

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.

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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.

treated, of an ethnic criterion which is acknowledged by all the leading authorities of Europe to be of the utmost value. Still another objection to the use of the cephalic index as a racial criterion, even from some of its best friends, seems to be answered by the study of such curves. It is maintained that the cephalic index is not an objective reality, but merely a relation of the length of the head to its breadth. This is, indeed,

would be absurd to maintain it. Surely it is the *relativity* in length of the leg bones compared with spinal column. If such a *relation*, then, of the length of the head to its breadth be not a fit subject for detailed analysis our curves certainly belie it.

Seriation curves drawn for the cephalic index are entirely similar to the more familiar ones based upon observations of stature.* The same principles underlie

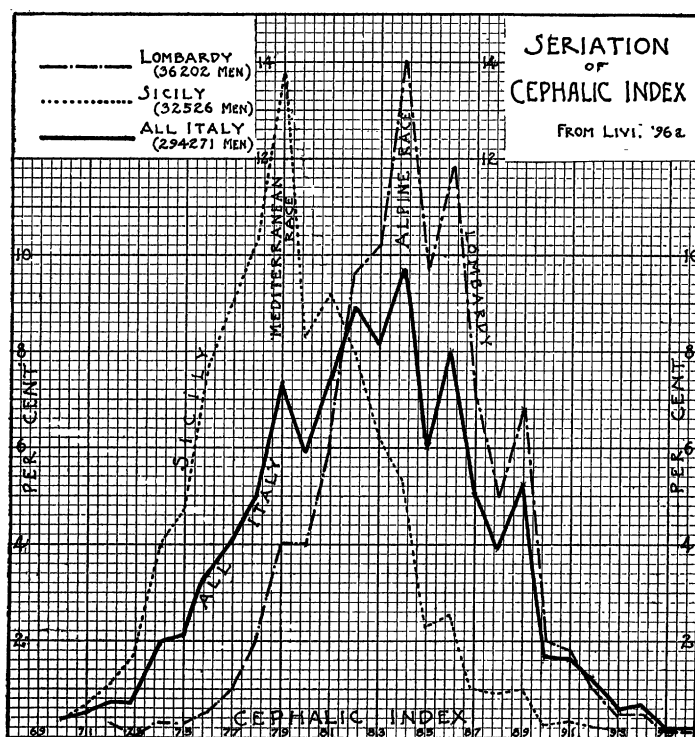


FIG. 1.

true. Yet how about nearly every other standard of comparison instituted either in anthropology or zoology? Is the long arm of the negro, compared with his length of trunk, according to Baxter and Gould, any the less characteristic because it is a *relation*? How do we measure the peculiarities in posterior extremities of the kangaroo or the rabbit? By their absolute length? It

them in each case. In the first of our diagrams it will be noted that we have to do with a very large number of individuals. It illustrates the difference in contour be-

* These we have analyzed with diagrams in *Popular Science Monthly*, LI., 1897, p. 197 *et seq.* A special discussion of the significance of 'type' as distinct from 'race' will appear also in the *Jour. Anth. Inst.*, London, for November, 1898.

tween a curve drawn for a relatively simple population and one in which several distinct types are coexistent. The narrowness and height of the pyramids for the two extremes of Italy culminating at indexes of 79 and 84 respectively, are notable.* The two regions are severally quite homogeneous in respect of the head-form of their population; for the apex of such curves rarely exceeds the limit of fourteen per cent. reached

clusion of each differently characterized population. It will be observed, however, that even this curve for a highly complex people preserves vestiges, in its minor apexes, of the constituent types of which it is compounded. Thus its main body culminates at the broadened head-form of the Alpine race; but a lesser apex on the left-hand side coincides with the cephalic index of the Mediterranean racial type, that

