

to get the right Minister and to organise the Ministry; and then there is no more than a beginning made. The central organisation is probably the least important part of the health organisation in this country. The most effective portion of the work will have to be done at the periphery, by the local organisations, as it has always been done, or, unfortunately in some cases, left undone.

The problem that faces the first Minister and the new Ministry is the problem of the organisation of the working forces, and when it is attacked it is within the bounds of possibility that the Minister and the Ministry may find that these forces are not distributed throughout the country in a particularly suitable manner. An entirely new method of dividing up the country may very probably have to be devised before anything can be done.

As matters stand at present, health work is distributed most unevenly, for the reason that the necessity for a standard unit has never been recognised. The local authority of each district has been declared to be the sanitary authority; powers and duties in relation to public health have been imposed upon or delegated to it, and that has been the end of it. The size of the area, the population and, more important still, the rateable value and the wealth or poverty of the district have never been taken into account.

The result has been that the work has properly been attended to only in the districts where the means were adequate. The large, prosperous districts did all they possibly could; the small, rich districts did superbly because they were small and because they were rich. In the poorer areas as much as could be afforded was done and more or less was left undone.

Only within the last few years has it been seen that the question of *affording* was one of importance, and that good might result if grants in aid of necessary work were made. The experiment was tried in the case of maternity and child welfare schemes, and the result has been that in practically every area an attempt has been made to cover this work. If the whole of public health work is to be covered in every area, grants in aid of all of it will have to be made. The Minister of Health who recognises this and, having induced the Treasury to see it, gets it put into operation will obtain good results; and if, instead of having a flat rate of grant, he gives a percentage that accords with local needs, he will obtain, in the poorer districts particularly, results still better. If he desires to ensure the best results, in addition to making health work more of a national and less of a purely local charge, he will arrange also for the proper distribution of the work. Most of the larger areas are too large to be effectively worked; many of the smaller areas are too small to be thought worth while working. If possible a standard unit of area and population must be devised, and the need for cutting here and grouping there recognised and put into effect.

This part of the Minister's task will be less easy even than arranging for grants in aid.

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Vested interests have stood and may still stand, for all that is known, in the way of the formation of the Ministry. Strong as they are, however, they are much less strong than the vested interests that must be overcome if local reorganisation is attempted. Until they are overcome and the nation's work of looking after the health of the nation is properly parcelled out, the best results cannot be expected.

The passing of the Ministry of Health Bill, the discovery of a suitable Minister, and the formation of a sound Ministry may bring satisfaction to many. They will not necessarily bring improvement in the national health; will not necessarily, as many appear to think, bring about a total disappearance of epidemics and a vast and immediate reduction in the amount of disease and the annual death-rate.

Marked improvement will be seen only when the work has been properly organised throughout, when it is recognised that the care of the nation's health is a national business and bound to succeed only if it is properly arranged, properly managed, properly financed, and properly supervised.

A Ministry of Health can, if it will, ensure that these things shall be done; it does not follow that they have been done when the Ministry has been formed.

RACIAL INVESTIGATIONS ON FISHES.

TWO very interesting papers¹ by Dr. Johs. Schmidt deal with the significance to be attached to variation statistics. Taking as his material collections of *Zoarces viviparus*, the viviparous Blenny, from different parts of the North European coasts, Dr. Schmidt makes mathematical analyses of measurements of various selected characters. The paper is tersely and very clearly written in English, and illustrated by numerous simple and adequate charts, and some maps showing the localities sampled. Excellent summaries of the reasoning and conclusions are given in each case.

A "population-analysis" by variation statistics can scarcely resolve any biological problem; it merely arranges the material and suggests lines of experiment. Let there be two fish populations, belonging to the same species, in different seas, which do not interbreed, and let certain measurable characters be chosen for study. Frequency-distributions with respect to each character and locality are made, average values of the selected character are calculated, and the fluctuations, or probable errors, are then found. If the differences observed are greater than the fluctuations, the usual conclusion is that the organisms are differentiated: that they belong to different "races," or elementary species. Dr. Schmidt contends that such a conclusion would, as a rule, be unsound. It may be that repeated sampling of a population gives the same average values for the characters—the same "racial picture"; nevertheless, to speak of a "race" and found it on such evidence

¹ *Comptes rendus des Travaux du Laboratoire de Carlsberg*, 13^{me} vol., liv. 3, 14^{me} vol., No. 1, 1917.

might mean little or nothing. By splitting up a large sample of Blennies into groups representing successive years of age, Dr. Schmidt obtained significantly different average values. By taking average values of a character in a number of mothers, and average values of the same character in a number of their offspring, he again obtained different "racial pictures." Finally, by taking different broods of young from the same mothers and rearing these in different conditions significantly different average values for the characters were again obtained. Character differences are thus both "genotypical" and "phenotypical," in Johannsen's terminology. The "race" is a mixture of "genotypes," pure lines of descent in which there is constancy of value of character, and variational studies only give statistical expressions for these mixtures of genes.

