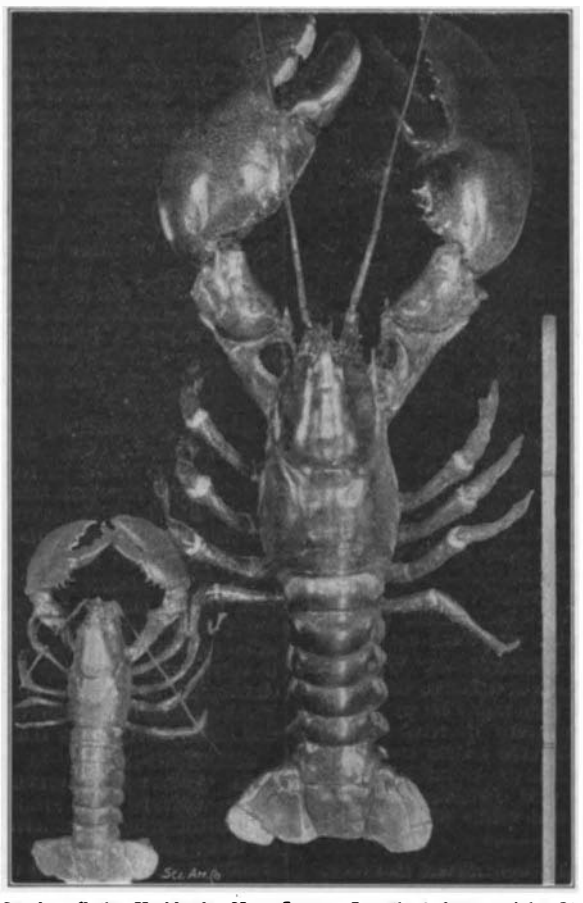
MONSTER CRUSTACEANS AT THE AMERICAN MUSEUM OF NATURAL HISTORY.

BY WALTER L. BEASLEY.

The American Museum of Natural History has just acquired a unique wonder of marine life in the shape of a gigantic Japanese crab, measuring 12 feet. This is the largest specimen in the world, the Biological Department of Columbia University having the next in size. The specimen shown is a type of the spider crab, which inhabits the waters of the group of islands forming the empire of Japan. At four of these great islands, at present, according to Prof. David Starr Jordan, some 1,100 different marine species are known to exist. The extraordinary size of the crab is strikingly shown in comparison with the ordinary-sized one; the body portion is of about the size of a large dinner-plate, while its two great arms, containing saw-like teeth, called "pinchers," could encircle the outstretched figure of a man. The eight arms resemble sections of bamboo growth, and are extremely elastic. One of the peculiar features of the crab is its faculty of assuming a disguise. This feat they are able to perform owing to the flexibility of their pinchers, and to the hooked hairs and spines with which their numerous arms are studded. By means of these pinchers they tear off small fragments of sponges and seaweeds. After first putting these to their mouths, which contain a glutinous saliva, they place them on the surface of their limbs and body, by sticking them fast with a rubbing movement. By this method the crab succeeds in completely changing its appearance and rendering itself indistinguishable from the materials common to the bottom of the sea. The big crab is one of the features which Prof. H. C. Bumpus, Curator of the Department of Invertebrate Zoology, is arranging for exhibition.

Another monster now on exhibition at the Museum is a gigantic lobster, estimated to be the largest specimen in the world thus far recovered. It is a species of the common marine lobster, *Homarus Americanus De Kay*, and was caught off the Highlands, New Jersey, by fishermen. This immense crustacean measured nearly a yard in length and weighed thirty-four pounds. When first captured it was exhibited at the New York Aquarium, but only survived a few days. On account of its unusual size it was afterward obtained by the Museum and mounted for permanent preservation. It now forms one of the most striking exhibits in the biological collection; it was also a prominent feature in the United States Fish Exhibit at the Paris Exhibition. Although of such extraordinary size, the lobster was quite normal in all its parts, being simply overgrown.

