

I am the first man that broached the fish business, but rest assured that all having streams want them. Once fairly established in the country we will sell to one another, because any person will be able to pay a higher price for breeding than for eating. If necessary we will meet the thing with cash, according to our wants and means.

Now, if possible, do not neglect us. We are all Uncle Sam's boys, and will appreciate the fish beyond any other section, and for the very reason that they will be a luxury for our own tables and nothing will sell better. It cannot be over done. Our greatest obstacle would lie in the Indians; a mean, stupid pack, that only think of stealing as a virtue; but once fairly started we can manage them.

The best route would be the Pacific Railroad to Battle Mountain, then a narrow gauge to Austin, and from Austin to Belmont 68 miles. You will find applicants at Austin, and on the road from Austin to Belmont. If you can send spawn by express or mail, it would be the best way. We have a stage three times a week from Austin.

Last season I persuaded the man above me on my stream not to go to Reese River after trout, because I hoped sooner or later to get carp, and I did not want trout in the stream to eat the young. I repeat, stock us at once if possible. Rest assured we will meet you with all assistance in our power, and appreciate your efforts beyond any other section. I have had worms an inch and a half long in my irrigating ditch, and could gather them by the handful.

Yours truly,

I. D. PASCO,  
Belmont, Nye County, Nevada.

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**THE CARANGOID FISHES OF THE UNITED STATES—POMPANOS,  
CREVALLÉS, AMBER-FISH, Etc.**

**By G. BROWN GOODE.**

The members of the family *Carangidae* are distinguished chiefly from the mackerels, to which they are closely allied, by the absence of finlets and by the fact that they have uniformly but 24 vertebrae, 10 abdominal and 14 caudal, while the mackerels have uniformly more, both abdominal and caudal. They are carnivorous fishes, abounding everywhere in temperate and tropical seas. On our own eastern coast there are at least 25 species, all of them eatable but none except the Pompanoes of much importance; on the California coast there are two or three species of this family of small commercial importance.

**THE BLUNT-NOSED SHINER.**

(*Argyrosus setipinnis*.)

This fish, known on some parts of the coast as the "Horse-fish," in North Carolina as the "Moon-fish" or "Sun-fish," and in Cuba by the

name "Jorobado," was called by Dekay "Blunt-nosed Shiner," and since this name, sometimes varied to "Pug-nosed Shiner," is in common use in New York market and in Narragansett Bay, while the other names are shared by other species similar and dissimilar, it seems the most suitable for general adoption. The fish is found everywhere throughout the West Indies as well as in Northern Brazil and in the Gulf of Guinea, but has not been found in Europe, nor, as yet, has it been recorded from the Gulf of Mexico. In Eastern Florida it is not very unusual, being frequently taken in the lower Saint John's and sometimes driven up as far as Jacksonville by easterly storms. Here and in the Indian River it is known as the "Moon-fish." It is a frequent summer visitor all along the coast as far north as Wood's Holl, Massachusetts, where it has a peculiar name, the people there calling it the "Hump-backed Butter-fish." The species attains the length of 10 or 12 inches and is esteemed an excellent article of food. Considerable numbers are brought yearly to New York, but elsewhere it rarely appears in the markets. Young, from 3 inches in length upwards, are found, but we have no definite knowledge as to its breeding habits.

#### THE SILVER MOON-FISH.

(*Selene argentea*.)

The Silver Moon-fish, which much resembles the one just described, is often spoken of under the same names, and is not likely to be distinguished from it by casual observers. On the Carolina coast, according to Mr. Earll, it bears the expressive name of "Look-down." It occurs sparingly on our coast as far north as Wood's Holl, and is found in the West Indies, in Brazil, and in the Gulf of Mexico. Its body is thinner, and it is consequently less desirable for food.

#### THE DOLLAR-FISH.

(*Argyriosus romer*.)

This species, which has by many authors been considered to be the young of the Silver Moon-fish, is a small fish quite abundant in our waters, frequently taken in Massachusetts Bay, and, in one or two instances, as far north as Halifax, Nova Scotia. Its range coincides closely with that of the species last mentioned. Its body is so thin that it can be dried in the sun without the use of any preservatives, retaining its shape and color. It is consequently of no importance as a food-fish.

