at Gay Head catch them on lines baited with fresh herring. At Woods Hole three "thrashers" 16 feet long were taken one morning in a trap at the breakwater. Specimens 20 feet long have been caught at Menemsha. Some only 4 feet long have been obtained. This species comes in April and remains until late in fall.

CARCHARIIDÆ. The Sand Sharks.**10. *Carcharias littoralis* (Mitchill). "*Sand Shark*." (* †)**

The commonest shark in this region, found from June to November, and often caught with traps and lines. The largest are 12-feet long; the average length is 4½ or 5 feet. Fish, crabs, and various other animals are found in their stomachs.

LAMNIDÆ. The Mackerel Sharks.**11. *Isurus dekayi* (Gill). "*Mackerel Shark*." (* †)**

Quite common in Vineyard Sound and Buzzards Bay. Most numerous in fall, remaining till end of November. Largest 10 feet long; average 4 to 5 feet.

12. *Carcharodon carcharias* (Linnaeus). *Man-eater Shark*. (*)

Rare. Reported by Professor Baird in his 1871 list. The U. S. National Museum contains several specimens sent from Woods Hole.

SQUALIDÆ. The Dog-Fishes.**13. *Squalus acanthias* Linnaeus. *Dogfish*; "*Horned Dogfish*." (* †)**

Less abundant than formerly, and comparatively scarce in 1897. When the fish factory was established at Woods Hole, this was the principal fish utilized in the manufacture of oil and guano; later, the scarcity or irregularity of the supply necessitated the use of menhaden. When the horned dogfish first comes, in May, it feeds largely on etenophores.

SQUATINIDÆ. The Angel Sharks.**14. *Squatina squatina* (Linnaeus). *Angel-fish*; *Monkfish*. (*)**

A specimen weighing 35 or 40 pounds and 3 or 4 feet long was taken in a fish trap at Menemsha Bight, September 1, 1873. It was sent to Washington at the time. The species has not since been observed.

RAJIDÆ. The Skates.**15. *Raja erinacea* Mitchill. *Summer Skate*; "*Bonnet Skate*." (* †)**

The commonest species of skate in this region. Found from June to October. In allusion to the habit the fish has of rolling itself up when caught, the local fishermen call it the "bonnet skate."

16. *Raja ocellata* Mitchill. *Big Skate*; "*Winter Skate*." (* †)

Common from February to June and from October 15 to end of trap fishing. Either absent or very rare in summer.

17. *Raja radiata* Donovan. *Starry Ray*. (*) Not common.**18. *Raja eglanteria* Bosc. *Brier Ray*. (* †)**

Not common. A few taken every year in traps at Menemsha; formerly caught at the breakwater.

19. *Raja lævis* Mitchill. "*Barndoor Skate*." (* †) Common in spring and fall, rare in summer.**NARCOBATIDÆ. The Electric Rays.****20. *Tetranarce occidentalis* (Storer). *Torpedo*; "*Crampfish*." (* †)**

Not uncommon in Buzzards Bay and Vineyard Sound from May to November. Most numerous in October and November. At times as many as half a dozen are taken at one lift of a trap at Menemsha. The average weight is 30 pounds, the maximum 75 pounds, and the minimum 4 or 5 pounds.

DASYATIDÆ. The Stingrays.

21. *Dasyatis centrura* (Mitchill). "*Sting Ray.*" (* †)
Common during summer, appearing early in July. The fishermen are much afraid of them.
22. *Pteroplatea maclura* (LeSueur). *Butterfly Ray*; "*Angel-fish.*" (* †)
Rare. Observed mostly in August and September.

MYLIOBATIDÆ. The Eagle Rays.

23. *Myliobatis freminvillei* LeSueur. *Sharp-headed Ray*; "*Sting Ray.*" (* †)
Not very common. A few are taken every year in traps.
24. *Rhinoptera bonasus* (Mitchill). *Cow-nosed Ray*; "*Sting Ray.*" (* †) Common.

ACIPENSERIDÆ. The Sturgeons.

25. *Acipenser sturio* Linnæus. "*Sturgeon.*" (* †)
Common. Most numerous in Vineyard Sound in June and July. Has the habit of jumping out of the water; at times as many as half a dozen may be seen in the sound at once. There is a considerable catch in traps, many 3 to 4 feet long being taken. The sturgeon was formerly thrown away when caught, but is now sold.
26. *Acipenser brevirostris* LeSueur. *Short-nosed Sturgeon.* (†)
Found in company with common sturgeon, but less numerous than latter. Taken in traps.

SILURIDÆ. The Cat-Fishes.

27. *Felichthys marinus* (Mitchill). *Sea Catfish*; *Gaff-topsail Catfish.* (* †)
Quite rare. Reported by Professor Baird in 1871. Recently but few have been seen; one specimen caught in a trap at Menemsha in 1886 is preserved in the collection.
28. *Galeichthys felis* (Linnæus). *Sea Catfish.* (†)
Reported to have been common in spring in Vineyard Sound many years ago, being often taken with cod; now very rare, and only occasionally observed since the Fish Commission station at Woods Hole was established. A specimen was taken in 1887, since which time none has been reported.

ANGUILLIDÆ. The True Eels.

29. *Anguilla chrysypa* Rafinesque. "*Eel.*" (* † †)
Abundant at all times, but most numerous in October. On west side of Buzzards Bay traps have been set especially for eels, and large catches have been made. During two weeks in October, 1896, one trap took 350 barrels; in one night between 30 and 35 barrels were caught.

LEPTOCEPHALIDÆ. The Conger Eels.

30. *Leptocephalus conger* (Linnæus). *Conger Eel.* (* †)
Comes in July and remains until fall; very common for several years, but rather rare formerly. Fishermen as a rule do not distinguish from the common eel. A few are taken in traps and with lines, but many large ones, weighing from 8 pounds upward, are caught in lobster pots. A specimen in the collection weighs 10 pounds. One caught on a line at Falmouth, August 30, 1897, weighed 12 pounds. The smallest observed are 15 to 20 inches long.

ELOPIDÆ. The Tarpons.

31. *Tarpon atlanticus* (Cuvier & Valenciennes). *Tarpon.*
Taken every year in traps at South Dartmouth, also occasionally at Quisset and at Menemsha, in latter part of September. All are about one size, 80 to 100 pounds. Fishermen call them "big-scale fish." An effort has been made to find a market for them in New Bedford, but the people did not like them, owing to the toughness of the flesh.
32. *Elops saurus* Linnæus. *Ten-pounder*; *Big-eyed Herring.* (* †)
Common in fall, none appearing before October. Taken in traps in Vineyard Sound and in herring gill nets at Vineyard Haven. Many have been sent to the Fish Commission by fishermen for identification. Average length, 18 to 20 inches. No young fish observed.

ALBULIDÆ. The Lady-Fishes.

33. *Albula vulpes* (Linnaeus). *Lady-fish; Bonefish.* (*)

Very rare. Reported by Professor Baird in 1871, and since observed only once or twice. None seen for many years.

CLUPEIDÆ. The Herrings.

34. *Etrumeus sadina* (Mitchill). *Round Herring.* (*)

Apparently rare. Known to have been found on only a few occasions. Some years ago, in October, several were taken in traps at Menemsha Bight.

35. *Clupea harengus* Linnaeus. *Sea Herring; "Herring"; "Sperling" (young).* (* †)

Schools of large herring, in a spawning condition, appear about October 15 and remain till very cold weather sets in, their departure corresponding with that of cod. By January young herring $\frac{1}{2}$ inch long are taken in surface tow nets; by May 1 they are 1 to $1\frac{1}{4}$ inches long, and by August 1 they have attained a length of $2\frac{1}{4}$ to 3 inches. Fish 3 to 5 inches long, called "sperling," are found from September 1 to end of season and are used for mackerel bait. About June 1 there is a large run of herring, smaller than those in the fall run. This lasts two weeks, during which the traps are full of them. No use is made of the early run, but in fall they are caught in gill nets for food and bait.

36. *Clupanodon pseudohispanicus* (Poey). *Spanish Sardine.* (* †)

First seen in 1892, when it was abundant throughout the region. It appeared at Menemsha in September and was taken in the traps. A few weeks later it was found in large numbers at Woods Hole, remaining till late in fall. In Eel Pond over 250 were taken at one seine-haul. Since then only a very few have been observed each year, none being taken in 1897. The fish is 4 or 5 inches long and is usually found with young herring (*Clupea harengus*) of slightly smaller size.

37. *Pomolobus mediocris* (Mitchill). *"Hickory Shad."* (* †)

Common. Comes in spring but is most numerous from last of September to end of trap-fishing season. In October, 1895, a trap near Tarpaulin Cove caught 3,500 at one lift. These brought 10 cents each in New York. In spring and summer the fish has no market value, but in fall it is shipped to New York.

38. *Pomolobus pseudoharengus* (Wilson). *Branch Herring; "Alewife"; "River Herring."* (* † §)

Arrives in March and is taken during March and April. By May 1 most of the fish have entered the streams and ponds to spawn; early in May it begins to return to salt water. Many are caught in scoop nets for bait.

39. *Pomolobus æstivalis* (Mitchill). *Glut Herring; "Blackback."* (* † §)

Common. Comes later than branch herring. Spawns in adjacent ponds.

40. *Alosa sapidissima* (Wilson). *"Shad."* (* †)

Comes about May 1 and is taken in traps. Less numerous than formerly; twenty-five years ago probably 100 times as many were caught as in recent years. In 1897 the average number taken in a trap was not over three to five.

41. *Opisthonema oglinum* (LeSueur). *Thread Herring.* (* †)

Very rare. A number were taken in the fall of 1871, but the species is not recorded in Professor Baird's list. In 1885 it was quite common in Buzzards Bay and Vineyard Sound in July. It remained about a month, and specimens were taken in traps at almost every lift. During the next four years the fish was also noticed, but none has been seen since 1890. Recorded from Newport, Rhode Island, from which place the type came; but not regularly found north of the Carolinas.

42. *Brevoortia tyrannus* (Latrobe). *"Menhaden"; "Pogy."* (* † §)

Arrives in schools about May 20, but scattered fish are taken in March with alewives; they remain until first of December, sometimes as late as December 20, but are most abundant in June. When the schools first arrive the reproductive organs of many of the fish are in an advanced stage of development, but after July 1 none with large ovaries are found. Late in fall the fish again have well-developed roes. The smallest fish are about an inch long; these are found in little schools about the shores and wharves as early as July 15. The young are abundant throughout summer and fall. The average length of adult menhaden is 13 or 14 inches; one fish 18 inches long, probably the largest ever observed, was caught here in 1876.

ENGRAULIDIDÆ. The Anchovies.