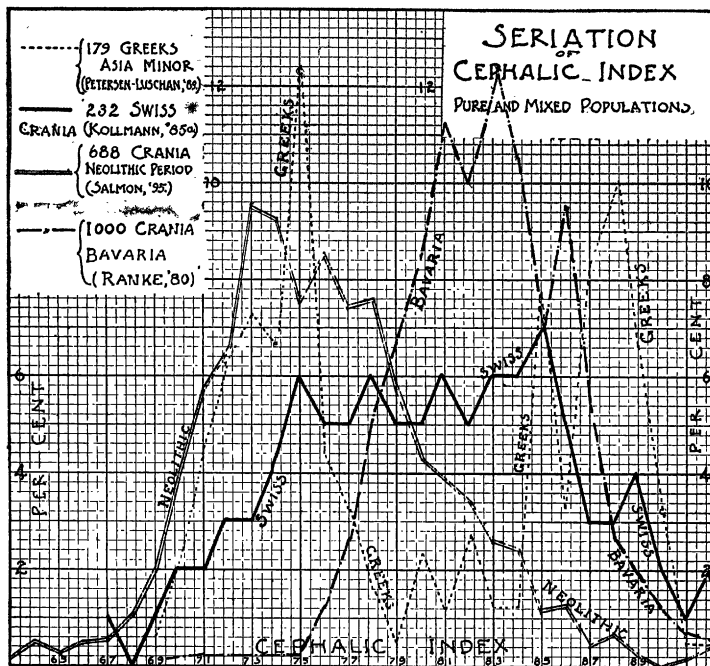


FIG. 2.

NOTE.—These curves are not strictly comparable with one another in detail; since they are based upon the differing systems of measurement of the French and German schools. Direct comparisons of cranial and cephalic index curves are also impossible. The form in all cases is, however, the same.

in these instances. The curve for all Italy, on the other hand, is the resultant of compounding such seriations as these for each district of the country. It becomes progressively lower and broader with the in-

which entirely dominated in the simple curve for Sicily alone.

The second diagram contains examples of a number of erratic curves. The Swiss one represents a stage of physical heterogeneity far more pronounced than that of all Italy, which we have just analyzed. Or rather, more truly, it is the product of an inter-

* Livi's maps of the distribution of these types in Italy are reproduced in our article on that country, in *Popular Science Monthly*, LI., 1897, p. 721 *et seq.*

mixture upon terms of entire equality of a number of types of head-form. In Italy, as we have seen, the broader head-form so far outweighed the Mediterranean one that a single culminating point of maximum frequency still remained with a lesser one corresponding to the minority partner. In this second diagram Bavaria represents about the same condition as all Italy, with, however, the proportions of the two constituent types reversed. For ; being north of the Alps the culminating apex of greatest frequency lies toward the longer-headed side of the curve. Therein does the dolichocephaly of the Teutonic race make itself manifest.

Compared with these curves for Italy and Bavaria, the Swiss seriation is seen to be devoid of any real apex at all. It represents a population in no wise possessed of distinct individuality so far as cephalic index is concerned. Broad and long heads are about equally common. This corresponds, of course, to the geographical probabilities for two reasons : inasmuch as Switzerland not only lies at the center of the continent; but, also, owing to its rugged surface comprises all extremes of isolation and intermixture within its borders. A stage of heterogeneity absolutely unparalleled seems to be indicated by still another of our curves, that drawn for the Greeks of Asia Minor. It culminates at the most widely separated cephalic indexes, viz., 75 and 88 respectively, known in the human species. The lower index corresponds to the primitive long-headed Greek stock; the other is probably a result of intermixture with Turks, Armenians and others. Or, perhaps, it is nearer the truth to say that the only bond of unity in the entire series is that of language; in other words, that the broad-headed apex represents Turks, Armenians and others, still physically true to their original pattern, yet who have chanced to adopt the speech of the Greeks. Here

again is the heterogeneous ethnic composition of eastern Europe fully exemplified by a seriation curve of cephalic index.

