lands, so it must have left the State last in the lowlands. That necessitated the two great ice-lobes, one from the north and northwest and one from the northeast. The former occupied the basin of the Red river of the North and the Minnesota valley, and the latter the valley of Lake Superior with its western tributaries. These at length united in one general ice sheet, but when they retired they assumed again their lobate forms outlined by moraines, and finally allowed an uncovered interlobate area of the high lands about the region of the Upper Mississippi. By the growth of this uncovered area the ice lobes shrank to smaller dimensions and disappeared entirely, the latest to finally leave the State being the northeastern lobe.

The belt along which these ice lobes collided in the central part of the State can be traced by the overlapping and confusion in the characters of the drift, the northwestern drift being normally gray and the northeastern red. This belt he marked out in general as continuing from Rice county to St. Paul, thence northwestwardly to the region of Itasca lake where it turns eastward, passes along the range known as Giant's range, and leaves the State not far from the extremity of Pigeon point. Wherever these ice-lobes uncovered land that slopes northerly, or toward the ice itself, the discharged waters formed lakes whose outlets, beaches and areas are sometimes well known, the chief of which is Lake Agassiz, described by Mr. Warren Upham. Twenty-five other such lakes were defined by Professor Winchell within Minnesota, varying in elevation from 890 feet to 1,700 feet above sea level.

Mr. Upham, in his lecture on 'The Giants' Kettles in the Interstate Park,' stated in substance that within an area of two or three acres in the northern part of the Interstate Park are found about seventy rock potholes, or giants' kettles, as they may be called in agreement with their common designation in the languages of Germany, Sweden and Norway. This area of their abundant occurrence is unsurpassed in respect to their numbers, depth and difficulty of explanation, by any other locality in the world, although many places, as in Maine, nearly all the other New England States, the vicinity of Christiania, Norway, and the Glacier Garden in Lucerne, have very remarkable giants' kettles.

At Taylor's Falls they range in diameter from a foot or less to 25 feet, and in depth from one foot or a few feet to 65 feet and 84 feet, these being the depths to which two potholes 25 feet apart have been excavated and sounded, but without yet reaching to their bottoms. In many cases the ratio of diameter to depth is as 1 to 5 or 1 to 7 with nearly cylindric, but occasionally somewhat spiral or rifle-like, form. The rock is the very hard Keweenawan diabase, scarcely exceeded in hardness by any known rock. From many features of these giants' kettles, as notably their abrupt rims and the generally unworn adjoining rock surface, Mr. Upham attributed their erosion to torrent-falling through moulins, vertical shafts of the ice sheet which covered this region in the Glacial period. Some of these kettles were filled and covered by drift, but the greater number are empty, excepting scanty gravel at the bottom, with a few water-rounded boulders. The adequacy of moulin torrents to erode the smaller as well as the larger kettles is shown by small potholes of such origin, in some instances only about a foot or two in diameter and depth, on the high ridges and tops of hills and mountains in Maine, New Hampshire and Vermont.

The above is but a brief summary of these two very instructive lectures which were delivered to a large audience in the Academy Assembly Hall.

F. G. Warvelle.

SHORTER ARTICLES.

CHIASMODON IN THE INDIAN OCEAN.

The Indian government survey steamer *Investigator*, Captain T. H. Henning, R. N., commanding, which has recently been engaged in beam-trawling off Cuddalore and Point Calimere on the southeast coast of India, has obtained a small specimen of the rare deep-sea fish, *Chiasmodon niger* Johnson, from a depth of 1,100 fathoms.

This species has hitherto been known only from four localities in the Atlantic. It was first reported from the Madeira Islands in 1850,

but not fully described until 1863, when Johnson obtained another specimen in that locality. Two other specimens have since been found at the surface (near the island of Dominica and on the Lehave Bank). The *Challenger* took another with the trawl at a depth of 1,500 fathoms in the mid-Atlantic.

Chiasmodon is remarkable for its large mouth and distensible stomach, enabling it to swallow fishes larger than itself. For most of the foregoing specimens, naturalists are indebted to the inability of the fish to digest what it swallows, resulting in its death and appearance at the surface.

H. M. SMITH.

U. S. FISH COMMISSION, WASHINGTON, D. C.

THE SAN JOSÉ SCALE PROBLEM AS COMPARED WITH THE ORANGE SCALE PROBLEM.

I WAS much interested in the communication of Professor Kellogg in the issue of SCIENCE for March 8, 1901. Of course the practical value of Mr. Kuwana's investigations is in the increased probability of our being able to import from Japan the natural enemies of the San José scale, and thus control the pest here, as was done in case of the *Icerya*. It is, therefore, of interest to see where we now stand in the matter of information, on which to base a second experiment in importing into this country parasitic enemies of scale insects. I copy the following lines from Professor Kellogg's communication:

* * * "It the [San José scale] is attacked by several enemies, Mr. Kuwana personally finding one chalcid, three lady-bird beetles and one moth, the larva of which feeds on the scale. Of these enemies the chalcid fly and one of the lady-bird beetles are everywhere common, and are effective checks to the increase of the scale. It is probable that the comparatively little injury produced by the scale in Japan, widespread as it is, is due to the presence of these natural enemies." * * *

By the side of this information may be placed the following, extracted from the Adelaide, South Australia 'Garden and Field' of November, 1887, by the late Mr. Frazer S. Crawford, who, from first to last, gave such efficient aid in bringing about the introduction of the Vedalia lady beetle that suppressed the Orange scale in California.

* * * "We have a few species of Coccinellidæ about Adelaide, but they are not very plentiful, and although one or more species attacks the *Icerya*, yet they are not very effective in keeping them under, as the following experiment proves. Three months ago I put in a glass bottle a small branch of a gooseberry tree, on which some forty or fifty adult Iceryas were clustered. On examining them subsequently I discovered two lady-bird larvæ, which have lived to the present time feasting on the *Icerya*, evidently contented with their quarters; but at the present time there are likewise a great number of young larvæ, lately hatched, running about, thus showing that the work of destruction has been very slow, and that even under such favorable circumstances the coccinellæ larvæ cannot cope with the productive power of the *Icerya*. Strange to say, a similar twig, covered with about the same number of adult females, was about the same date placed in a lemon tree, and a fortnight back every vestige of *Icerya* had disappeared. This clearance was gradual, but what has caused it I am at a loss to say." * * *

It must be remembered that this was written one year prior to Mr. Keoheles starting for Australia on his first trip. It will thus be seen that Mr. Kuwana has thrown a flood of light upon this problem which I can only look upon as very similar to the one in which *Icerya* was involved, and afterwards so effectually solved. As I read of the conditions of the San José scale in Japan, as relating to numbers and effect, it seemed to coincide exactly with the mental picture that I could not banish from me when I went over some infested nursery stock two or three years ago, just received direct from Japan. While I had practically nothing to do with the introduction of the *Vedalia*, I did examine many orange groves about Adelaide, South Australia, for the *Icerya* and found a similar condition—only here and there a solitary individual, at most two or three together.

We can make a *defensive* fight against the San José scale with whale oil soap, petroleum, the axe and fire, in fact we must do so, in order to save our orchards from ruin; but we shall never be able by these measures to do more than check the pest. If we ever expect to do more than this we must make an *offensive* fight and with natural enemies brought from the country where they are found doing their work and holding this pest perpetually below the danger line in point of numbers.

F. M. WEBSTER.

WOOSTER, OHIO, March 12, 1901.