43. *Stolephorus brownii* (Gmelin). *Striped Anchovy*; "*Anchovy*." (*†§)
Abundant. Occasionally rather uncommon. Found from August to late in fall. Much the most numerous species of anchovy.
44. *Stolephorus argyrophanus* (Cuvier & Valenciennes). "*Anchovy*." (*†)
Not uncommon at times. Most numerous in fall, in company with small herring.
45. *Stolephorus mitchilli* (Cuvier & Valenciennes). "*Anchovy*." (*†)
Abundant. Associates with *S. brownii*.

SALMONIDÆ. The Salmon Family.

46. *Salmo salar* Linnæus. *Salmon*. (*†)
A few are taken every year in traps in Buzzards Bay and Vineyard Sound, generally in May. The usual weight of those caught is 2½ pounds, large fish being rare. As having salmon in one's possession is against Massachusetts law, it is difficult to learn much about the fish from the fishermen.
47. *Salvelinus fontinalis* (Mitchill). *Brook Trout*; *Speckled Trout*. (†)
Abounds in the fresh waters of the region, and in fall, where communication exists, regularly enters the salt water, remaining through winter. Occasionally taken in fyke nets set in Great Harbor and Little Harbor.

ARGENTINIDÆ. The Smelts.

48. *Osmerus mordax* (Mitchill). "*Smelt*." (*†§)
Most abundant in March, but common from October to May; a few are found in summer in Eel Pond and Hadley Harbor. Spawns in February and March. Maximum length 14 inches, minimum 2½ inches; fishes of the latter size being seined in Eel Pond.

SYNODONTIDÆ. The Lizard-Fishes.

49. *Trachinocephalus myops* (Forster). *Ground Sparring*. (*†)
Rare. On September 10, 1892, two specimens, 4 inches and 2½ inches long, respectively, were taken at Nobska Beach, Woods Hole, in a seine. The National Museum contains a specimen obtained at Woods Hole September 3, 1887, and others taken in 1876, 1878, and 1887.
50. *Synodus fœtens* (Linnæus). *Lizard-fish*. (†§)
First noted in 1885, since which time a few have been taken nearly every year in September on the beach inside of Nobska Point. Generally 3 or 4 inches long, but a few are 6 inches long.

MAUROLICIDÆ.

51. *Maurolicus pennanti* (Walbaum). (*)
A specimen of this pelagic species was taken at Woods Hole on January 3, 1884, and is now in the U. S. National Museum. In August, 1879, one was found on the beach near Provincetown, Mass.

PECILIIDÆ. The Killifishes.

52. *Fundulus majalis* (Walbaum). *Mayfish*; *Killifish*. (*†)
Common in summer, especially on sandy beaches. Leaves late in fall and is not seen until about April 1, from which time till May it increases in abundance. Spawns in June.
53. *Fundulus heteroclitus* (Linnæus). *Common Killifish*; *Mummichog*. (*†§)
Most abundant of the mummichogs, and present at all seasons. Found principally in eelgrass. Spawning is chiefly in June, but to some extent in July and August.
54. *Fundulus diaphanus* (LeSueur). *Spring Minnow*; *Killifish*. (*†§)
Common throughout year. Very abundant in Waquoit Bay and other places having fresh-water tributaries. Rare in Eel Pond. Found in Hadley Harbor, where there are springs.
55. *Lucania parva* (Baird & Girard). *Rainwater-fish*. (†)
First taken in 1884 in Waquoit Bay, 9 or 10 miles east of Woods Hole, on Vineyard Sound. Since then obtained in all brackish ponds between there and the station. In 1897 was found in Eel Pond and Quisset Harbor for first time.
56. *Cyprinodon variegatus* Lacépède. *Short Minnow*; *Variiegated Minnow*. (*†)
Locally abundant in salt-water ponds near Falmouth. A few are found in Woods Hole Harbor. Spawns in June.

ESOCIDÆ. The Needle-Fishes and Gar-Fishes.

57. *Tylosurus marinus* (Walbaum). *Garfish; Billfish; "Bill Eel."* (* + §)

Common. Fish 2 to 3 feet long arrive about June 15 and are caught in traps with scup. Young, from 3 to 6 inches long, found along shores and in harbors in summer. Examples 10 to 24 inches long are usually common and often abundant in September and October.

58. *Tylosurus acus* (Lacépède). *Houndfish.* (* +)

A fish of this species, 4½ feet long, now in the Woods Hole collection, was taken in a trap at the breakwater August 6, 1885; on the top of its head, between the eyes, were 5 or 6 barnacles, each about 2½ inches long. In the Proceedings of the National Museum for 1878, Dr. Goode refers to the capture of this houndfish (then called *Belone latimana*) at Woods Hole in 1875. This specimen was 49 inches long and weighed 5½ pounds. Several other specimens have, from time to time, been sent to Washington from Woods Hole.

59. *Athlennes hians* (Cuvier & Valenciennes). (§)

In the summer of 1895, a specimen of this fish, 2½ feet long, was brought into the Woods Hole market from a trap at the breakwater. This is the only known occurrence of the species in these waters, or, in fact, north of Florida.

HEMIRAMPHIDÆ. The Halfbeaks.

60. *Hyporhamphus roberti* (Cuvier & Valenciennes). *Halfbeak; "Skipper."* (* +)

Usually common; often abundant at mouth of Vineyard Sound. Found in July, August, and September. Caught in traps at Menemsha, and has also been seined at West Falmouth, on Buzzards Bay. The usual size of the fish is 8 inches, but specimens as small as 3 inches are taken in the fine-meshed collecting seine. In August the thresher shark may frequently be seen among the schools of halfbeaks near Gay Head; when the sharks are driving the fish and causing them to "skip," the jagers (*Stercorarius*) catch them with great dexterity.

SCOMBERESOCIDÆ. The Sauries.

61. *Scomberesox saurus* (Walbaum). *Saury; Skipper; Billfish.* (* +)

Very rare. Given by Professor Baird in his 1871 list. Since then observed only a few times. Several specimens now in Washington were taken prior to 1880. On December 4, 1885, one was seined on the beach near Nobska Point. Very abundant on the northern side of Cape Cod late in fall, and hundreds of barrels are sometimes taken there in traps; many also go ashore.

EXOCETIDÆ. The Flying-Fishes.

62. *Exocetus volitans* Linnæus. *"Flying-fish."* (* +)

Common some years, but usually scarce. Taken in traps in Vineyard Sound, and a few have been caught in Great Harbor. Small fish, from 1½ to 4 inches, are obtained in seines in the harbor in the latter part of September and the first of October. Even the smallest specimens have been observed to "fly" a distance of 10 feet.

GASTEROSTEIDÆ. The Sticklebacks.

63. *Pygosteus pungitius* (Linnæus). *Nine-spined Stickleback.* (* + §)

Common in Eel Pond, Quisset Harbor, and Hadley Harbor, but rare in open harbors. Present throughout the year.

64. *Gasterosteus bispinosus* Walbaum. *Two-spined Stickleback.* (* + §)

Most common of the sticklebacks, being, perhaps, twenty times as numerous as *Apeltes*. Found throughout the year.

65. *Gasterosteus gladiunculus* Kendall. (§)

A stickleback taken at the surface October 15, 1897, is referable to this species. It may be distinguished from *G. bispinosus* by its greater depth, brighter color, and fewer dorsal and anal rays. Reported as not uncommon at the surface in April and May, but rare at other times.

66. *Apeltes quadracus* (Mitchill). *Four-spined Stickleback.* (* + §)

Very common. Found at all seasons.

FISTULARIIDÆ. The Cornet-Fishes.**67. *Fistularia tabacaria* Linnaeus. *Trumpet-fish.* (* † §)**

A few are observed every year, mostly in Buzzards Bay near Quisset; some are taken in Great Harbor; found mostly in September and October. The usual size is 7 or 8 inches, the smallest 4 inches; the largest specimen, about 16 inches long, was caught at the station within the inner basin.

SYNGNATHIDÆ. The Pipe-Fishes.**68. *Siphostoma fuscum* (Storer). *Pipefish.* (* † §)**

The types of this species were obtained at Woods Hole.¹ Very common from about the first of May till December, and probably present throughout the year. Found chiefly among eelgrass. Spawning occurs about June 1. Very young transparent pipefish are sometimes taken at the surface in tow nets in July.

HIPPOCAMPIDÆ. The Sea-Horses.**69. *Hippocampus hudsonius* DeKay. *Sea-horse.* (†)**

Rare. A few are picked up every year in August and September in Vineyard Sound in gulf-weed or rock-weed. All are about 4 inches long.

ATHERINIDÆ. The Silversides.**70. *Menidia gracilis* (Günther). *Silverside.* († §)**

Abundant. Often in large dense bodies about piers in July, August, and September and as late as December. Appears early in spring and remains later than *M. notata*.

71. *Menidia notata* (Mitchill). *Silverside; "Brit."* (* † §)

Very abundant from April to December. In November exceedingly numerous in harbor.

MUGILIDÆ. The Mulletts.**72. *Mugil cephalus* Linnaeus. *Striped Mullet; "Jumping Mullet."* (* † §)**

Commoner than the white mullet. Found from September to end of October, going in large schools about October 1. Largest, 10 inches; average, 7 or 8 inches.

73. *Mugil curema* Cuvier & Valenciennes. *White Mullet; "Jumping Mullet."* (* †)

Common from July 1 to October. Largest, 5 inches long. In summer fish from $\frac{3}{4}$ inch to 2 inches long and upward are taken.

74. *Querimana gyrians* Jordan & Gilbert. *Whirligig Mullet.* (§)

Common in summer. Originally described from Key West, this species has been successively recorded from North Carolina, Virginia, and Massachusetts.²

SPHYRÆNIDÆ. The Barracudas.**75. *Sphyræna barracuda* (Walbaum). *Barracuda.* (§)**

A rare straggler. First recorded from Woods Hole by Dr. Goode, who says "it occasionally finds its way into our northern waters, and one or two specimens of it and other West Indian species have been taken at Woods Hole."³ A young example $3\frac{1}{4}$ inches long was seined at Quisset Harbor September 22, 1897.

76. *Sphyræna guachancho* Cuvier & Valenciennes. *Barracuda.* (*)

A rare straggler not recently met with. A specimen 22 inches long was taken at Woods Hole July 7, 1876. Another was caught in Buzzards Bay, near Woods Hole, July 17, 1883.

77. *Sphyræna borealis* DeKay. *Barracuda.* (* † §)

Dr. Goode³ said of this fish in 1882 that it had "recently appeared in considerable numbers on the coast of southern Massachusetts. * * * No specimens of greater length than 10 or 12 inches have ever been taken, and individuals of this size are very unusual, though smaller ones, ranging from 2 to 6 inches, are occasionally found in large schools about the western end of Marthas Vineyard

¹ See Storer, Rept. Mass. Fishes, 1838. ² See Bull. U. S. F. C. 1894, p. 20. ³ Nat. Hist. Aquat. Anim., p. 448.

and about Wood's Holl, Massachusetts. It seems incredible that the young should occur so abundantly in these waters and the full-grown individuals should be absent. This is possibly because we do not yet know how to capture them."

