

### The London Zoological Society's Aquarium.

THE aquarium at the Zoological Gardens, Regent's Park, which has been in course of construction for the past eighteen months, is now complete, and was opened by His Grace the Duke of Bedford on April 5. Mr. E. G. Boulenger, who has been Curator of Reptiles at the Gardens for the past twelve years, has been appointed Director, and has himself superintended the construction down to the smallest detail.

The building, which is situated under the hills of the Mappin Terraces, is divided into three large halls. The first of these is devoted to the exhibition of temperate fresh-water fishes, and there are twenty-five tanks of varying size. Among the most noteworthy exhibits in the Fresh-water Hall are the American gar-pike (*Lepisosteus tristoechus*) (Fig. 1), the bowfin (*Amia calva*), the Central European catfish (*Silurus glanis*), and the sterlet (*Acipenser ruthenus*).

The catfish is about 3 feet long and was presented by the Duke of Bedford, who has several very large specimens living in his ponds at Woburn. It is the largest European fish found in fresh water, with the exception of the sturgeon, and is known to attain the length of 10 feet.

The sterlet, which is also found in the rivers of Central Europe, never attains the large size of the sturgeon, but is extremely active and forms an interesting exhibit. Although it has been stated that this fish does not live for more than ten years, the specimen on view at present was given by Capt. J. A. M. Vipian, who has had it in captivity with several others for thirty-six years in his aquarium at Stibbington Hall. It is not kept in the main fresh-water circulation, which has a temperature of 55° F., but in a special tank of colder water at 40° F.

Most of the British fresh-water fish are represented, trout, perch, gudgeon, bream, rudd, salmon, carp, etc. Chub, dace, and grayling do not live well in aquaria, the two former being particularly susceptible to a fungus (*Saprolegnea*) and a protozoal disease known as Ichthyophthirius, while the latter is generally infested with a species of endoparasitic *Acanthocephala* which is liable to penetrate the intestinal wall and cause death. The rainbow trout, which arrived early in February, spawned immediately, and some of the young trout were observed to be hatched and feeding in the tank six weeks later.

In addition to the fish exhibits, certain amphibians are shown. One of the most interesting is a Giant Salamander which was brought from Hong Kong last year by the Marquess of Sligo; this proved to be new to science, and has been recently described by Mr. E. G. Boulenger as a new species, *Megalobatrachus sligoi*.

The Sea-water Hall is the largest of the three halls, and occupies the centre of the building. It is surrounded by twenty-five large tanks, in which, with the exception of the turtle and Limulus tanks, are shown

all the common objects of our shores and the fish which inhabit British waters.

Many of the fish were obtained with the assistance of the Marine Biological Laboratory at Plymouth, and the Society is much indebted to Dr. E. J. Allen, the Director, for the assistance he has rendered and the advice he has given not only in the stocking, but also in the construction of the Aquarium.

The other main localities from which the sea-water tanks have been stocked are Brighton and Lowestoft. Dr. E. S. Russell, of the Fisheries Laboratory at Lowestoft, has also given assistance in the stocking of the sea tanks, and the specimens of the wolf fish which are shown were obtained by him from the North Sea. The fish seem to stand the long railway journey from Plymouth (about 8 hours) very well. They are sent in wooden tubs specially constructed with a ledge about 6 inches wide round the lid. These are filled



Photo]

[F. W. Bond.

FIG. 1.—View of fresh-water tank containing American gar-pike (*Lepisosteus tristoechus*), N. America.

with water to within about 3 inches from the top, and the jolting of the train is sufficient to aerate the water by causing it to lap against the ledge. If the train stops more than ten minutes the tubs are aerated by means of a small air compressor.

All the edible sea fish are shown with the notable exception of the herring and the mackerel, both of which are extremely difficult to keep in captivity at any distance from the sea, owing to the way in which they succumb to the slightest injury in transit. It is hoped that this difficulty may in time be overcome.