In this connection it may be said that an important discovery bearing on the lobster industry has just been announced by Prof. H. C. Bumpus, of the American Museum, who states that the problem of artificial lobster culture has been conclusively demonstrated. This new and far-reaching discovery places the United States ahead of all the nations of the world in this particular branch of biological investigation, as for years the artificial propagation of this crustacean has baffled the leading scientists abroad. The supply of lobsters has been slowly diminishing during the past five years. It was apparent to the United States Fish Commission that unless some active means were taken to increase the production the lobster would, in a few years, become practically extinct. Prof. Bumpus, who has been conducting investigations in this line at the Wood's Holl Laboratory in the past, was appointed to take charge of this work. The practical experiments, which have yielded a series of surprising and brilliant results, were carried on at the Wickford, R. I., station of inland fisheries, on board the new floating laboratory or houseboat, which was especially adapted for practical work. After numerous experiments had been made it was found that the secret of success in rearing the young lobsters from the eggs was to keep the water in continuous motion, thereby preventing the fry from settling into pockets to smother or devour one another; as at certain times they have a tendency to leave the surface and sink to the lower depths, this resulting in great mortality. Dr. A. D. Meade, of Brown University, and the Director of the Wickford Station, originated the continuous motion idea and carried on the practical details of the work. A simple and ingenious stirring and feeding apparatus was constructed, consisting of several cylindrical scrim bags, 3 feet in diameter and 4 feet deep. Mr. George H. Sherwood devised and installed this contrivance. In the central space or pool of the houseboat were submerged a dozen or more of these scrim bags, containing several thousands of the young fry. In each bag was placed a dasher, turned by a gasoline engine, the rotating blades of which would constantly keep the water so agitated that the fry would not and could not settle to the bottom. The blades also kept the food in circulation, so that the fry could obtain it. The apparatus sufficed not only for keeping the fry and artificial food from the bottom, but it also provided the fry with living natural food. They were fed with the soft parts of clams, cut into fine pieces in a chopping-tray. This diet seemed best suited to the young lobster's digestion. The experiments proved that lobsters can be artificially reared from the eggs until in nine to sixteen days they pass



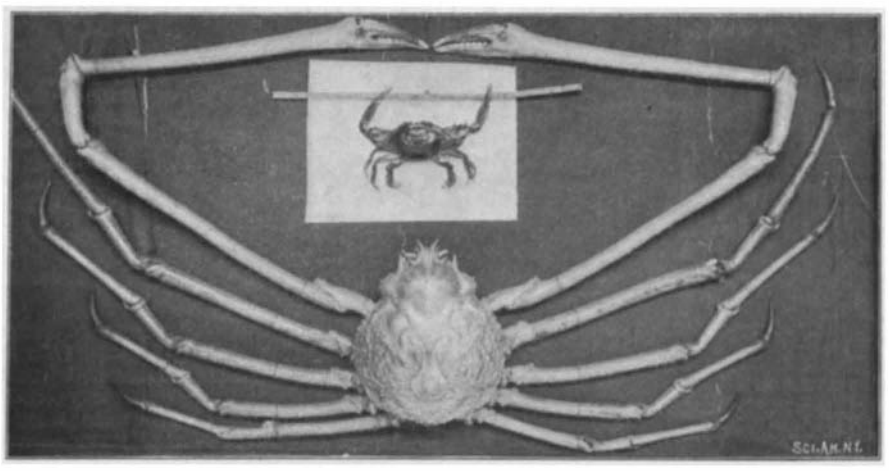
Caught off the Highlands, New Jersey. Length, 3 feet; weight, 34 pounds. Now in American Museum of Natural History, New York.

THE LARGEST LOBSTER ON RECORD.

the critical stage, after which they become similar to the adults in structure and habits, being able to take care of themselves when liberated. Dr. Meade reports that by actual count in no case was the number of lobsters that reached this stage less than 16 per cent of the number of fry originally placed in the bags. In many cases it was above 40 per cent, and in one instance it was as high as 54 per cent. In previous years no experiments had yielded more than a fraction of 1 per cent. Encouraged by these results the United States Commission of Fish and Fisheries is now planning to equip several stations along the New England coast with the new hatching and brooding apparatus for the purpose of raising millions of fry. The liberation of large numbers of these hardy youngsters will result in the re-stocking of our depleted waters, thereby saving the lobster industry from extinction.

Anthracite in China.*

Examination of the fossils which were brought from the southern provinces of China has been made under the direction of M. G. Vasseur, Director of the Geological Laboratory of Indo-China.



THE LARGEST CRAB ON RECORD.