Specimens 2 to 6 inches long are common in this region after July, but large fish are rare. Most numerous at Woods Hole from October 1 to December, although at Gay Head many occur as early as July and many are caught in fish traps in fall. When snow falls early, large numbers sometimes come ashore dead in Buzzards Bay and Vineyard Sound. Examples 18 inches long are sometimes taken, but those 12 inches long are uncommon and the usual length of the larger fish is only 8 inches.

POLYNEMIDÆ. The Threadfins.

78. *Polydactylus octonemus* (Girard). *Eight-threaded Threadfish.*

A specimen 4 inches long was taken in a seine in Little Harbor in September, 1882. The identification was by Professor Baird (as *Trichidion octofiliis*). The fish was sent to Washington at the time, and appears on the fish register of the National Museum, but seems to have been lost.

AMMODYTIDÆ. The Sand Launces.

79. *Ammodytes americanus* DeKay. *Sand Launce; Lant; "Sand Eel."* (* + §)

Found throughout the year, although most abundant late in fall and early in spring. Only a few are observed in winter, and ordinarily they are not especially common in summer, but some years (1897, for instance) they are fairly plentiful; they usually frequent sandy beaches and reefs, and go in dense schools. In this region the launce is rather small, rarely exceeding 6 inches in length, but on the north side of Cape Cod the size is usually 8 inches. This fish is one of the principal foods of the mackerel in this section. Although it burrows in the sand with great rapidity, it is readily caught by the mackerel.

80. *Ammodytes dubius* Reinhardt. *Sand Launce.* (*)

Apparently very rare on the south side of Cape Cod and known to have been taken there on only one occasion (June, 1877), but regularly found north of the cape.

MULLIDÆ. The Surmulletts.

81. *Mullus auratus* Jordan & Gilbert. *Goatfish.* (* + †)

Rare. Taken every year in September, mostly in Quisset Harbor. Usually not more than 4 to 6 are obtained annually. Prior to ten years ago the fish was rather more numerous than now, the National Museum containing a good many specimens taken between 1875 and 1880.

SCOMBRIDÆ. The Mackerels.

Of the richness of the Woods Hole fish fauna the representation of this family is an illustration. Of the 15 species of *Scombrida* known to inhabit the waters of North and Middle America, 11 have been obtained at Woods Hole.

82. *Scomber scombrus* Linnæus. *Common Mackerel.* (* + §)

This region has felt the general scarcity of mackerel, which has now (1897) existed for more than ten years. Nevertheless, a good many small and medium-sized mackerel have recently been taken in Vineyard Sound, and some years there has been a run of large fish. There is a regular mackerel line fishery carried on with catboats in Vineyard Sound near Gayhead, and the fish is also taken in traps at Menemsha and in Buzzards Bay. The mackerel appears in the latter part of May or about June 1 and remains for about two weeks; it then disappears for about two weeks, when it is thought to be spawning. About July 4 the fishermen look for its reappearance, after which it remains until the latter part of November.

83. *Scomber colias* Gmelin. *Chub Mackerel; "Bull's-eye Mackerel."* (* + †)

Some years abundant in Vineyard Sound and lower part of Buzzards Bay; other years uncommon. Caught in traps and also on lines while fishing for common mackerel. Usually appear about July 15 and leave late in October.

84. *Auxis thazard* (Lacépède). *Frigate Mackerel; "Bonito"; "Tunny."* (†)

Very rare. First observed in 1885, when one was taken in a trap at Menemsha Bight. Since then only one has been recorded; this was caught in a pound net at Woods Hole, June 29, 1892. These weighed respectively $3\frac{1}{2}$ and 3 pounds.

85. *Gymnosarda pelamis* (Linnaeus). *Oceanic Bonito*; "*Blue Bonito*." (*)

This fish has been reported in the Woods Hole region on only one occasion, in 1878, when there was a remarkable run in the traps at Menemsha. The fish remained in the vicinity several weeks, and were caught daily in some of the nets. As many as 2,000 or 3,000 in all were taken. The name "blue bonito" was given them by the fishermen in allusion to the intense dark blue of the back. They were about the same length as the common bonito, but were somewhat heavier. The species was first taken on the United States coast in July, 1877, when a specimen was obtained at Provincetown, Mass.

86. *Gymnosarda alleterata* (Rafinesque). *Little Tunny*; "*Tunny*"; *Bonito*. (*)

Usually abundant in Vineyard Sound in July and August. Taken only at Menemsha, where sometimes as many as 100 are caught in a net at one lift. All are of one size, weighing about 8 pounds. The species is stated by Goode¹ to have made its first appearance in American waters in 1871, when several large schools were observed by the Fish Commission in Buzzards Bay and Vineyard Sound.

87. *Thunnus thynnus* (Linnaeus). *Horse Mackerel*; *Tunny*. (*)

Formerly plentiful, but rare for a number of years; none for five years in Buzzards Bay traps. About 1888, one weighing 630 pounds was taken in a trap off Quisset Harbor. Abundant on the north side of Cape Cod.

88. *Germo alalunga* (Gmelin). *Long-finned Albacore*.

On May 21, 1895, a specimen 3 feet long and weighing 21 pounds became entangled in the leader of a fyke net set in Great Harbor and was thus caught. This appears to be the only known occurrence of the fish on the Atlantic coast of the United States, although it is found in the eastern Atlantic and Mediterranean, as well as in the Pacific.

89. *Sarda sarda* (Bloch). "*Bonito*." (* †)

Usually common. Some years abundant and some quite scarce. In traps, at Menemsha, as many as 1,000 are often taken daily in August, September, and first part of October. The average weight is 3½ to 4 pounds; a few weigh 7 or 8 pounds, and many small ones are caught weighing only half a pound. Very young fish are rare. On one occasion some 2 inches long were taken in July at Menemsha.

90. *Scomberomorus maculatus* (Mitchill). "*Spanish Mackerel*." (* †)

Rare during recent years, and apparently scarcer each season. Formerly abundant. In 1883 or 1884 530 were taken at one lift of a trap at the breakwater. When the fish was abundant it was more common in Buzzards Bay than in Vineyard Sound. Only one or two have of late been taken annually. The average weight in this region is 2½ pounds.

91. *Scomberomorus cavalla* (Cuvier). "*Cero*." (* †)

Appears in Vineyard Sound about July 1, and is quite common until the end of the trap-fishing season. It is much more common than the Spanish mackerel. At times 8 or 10 are taken at one lift of a trap at Menemsha. When traps were set in Buzzards Bay about 35 or 40 of this and the preceding species were caught annually at Quisset. The fishermen do not distinguish *S. cavalla* from *S. regalis*, but call both "cero."

92. *Scomberomorus regalis* (Bloch). *Kingfish*; "*Cero*." (* †)

Occurs in about same abundance and at same time as the foregoing species.

TRICHIURIDÆ. The Cutlas-Fishes.**93. *Trichiurus lepturus* Linnaeus. *Cutlas-fish*; *Scabbard-fish*. (*)**

A specimen 3 feet long was taken at Woods Hole in 1874. A few stragglers have been taken in traps at Menemsha Bight during the last ten years, usually not more than one or two in a season; one that has been preserved was caught September 21, 1874. Chesapeake Bay appears to be the normal northern limit of its range, and is the limit assigned in recent lists. As early as 1840, however, the fish was taken in Buzzards Bay, and in 1845 was recorded from Wellfleet.²

¹Natural History of Aquatic Animals.

²See Storer, History of Massachusetts Fishes.

ISTIOPHORIDÆ. The Sail-Fishes.

94. *Istiophorus nigricans* (Lacépède). *Sailfish*. (*)

Rare. Taken only at Quisset Harbor, where during the past 25 years about half a dozen have been caught in a trap; all were about 9 feet long.

95. *Tetrapterus imperator* (Bloch & Schneider). *Spearfish*. (*)

Generally rare, but between 1885 and 1890 numbers were taken in the traps in Vineyard Sound and Buzzards Bay during July and August. Most were caught in the trap farthest up Buzzards Bay at Quisset Harbor.

XIPHIIDÆ. The Sword-Fishes.

96. *Xiphias gladius* Linnæus. "*Swordfish*." (*)

Abundant near Gayhead. Rare now in Vineyard Sound, but some time ago a number were taken there annually near Tarpaulin Cove.

CARANGIDÆ. The Pompanos, Crevallés, Amber-Fishes, Etc.

97. *Oligoplites saurus* (Bloch & Schneider). *Leather-jacket*. (*)

Very rare. Only three instances of its occurrence known. In 1874 one specimen was caught in a trap at Menemsha; on August 13, 1875, another was taken, and in September, 1886, two or three specimens were taken in a pound net at the breakwater. Specimen in the Woods Hole collection, from Newport, Rhode-Island, taken September 10, 1886.

98. *Naucrates ductor* (Linnæus). "*Pilot-fish*."

Recorded by Professor Baird in 1871. Not common in inshore waters. The banded rudder-fish (*Seriola zonata*) is usually mistaken for this species by the fishermen.

99. *Seriola zonata* (Mitchill). *Shark-pilot*; *Rudder-fish*; "*Pilot-fish*." (* † §)

Common from July to October. Usually seen around spiles, pound-net stakes, vessels, and under floating seaweed. In July and August, 1897, was often met with in Vineyard Sound, under gulf-weed and eelgrass; also in Eel Pond, Great Harbor, Quisset Harbor, Hadley Harbor, and elsewhere. While the *Grampus* was moored at the Woods Hole pier in August, 1897, there was a school of "pilot-fish," 6 to 7 inches long, beneath the bow and stern for several weeks, feeding chiefly on *Menidia gracilis*. They were very shy and would not take the hook, but some were caught with a dip net. This species is not distinguished by fishermen from *Naucrates ductor*. Examples as small as 1½ inches in length are taken in summer.

100. *Seriola lalandi* Cuvier & Valenciennes. *Amber-fish*. (* † §)

Rare. An amber-fish, 2½ feet long, taken at Woods Hole September 10, 1895, is apparently referable to this species. Another, 3 feet 1 inch long, taken July 8, 1892, and several others, obtained at various times, have been preserved.

101. *Seriola dumerili* (Risso). *Amber-fish*; *Amber-jack*. († §)

Rare. The Woods Hole collection contains three specimens, from 7¼ to 13 inches long, taken in August and September.¹

102. *Decapterus punctatus* (Agassiz). *Round Robin*; *Scad*; *Cigar-fish*. (* †)

Reported by Professor Baird in 1871. Recently very rare and observed only in Quisset Harbor; taken there in 1886 and on only one or two other occasions.