#### THE ROUND ROBINS.

(*Decapterus punctatus* and *D. macarellus*.)

The Round Robin, *Decapterus punctatus*, or, as it is called at Pensacola, the "Cigar-fish," occurs in the Bermudas, where it is an important food-

fish; it is found also in the West Indies and along the coast of the United States north as far as Wood's Holl.

A closely related species, *Decapterus macarellus*, is found also in the West Indies and along the eastern coast of the United States. According to Stearns, individuals of this species are rather rare in the northern part of the Gulf, but more common along the South Florida coast. They live in shallow water and in harbors, usually moving about in small schools. At Key West they are caught in seines and are eaten.

#### THE JUREL.

(*Paratractus pisquetus*.)

This fish, known about Pensacola as the "Jurel," "Cojinua," and "Hard-tail," along the Florida coast as "Jack-fish" and "Skipjack," in the Bermudas as the "Jack" or "Buffalo Jack," in South Carolina as the "Horse Crevallè," at Fort Macon as the "Horse Mackerel," about New York and on the coast of New Jersey as the "Yellow Mackerel," is found in the Western Atlantic from Brazil, Cuba, and Hayti, to Halifax, Nova Scotia, where specimens were secured by the United States Fish Commission in 1877. It is one of the commonest summer visitants of the West India fauna along the whole coast of Southern New England and the Middle States, and is especially abundant in the Gulf of Mexico, and is one of the commonest fishes in the Bermudas. This fish is occasionally brought to the New York market; but is of no special importance as an article of food north of the Gulf of Mexico. Concerning its habits in those waters, Mr. Stearns has contributed a very interesting series of notes. His observations are especially instructive since nothing has previously been known of its life history.

"It is extensively abundant everywhere on the Gulf coast of Florida, Alabama, and Mississippi. At Pensacola it is one of the important fishes of trade and is highly prized for food. It is one of the class of migratory fishes of this coast, like the Pampano, Mullet, Spanish Mackerel, and Redfish, having certain seasons for appearing and disappearing on the coast and also has habits during these seasons that are peculiar to themselves or their class. It appears on the coast in April in small schools that swim in shoal water near the beach during pleasant weather, when there is little or no surf, in 8 or 10 feet of water, and in stormy weather some little distance from the breakers. Their movement is from the eastward to the westward. As they seldom swim at the surface their movements can be watched only when in shoal water. The schools 'running' in April and first of May are usually smaller than those of a few weeks later; but the individuals of the first are somewhat larger. The mass or largest 'run' comes in May, and it is on the arrival of these that schools are first seen coming in the inlets.

"A noticeable peculiarity of the Hard-tail compared with some other common migratory fishes, is that the first schools do not stay about the

mouths of an inlet and along the beach weeks before coming inside as those of the latter do, but continue their westward movement without seeming to stop to feed or play until the time has come for a general movement towards the bays. In this way they must be distributed along the coast with no unequal accumulation at any one point. When once inside, the numerous schools break up into smaller ones of a dozen or two fish, which are found in all parts of the bay during the summer. On their arrival the larger fish contain spawn, which in July and August becomes quite full, after which none are seen but the young fish of about 10 inches in length, until there is a general movement towards the sea. It is believed that the adult fish spawn in the bays, but the only evidence to support that belief is that they come inside with spawn, go away without it, and that very young fish are found there. In October and November small Hard-tails are caught in Santa Rosa Sound measuring 5 and 6 inches in length.

"The smallest of the spring run are 9 or 10 inches long. Adult fish measure 12, 14, and 15 inches in length, very rarely more than the last. During the months of October and November Hard-tails leave the bays formed in small schools, and swimming below the surface in deep water. The only time that they can then be seen is when they cross the 'bars' at the inlet or sandy shoals in the bay. A few stragglers remain in Pensacola Bay and Santa Rosa Sound all winter, which are taken now and then with hook and line. I have found them in abundance in winter on the South Florida coast, where, owing to less variable conditions of the water, their habits are decidedly different. The Hard-tail is a most voracious fish, waging active war upon the schools of small fish. Its movements are rapid, and sometimes in its eagerness it will jump high out of the water. It has its enemies also, for I have seen whole schools driven ashore by sharks and porpoises; a great many are destroyed in this way. Hard-tails are caught for the market in seines."

