ginia, 55.5 per cent in Florida,* and 75.3 per cent in Tennessee.

Corn does not exhibit the same regularity of progression, owing (1) to the large acreage in the semi-arid portions of Texas, Kansas and Nebraska, where the frequent deficiency of moisture is a disturbing element; (2) to the extent to which special varieties have been adapted to local conditions to meet a want that no other crop can satisfactorily supply, and (3) to the extreme care with which this greatly esteemed product is cultivated in certain sections where its growth is precarious.† Still, the variation in the Upper Austral zone, excluding Kansas and Nebraska,‡ is 49.69 per cent, against 38.46 per cent in the Lower Austral, exclusive of Texas;‡ and if, for the reasons above stated, that of the most northerly tier of states, excluding Maine and Rhode Island,‡ is only 44.57 per cent, it is a significant fact that there is not a state in this belt with as small a variation as Alabama or Florida, and that there is but one that will compare favorably with Georgia, Mississippi, Louisiana or Tennessee.

Investigations show that this law of diminishing constancy is entirely independent of whether the average yield per acre is high or low, and that there is no general correspondence between its operation and the annual variation in the rainfall. The non-uniformity in the fluctuations of various products is attributed by the author to the different proportions of such products grown at a greater or less distance from the natural habitat.

JOHN HYDE.

U. S. DEPARTMENT OF AGRICULTURE.

*Not altogether reliable, owing to the non-determinable proportions of the upland and sea-island varieties.

†Although corn is essentially a tropical plant, the highest average yields per acre in this country are those of the New England States. While the high cultivation to which this is due has a steadying effect upon the rate of production from year to year, that rate of production is by no means so uniform as in the States bordering on the Gulf of Mexico, Texas excepted.

‡The reasons for these exclusions are fully stated in the paper from which this brief abstract is taken.

ON THE REAPPEARANCE OF THE TILE-FISH.
(*LOPHOLATILUS CHAMÆLEONTICEPS.*)

DURING March and April, 1882, the presence on the surface of the ocean of large numbers of dead tile-fish gave rise to considerable discussion in scientific journals, and frequent allusions have since been made in text-books, and elsewhere, to this phenomenon as illustrating the elimination of a species in recent times by purely natural agents. The reappearance of the fish in abundance in its original locality is, therefore, of considerable biological interest.

The history of the discovery, the 'extinction' and reappearance is as follows:

In May, 1879, Captain Kirby, of Gloucester, caught a great number of tile-fish off the southern coast of Nantucket, in water about 150 fathoms in depth. Specimens were sent to Washington and the species was described by Goode and Bean in the 'Proceedings of the U. S. National Museum' for that year. In July, Captain Dempsey, also of Gloucester, found several specimens in practically the same locality.

In 1880 Professor Baird sent the 'Mary Potter' to search for the fish, but the expedition, on account of uncommonly severe weather, was not successful. The 'Fish Hawk,' however, while exploring along the continental plateau, caught several specimens.

In 1881 the 'Fish Hawk,' continuing deep-sea work along the southern shore of New England, caught a large number, and Professor Baird felt confident that he was about to establish a new industry.

In March and April, 1882, vessels entering New York and other Atlantic ports reported that they had passed through

countless numbers of dead fish while crossing the northern edge of the Gulf Stream. Investigation proved that these were tile-fish, and that they appeared on the surface of the water for an extent of 170 miles in length and 25 miles in width. A conservative estimate, made by Captain J. W. Collins, placed their number at upwards of 1,438,720,000. Allowing ten pounds to each fish, there would be 288 pounds of fish for every man, woman and child then in the United States. In September, Professor Baird chartered the 'Josie Reeves' and sent her to the tile-fish grounds, that he might ascertain to what extent the species had been depleted; but the vessel returned without having found a single individual.

In 1883 the 'Albatross' made further search, but without success.

In 1884 the 'Albatross' made a more careful investigation, but again without success.

In 1885 the same vessel searched from Newfoundland to the Gulf of Mexico without discovering the least trace of the Tile-fish, though *Munida*, a species of Crustacean upon which the fish was known to have fed, was found in abundance.

In 1886, 1887, 1888, 1889, 1890 and 1891 nothing new was learned.

In 1892 Commissioner McDonald fitted out the 'Grampus,' and on August 5th trawls were set on the old tile-fish ground. No fish were taken. On the 6th the trawls were set again, and one specimen weighing seven pounds was brought to the surface. This was the first specimen that had been seen since the mortality of 1882, ten years before. The 'Grampus' continued her work, and in about two weeks caught a second specimen which weighed thirteen pounds. On September 17th one specimen was caught, and on September 18th three specimens were taken. No more were caught until October 8th, when two were found off the Delaware coast. Thus, in 1892, a search of two months yielded only eight specimens.

