

the digestive liquids produced in different ways did not in the slightest change it; but when it was boiled or roasted it was easily changed to sugar and thus rendered soluble. It is, therefore, evident that of the seeds of some grasses growing in the water and the young shoots of some aquatic plants, which are occasionally found in the intestinal canal of carp, and of the grains of wheat, &c., which I discovered in some fish, and which Professor Fric found in large quantities in the stomach of young salmon, it was not the starch which was digested, but the small quantity of albumen, fat, and sugar contained in them.

50.—POISONOUS FISH.*

By Dr. OSCAR TYBRING.

It is well known that in many places, especially in the tropics, there is a risk of eating fish which are injurious to health and which may even endanger life. Some fish seem to be poisonous at certain seasons of the year, while at others they are perfectly harmless. The spawning season seems to be the one in which they are particularly dangerous. Some fish are poisonous when caught in certain localities, while in others they may be eaten without any bad result. In most fish of this kind it is not the meat which is poisonous, but the entrails, especially the liver, the roe, and the milt; sometimes the skin also is poisonous; and finally there are some fish whose meat is poisonous. Certain kinds furnish a perfectly harmless food if eaten as soon as they are taken out of the water, but if they are allowed to lie only an hour their flesh spoils.

One cannot judge by the appearance of the fish, for those that look finest and most appetizing are frequently the ones that are poisonous; while there are fish which have a revolting appearance, but which are harmless and good to eat.

In the East Indian and Australian waters the poisonous *Meletta* is found in large numbers. It greatly resembles a herring, to which family it belongs; it is 5 or 6 inches long, with a sharp, serrated belly, silvery scales, and a bluish-green back. Foussagrive states as its principal characteristic that it has no teeth, with the exception of a few very small ones on the tongue. This fish is found especially near the Seychelles and near New Caledonia. It is always poisonous; and when eaten, causes vomiting, violent diarrhea, chills, a languid feeling, and invariably pain and cramps, particularly in the legs; the symptoms, therefore, resemble those of cholera. It is often caught with another kind of *Meletta* which is not strictly poisonous, and which may be distinguished from the poisonous one by having larger scales. The poisonous *Meletta* has a black snout and a black spot on the dorsal fin. Other-

* "*Giftige Fiske.*" From the *Norsk Fiskeritidende*, Bergen, October, 1885. Translated from the Danish by HERMAN JACOBSON.

wise these two kinds of fish cannot easily be distinguished one from the other. The second kind of *Meletta*, or the tropical herring (*Meletta thrissa*), is quite common on the coast of Brazil, in the West Indies, and on the east coast of North America as far north as New York. It is considered dangerous, especially during the spawning season, the roe being its most poisonous part. From San Domingo cases have been reported where people have died from eating this fish. Hornemann in his medical work says that it is advisable to forbid the crews to eat any fish of the sardine kind (to which family the *Melettas* belong) in the tropics, especially during the spawning season, an advice which should be heeded, as mistakes may easily have fatal consequences.

From Japan we also have reports of poisoning by fish of a similar kind, the *Engraulis japonica*. It is found in large numbers, especially near Nagasaki, and is most dangerous during the time from July to September. In the same locality the *Enorantis japonica* is also found, which Foussagrive supposes to be the same fish as *Meletta thrissa*.

In the Brazilian and West Indian waters the *Caranx fallax* (belonging to the mackerel family) is found. In Havana it is called "jurel." It may be distinguished from the *Caranx carangus*, which is common throughout the entire tropical portion of the Atlantic, by the following marks: The harmless *Caranx* has a black spot on the gill-covers, which is wanting in the poisonous one. The poisonous *Caranx* also grows larger, sometimes weighing as much as 25 pounds, while the other rarely weighs more than 2 pounds; for which reason it is prohibited in Havana to sell *Caranx* weighing more than 2 pounds. The poisonous *Caranx* has scales on the neck, while the other has a bare neck. The poisonous one has invariably twenty-two rays in the second dorsal fin. It is also said that this fish is poisonous only when worms are found in its head; this should, if true, also be considered as a distinguishing mark.

Another kind of mackerel (*Caranx plumieri*) is also found in the West Indies, and is poisonous only in certain localities and at certain times; but then it is poisonous to a high degree. In the French West India Islands it is called "coulirou," and the Spaniards call it "chicaro." Hornemann states that in Havana it is not considered poisonous, but in Guadeloupe, where it is found in large quantities, and where it has a very fine flavor, it sometimes happens that specimens of this fish are caught which are so poisonous that they are used to poison rats. It is said that these poisonous specimens may be distinguished by the circumstance that their bones are red, which is not the case with the harmless ones. It very much resembles the common mackerel, but is shorter and thicker from belly to back.

The bonito also (*Scomber pelamys*), which belongs to the same family and which is frequently very delicious as an article of food, under certain circumstances may be, if not poisonous, at any rate unwholesome and hurtful. There have been instances where the eating of this fish has caused colic and diarrhea, and an itch breaking out on the skin. In

the Antilles the *Tynnus vulgaris* is also considered dangerous; and in the Mediterranean it is sometimes, but rarely, said to cause indigestion. The same is said also of *Cybbium cavalla*.