#### THE GOGGLER.

(*Carangus crumenophthalmus*.)

This fish, called in the Bermudas, where it is of some importance as a food-fish, the "Goggler," or "Goggle-eyed Jack," and in Cuba the "Cicharra," occurs in the West Indies and along the Atlantic coast of the United States north to the Vineyard Sound. It is also found at Mauritius, and in the Pacific, Atlantic, and Indian Oceans, the Red Sea, and off the coast of Guinea, while, as has been remarked, it is abundant in the Bermudas. Its large, protruding eyes are very noticeable features, and the Bermuda name seems appropriate for adoption, since the fish has with us never received a distinctive name. In form it somewhat resembles the species last discussed, with which, also, it is probably often confused.

Stearns speaks of a fish, common at Key West, which is known as the "Horse-eyed Jack," and this may prove to be the same species.



## THE CAVALLY.

*(Carangus hippos.)*

The Cavally of the Gulf of Mexico and Eastern Florida—the Horse-crevallè of South Carolina—occurs abundantly on our southern coast, and has been recorded by Professor Poey from Cuba, and by Cope from St. Christopher and St. Croix. It has been so confused with other species of the same genus that at present it is impossible to state its distribution throughout the West Indies. The species was originally described from specimens sent from South Carolina by Garden to Linnaeus. The name of this fish is usually written and printed “Crevallè,” but the form in common use among the fishermen of the South, Cavally, is much nearer to the original Spanish name, Cavalla, or Cavalla, meaning “horse.” The name as used in South Carolina is a curious reduplication, being a combination of the English and Spanish names for “horse.” It should be carefully remembered that in South Carolina the name Crevallè is most generally applied to quite another fish, the Pompano.

The Cavally, as it seems most appropriate to call *Carangus hippos*, though in individual cases occurring as far north as Cape Cod, and even, in one instance, at Lynn, Mass., is not commonly known in the United States north of Florida. Storer remarks: “This fish is so seldom seen in the waters of South Carolina that we are unacquainted with its habits.”

I observed a specimen in the Jacksonville market in April, 1874. Concerning the Cavally of Southern Florida, which is either this or a closely allied species, Mr. H. S. Williams remarks:

“In the Indian River this is one of the best of the larger varieties. Its season is from the 1st of May to November. It ranges in weight from three to twenty pounds, being larger and more numerous to the southward toward the Mosquito Inlet. The south end of Merritt’s Island and the inlets opposite old Fort Capron seem to be a sort of headquarters for the Cavalli. When in pursuit of prey they are very ravenous, and move with the rapidity of lightning. They readily take a troll either with bait or rag. The favorite mode of capturing them, as well as all other large fish that feed in shallow water or near the shore, is with a rifle. The high rocky shores afford an excellent opportunity for this sport, though the rapid movements of the fish render them very difficult targets.”

Mr. Stearns writes: “The Crevallè is common on the Gulf coast. In West Florida it appears in May and remains until late in the fall. Is equally abundant in the bays and at sea. In the bays it is noticeable from the manner in which it preys upon fish smaller than itself, the Gulf Menhaden and Mullet being the most common victims. On arrival it contains spawn, which it probably deposits in the salt-water bayous, for in the fall schools of young are seen coming out of those places on their

way to the sea. These young are then of about one pound weight, appearing to the casual observer like Pampano, and I am told that they equal it for edible purposes. They are caught accidentally by seines and trolling-lines. Large ones are not considered choice food, the flesh being dark and almost tasteless. The average weight is twelve pounds; occasionally they attain the size of twenty pounds."