103. *Decapterus macarellus* (Cuvier & Valenciennes). *Mackerel Scad*. (* †)

Common every year in fall, but not observed at other times. Comes in October and remains about a month. In Great Harbor several hundred have been taken at one seine-haul. No full-grown fish ever observed. Those taken are usually 5 inches long, none over 6 inches. In October, 1897, the fish was remarkably abundant in Vineyard Sound, some traps taking 10 barrels daily.

104. *Trachurops crumenophthalmus* (Bloch). *Goggler*; *Big-eyed Scad*. (* †)

Common every year in fall, from about October 15 to November 15. All are 4 to 6 inches long.

¹ See Rept. U. S. F. C. 1896, p. 172.

105. *Caranx bartholomæi* Cuvier & Valenciennes. *Yellow-jack*. (* † §)

Very rare, but has been obtained during four different years. Nine specimens about 6 inches long were taken in 1876; one 5½ inches long was obtained November 10, 1885; another was caught in Great Harbor September 30 of the same year; one 2½ inches long was seined August 10, 1886. On October 6, 1897, one 4¾ inches long was caught in a fyke net in Great Harbor.

106. *Caranx hippos* (Linnaeus). "*Crevallé*"; *Jack*. (* †)

Common. First appear about July 1, and caught as long as the fish traps are set, being most numerous in October. No spawn found in them. Young an inch long are taken about July 1. Large examples occur in fall; they sometimes measure over 2 feet in length and weigh 12 to 14 pounds.

107. *Caranx crysos* (Mitchill). "*Yellow Crevallé*"; *Hardtail*; *Runner*; *Jewel*. (* †)

Arrives and departs about same time as foregoing. Young, 2 to 2½ inches long, are caught in Buzzards Bay in summer. The largest are about 15 inches long and weigh 2 to 3 pounds.

108. *Alectis ciliaris* (Bloch). *Cobbler-fish*; *Threadfish*. (* † §)

Usually not common, but some years numerous. Found from June 15 until November 1, or later; taken in traps. Three to 8 inches long.

109. *Vomer setipinnis* (Mitchill). *Horsefish*; "*Dollar-fish*." (* †)

Common some years, rare others, in Buzzards Bay and Vineyard Sound. Usually more numerous than *Selene vomer*. It first appears in August and is found during that month and September.

110. *Selene vomer* (Linnaeus). *Lookdown*; "*Dollar-fish*." (* †)

Rare. A few are taken each year in traps and with the collecting seine, usually in September. First noticed here in 1885.

111. *Trachinotus falcatus* (Linnaeus). *Round Pompano*. († §)

Young very common; adults never observed. Fish half an inch to an inch long appear in July; by September 15, when they disappear, they are about 2 inches long.

112. *Trachinotus goodei* Jordan & Evermann. *Permit*; *Black-finned Pompano*. († §)

Rare, and not observed every year. First obtained in 1894, when about a dozen specimens were seined on Nobska Beach, on September 18. In September, 1897, a number were caught at various places, in company with *T. carolinus* and *T. falcatus*. The specimens are all small—3 inches or less in length.

113. *Trachinotus argenteus* Cuvier & Valenciennes. *Silvery Pompano*.

Rare. On September 7, 1885, a specimen was taken at Woods Hole which was identified by Professor Baird as this species.

114. *Trachinotus carolinus* (Linnaeus). *Common Pompano*. (* † §)

Adult fish rare, none having been observed for ten years. Young, from 2 to 4 inches long, common, usually appearing between July 20 and August 1, and remaining till about end of September.

POMATOMIDÆ. The Blue-Fishes.**115. *Pomatomus saltatrix* (Linnaeus). "*Bluefish*." (* † §)**

Common. Arrives about June 1 and remains till some time in November, being taken as late as the traps are operated. Most numerous in July and October. Young first appear early in July, being about 3 inches long. Fish from 3 to 6 inches long are often very abundant in the harbors, several hundred being taken at one haul of the collecting seine. Many of this size are caught with lines off the Fish Commission wharves. The largest are taken in fall; some weigh 14 to 16 pounds. Well-developed spawn is found in a small proportion of the bluefish when they first arrive, and at Nantucket large roes have been found as late as July 15.

RACHYCENTRIDÆ. The Sergeant-fishes.**116. *Rachycentron canadum* (Linnaeus). *Cobia*; *Crab-cater*.**

Rare. Not observed every year. All specimens recorded in this region have been taken in September in Buzzards Bay traps and have weighed 5 or 6 pounds. The fish appears to have been more common in the seventies than at present.

NOMEIDÆ. The Nomeids.**117. *Nomeus gronovii* (Gmelin). *Portuguese Man-of-war-fish.* (* †).**

First noticed in 1889, when specimens were taken in Vineyard Sound, on July 6, July 23, and August 12. Since then observed only in 1894, when there were many "Portuguese men-of-war" in Vineyard Sound. For several days in July there were often several dozen of the "men-of-war" in sight at one time off Tarpaulin Cove, and under these the fish were numerous. Sometimes a dozen would be found under one "man-of-war," and 21 were collected by the Commission on July 31, all about 6 inches long.

CORYPHÆNIDÆ. The Dolphins.**118. *Coryphæna hippurus* Linnaeus. "*Dolphin.*" (* †)**

Large specimens are very rare in Vineyard Sound, and none has been seen since about 1890. In past years some 3 feet long have been taken in traps at Menemsha. Young fish from 2 to 12 inches long are obtained nearly every year in the floating gulf-weed; four or five were secured in 1897 in Vineyard Sound, in July and August.

CENTROLOPHIDÆ. The Rudder-Fishes.**119. *Centrolophus niger* (Gmelin). *Blackfish; Black Ruff.* (*)**

A specimen of this southern European species was taken at Dennis, Mass., about 25 miles east of Woods Hole, on November 23, 1888.

120. *Palinurichthys perciformis* (Mitchill). "*Rudder-fish*"; "*Polefish.*" (* † §)

Common from last of June to October. Observed in gulf-weed and other floating objects. As many as a hundred small and medium-sized fish may sometimes be found under a box, barrel, or tub. It is often seen around pound-net poles and has received the name of "polefish" among the local fishermen. The largest specimens are taken in traps at Menemsha, and are 15 or 16 inches long.

STROMATEIDÆ. The Butter-Fishes.**121. *Rhombus paru* (Linnaeus). *Harvest-fish; "Long-finned Butter-fish."* (†)**

Usually rare, but occasionally common. As a rule only 3 or 4 are taken in a season, but one year 300 or 400 were obtained. Observed mostly in June and July, in company with butter-fish.

122. *Rhombus triacanthus* (Peck). "*Butter-fish.*" (* † §)

Abundant. There is a noteworthy run in June, mixed with the scup. In 1896 and 1897, as many as 60 barrels were taken from a trap at Naushon at one lift; 30 barrels shipped from this trap to New York in 1897 yielded the fishermen only two 2-cent stamps! This run lasts only 1 or 2 weeks, but the fish is taken from early summer to late fall. Spawning occurs in June. The butter-fish is often seen swimming under jelly-fish.

TETRAGONURIDÆ. The Square-Tails.**123. *Tetragonurus cuvieri* Risso. *Square-tail; Sea-raven.* (*)**

One specimen obtained at Woods Hole November 10, 1890.

SERRANIDÆ. The Sea Basses.**124. *Roccus lineatus* (Bloch). "*Striped Bass*"; "*Rockfish.*" (* †)**

Not common. Arrives about May 1, and leaves about November 1. Most numerous in June. Apparently does not spawn in this section. Smallest weigh half a pound; largest 65 pounds.

125. *Morone americana* (Gmelin). "*White Perch.*" (* † §)

Abundant in fresh-water ponds of the region connected with salt water. Spawns in ponds in May and June. In October specimens from 8 to 15 inches long are taken in nets in Buzzards Bay and Vineyard Sound.

126. *Epinephelus niveatus* (Cuvier & Valenciennes). *Snowy Grouper.* († §)

Not rare. First reported in 1895, when as many as 10 or 12 specimens were obtained in the Woods Hole region.¹ In 1897 several others were taken in summer and fall; one was caught August 7 in a dredge in Vineyard Sound in 6 fathoms of water and in November several were taken in a fyke net in Great Harbor. All have been of small size (3 inches or less), and most of them have been brought up in lobster pots. A number have also been secured in Rhode Island waters.

¹See Rept. U. S. F. C. 1894, p. 171.

127. *Centropristes striatus* (Linnaeus). "Sea Bass"; "Black Bass." (* + §)

Very common. Arrives in May, and departs from the inshore waters about October 1, being most abundant July to September. Spawns in June. Young are first seen about August 1. Maximum weight 6 pounds. A very important and excellent food-fish, taken in large numbers on lines for market and sport.

LOBOTIDÆ. The Triple-Tails.**128. *Lobotes surinamensis* (Bloch). *Flasher*; *Triple-tail*. (* †)**

Very rare. Given by Professor Baird in his 1871 list. Since then the fish has been met with on only a few occasions. Specimens now preserved in Washington were taken in August, 1873, and December, 1875. On September 20, 1886, a specimen 2 feet long was taken in a trap at Menemsha, and in August, 1890, another thus caught was sent to Washington.

PRIACANTHIDÆ. Catalufas.**129. *Priacanthus arenatus* Cuvier & Valenciennes. *Catalufa*; *Short Big-eye*. (* †)**

Rare. First taken in 1876, when 7 specimens were obtained in September and October, after which time for several years 3 or 4 were caught annually. The last specimen, 3½ inches long, was taken October 2, 1888, in a seine at Quisset Harbor.

130. *Pseudopriacanthus altus* (Gill). *Big-eye*. (* †)

Rare. The local collection contains 2 specimens, 1½ inches long, taken November 28, 1885. Examples in the National Museum were obtained September 29, 1875, and September 26, 1877. There have been several other known occurrences of the fish in this section; it is also recorded from Marblehead, Mass., by Storer (*Fishes of Massachusetts*, 1867). On November 1, 1890, a specimen was taken in the Acushnet River at New Bedford. The type of the species was from Narragansett Bay, R. I.

LUTIANIDÆ. The Snappers.

This family of tropical and subtropical fishes is represented in the Woods Hole collection by an unexpectedly large number of species, some of which were taken for the first time in the fall of 1897. Several large snappers have been taken in traps from time to time, but they can not be identified with certainty, as they were not preserved. On September 28, 1894, a snapper weighing 25 pounds, similar in general appearance to the gray snapper (*Neomænis griseus*), was taken in a trap in Buzzards Bay. It was seen by a number of persons from the Fish Commission station. In 1896 a fish of the same species was caught at Newport.