The researches have proved that there are in several parts of the provinces of Yun-nan and Koni-tcheon, Devonian schists very rich in fossils. The species most abundantly represented in these beds are: streptorhynchus, orthis, rhynchonella, pentamerella, pentamerus, cyrtia, atrypa, athyris, with trilobites and débris of fishes.

The village of Lan-mon-tchang, in Koni-tcheon, is situated about half way between the districts of Hing-i and Gan-chuen. Here is a coal mine, worked by the Chinese. The strata of coal are intercalated with schists in a circular elevation. The schists vary in color from clear gray to an almost blackish gray. They are covered with a calcareous formation.

The inclination of the coal measures is about 20 deg. toward the northeast. The enveloping rock is rich in organic débris. The fossils in the floor and roof of the carbonaceous strata are identical. They are chiefly brachiopods of the species streptorhynchus. This order is represented in quite a variety of genera, which appear to be for the most part peculiar to this formation. Some trilobites are also found here, and attention should be especially called to the genus Phacops, which in connection with other fossils, indicates indubitably the level to be assigned to the sediment inclosing it, and consequently to the coal deposits interstratified in these formations.

As might be expected from the age of the beds, the coal of Lan-mon-tchang is an anthracite. Its analysis, made by M. Estienne, engineer-chemist of the Worms firm at Marseilles, is as follows: water, 0.50; volatile matters, 8.75; ash, 10.40; fixed carbon, 80.35; total, 100.

The proportion of ash is quite high. This is probably due to the presence of sulphur.

This mineral exists in the vicinity of the bearings. Iron pyrites is also found in the schist. In the calcareous strata covering the schist, a small crevice lined with cinnabar has been worked by the Chinese.

This is a very important anthracite bed. It is worked by means of three very narrow galleries, of which one has a depth of about one and a half kilometers.

Lan-mon-tchang is the only point where fossils have not been found clearly Devonian in contact with coal. But this proves nothing except that beds of the same age do not exist elsewhere. Several deposits of fuel appear in stratigraphic conditions absolutely similar to those which I shall take occasion to describe. At least in one point, a coal bed exists incontestably Devonian.

M. Zeiller, engineer-in-chief to the Society of Mines, has already shown, that, according to the samples brought by M. Leclère and M. Monod, China contains numerous coal beds of unequal value; some of them belonging to the carboniferous strata, others to a lower formation, and the middle to the Jurassic period.

The Lan-mon-tchang bed proves that the vertical extension of coal is greater than formerly supposed. This extension would be augmented still more, if the tertiary lignite found at Ma-pé-kai, in the east of Yun-nan, should be taken into account. These lignites are accompanied by a complete fauna of lacustrine gasteropods, among which the phanobis predominate. From the works of M. Zeller, it seems that lignites, probably Pliocenes, exist also at Tonkin, in the Yen-Bay region, where they are inclosed in the sand-clay schists with tulatomes and vegetable dicotyledons.

Thus it is evident that coal was formed in China in the Devonian and Carboniferous eras, during a part of the Jurassic period and in certain tertiary lagoons.

* Paper of M. G. H. Monod, presented to the Académie des Sciences.

Power Lost in Flywheels.

The resistance which a flywheel offers to the air may give rise in some cases to a considerable expenditure of energy. Some tests were made in the Nürnberg central station which showed this very clearly. The station is provided with two tandem compound engines of 450 horse power, direct coupled to the dynamos and working at 95 revolutions per minute. In order to equalize the running with the great variations of load which occur, a very heavy flywheel was used with arms of a channel section. It was found that these arms offered a great resistance to the air, and created a powerful draft, and so it was decided to cover the wheel with sheet iron in order to reduce the resistance and thus gain considerable power. In order to test the amount of energy lost, the dynamo was made to run as a motor and thus drove the engine and flywheel at no load. When the latter had no protecting covering it was found to absorb 13,300 watts, but when the covering was replaced it took only 9,874 watts, thus showing a gain of 3,426 watts or 5.7 horse power, this being 1.2 per cent of the power of the engine. Counting the current price per kilowatt hour and a day's run of 17 hours, it was found that this represented an economy of nearly $270 annually. Another test of a similar nature was made by M. Ingliss upon a 630 horse power engine and showed an economy as high as 30 horse power or 4.8 per cent of the engine power which was gained by properly diminishing the resistance of the flywheel.

The monkey wrench gets its name from its inventor, Thomas Monkey, of Bordentown, N. J.