#### THE GOLDEN MACKEREL.

(*Carangus chrysos.*)

The Golden Mackerel, called "Yellow Mackerel" at New York, and "Sun-fish," in North Carolina, is said to be somewhat abundant in Beaufort Harbor. It has also been obtained at Wood's Holl, Mass. It has been confused with the other related forms and but little is known of it. The species called by Girard *Carangus esculentus*, and identified by Gill with this species, was found on the coast of Texas. I obtained a single specimen in the Saint John's River in the spring of 1878.

#### THE CUBA JUREL.

(*Carangus fallax.*)

The occurrence of this species on our coast is vouched for only by a drawing, made by Mr. J. H. Richard, of a fish taken in South Carolina. Upon this drawing Holbrook founded his species *C. Richardii*. *Carangus fallax* occurs at various points in the West Indies, and it would be by no means impossible that a straggler should have found its way to Charleston. According to Professor Poey this fish has been prohibited from sale in Cuba from time immemorial, and with good reason, since many disastrous cases have followed its use as food.

#### THE SCAD.

(*Trachurus Plumierianus.*)

The Scad, known in New England as the Horse Mackerel, appears to occur in all temperate and tropical waters. Its distribution is given by Günther as extending "from the coasts of the temperate parts of Europe, along the coasts of Africa, round the Cape of Good Hope, into the East Indian seas, to the coasts of New Zealand and West America."

In Europe the Scad ranges north to the Drontjem's Fjord, latitude 65°, occurring also in abundance in the Mediterranean. On the coast of Holland it is known as the "Marse Banker" or "Hors." It is interesting to American ichthyologists, since the similarity of its habits to those of the Menhaden, so important in our waters, caused the latter fish to be called, among the early Dutch colonists of New York, by the same name. European writers describe them as occurring upon those coasts in schools of immense numbers, and it would seem that, although

their manner of swimming resembles that of the Menhaden, in their other habits they more closely resemble our own Bluefish. They are considered to be food-fishes of fair quality, and attain the length of about 12 inches. They are supposed to spawn about the same time as the Mackerel. Only a single specimen of this species has ever been taken on the east coast of the United States, this having been obtained by the Fish Commission from Southern New England in 1878. In California, according to Jordan, it is an abundant species, and is there commonly known as the Horse Mackerel. He remarks:

“It reaches a length of about a foot and a weight of less than a pound. It ranges from Monterey southward, appearing in the summer, remaining in the spawning season, and disappearing before December. It arrives at Santa Barbara in July and at Monterey in August. In late summer it is exceedingly abundant. It forms part of the food of larger fishes, and great numbers are salted for bait. As a food-fish it is held in low esteem, but whether this is due entirely to its small size we do not know. A similar species has been described from San Diego, under the name of *Caranx boops* Grd. It is unknown to us.”

#### THE THREAD-FISH.

(*Blepharis crinitus*.)

This fish, also known as the Shoemaker Fish, is found along our coast from Cape Cod to the Caribbean Sea. In South America and also in California it is of no economic importance, but on account of its strange shape and the long thread-like appendages to its fins, which float behind it to the distance of five or six times its own length, it is often brought to the markets as a curiosity.

#### THE POMPANOES (*Trachynotus carolinus*) AND OTHER SPECIES.

There are four species of Pompano in the Western Atlantic, very similar to each other in general appearance, but easily distinguished by differences in proportion and in the number of fin rays.

The commonest species, the Carolina Pompano, *Trachynotus carolinus*, has the height of the body contained two to two and two-thirds times in the total length. The length of the head, five to five and one-third times, one of the caudal lobes four times; it has 24 to 25 rays in the second dorsal, while the anterior rays of the true dorsal and anal fins, if laid backward, reach to the middle of the fin.

The Round Pompano (*T. ovatus*) has the height of the body contained two to two and one-third times in the total length; the length of the head, five to five and one-fourth times; one of the caudal lobes, three and a half to four times. In the second dorsal are from 18 to 21 rays, in the second anal from 16 to 19, while in the Carolina Pompano there are 21 to 22.

The African Pompano (*T. goreensis*) resembles in general form the

Round Pompano, though somewhat more elongate, while the head is larger, being contained four and a half times in the total length. The anterior rays of the dorsal and anal extend beyond the middle of the fin, if laid backward. In the number of the fin rays it corresponds most closely with the Round Pompano.