131. *Neomænis griseus* (Linnaeus). *Gray Snapper*; *Mangrove Snapper*. (§)

Two obtained in the fall of 1897, one 2½ inches long in Eel Pond, September 21, and one 2 inches long in Great Harbor, September 26. Not previously detected and apparently only a waif.

132. *Neomænis jocu* (Bloch & Schneider). *Dog Snapper*. (§)

Apparently only a straggler. One specimen, 2½ inches long, taken in Eel Pond September 21, 1897.

133. *Neomænis apodus* (Walbaum). *Schoolmaster*. (§)

A rare straggler. The collection contains one specimen, 5½ inches long, taken at Woods Hole September 20, 1888.

134. *Neomænis aya* (Bloch). *Red Snapper*. (†)

A very rare straggler, taken on only one occasion. On October 10, 1890, a specimen weighing 8½ pounds was caught in a trap at Menemsha; this is preserved in the collection at Woods Hole.

135. *Neomænis analis* (Cuvier & Valenciennes). *Mutton-fish*. (* †)

In 1897 two specimens were taken; one 1½ inches long in Quisset Harbor, August 14, and one 2½ inches long in the same locality September 4. Seven specimens of similar size in the National Museum were taken at Woods Hole in 1876.

SPARIDÆ. The Porgies.**136. *Stenotomus chrysops* (Linnaeus). "*Scup*"; *Porgy*; *Scuppaug*. (* + §)**

Very common. Appears about May 1 and leaves about October 15 or 20, being most abundant in June and July. Spawning occurs during first part of June, and young ½ inch to ¾ inch long are observed by the middle of July. The largest taken weigh about 3 pounds.

137. *Lagodon rhomboides* (Linnæus). *Sailor's Choice; Pinfish; "Shiny Scup."* (* + §)
Not common. A few are usually taken each season from July to September.

138. *Archosargus probatocephalus* (Walbaum). *Sheepshead.* (* †)
Very uncommon of late, not one having been seen or heard of in Vineyard Sound or Buzzards Bay in past four or five years. Formerly quite common, often being caught while line-fishing for tautog and scup. Maximum weight about 3 pounds; smallest 8 or 9 inches long.

GERRIDÆ. The Mojarras.

139. *Eucinostomus gula* (Cuvier & Valenciennes). *Irish Pompano.* (* † §)
Usually very uncommon. In 1897, when apparently this fish was more common than in any previous year, 5 specimens were taken at one seine-haul in Quisset Harbor on August 14, 2 in the same locality September 7, and another in Eel Pond on September 23; all of these were 1 to 2 inches long. On October 5 the fish was numerous at Quisset Harbor.

KYPHOSIDÆ. The Rudder-Fishes.

140. *Kyphosus sectatrix* (Linnæus). *Rudder-fish; Bermuda Chub.* (* † §)
Not rare in summer and fall, occasionally found in spring (April); sometimes taken among gulf-weed at surface. Specimens usually small, largest about 6 inches.

SCIÆNIDÆ. The Drums.

141. *Cynoscion regalis* (Bloch & Schneider). *Weakfish; "Squeteague."* (* †)
Usually abundant. Comes about June 1, and leaves October 1 to 10. This is the principal fish taken in traps in Vineyard Sound, the catch in 1896 being over 400,000 pounds. In July, 1897, a school of several hundred followed young herring into the basins at the Fish Commission station and remained there for several days; many weighing 4 to 5 pounds were taken at night with short lines, baited with herring, rapidly drawn in on the surface after having been thrown out a few yards. Young fish as small as 1½ inches long are taken about July 1 at the head of Buzzards Bay. Spawning occurs about June 1, some of the fish having ripe spawn when they arrive. The average weight is 4 pounds; 8 pounds is usually the maximum weight in a season, but in 1897 a squeteague weighing 14 pounds was obtained at Cuttyhunk.

142. *Larimus fasciatus* Holbrook. *Banded Drum.* (†)
A very rare straggler, taken on only one occasion. On August 13, 1889, a specimen 8 inches long was caught in a trap at the breakwater, Buzzards Bay.

143. *Sciænops ocellatus* (Linnæus). *Red Drum; Channel Bass; Redfish.* (†)
Only one fish of this species is known to have been taken in this region. This was caught in 1894 in a trap in Buzzards Bay at the breakwater. The specimen, now in the Woods Hole collection, is 2 feet 10 inches long and weighs about 14 pounds.

144. *Leiostomus xanthurus* (Lacépède). *Spot; Goody.* (* †)
Common in fall, being observed during whole of October. When water temperature reaches 45° F. the fish leaves. All specimens are about 6 inches long.

145. *Micropogon undulatus* (Linnæus). *Croaker.* (†)
On September 9, 1893, a specimen 15 inches long was taken in a trap at the breakwater in Buzzards Bay. This is the only known occurrence of the fish in this vicinity.

146. *Menticirrhus saxatilis* (Bloch & Schneider). *"Kingfish"; Sea-mink.* (* † §)
Adults full of spawn are common in June; uncommon after July 15. Fish about an inch long appear in the middle of July, and the young are numerous on sandy beaches during the summer and until early part of October, when they leave, having attained a length of 4 or 5 inches. Some of the young are almost entirely black, while others of same size taken at the same time show the color markings of the adults. The maximum weight is about 2 pounds.

147. *Pogonias cromis* (Linnæus). *Drum.* (†)
Very rare. First taken May 7, 1874, and observed only 3 or 4 times since. The recent specimens have been taken in traps at Quisset Harbor, in the latter part of September or early in October. All were of one size, weighing 4½ or 5 pounds.

LABRIDÆ. The Wrasse-Fishes.

148. *Tautoglabrus adspersus* (Walbaum). "Cunner"; "Chogset." (* + §)

Very abundant. Remains in eelgrass in winter and thousands perish from cold every year. Large numbers of cunners of all sizes are found under wharves and around piers in warmer months. Spawning takes place in June. By August 1 the young, an inch long, are observed. In the bays and harbors the maximum weight is about a pound, but outside of Gayhead and Cuttyhunk they reach a weight of 2½ pounds. The usual weight is one-quarter to one-half a pound.

149. *Tautoga onitis* (Linnaeus). "Tautog"; "Blackfish." (* + §)

Abundant everywhere on rocky bottom, remaining throughout the year. In winter they seek deep water or the eelgrass; many are killed each year by anchor ice. Spawns in June and July. Young appear about 1st of August. Average weight 3 pounds, but 12-pound fish are common, and some weigh 16 pounds. Many are caught on lines by anglers and professional fishermen, and some are also taken in traps in April. Lobster is the most attractive bait. Judging from the behavior of tautog in aquaria, it must be one of the greatest enemies of both large and small lobsters; it readily attacks full-grown lobsters, first biting off their eyes by rapid darts, and then consuming them. The fish continues to bite at the hook until snow falls, usually about November 15 or 20.

EPHIPPIDÆ. The Angel-Fishes.

150. *Chætodipterus faber* (Broussonet). Moonfish; Angel-fish; Spadefish. (* + §)

A very rare straggler. First taken in 1889, when one specimen was obtained. Since then only three have been observed. All were caught in traps at Menemsha in August and September. The fish are all of one size, having a length of 16 to 18 inches. Not known to fishermen.

CHÆTODONTIDÆ. The Butterfly-Fishes.

151. *Chætodon ocellatus* Bloch. Parche. (* + §)

A few specimens are taken nearly every year in October and November, when seining in eelgrass. Three is the largest number caught at one haul of the net, and five the largest number in one season.

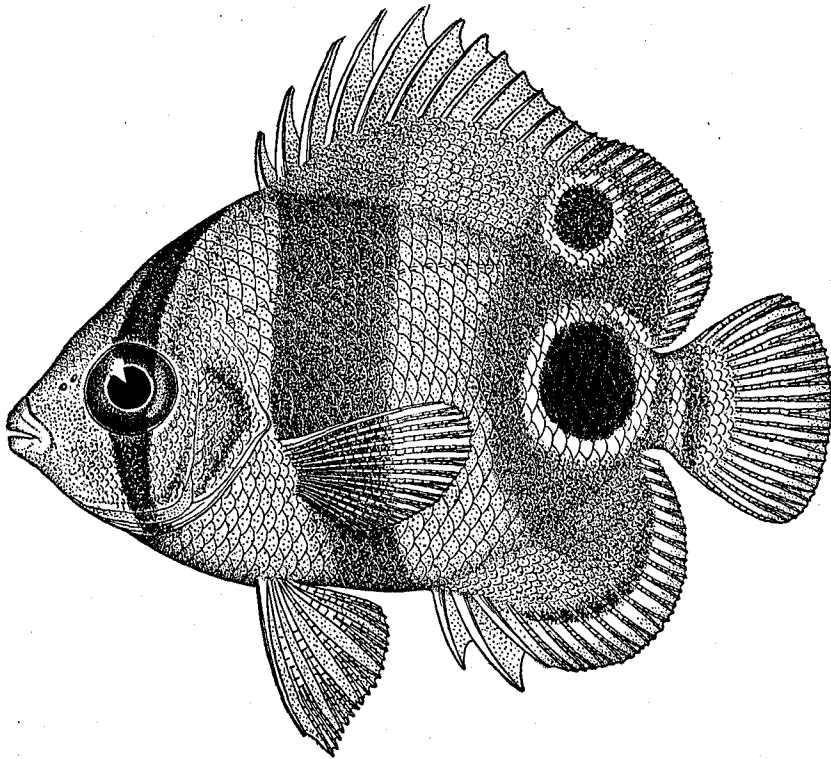
152. *Chætodon bricei*, new species.

Three specimens of an undescribed species of *Chætodon* were seined in the vicinity of Woods Hole in 1897. One was obtained August 3 in Quisset Harbor, another August 10 in Eel Pond, and the third October 7 in Quisset Harbor; all are under 1½ inches in length. These examples were undoubtedly stragglers from the West Indies, whence they were transferred in the Gulf Stream. The species is readily distinguished by two prominent ocelli situated posteriorly, and is one of the most strikingly beautiful members of a large family of peculiarly marked and brilliantly colored fishes of the tropical seas. It is named for Hon. John J. Brice, United States Commissioner of Fish and Fisheries.