In conclusion, we may call attention to the following seriation curve based upon observations taken by Messrs. Fiske and Melliush upon nearly five hundred students

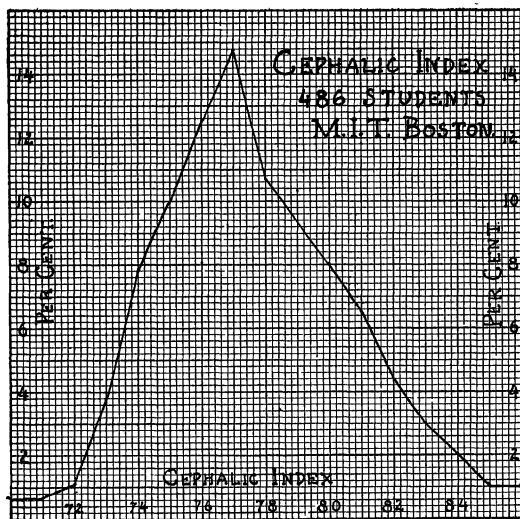


FIG. 3.

at the Massachusetts Institute of Technology. Its simplicity, points to a remarkable homogeneity of physical type, so far as the proportions of the head are concerned. This would seem to be at variance with our notions of the composition of our American population. Yet it should be observed, that this series is one based upon a selected class; selected, in that it comprises those possessed of intellectual ability sufficient to enable them to withstand the pressure of Institute examinations. It appears that this purity of type, culminating at a cephalic index of about seventy-seven, corresponds quite closely to other series taken among peoples of Anglo-Saxon descent, especially in the English universities by Venn and others. From one end of the British Isles* to the other a uniformity in

*Vide our map in *Popular Science Monthly*, LII.,

this respect is apparent, which leaves little ground for expecting a heterogeneity in America. The broad-headed Alpine race of Central Europe, seems to have been so far excluded from the British Isles as to leave a population quite uniform in its cephalic proportions. A 'type' of head-form certainly transmissible not only from one population to its successor, but over seas as well, seems to be indicated.

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*THE INTERNATIONAL CONFERENCE ON
TERRESTRIAL MAGNETISM.**

THIS was the second occasion the British Association provided the means for a meeting of the scientists engaged in the study and development of our knowledge of terrestrial magnetism, the first magnetic congress having been held at Cambridge as far back as 1845. On the present occasion the Conference was of an international character, thanks to the cordial cooperation between the British Association and the International Meteorological Association, with which latter the Magnetic Conference for the present remains affiliated. It was at the International Meteorological Conference, held at Paris in 1896, that a 'Permanent Committee for Magnetism and Atmospheric Electricity' was appointed; it consisted of eight members with power to add to their number. The British Association allowed the Conference to organize under its President, Professor A. W. Rücker, M.A., D.Sc., as a branch of Section A (Mathematics and Physics), and undertook the expense of sending out the necessary notices to print the papers of the Conference in the report, and with great

1897, p. 148. Beddoe is best on this subject. Dr. West is the only other American observer studying the school children in Worcester, Mass.

* Held at the Bristol Meeting of the British Association for the Advancement of Science, September 7-14, 1898.

liberality extended to the foreign delegates of the Conference all the privileges of foreign members of the Association. The Bristol Conference, under its President, Professor A. W. Rücker, was attended by Dr. A. Schuster, of England, and the following foreign members:

Dr. M. Eschenhagen, of Potsdam.
Professor S. Lemström, of Helsingfors.
Professor T. Liznar, of Vienna.
Professor E. Mascart, of Paris.
Ch. Moureaux, of Paris.
Professor L. Palazzo, of Rome.
Gen. M. Rykatchew, of St. Petersburg.
Dr. A. Schmidt, of Gotha.
C. A. Schott, of Washington.

Besides these members various physicists and magnetists were present and took part in the deliberations.

In view of the fact that the United States Coast and Geodetic Survey has been largely engaged in the investigation and study of terrestrial magnetism in this country as forming part of its regular duty, inasmuch as the issue of its maritime charts demands the fullest information procurable, the Superintendent of the Survey proposed sending a delegate to the Bristol International Meeting to take part in the Conference. After approval by the Honorable Secretary of the Treasury instructions were issued by the Superintendent, Dr. H. S. Pritchett, in which he remarks: "The Conference having for its object the advancement of our knowledge in terrestrial magnetism, through communications and intercourse of those interested, you are expected to assist in these deliberations and make such suggestions as seem most appropriate, with a view of increasing our knowledge of the distribution of magnetism over the whole globe and in particular for the region covered by the United States."

The meetings, of which there were ordinarily two a day, one public, the other for consultation and discussion, were held at the University College and in connection