The Banner Pompano (*T. glaucus*) has a somewhat elongate body and a small head. It is much thinner than either of the other species. Its silvery sides are marked with four blackish vertical streaks; the best distinguishing mark is in the length of the first rays of the dorsal and anal, which extend back nearly to the tip of the caudal fin. The name Pompano, applied in this country to all of these fishes, is a Spanish word, meaning "grape leaf." The word in Western Europe is applied to a very different fish.

#### THE COMMON POMPANO.

The Common, or Carolina, Pompano (*Trachynotus carolinus*) occurs in both the Atlantic and Pacific waters of the United States. On our eastern coast it ranges north to Cape Cod, south to Jamaica, east to the Bermudas, and west to the Gulf of Mexico, at least as far as the mouth of the Mississippi River.

In our New England and Middle States it is a summer visitor, appearing in June and July and departing in September. Although it is at present impossible to ascertain the lower limit of its temperature range, it is probable that it corresponds very nearly to that indicated by a harbor temperature of 60° to 65°.

This species, like the Round Pompano, was described by Linnaeus from South Carolina, and never had been observed in any numbers north of Cape Hatteras until the summer of 1854, when Professor Baird discovered them near Great Egg Harbor. In his "Report on the Fishes of New Jersey" he states that he had seen them taken by thousands in the sandy coves on the outer beach of Beesley's Point. These, however, were young fish, few of them weighing more than half a pound. In 1863 he obtained both species in Southern Massachusetts, where in subsequent years they have been frequently captured.

"My first acquaintance with the Pompano (New England)," writes Professor Baird, "was in 1863, during a residence at Wood's Holl, where I not unfrequently caught young ones of a few inches in length. I was more fortunate in the summer of 1871, which I also spent at Wood's Holl; then the Pompano was taken occasionally, especially in Captain Spindle's pound, and I received at different times as many as 20 or 30, weighing about 1½ pounds or 2 pounds each. Quite a number were caught in Buzzard's Bay and Vineyard Sound in 1872."

It is a fair question whether the Pompano has recently found its way into northern waters, or whether its presence was unknown because nobody had found the way to capture it. When Mitchell wrote on the



fishes of New York in 1842 he had access to a single specimen which had been taken off Sandy Hook about the year 1820.

The spawning-times and breeding-grounds of these fishes are not well known.

Mr. S. C. Clarke states that in the Indian River they spawn in March in the open sea, near New Smyrna, Fla. It is supposed that those visiting our northern coasts breed at a distance from the shore. The eggs, like those of the Mackerel, being lighter than the water, float at or near the surface. The Pompanoes may, however, be truly migratory, seeking the waters near the equator in winter and following along a coast-wise migration, north and south, in summer. They are rapid, powerful swimmers; their food consists of mullusks, the softer kinds of crustaceans, and, probably, the young of other fishes. S. C. Clarke remarks that they have been known to bite at a clam bait. Genio Scott remarks: "It is mullet-mouthed; never takes a bait except by mistake." Their teeth are very small and are apt to disappear with age. As seen in the New York market they rarely exceed 5 pounds or 6 pounds in weight. I quote in full the observations of Mr. Stearns:

"The common Pompano is abundant on the Gulf coast from the Mississippi River to Key West, and, as far as I can learn, is rare beyond this western limit until the Yucatan coast is reached, where it is common. It is considered the choicest fish of the Gulf of Mexico, and has great commercial demand, which is fully supplied but a few weeks in the year, namely, when it arrives in spring. The Pompano is a migratory fish in the Pensacola region, but I think its habits on the South Florida coast are such that it cannot properly be so classed.

"At Pensacola it comes in to the coast in spring and goes away from it in fall, while in South Florida it is found throughout the year. In the former section it appears on the coast in March in schools varying in numbers of individuals from fifty to three or four thousand, which continue to 'run' until the latter part of May, when it is supposed that they are all inside. Their movement is from the eastward and they swim as near to the shore as the state of the water will permit, very seldom at the surface, so as to ripple or 'break' the water, although sometimes while playing in shoal water they will jump into the air.