Description.—Body short, deep, much compressed, its depth contained 1½ times in length. Profile steep, slightly convex. Head rather large, pointed, its length rather less than a third of the body length. Mouth small, terminal; snout not produced, five-sixths length of eye. Eye large, its length contained 2½ times in head. Lateral line beginning at posterior edge of eye, curving upward and backward, and terminating under anterior part of soft dorsal fin. Scales large; number in median line of body 40; number in transverse series between front of dorsal and base of ventral 23, 6 being above the lateral line; rows of scales above longitudinal axis of body directed upward and backward, those below inclined slightly downward. Caudal peduncle very short, about as broad as eye. Dorsal long, elevated, with 13 spines and 20 rays, the longest spine six-sevenths length of head; soft dorsal evenly rounded; basal half of both portions of fin thickly covered with small scales; dorsal origin opposite posterior edge of opercle. Anal fin deep, long, rounded, containing 3 spines and 18 rays; the proximal two-thirds of soft portion densely squamated, the small scales also covering the bases of the second and third spines. Caudal short, rounded. Pectorals two-thirds length of head, rounded. Ventrals as long as pectorals, pointed.

Colors in life: General body color, pearly gray. A glistening jet black band about two-fifths width of eye, and having a forward curve, begins a short distance in front of dorsal and extends downward through eye and thence downward and backward to lower margin of gill opening; this does not extend on the breast, and hence does not meet its fellow of the opposite side; above eye this stripe is bordered on each side by a very narrow pale streak. A dull blackish band, 1½ times as wide as eye, runs vertically across body from base of dorsal to median line of abdomen; the anterior border

of this band extends from front of dorsal to posterior angle of opercle, thence obliquely downward and backward behind base of pectoral. Behind this band and separated from it by a space somewhat wider than eye is another dark band; it is duller and two-thirds wider than the foregoing, with its anterior edge curved forward and its posterior margin on the caudal peduncle. Involving about two-thirds the width of this band and extending from the dorsal to the ventral edge of the body is a large, circular ocellus, more than $1\frac{1}{2}$ times the size of eye, consisting of a dark-blue spot surrounded by a narrow white zone, which covers a part of the base of the soft dorsal. Immediately above this and within the extension on the dorsal fin of the dark band is another similar but smaller ocellus, about the size of eye, involving the first 8 or 9 rays of the soft dorsal. A narrow, dark-brown, vertical bar on caudal peduncle is separated from the base of the caudal rays and from that part of the broad body band posterior to the ocellus by narrow white spaces. Head in front of ocular stripes, and breast greenish yellow. A black crescentic mark on opercle. Spinous dorsal dusky, the dark vertical band extending on the first 7 spines. Soft dorsal dark, with sharply defined pale edge. Part of anal covered by scales dusky, with a narrow darker margin; unscaled portion yellowish white. Caudal and pectorals pale, ventrals dusky, edged with yellow.



Chaetodon brucei H. M. Smith.

The foregoing description applies especially to the largest specimen, taken October 7; the others differ from it only in having darker dorsal, anal, and ventral fins, and minor variations in the dorsal and anal rays.

153. *Chaetodon striatus* Linnæus. *Portuguese Butterfly*. (§)

Taken on only one occasion. On October 29, 1894, a specimen $1\frac{1}{4}$ inches long was caught in a seine in Great Harbor.

BALISTIDÆ. The Trigger-Fishes.

154. *Balistes vetula* Linnæus. *Trigger-fish*; *Leather-jacket*. (* † §)

Every season, mostly in September, adult specimens of this fish are taken in some numbers in the traps at Menemsha. During summer and fall the young, $1\frac{1}{4}$ or 2 inches long, are found at the surface in Vineyard Sound in gulf-weed and also around the shores.

155. *Balistes carolinensis* Gmelin. *Trigger-fish*; *Leather-jacket*. († §)
Very rare; not taken every year. Young not observed.

156. *Canthidermis asperimus* (Cope). *Sobaco*. (§)

A specimen of *Canthidermis* taken in the summer of 1897 is identified as *Balistes asperimus* of Cope, the type of which, belonging to the Philadelphia Academy of Natural Sciences, has been examined. The type is 3 inches long and is labeled "Darlen" (Isthmus of Panama); no other specimens are known, unless this fish should prove to be the young of Poey's *Balistes sobaco* from the West Indies. The Woods Hole example is 1½ inches long, and was obtained July 24, 1897, under a small piece of floating gulf-weed in Vineyard Sound off Great Harbor.

MONACANTHIDÆ. The File-Fishes.

157. *Monacanthus hispidus* (Linnæus). *Foolfish*; *Filefish*. (* † §)

Present every year; some years rather scarce, some years abundant. In 1897 it was extremely numerous in July and August, and several hundred were often taken in one day in the collecting seine. May often be obtained under gulf-weed, but usually most plentiful in eelgrass and rockweed. No large fish are observed; the maximum size is under 4 inches, and the smallest is 1 inch. The smallest filefish are rather uniformly dull brownish or greenish yellow in color, but those 3 or 4 inches long are mottled with white and several shades of dark green. In aquaria, small filefish often annoy and injure other fish, following them with great persistency and biting their fins, eyes, and other parts. Fish many times larger than themselves are sometimes the object of their attack.

158. *Alutera schœpfii* (Walbaum). *Foolfish*; "*Filefish*." (* † §)

Rather common every year in August and September. The largest are 18 inches long, the smallest 3 inches. The position constantly assumed in the aquarium is with the head down. Succulent algæ are often eaten by the fish in captivity, the long branches of some species being bitten off and swallowed in a surprisingly short time. The color of the young is a dirty white, with large reddish-brown mottlings or blotches; the larger are orange-colored with same mottlings as when young.

OSTRACIIDÆ. The Trunk-Fishes.

159. *Lactophrys trigonus* (Linnæus). *Trunkfish*; *Shellfish*. (* §)

Adult trunkfish have not been observed in this vicinity, but the very young are not uncommon and are taken every year. They are found from July to October. On quiet days they are seen, singly or in scattered bodies, in the eelgrass about the wharves. The largest specimens in the collection are 1 inch long, and the smallest one-fourth inch. They are taken under the gulf-weed, in surface tow nets and in shore seines. Several dozen have been obtained at one seine-haul.

TETRAODONTIDÆ. The Puffers.

160. *Lagocephalus lævigatus* (Linnæus). *Smooth Puffer*; "*Puffer*." (* †)

Not very common. Perhaps half a dozen are taken each year in traps in Buzzards Bay and Vineyard Sound, mostly in September and October. All are about 11 or 12 inches long, small ones never being observed.

161. *Spheroides maculatus* (Bloch & Schneider). *Swelldish*; "*Puffer*." († §)

Appears about first of June, and is abundant during the run of scup; many caught in traps at that time. Common throughout the summer at head of Buzzards Bay, but rare at Woods Hole during that season. Leaves in fall as soon as cold weather sets in. The spawning season is June 1 to 10. The largest are 7 inches in length, but the average size is 5 inches. From about July 1 to October 15 the young, from ½ inch to 1 inch long, are extremely abundant at Woods Hole, frequenting chiefly sandy beaches, where as many as a hundred are often taken in one seine-haul.

162. *Spheroides spengleri* (Bloch). *Southern Puffer*; *Swelldoad*. (*)

Very rare. A number of small specimens taken in September and October, 1877; not recently detected.

DIODONTIDÆ. The Porcupine-Fishes.

163. *Diodon hystrix* Linnæus. *Porcupine-fish*. (§)

A very rare straggler, being taken only once. On August 12, 1895, a specimen, 9¼ inches long, was obtained in Buzzards Bay near the station.¹

¹ See Rept. U. S. F. C. 1896, p. 173.

164. *Chilomycterus schœpfi* (Walbaum). *Swell-toad*; "*Puffer*"; "*Porcupine-fish*." (* †)

Rare, and of irregular occurrence. Some years a few are taken in almost every trap in the vicinity, then none will be caught for several years. The latter part of September and the early part of October are the periods when this fish is observed. The specimens taken are from 2½ to 5 inches long.

MOLIDÆ. The Head-Fishes.**165. *Mola mola* (Linnæus). *Sunfish*.**

Much rarer now than formerly. In the early years of the Commission 8 or 10 specimens were observed annually in Vineyard Sound, but of late there is seldom more than one seen in a season. In 1896 a 400-pound fish was seen off Tarpaulin Cove. In 1887 a 200-pound specimen, caught off Great Harbor, was retained alive at the station for about a week. August is the month when the sunfish is usually found in these waters. A number that have been opened by Mr. Edwards contained only ctenophores and medusæ.

SCORPÆNIDÆ. The Rock-Fishes.**166. *Sebastes marinus* (Linnæus). *Rosefish*; *Red Perch*; *Bream*; *Norway Haddock*. (* †)**

Obtained in the Woods Hole region on only one occasion. On December 20, 1895, in Great Harbor, 7 or 8 specimens, 3 inches long, were found in a hole on a flat, where they had been left by the tide; 4 or 5 of these had been stranded and were dead; the others were alive, and are now preserved in the collection. Taken in deep water as far south as New Jersey, but not previously recorded from inshore waters south of Maine. Fishermen claim that they sometimes catch these fish in traps very late in fall at Provincetown.

COTTIDÆ. The Sculpins.**167. *Acanthocottus æneus* (Mitchill). *Little Sculpin*; *Grubby*. (* † §)**

Very common. Remains during entire year, and is the only sculpin found during summer. In winter from 10 to 50 are caught daily in fyke nets set in harbor. The fish is then in a spawning condition, and the eggs adhere to the twine. The maximum size of the fish is 5 inches.

168. *Acanthocottus octodecimpinosus* (Mitchill). *Eighteen-spined Sculpin*; "*Sculpin*." (* †)

First appear about October 1, become very abundant by October 15, and remain until December or January. The spawning time is November and December; the eggs often come ashore by bucketfuls on Nobska Beach.

169. *Acanthocottus grœnlandicus* (Cuvier & Valenciennes). *Daddy Sculpin*; "*Sculpin*." (* †)

The foregoing remarks apply equally well to this species.

170. *Hemitripterus americanus* (Gmelin). *Sea-raven*; "*Red Sculpin*." (* †)

Common in October and November. Usual length about 16 inches. Young are rarely seen.

CYCLOPTERIDÆ. The Lump-Suckers.**171. *Cyclopterus lumpus* Linnæus. "*Lumpfish*." (* † §)**

Adults common in April; a few in May. Young are taken throughout the summer in Vineyard Sound among driftweed. Spawning occurs in April.

LIPARIDIDÆ. The Sea-Snails.**172. *Neoliparis montagui* (Donovan). *Sea-snail*. (*)**

Apparently not common in the shallow waters reached by the collecting seine. No specimens in local collection.

173. *Liparis liparis* (Cuvier). *Sea-snail*; "*Sucker*." (* †)

Common in the winter on rocky bottom. Found full of spawn in December and January.

GOBIIDÆ. The Gobies.**174. *Gobiosoma bosci* (Lacépède). *Goby*. (* †)**

Common in Buzzards Bay. Taken in seine at Quisset Harbor throughout the summer.