In the West Indies the *Sphyræna becuna* is found. It has a long-stretched body (about 2 feet long), and a pointed head resembling that of the pike, and sharp, lancet-shaped teeth, some of the front ones, both in the upper and lower jaw, being larger than the others. It has two dorsal fins, with a large space between them. Its meat is usually wholesome; but sometimes, when it is presumed to have eaten poisonous fish, it becomes very hurtful. It is said that the fact of its being poisonous is shown by the teeth being black at the roots.

The *Sphyræna barracuda* is much larger than the *Sphyræna becuna*, and sometimes becomes 15 feet long. It is found on the coast of Brazil, in the Antilles, and the Bahamas; and is likewise poisonous at certain times. This is the case when the teeth are black, the liver tastes bitter, and a black juice oozes out of the flesh when it is cut. In the port of Rio Janeiro several men belonging to a French frigate were dangerously poisoned in 1862 by eating a fish which the natives called caçao and which Royde Méricourt supposes to have been the *Sphyræna barracuda*. This fish also becomes dangerous by attacking people while bathing in the sea, and inflicting ugly wounds with its sharp teeth.

There is some uncertainty as regards the poisonous character of *Diodon attinga*, *D. histrix*, *D. tigrinus*, and *Tetrodon ocellatus*, *T. scleratus*, and *T. maculatus*; but it may be laid down as a rule that they should not be eaten, as most of them are either poisonous or at any rate unwholesome. They may be recognized by not having any scales, but either large thick spines or short thin pins all over the body. Some of these fish can puff themselves up, and thus float on the water, belly upward. They have a tooth in each jaw, each tooth having a deep furrow running lengthwise, so that it looks as if there were two teeth by the side of each other. Some of these kinds of fish are found near Rio Janeiro, and are considered very dangerous.

Near the Cape of Good Hope (Simon's Bay), the *Tetrodon scleratus* or *Geneion maculatum* is found, which is frequently very poisonous. It is also called "hoad-fish."

Among the *Scarus* family there are several which are poisonous. They are distinguished by their beautiful colors, and are very common in the tropics. Near Isle de France, in the Antilles, and also in China and Japan, several poisonous species of this fish are found. Hornemann states that in the Seychelles there are two kinds, one of which is poisonous, and may be recognized by having a deeply indented caudal fin, while that of the harmless kind is hardly indented at all. Near Isle de France the *Scarus vetula* is found; in the Antilles (Guadeloupe) the *Belone caribæa*; and in China and Japan a kind of *Lophius*, resembling the *Lophius setigera*; all of which are poisonous.

As regards sharks, which are also occasionally used as food, it may

be said that their meat has not a very fine flavor, and is sometimes very indigestible; otherwise it cannot be considered hurtful, and may therefore be eaten with moderation.

The *Murana* is sometimes unwholesome when it is very large (more than 5 or 6 pounds), but it cannot strictly be termed poisonous.

In the Norwegian waters there are no poisonous fish, but it is well known that the sting-bull may be dangerous if one happens to run the pointed dorsal fin into the finger or any other part of the body. This fish is found also in the Mediterranean and in some places in the tropics; and seems to inflict more dangerous wounds there than in more northern waters, sometimes even causing death in a very short time. It is said in Norway that wounds produced by the fin of this fish may be cured by its liver; the same result, however, would undoubtedly be obtained if the wound was treated like any other poisonous wound.

There are several other kinds of fish which may cause dangerous or painful wounds by the spines of their fins or gill-covers, such as some of the varieties of the frog-fish, the sheat-fish, and the thorn-back.

It seems as if in all of the above-mentioned fish which are poisonous in themselves that it is the same kind of poison that produces this result in all of them; at least if we consider the symptoms following the eating of these fish, which are the same in all cases. They consist in diarrhoea, vomiting, violent pain in the stomach, colic, and an exceedingly languid feeling, which may become as extreme as in cholera, and is often accompanied by cramps, stiffness, chills, and extreme weakness, leading to death. The symptoms, therefore, resemble those of the cholera. But nothing definite is thus far known as to the kind of poison which has this effect, why it has this effect, and what causes the variations of this effect.

This is certain, however, that there is every reason to exercise caution in places where poisonous fish are found. At the Cape of Good Hope every vessel which arrives is warned against poisonous fish. As regards the treatment of cases of poisoning by fish, it should be the main object to remove the poison from the stomach as quickly as possible by using emetics; and when weakness sets in, to use ether and alcoholics to keep up strength. Opiates may also be used in cases of pain in the stomach and cramps.

It would be very desirable if persons whose calling frequently takes them to the tropics would aid in extending our knowledge of poisonous fish by bringing home specimens put up in alcohol, or at any rate by noting the distinguishing marks of such fish and the places where they are found, and by obtaining information on these points from the natives. Information should also be sought regarding the symptoms of poisoning, and especially as to the mode of treatment; for it frequently happens that the natives of those countries where poisonous animals are found know the most effective remedies, which are entirely unknown in other places.