"Before any schools enter the bays certain ones will remain for days, or even weeks, in a neighborhood, coming to the beach during the flood-tide to feed on the shell-fish that abound there, and returning again to deeper water on the ebb-tide. The holes or gullies in the sand along the beach are their favorite feeding grounds on these occasions. Sharks and porpoises pursue the Pompano incessantly, doubtless destroying many. The largest numbers come in April, and sometimes during that month the first schools are seen entering the inlets, others following almost every day until about June 1, when the spring 'run' is said to be over. Every year they appear in this way at Pensacola and adjoining bays, although there are many more some years than others. As the

abundance is judged by the quantity caught, I think that the difference may lie more in the number of fishing days (pleasant ones) than in the real numbers of fish present. The sizes of Pompano that make up these schools are large or adult fish averaging 12 or 14 inches in length, and small fish (probably one year old) averaging 8 inches in length. The largest Pompano that I have seen measured  $19\frac{1}{2}$  inches in length, and weighed  $6\frac{1}{4}$  pounds, the extremely large fish called Pompano, of two or three times that size, probably being another species. After entering the bays the schools of Pompano break up, and the fish scatter to all parts where the water is salt and there are good feeding-grounds. Except single individuals that are taken now and then, nothing is seen of Pompano until late in the fall, when they are bound seaward. In regard to its spawning habits nothing very definite has been learned. It has spawn half developed when it arrives and has none when it leaves the bays. Large quantities of the fry are seen in the bays all summer, which is some proof of its spawning inside. In June, 1878, I caught specimens of the fry, varying in size from three-quarters of an inch to 3 inches in length. Very many schools of these sizes were also observed in July and August, of the same and following years of 1879-'80.

"The schools of fry go to sea in August and September. The older or adult fish leave the coast in September and October in small schools, that are only seen and caught at the inlets where they happen to cross shoals or follow the beach. These Pompano of the fall are very fat and in every way superior to those caught in the spring. As before mentioned, the Pompano is found on the South Florida coast all the year. The sea-beach from Tampa Bay to Charlotte's Harbor seems to be its favorite feeding-ground, owing to the quantity of shell-fish that occur there. It does not form in large schools as in the Pensacola region, and therefore is not taken in such large quantities by seine fishermen.

"Smacks from Mobile and Pensacola sometimes go to Tampa Bay for them. I have been told that Pompano are caught at Key West in considerable quantities by hook and line, and I have known of a few being taken in that manner at Pensacola. It feeds entirely upon small shell-fish, which are crushed between the bones of its pharyngeal arch."

#### THE ROUND POMPANO.

(*T. ovatus*.)

The Round Pompano (*T. ovatus*), sometimes called the Shore Pompano, is at Pensacola known by the name "Gaff-topsail," and in the Bermudas by the name "Alewife." This fish is very often confused by market-men with the Carolina Pompano, and I have seen them sold together under the same name in the Charleston market, just as I have seen the young of four species of the herring family sold indiscriminately in New York.

The Round Pompano is cosmopolitan in its distribution, occurring in

the North and South Atlantic, in various parts of the Indian Ocean, and on the coasts of California and China. The young have been obtained in the harbor of Vineyard Haven, Mass. It is probable that the species is far more abundant in our waters than we now suppose it to be. Stearns remarks that it is obtained occasionally at Pensacola with the other species, but is never very common; is seen only in the spring, and is not valued as a food-fish. About the Bermudas they are sometimes very abundant, and in 1875 a school of them, numbering 600 or 700, was seined on the south shore of the islands. They are there considered most delicious fish.

#### THE AFRICAN POMPANO.

(*T. goreensis.*)

This species was originally described from the island of Gorea, on the west coast of Africa, and was observed by the writer in 1876, and in 1877 was discovered in Florida. It is the largest of the Pompanoes. Two or three specimens, weighing from 15 pounds to 20 pounds each, have been sent from Florida to the New York market. One of these, taken at Jupiter Inlet, was sent by Mr. Blackford to the National Museum. In the Gulf of Mexico it is not unusual, being known at Key West as the "Permit."