BATRACHOIDIDÆ. The Toad-Fishes.**175. *Opsanus tau* (Linnæus). "*Toadfish*"; "*Toad-grunter*." (* †)**

Common under stones in ponds and harbors. Spawns in June, the eggs being attached to the under side of stones. Maximum weight about a pound.

XIPHIDIIDÆ.

176. *Pholis gunnellus* (Linnæus). *Butter-fish*; "*Rock Eel*." (* †)

Abundant around shores in March and April, but rare at other times. May be taken in Vineyard Sound with a dredge at almost any season at a depth of 4 or 5 fathoms. Largest about 7 or 8 inches. Seined only on gravelly bottom.

CRYPTACANTHODIDÆ. The Wrymouths.

177. *Cryptacanthodes maculatus* Storer. *Wrymouth*; *Ghostfish*. (* †)

Very rare. On December 18, 1896, one 18 inches long was caught at Woods Hole in a fyke set in Great Harbor.¹ A specimen in the National Museum from Woods Hole was taken about 1875.

ANARHICHADIDÆ. The Wolf-Fishes.

178. *Anarhichas lupus* Linnæus. *Wolf-fish*; "*Catfish*." (†)

Quite rare. Taken in Vineyard Sound late in fall in traps and also on lines fished for cod.

ZOARCIDÆ.

179. *Zoarces anguillaris* (Peck). *Eel-pout*; "*Sea Eel*." (* †)

Abundant in fall, off Gay Head and Cuttyhunk; caught while line fishing for cod, on rock bottom, and occasionally late in fall in Vineyard Sound off Great Harbor on lines baited for tautog.

180. *Lyodes reticulatus* Reinhardt. *Eel-pout*. (*)

This northern species has occasionally been taken in southern New England. The National Museum contains specimens obtained by the *Fish Hawk* in Vineyard Sound and Narragansett Bay.

TRIGLIDÆ. The Gurnards.

181. *Prionotus carolinus* (Linnæus). *Common Gurnard*; "*Sea-robin*." (* †)

Appears in May or June and remains until October or later. More abundant than *P. strigatus*. Begins to spawn early in June. Young are very common in Waquoit Bay in summer, but are rather rare elsewhere. This species attains only a third of the maximum weight of the striped gurnard.

182. *Prionotus strigatus* (Cuvier & Valenciennes).¹ *Sea-robin*; "*Red Sculpin*." (* †)

Comes in June, somewhat later than *P. carolinus*. It is then rather abundant, but is less common at other times. Spawns in summer. Young, $\frac{3}{4}$ inch long and upward, are very common throughout summer; by fall they have reached a length of 4 inches. This species attains a length of 18 inches in the Woods Hole region.

CEPHALACANTHIDÆ. The Flying Gurnards.

183. *Cephalacanthus volitans* (Linnæus). *Flying-robin*; "*Flying Gurnard*." (* †)

A few are taken every year late in the fall. They sometimes come ashore in Buzzards Bay and Vineyard Sound benumbed by cold. Not so abundant now as they were prior to ten years ago.

ECHENEIDIDÆ. The Remoras.

184. *Echeneis naucrates* Linnæus. *Shark Sucker*; *Remora*. (* †)

Not uncommon. One 1 $\frac{1}{2}$ feet long was caught at West Falmouth, July 16, 1897, on a hook baited with fresh clam.

185. *Echeneis naucrateoides* Zuiew. *Sucker*. (*)

Given by Professor Baird in 1871, and a number taken during next ten years. Not recently detected.

186. *Remora remora* (Linnæus). *Remora*. (* †)

Rare. Reported by Professor Baird in 1871. Specimen in collection taken in July. Usually attached to large sharks.

187. *Remora brachyptera* (Lowe). *Swordfish Sucker*. (*) Rare.188. *Rhombochirus osteochir* (Cuvier). *Spearfish Remora*. (* †)

Rare. Recorded by Professor Baird in 1871. A specimen was taken August 6, 1886, in a fish-trap at Quisset Harbor.

¹ See Rept. U. S. F. C. 1896, p. 176.

MERLUCCIIDÆ. The Hakes.

189. *Merluccius bilinearis* (Mitchill). *Silver Hake; Whiting; "Frostfish."* (* †)

Abundant every fall; some years common in summer. The fish swims close to the shore, and is caught in considerable numbers in Buzzards Bay at night with spears, for home use and sale in New Bedford. The weight of those thus taken is about a pound, but those caught in traps usually weigh 5 or 6 pounds. Young specimens, 2½ to 3 inches long, are seined in fall about Woods Hole.

GADIDÆ. The Cods.

190. *Pollachius virens* (Linnaeus). "*Pollock.*" (* †)

Adult fish appear in Vineyard Sound and Great Harbor in May, following the run of cod. They depart when temperature of water reaches 60° or 65°. There is no regular fishing with lines, but many are caught in traps at Menemsha. Fyke nets set in the harbor take pollock 7 or 8 inches long in February and March. In April there is a run of fish 1 to 1½ inches long; by June these have attained a length of 4 inches. The fish leave in June. In fall there is a small run of fish 7 or 8 inches long. Average weight of adults about 10 pounds, the maximum being 14 pounds.

191. *Microgadus tomcod* (Walbaum). *Tomcod; "Frostfish."* (* †)

Abundant in winter, coming about October 1 and remaining till May 1. Spawns in December. Many are caught in fykes and sent to the markets.

192. *Gadus callarias* Linnaeus. "*Cod.*" (* †)

Appears in Vineyard Sound about April 1 and remains till about May 15, or till the dogfish strike on. When the fish first come they feed chiefly on worms, and are known among the fishermen as the "worm school"; later they feed on herring, lants, and crabs, and are known as the "herring school." After the middle of October the cod come again, but in less numbers than in spring, and remain until the first wintry weather. Young cod are first observed about the 1st of April, when fish about 1 inch long are seined. Most of the young leave by June 15, having attained a length of 3 to 4 inches. No cod are seen between fish of that size and those weighing 1½ to 2 pounds caught in traps in spring. There is now but little line fishing for cod in Vineyard Sound, although there is some off Gay Head.

193. *Melanogrammus æglifinus* (Linnaeus). "*Haddock.*" (* †)

Not detected in Vineyard Sound or Buzzards Bay, but common 6 or 7 miles off Gay Head and on ocean side of Marthas Vineyard. Reported by Professor Baird in 1871.

194. *Phycis regius* (Walbaum). *Codling; King Hake.* (* †)

Rare. Taken in seine only late in fall. Varies in length from 7 to 12 inches.

195. *Phycis tenuis* (Mitchill). *Squirrel Hake; White Hake; "Hake."* (* †)

Fish weighing 1 to 1½ pounds abundant in October and November. A great many then enter Eel Pond. Young fish, 1 inch long and upward, associate with pollock in spring and are also found throughout the summer in considerable numbers. They are often obtained in summer at the surface, under gulf-weed and celgrass.

196. *Phycis chuss* (Walbaum). "*Hake.*" (* †)

Abundant in May and June and in October and November. They fill the traps and cause fishermen much annoyance, as there is no sale for them. They weigh from 2 to 5 pounds.

197. *Rhinonemus cimbricus* (Linnaeus). *Four-bearded Rockling.* (* †)

A rare visitor, found only in winter. Once taken in a fyke net in Great Harbor.

198. *Brosmius brosme* (Müller). *Cusk; "Ling."* (* †)

Formerly not uncommon in Vineyard Sound, and caught with cod in April and May. Very rare for twenty years or more, although a few are still taken in April. Average weight is 5 pounds; maximum, 12 or 13 pounds.

MACRURIDÆ. The Grenadiers.

199. *Macrourus bairdii* Goode & Bean. *Baird's Grenadier.* (*)

Very rare. Obtained once in Vineyard Sound by the *Fish Hawk* at a depth of 9 fathoms, on August 26, 1882.

PLEURONECTIDÆ. The Flounders.

200. *Hippoglossus hippoglossus* (Linnaeus). "Halibut." (*)

Formerly not very uncommon in Vineyard Sound, but now very rare. Last taken about ten years ago, when one weighing about 80 pounds was caught. Between ten and twenty-five years ago, during April, a number of large-sized halibut were taken annually while fishing for cod off Great Harbor and elsewhere in the sound. In 1872 or 1873 Mr. Edwards caught a number weighing 235 or 240 pounds.

201. *Hippoglossoides platessoides* (Fabricius). *Sand-dab; Rough-dab; Rusty Flounder.* (*)

Not common. Found some years in winter in the inshore waters adjacent to Woods Hole; specimens have been taken in February on lines. One year some were caught in a fyke net in Great Harbor.

202. *Paralichthys dentatus* (Linnaeus). *Summer Flounder; "Flounder."* (* †)

Found from about May 10 to October 15. More abundant during summer than the flatfish. Frequents sandy bottoms. Average weight, $2\frac{1}{2}$ pounds; maximum, 20 pounds. The largest are taken in the traps.

203. *Paralichthys oblongus* (Mitchill). *Four-spotted Flounder; "Flounder."* (* †)

Common in May and June; scarce at other times. Most abundant about June 1, during the run of scup, when many are caught in traps. Young fish are rarely observed, but in the fall of 1885 or 1886 large numbers, 2 or 3 inches long, were seined. Average length, 12 inches. The fish spawns in May and its eggs have been experimentally hatched at Woods Hole. The eggs are buoyant, $\frac{1}{4}$ of an inch in diameter, and hatch in 8 days in water having a mean temperature of 51° to 56° F.

204. *Bothus maculatus* (Mitchill). *"Sand-dab"; "Window-pane."* (* †)

Found from April to late in autumn. There is quite a large run about June 1, when the fish is with spawn. The average size is 10 or 12 inches. In the experimental hatching of the eggs of this fish at Woods Hole it has been found that the eggs are buoyant, nonadhesive, and $\frac{1}{4}$ of an inch in diameter, and that they hatch in eight days when the mean water temperature is 51° to 56° F.

205. *Limanda ferruginea* (Storer). *"Rusty Flatfish."* (* †)

Very common in Vineyard Sound and Buzzards Bay, in water 10 to 12 fathoms deep, where it may be found throughout the year. There is no fishery, but numbers are caught incidentally while bottom fishing for other species. In Great Harbor a few are taken in fyke nets only in winter. The average length is about 14 inches.

206. *Pseudopleuronectes americanus* (Walbaum). *"Flatfish"; "Winter Flounder"; "Pug."* (* †)

A very abundant permanent resident. Frequents muddy or grassy bottom. Some are either wholly or partly blackish on the nude side, this condition being more prevalent some winters than others. The average weight of those taken in the immediate vicinity of the station is only 1 pound, but larger examples are found in the deeper water of the sound and bay. In October fish averaging 2 pounds, and apparently slowly migrating, are taken with lines in Vineyard Sound on sandy bottom; these are called "pugs" by the fishermen, and the fishery is called "pugging."