The average racial character is much more the result of the mixture, in various proportions, of genes than due to the environment; nevertheless, the latter may be very important. Thus Dr. Schmidt shows that all the fresh-water eels of Europe are racially the same, the average values of the diagnostic characters being practically identical; this is because the environment is really the same, that of the deep water in the Atlantic, where all those eels are spawned and undergo larval development, fixing certain characters for the rest of the lifetime. But the Blennies are non-migratory fishes, and each locality has its own stock. Selection has therefore operated in helping to produce the differences that variation statistics reveal. The environment also acts directly, as is indicated by the experiments recorded in Dr. Schmidt's second paper, producing significant character differences which need not, of course, be transmissible.

J. J.

CANON ALFRED MERLE NORMAN, F.R.S.

IT has often been remarked that the study of science in this country has been notably advanced by the efforts of those who have never been professionally engaged in it. Canon Norman, who died on October 26, belonged to the best type of this class of scientific worker. His name will be long remembered for the conspicuous service he rendered to the study of the marine Invertebrate fauna of the Atlantic and Arctic areas, and for the special interest he took in deep-sea dredging at the time when the wonders of the abysses were first being revealed. The youngest son of John Norman, D.L., of Iwood, Congresbury, and Claverham House, Yatton, Somerset, he was born at Exeter in 1831, and was educated at Winchester and Christ Church, Oxford, where he took his first degree in 1852.¹ He was ordained deacon in 1856, and priest in 1857. After holding several curacies he was presented to the living of Burnmoor, Co. Durham, in 1866, where he spent nearly thirty years, becoming rector of Houghton-le-

Spring, in the same county, in 1895, and rural dean. He was obliged by illness to give up this appointment in 1898, and he soon afterwards settled at Berkhamsted, Herts, where he died. He had become Hon. Canon of Durham Cathedral in 1885.

When quite a child A. M. Norman was interested in botany by his brother, the Hon. John Paxton Norman, officiating Chief Justice of Bengal, who was assassinated by a fanatic in 1871. At Winchester he studied entomology, and at Oxford he devoted his attention specially to the Mollusca of the county, of which he published an account. While acting as private tutor in the house of the Dowager Countess of Glasgow, at Cumbrae, in 1854-55, he first seriously took up the study of the marine fauna, and from that time he spent nearly all his summer vacations in dredging round the British Isles, Norway, and Madeira, and in the Mediterranean. He thus formed the nucleus of his famous collection of the marine Invertebrates of the Arctic circumpolar seas and of the temperate North Atlantic, together with the inland representatives of the same classes of animals which inhabit the Palæarctic region. This collection was estimated to consist of about 10,000 species and named varieties in 1895. While a large part of it was obtained by himself, many of his choicest treasures were specimens of historical interest which had been purchased or given to him. It was thus extraordinarily rich in type-specimens acquired in these various ways, and it surpassed in importance anything of the same kind existing elsewhere. Before his death Canon Norman transferred it to the British Museum (Natural History), and he presented his almost equally noteworthy collection of books and pamphlets to the zoological departments of the University of Cambridge.

In these days of specialisation the breadth of Canon Norman's interests may well be considered remarkable. It would be difficult to find another modern zoologist able to write with authority on two groups so different as the Polyzoa and the Crustacea, for example. Not only was Dr. Norman an acknowledged authority on both of them, but he was equally well acquainted with others, such as Mollusca, Tunicata, Foraminifera, and sponges. Most of his work was systematic, and a good idea of its general character can be obtained from his papers entitled "A Month on the Trondhjem Fiord," published in 1893 and 1894. It is scarcely necessary to add that he made many additions to the British fauna in many diverse groups, besides describing large numbers of new species.

The remarkable genus *Rhabdopleura* was dredged by Canon Norman in ninety fathoms off the Shetland Islands and sent to Prof. G. J. Allman, by whom it was described. This organism had no near allies among forms then known, and its affinities were not properly understood until after the discovery by the *Challenger* of *Cephalodiscus*, a second member of the same group. Another of his specially noteworthy discoveries

¹ These personal details have been taken from "Bucks, Beds, and Herts in the Twentieth Century." (Brighton: W. T. Pike and Co.)