Stearns remarks:

"This fish is rather common along the lower end of the Florida Peninsula, specimens being caught quite often in seines at Cedar Keys and at the Mullet fisheries of Sarasota and Charlotte's Harbor, and also at Key West. It is said to attain a considerable size, 15 or 20 pound specimens being common. It is not a choice food-fish when so large, and even smaller ones are comparatively dry and tasteless. I have not found it north or west of Cedar Keys."

#### THE BANNER POMPANO.

(*T. glaucus.*)

This species is a member of the West Indian fauna and occasionally occurs at the Bermudas; it has lately been noticed on the Pacific side of the Isthmus of Panama.

#### THE PILOT-FISH.

(*Naucrates ductor.*)

The Pilot-fish, though of little or no economic importance, deserves passing mention, as it is so frequently referred to in literature. It is occasionally taken on our coast. Captain Atwood mentions a specimen which was taken in a mackerel net in Provincetown Harbor in October, 1858. A whale ship had come in a few days before and he supposes the Pilot-fish had followed it into the harbor.

“The Pilot-fish (*N. ductor*) is a truly pelagic fish, known in all tropical and temperate seas. Its name is derived from its habit of keeping company with ships and large fish, especially Sharks. It is the *Pompilus* of the ancients, who describe it as pointing out the way to dubious or embarrassed sailors, and as announcing the vicinity of land by its sudden disappearance. It was therefore regarded as a sacred fish. The connection between the Shark and the Pilot-fish has received various interpretations, some observers having perhaps added more sentiment than is warranted by the actual facts. It was stated that the Shark never seized the Pilot-fish, that the latter was of great use to its big companion in conducting it and showing it the way to its food. Dr. Meyen, in his ‘*Reise um die Erde*,’ states: ‘The Pilot swims constantly in front of the led by the Pilot. When the Shark neared the ship the Pilot swam close Shark; we ourselves have seen three instances in which the Shark was to the snout or near one of the pectoral fins of the animal. Sometimes he darted rapidly forwards or sideways as if looking for something, and constantly went back again to the Shark. When we threw overboard a piece of bacon fastened on a great hook the Shark was about twenty paces from the ship. With the quickness of lightning the Pilot came up, smelt at the dainty, and instantly swam back again to the Shark, swimming many times around his snout and splashing, as if to give him exact information as to the bacon. The Shark now began to put himself in motion, the Pilot showing him the way, and in a moment he was fast upon the hook.\* Upon a later occasion we observed two Pilots in sedulous attendance on a Blue Shark which we caught in the Chinese Sea. It seems probable that the Pilot feeds on the Shark’s excrements, keeps his company for that purpose, and directs his operations solely from this selfish view.’ We believe that Dr. Meyen’s opinion, as expressed in his last words, is perfectly correct. The Pilot obtains a great part of his food directly from the Shark in feeding on the parasitic crustaceans with which Sharks and other large fish are infested, and on the smaller pieces of flesh which are left unnoticed by the Shark when it tears its prey. The Pilot also, being a small fish, obtains greater security when in company of a Shark, which would keep at a distance all other fishes of prey that would be likely to prove dangerous to the Pilot. Therefore in accompanying the Shark the Pilot is led by the same instinct which makes it follow a ship.

“With regard to the statement that the Pilot itself is never attacked by the Shark, all observers agree as to its truth; but this may be accounted for in the same way as the impunity of the swallow from the hawk, the Pilot-fish being too nimble for the unwieldy Shark.

“The Pilot-fish does not always leave the vessels on their approach to land. In summer, when the temperature of the sea-water is several degrees above the average, Pilots will follow ships to the south coast of

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\* In this instance one may entertain reasonable doubts as to the usefulness of the Pilot to the Shark.



England into the harbor, where they are generally speedily caught. Pilot-fish attain a length of 12 inches only. When very young their appearance differs so much from the mature fish that they have been described as a distinct genus, *Naucleus*. This fry is exceedingly common in the open ocean, and constantly obtained in the tow-net; therefore the Pilot-fish retains its pelagic habits also during the spawning season, and some of the spawn found by voyagers floating on the surface is, without doubt, derived from this species.\*

#### THE MEDREGAL.

(*Zonichthys fasciatus*.)