This fish spawns from February to April in this region and its artificial cultivation is extensively carried on. Spawning fish are very abundant and are caught with fyke nets on hard clay bottom in water 6 to 15 feet deep. On being transferred to tanks containing running water, many deposit their eggs voluntarily during the night. The eggs are $\frac{1}{30}$ of an inch in diameter, and when first extruded are very glutinous, sticking together in masses of various sizes. The average number of eggs to a fish is 500,000. On March 6, 1897, 1,462,000 eggs, or 30 fluid ounces, were taken from a fish that weighed $3\frac{1}{2}$ pounds after spawning. The eggs hatch in 17 or 18 days when the mean water temperature is 37° or 38° F.

SOLEIDÆ. The Soles.

207. *Achirus fasciatus* Lacépède. *Sole; Hog-choker; "Black Flatfish."* (* †)

A few are taken every year in the traps in Vineyard Sound. It is abundant in Wareham River, at the head of Buzzards Bay; some are found in Waquoit Bay and a few are taken in Great Harbor. It is present throughout the year. In allusion to the dark underparts the fishermen call it the "black flatfish."

LOPHIIDÆ. The Fishing-Frogs.

208. *Lophius piscatorius* Linnaeus. *Goosefish; Angler; Fishing-frog; "Toadfish."* (* †)

Abundant in Vineyard Sound, usually from April 1 to July 1, some seasons from April to November or as late as the traps are set. The spawn is often found floating in Vineyard Sound. The traps often take boatloads of them which are carried ashore and put on the land, no other use being made of them, although the flesh is considered very palatable. Those caught in traps are from 4 inches to 4 feet long. The young keep offshore in deep water and are never taken in the seine.

ANTENNARIIDÆ.

209. *Pterophryne histrio* (Linnaeus). *Marbled Angler.* (* † §)

This fish is to be regarded as a straggler from the tropics, whence it comes in the Gulf Stream and is drifted ashore in gulf-weed. It was first taken in 1877.¹ In November, 1885, 12 specimens were seined in Quisset Harbor. From that year until 1897 none was observed, although the gulf-weed was systematically examined. In 1897 this fish was comparatively common in Vineyard Sound. During July there was an unusual prevalence of southerly winds and a large quantity of sargasso-weed was blown inshore from the Gulf Stream, and with it the marbled angler. During the forenoon of July 24, 22 specimens were taken in a boat from the Fish Commission station with small dip nets, among the gulf-weed in Vineyard Sound, a few miles from Woods Hole, and on the same day 28 specimens were secured by a steamer of the Marine Biological Association. Stragglers continued to be caught during July and August, one being obtained at the Fish Commission wharf on August 2. Probably not less than 100 specimens were taken during the season. Many were kept alive in aquaria for several weeks, and proved of great attraction to visitors. Some remained under or among the gulf-weed at the surface, some concealed themselves in algae on the bottom, some hid behind stones and other objects in the aquarium, and some sought crevices in rocks. While clumsy in their movements, they were adept in approaching and capturing other fishes. They were quite cannibalistic, one about 6 inches long swallowing another nearly 4 inches long, and they frequently bit off the fleshy dermal appendages of their fellows. In August several spawned in the aquarium. The eggs are connected in long bands like those of the goosefish (*Lophius*). On July 17, 1897, 8 specimens of this fish were taken in gulf-weed off Nantucket. It is reported that in the summer of 1889 the fish was not uncommon in that region.

Coincident with this noteworthy appearance of *Pterophryne* in the summer of 1897, the Portuguese man-of-war (*Physalia*) was more abundant in Vineyard Sound than during any time in the past twenty-five years; on several days in the latter part of August hundreds were in view at one time off Woods Hole.

¹ Recorded from Holmes Hole (Vineyard Haven) by Storer, History of Massachusetts Fishes, 1867.

II.—FISHES OF THE WOODS HOLE REGION NOT PREVIOUSLY REPORTED SO FAR NORTH OR SOUTH.

The following species, represented in collections or authentically ascertained to inhabit the waters embraced within the limits of this paper, have not before been reported from the region in published ichthyological works. The limits of the previously ascribed range of each are noted.

- Tarpon atlanticus** (Cuvier & Valenciennes). *Tarpon*. Long Island to Brazil.
- Opisthonema oglinum** (LeSueur). *Thread Herring*. Regularly northward to Florida and Carolina, straying occasionally to Virginia, New Jersey, and Rhode Island.
- Trachinocephalus myops** (Forster). *Ground Sparring*. Tropical parts of western Atlantic; common in West Indies and Brazil, and ranging on the Atlantic coast to South Carolina.
- Lucania parva** (Baird & Girard). *Rainwater-fish*. Atlantic coast, from Connecticut to Key West.
- Athlennes hians** (Cuvier & Valenciennes). West Indies, from Florida to Brazil.
- Gasterosteus gladiunculus** (Kendall). Off coast of Maine.
- Polydactylus octonemus** (Girard). *Eight-threaded Threadfish*. New York to the Rio Grande.
- Oligoplites saurus** (Bloch & Schneider). *Leather-jacket*. Both coasts of America, north to New York and Lower California.
- Caranx bartholomæi** Cuvier & Valenciennes. *Yellow-jack*. West Indies northward to Florida and North Carolina.
- Trachinotus goodei** Jordan & Evermann. *Permit; Black-finned Pompano*. West Indies north to southern Florida.
- Neomænis griseus** (Linnaeus). *Gray Snapper*. Atlantic coast from New Jersey to Brazil.
- Neomænis jocu** (Bloch & Schneider). *Dog Snapper*. West Indies, north to Florida Keys, south to Bahia.
- Neomænis apodus** (Walbaum). *Schoolmaster*. West Indies, north to Key West, south to Bahia.
- Neomænis aya** (Bloch). *Red Snapper*. Long Island to Brazil.
- Neomænis analis** (Cuvier & Valenciennes). *Mutton-fish*. West Indies, Pensacola to Brazil.
- Larimus fasciatus** Holbrook. *Banded Drum*. Coast of United States from Chesapeake Bay to Galveston, Tex.
- Sciænops ocellatus** (Linnaeus). *Red Drum; Channel Bass; Redfish*. Coast of United States from New York to Texas.
- Pogonias cromis** (Linnaeus). *Drum*. Atlantic Coast from Long Island to Rio Grande.
- Chætodon ocellatus** Bloch. *Parche*. Havana; Gulf Stream; New Jersey and Rhode Island.
- Chætodon striatus** Linnaeus. *Portuguese Butterfly*. West Indies.
- Canthidermis asperrimus** (Cope). *Sobaco*. Darien, Isthmus of Panama.
- Spheroides spengleri** (Bloch). *Southern Puffer; Swelltoad*. West Indies; coast of Texas and of Florida south to Rio Janeiro and to the Madeiras and Canaries.
- Sebastes marinus** (Linnaeus). *Rosefish; Red Perch; Bream; Norway Haddock*. North Atlantic, south to Faroe Islands, Maine, and in deep water off coast of middle New Jersey.

III.—FISHES OBTAINED AT WOODS HOLE NOT YET FOUND ELSEWHERE ON THE UNITED STATES COASTS.

- Stolephorus argyrophanus** (Cuvier & Valenciennes). *Anchovy*.
- Centrolophus niger** (Gmelin). *Blackfish; Black Ruffe*.
- Tetragonurus cuvieri** Risso. *Square-tail; Sea-raven*.
- Chætodon striatus** Linnaeus. *Portuguese Butterfly*.
- Chætodon bricei** H. M. Smith. *Brice's Chatodont*.
- Canthidermis asperrimus** (Cope). *Sobaco*.

IV.—LIST OF FISHES RECORDED FROM ADJACENT LOCALITIES WHICH MAY
BE LOOKED FOR AT WOODS HOLE.

Besides stragglers from the high seas and the West Indies that may from time to time be detected at Woods Hole, a number of species have been obtained within comparatively short distances to the north or south of the region which are liable to be added to the local fauna. Narragansett Bay, for instance, distant only 35 miles, has yielded several species not yet observed at Woods Hole; and there are also some more northern shore fishes regularly found as far south as Cape Cod which are to be looked for in Vineyard Sound. The following list, not by any means complete, is suggestive of the possible augmentation of the already rich fauna of Woods Hole.

- Scoliodon terræ-novæ* (Richardson). *Sharp-nosed Shark*. Cape Cod to Brazil.
Lamna cornubica (Gmelin). *Porbeagle*; *Mackerel Shark*. Newfoundland to West Indies; common on Massachusetts coast.
Somniosus microcephalus (Bloch). North Atlantic, south to Cape Cod.
Dasyatis hastata (DeKay). *Sting Ray*. West Indies, north to Rhode Island.
Dorosoma cepedianum (LeSueur). *Gizzard Shad*; *Mud Shad*. Cape Cod to Mexico.
Cypsilurus gibbifrons (Cuvier & Valenciennes). *Flying-fish*. Atlantic Ocean; Newport, R. I.
Chloroscombrus chrysurus (Linnaeus). *Bumper*. Cape Cod to Brazil.
Spheroides testudineus (Linnaeus). *Globefish*; *Swellfish*. West Indies; in Gulf Stream as far north as Newport, R. I.
Prionotus tribulus (Cuvier & Valenciennes). *Sea-robin*. Atlantic coast, north to Long Island.

V.—FRESH-WATER FISHES COLLECTED IN THE VICINITY OF WOODS HOLE.

In the fresh-water ponds near Woods Hole, a number of fishes are found, some of which have been mentioned in the foregoing list, together with others that are strictly fresh-water species. Besides the white perch (*Morone americana*), spring minnow (*Fundulus diaphanus*), four-spined stickleback (*Apeltes quadracus*), and nine-spined stickleback (*Pygosteus pungitius*) already given, the following have been noted, specimens being preserved in the local collection. Further collecting will doubtless disclose the presence of other species.

- Catostomus commersonii* (Lacépède). *Brook Sucker*.
Abramis crysoleucas (Mitchill). *Golden shiner*; *Roach*; *Dace*.
Notropis cornutus (Mitchill). *Shiner*; *Red-fn*.
Hybopsis kentuckiensis (Rafinesque). *River Chub*; *Horny-head*.
Lucius reticulatus (LeSueur). *Pickrel*.
Perca flavescens (Mitchill). *Yellow Perch*.
Ameiurus nebulosus (LeSueur). *Horned Pout*; *Bullhead*.
Boleosoma nigrum olmstedii (Storer). *Darter*.
Eupomotis gibbosus (Linnaeus). *Sunfish*.
Micropterus dolomieu Lacépède. *Small-mouth Black Bass*. (Introduced.)
Micropterus salmoides (Lacépède). *Large-mouth Black Bass*. (Introduced.)