In 1893 the 'Grampus' resumed the search throughout the months of July, August and September and caught scattering specimens.

During 1894, 1895 and 1896 no additional information relative to the fish was secured.

On February 8, 1897, the Schooner 'Mabel Kenniston,' of Gloucester, was overtaken by a gale on George's Bank and blown 120 miles toward the southwest. After the gale, trawls were set in sixty-five fathoms of water, and thirty tile-fish were caught. These weighed from six to fifteen pounds each. They were landed at Gloucester on February 16th.

On August 12th, of the present year, the 'Grampus' left Woods Holl with a small party of scientific men, and sailed to a point about seventy miles south of No Man's Land. At the first set of the trawl, eight beautiful tile-fish were taken. The boat, insufficiently equipped with lines and bait, at once returned to the 'Station.' New trawls were purchased and on August 30th, ice and bait having been taken on at Newport, she again sailed south. The following morning, when the boat was only sixty miles from Block Island, the trawls were set. The first haul yielded seven fish; the second, forty-seven, and the third, nineteen. On the following day seventy-eight fish were taken, many of them of large size, and the vessel, now bearing 1,000 pounds, headed for Montauk Point, where the fish were given to the soldiers at Camp Wikoff.

When one considers that the trawls were short, provided with only a few hooks and tended by only one dory, it would seem that the fish are sufficiently abundant for an ordinarily equipped fishing-smack, with its miles of trawls, to secure a full fare in a very short time.

The tile-fish, since the mortality of 1882,

has been taken only along the edge of the continental plateau, in water near the one-hundred-fathom line, from points south of No Man's Land, Block Island and the eastern portion of Long Island. The 'range' of the species, as at present determined, is restricted to a tract of the sea bottom about one hundred and fifty miles in length, and ten to fifteen miles in width. The 'stations,' however, are few, and further investigation may result in a considerable extension of the range. The fish that have been caught during the past summer differ in respect to size from those that were caught before the mortality; for, while many are large, weighing fully twenty pounds, there are also many small immature individuals which often weigh but a pound or two. This percentage of immature fish would seem to indicate that the present environmental conditions are favorable, and that the species has become re-established.

H. C. Bumpus,
Director of Biological Laboratory.
U. S. F. C. Station, Woods Holl.

Note—The Grampus again visited the tile-fish grounds the latter part of September, returning to Woods Holl on October 2d, with over two hundred and three fish, weighing upwards of 3,000 pounds. This last catch was made between the meridians of 69 and 70 west longitude, a tract that has not heretofore been known to be occupied by the fish, and indicates an eastern extension of the range of about twenty-five miles.—H. C. B.

SERIATION CURVES OF THE CEPHALIC INDEX.

As a contributor to the discussion of the problems of 'type' and 'variation,' few sciences can offer a more comprehensive data for analysis than physical anthropology. Especially during the last ten years the number of observations available, based upon the study of European populations, has become very large. As late as 1885 the most considerable cranial series which Topinard* could muster were those of Ranke for the Bavarians and of Broca for the Parisians respectively. These, numbering one thousand each, were at that time considered extraordinarily comprehensive. Yet, since the development of the younger school of anthropologists, whose leading principle has been to confine their measurements to the most simple alone, but to extend the number of individuals to a maximum, series of far greater range are possible. Interest in cephalic rather than cranial measurements, the living specimens being limited in number only by the endurance of the observer, has contributed greatly to this result. An analysis of a few seriation curves based upon such observations is not without importance even outside the limits of those interested in physical anthropology alone. Methods and principles are involved which apply to every branch of physical science, from astronomy to psychology.†

There is another imperative reason for calling attention to the significance of these seriation curves of cephalic observations. They are a most conclusive refutation of the statement, which reappears from time to time among those who do not consider the statistical aspects of physical anthropology, that the cephalic index measuring the proportions of the head is devoid of ethnic significance. Confused by the phenomena of individual variation, these critics lose sight of the value, when properly

* Éléments d' anthropologie, pp. 387 *et seq.*

† The best technical discussion of such curves among anthropologists will be found in Goldstein, 1883; Stieda, 1883; Ammon, 1893 and 1896c; Livi, 1895 and 1896a, pp. 22 *et seq.* Dr. Boas has contributed excellent material, based upon the American Indians for the most part. Full titles of all these papers will be found in our Bibliography of the Anthropology and Ethnology of Europe; which, after more than a year of preparation, is shortly to be issued as a special bulletin by the public library of the city of Boston.