This fish, called in Cuba the Medregal and in Bermuda the Bonito, has been observed in South Florida and along the coasts of the Carolinas. It is apparently exceedingly rare in the waters of the United States. In Bermuda it attains a length of two feet or more and is highly esteemed as a food-fish.

#### THE BANDED RUDDER-FISH.

(*Seriola zonata*.)

This species, known in South Carolina by the names "Jack-fish" and "Banded Mackerel," has been observed as far north as Salem and Beverly, Mass. Several specimens have been taken north of Cape Cod during the past forty years. It has also been found in South Carolina and Georgia, though rare in that region. It is a small fish, rarely exceeding 6 or 8 inches in length, conspicuous by reason of its brilliant and beautiful colors, and good to eat, though rarely saved by the fishermen who accidentally capture it. It is called the Rudder-fish on account of its resemblance to the Rudder-fish of the ocean. *Naucrates ductor*.

This fish was observed in the Gulf of Mexico by Mr. Silas Stearns, who writes:

"The Amber-fish is quite common off the West Florida coast, occurring in from 10 to 30 fathoms of water, on or near the 'Snapper Banks' throughout the year. It is a very active fish, swimming just below the water's surface, preying upon schools of small fish. It is rather shy of a baited hook, and but few are caught. It is a good food-fish. It attains a size of 40 inches length, and 15 pounds weight. Its average size but little more than half that."

The "Rock Salmon" of Pensacola (*Seriola bonariensis*) is recorded by Stearns as occasionally occurring near Pensacola in company with the preceding species, which it resembles in habits. It is caught with hook and line and is eaten. In his opinion, it attains a larger size than

\* Günther's Study of Fishes, p. 444.

the Amber-fish. There is a third species of Amber-fish, of which the National Museum has received a single specimen from South Florida. It is closely related to the fish described by Cuvier under the name *Seriola Lalandii*. This species also occurs on the coast of California, where, according to Jordan, it is known under the names "Yellow-tail," "White Salmon," and "Cavasina."

Of the "Yellow-tail" Professor Jordan says:

"It reaches a length of 4 to 5 feet, and a weight of 50 to 60 pounds, and individuals of less than 15 pounds weight are rarely seen. It ranges from the tropical Pacific northward to the Santa Barbara and Coronados Islands, where it is found in great abundance in the spawning season, arriving in July and departing in early fall. It spawns about August 18. It is caught chiefly by trolling. It feeds on Squid and such fish as the anchovy and sardine. As a fresh fish it ranks high, although large individuals are sometimes coarse and tough. When salted and dried it is inferior to none on the coast, ranking with the Whitefish and Barracuda."

#### THE RUNNER.

(*Elagatis pinnulatus*.)

This West Indian fish, known at Key West as "Skipjack" or "Runner," and at Pensacola as "Yellow-tail" or "Shoemaker," is, according to Stearns, "abundant on the western and southern coasts of Florida. At Pensacola it spawns in spring; the young fish are seen in July and August. It is found in the bays and along the sea beaches, seeming to prefer clear, salt water, swift currents, and sandy bottoms. It usually moves in small schools of a dozen or two individuals. It feeds upon small fishes and crustaceans. When pursued by larger fish it jumps repeatedly from the water, very much in the same manner as the Flying-fish, only its flights are much shorter and oftener repeated. This habit has given it the names of "Skipjack" and "Runner," at Key West, where it may be seen at almost any time. It is sometimes eaten at Key West, and at Havana is quite an important fish in the markets, being also exposed for sale at stands on the streets, cooked and ready for use."

#### THE LEATHER-JACKET.

(*Oligoplites occidentalis*.)

This fish, which is found throughout the West Indies and south as far as Bahia, has, since 1875, been several times observed between Florida and Newport, R. I. It is known to fishermen as the "Skipjack," sharing this name with a number of other scombroid fishes which leap from the water as they pursue their prey. It is one of the most beautiful and graceful fishes in our waters, but at present is of no economic importance.