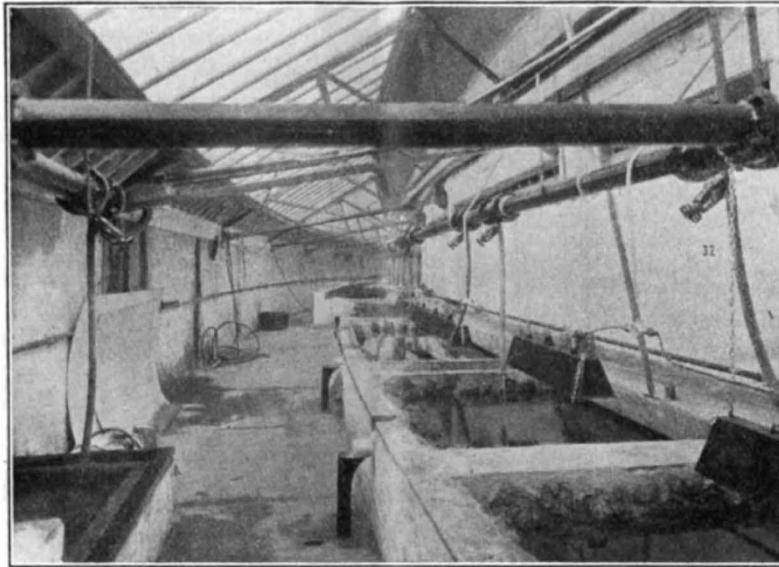
The habits of the hermit crab and the commensal anemone (*Adamsia*) may be studied in a special tank; there are also tanks for the octopus, pipe fish, sea anemones, crabs, lobsters, crawfish, and the commoner British molluscs. Some very fine specimens of the king crab (*Limulus*) have been presented by the New York Aquarium; the largest of these measures 2 feet in length. In the turtle tank are shown Loggerhead and Hawksbill turtles.

The sea-water is stored in two of the three large concrete reservoirs which lie under the floor of the Sea-water Hall, and was obtained from the Bay of

Biscay by a number of tank steamers from which it was discharged into barges at the London docks. From the docks it was brought to the Gardens by the Regent's Canal and pumped directly into the reservoirs. Each reservoir holds 60,000 gallons, and only one reservoir is in use at a time; after the water from one reservoir has been in circulation for a month, it is allowed to stand and settle, and the water from the other reservoir is used. From time to time it is necessary to add a little fresh water to make up for loss by evaporation and the concentration of the salts. There is also in time a certain loss of some quality analogous to vitamins, but this may be remedied by the occasional addition of a few gallons of fresh sea water. At the New York Aquarium the same sea water has been in circulation since 1907 with the addition of a few

against an iron frame-work in a soft mastic putty. The decorative rock-work in the tanks has been copied in natural stone in accordance with models made to scale in plasticine by Miss Joan B. Procter, the Curator of Reptiles. The lighting of the tanks on the outer side of the crescent is by daylight; for foggy days and dark evenings artificial light can be added. The lighting on the south side, which is under the mountains of the Mappin Terraces, is entirely artificial. Special blue glass electric bulbs are used which cut off certain rays and produce a "daylight" effect.

The building is heated entirely by steam. It is very important that the temperature of the water in the tanks and the air in the various parts of the building should be the same. To ensure this a ventilating



Photo]

F. W. Bonif.

FIG. 2.--Service passage behind the sea-water tanks, showing arrangement of lighting, circulation, aeration, and overflows.

gallons annually. The sea water is kept at a more or less constant temperature of 55° F. with the exception of the turtle tank, which is heated to 75° F. The circulation is so arranged that the water in each show tank is changed once every twelve hours; this is also the case in the fresh-water and tropical tanks.

The Tropical Hall is devoted entirely to fresh-water fish from the Tropics. There are ten large and thirty-five small tanks, and the water in these is kept at a temperature of from 70° to 80° F. Among the most interesting exhibits are the Australian lung fish (*Ceratodus*) and the South American lung fish (*Lepidosiren*); besides these, there are a number of other species remarkable for their brilliant colouring and curious breeding habits.

With the exception of the four largest tanks, which are made of reinforced concrete, and the smallest of the tropical tanks, which are entirely of glass, all the tanks are made of 2-in. slate. The glass fronts of the tanks vary in thickness from ¼ in. in the small tropical tanks to 1¼ in. specially annealed plate glass in the larger ones. The glass in the small tanks is bedded in a mixture of red lead and gold size which sets hard, whereas the large sheets of plate glass are floated

system has been installed and the air is circulated by electric fans in conduits which run throughout the Aquarium. In the summer the air can be cooled. The roof of the service passage (Fig. 2) on the north side is of double reinforced glass with an air space between the layers so that the air in the passage is maintained at a more or less constant temperature.

The centrifugal pumps which circulate the water and the aerating apparatus are electrically driven. All the electrical plant has been duplicated in case of a breakdown.

The Aquarium is provided with good research facilities. A number of experimental tanks has already been provided in the service passage at the back of the show tanks, and there is a well-equipped laboratory over the entrance hall. Work on the helminth parasites of fishes which have died during the stocking of the Aquarium has already been started by Prof. R. T. Leiper and Mr. G. S. Thapar. It is hoped that, in the near future, researches will be undertaken on many of the other problems relating to food fishes, which are of the greatest economic importance.

G. M. V.