

RACE DISTRIBUTION IN SCOTLAND.

BY JOHN BROWNLEE, M.D.

[Read 5th March, 1912.]

The analysis of a population into its original sources has not hitherto been attempted on any definite principle. The usual method has been to count the number of persons with each colour of hair and to tabulate the percentage of brunetness or darkness, but such a method lies open to the grave defect that no account is taken of the effect produced when mating of different races occurs. Thus if an individual with black hair marry one with fair hair all the immediate offspring will be dark haired. If a colony of such further inter-marry one out of every four will be fair haired. To say then that the races consist of a mixture in the proportion of three dark haired persons to one fair is obviously a mis-statement.

When we start to analyse the Scottish race we have several things to remember. First, the only survey of the adult Scottish race as regards pigmentation is that made by Dr Beddoe in the years 1870-1885, so that the figures only relate to what existed at that period. Selection, Emigration and Migration have been going on for centuries, and although nearly all Dr Beddoe's figures show that in the country districts essentially stable populations exist, it must be remembered that these districts have been recruited more or less from outside for many centuries. Secondly, that at present the information regarding the kind of blending which takes place when persons of different hair mate is not completely known, but can only be surmised from a study of Dr Beddoe's figures, and that these are not recorded in a manner to give more than a limited amount of information.

The method in which migration takes place has probably always been essentially the same, and between different dis-

tricts interchange of population has always been going on more less steadily. Even where the invasion was war-like anything like extermination of the inhabitants must have been exceedingly rare, and when peaceful conditions again asserted themselves intermingling must have taken place; in barbarous or semi-civilised times people probably associated with much concubinage but with the same results. Thus we find in part of the west coast of Scotland as high a proportion of fair haired persons as in districts adjacent to Berwick, where the main stress of the Angle occupation occurred, although the Norse invasion must have been much less associated with female immigration than that of the Angles and Saxons. As illustrating the method in which immigration takes place, Perthshire in the year 1881 is chosen as a typical example. This shire had no special development of industry during the nineteenth century, but there was a large extension of touring facilities. The immigration had been moderately extensive amounting to about 25 per cent. of the total population over the age of twenty years. This immigration has been most extensive from Forfarshire but it has been very considerable from Fifeshire, Stirlingshire, Argyleshire, Invernessshire and from Aberdeen. As an extreme example Peeblesshire may be next taken. This is a nearly purely agricultural district from which great emigration took place in the middle of the last century leaving very considerable openings for a new population. The extent of this immigration is surprising. Of adults over twenty years of age only 1 in every 3 were actually born in the county of Peebleshire. Again it is from the counties in immediate contact with the boundaries of the county that the greatest immigration has taken place. The other extreme is shown in the case of the Shetland Islands where of inhabitants over 20 barely 1 per cent. have come from other parts. Exactly the same holds with regard to immigration from England for even in these days of locomotives it is still the border counties which possess the greatest proportion of their population drawn from England. These facts show an ebb and flow of the population to an extent not at first expected. Although in the centuries prior to 1750 or thereabouts such migration could not have gone on to anything like the same

extent, yet the length of time between the Roman invasion and that date is so considerable that there must have been a very great degree of intermixing going steadily on. No war-like raid but would aid in this intermixing; to take an instance, in the strifes in the Highlands the inhabitants of one district were frequently compelled to take refuge in an adjacent district belonging to a friendly clan.

With regard to Selection, not much can be said at present. There seems undoubtedly to be in large towns a tendency for fair haired people to stand the confinement of a town less well than the darker inhabitants, but beyond this there is no accurate information. How Selection has acted in the last thousand years can only be surmised. All that can be stated from the results of investigation such as this is that the present population of the different districts of Scotland are such as might have been derived originally from certain percentage admixtures of the different races if mating were free and fertility equal. It is probable that something approaching this at least has been the rule for some centuries.

Within certain limits the races inhabiting Britain from the earliest neolithic time are more or less adequately known. But behind these, apparently belonging to the transition period between palaeolithic and the neolithic time, a number of skeletons have been obtained of great age which are so closely related in form to the present inhabitants of this country that it is difficult to avoid conclusion that they are at least to some extent the ancestors of the present inhabitants. In the chambered cairns of the early neolithic time we find quite definitely a race which is now since the work of Sergi, commonly known as the Mediterranean race, a race extending from the confines of India through the Persian Gulf, Arabia, the shores of the Mediterranean and Spain, to France and Britain. Evidences of the presence of this race are practically complete. In Britain the cephalic index in these skulls ranges from 68 to 79. The tombs of the Mediterranean race are found in the west coast of England, in Wales and in the west coast of Scotland, in Caithness and in Orkney. They are

largely absent from the remaining portion of the island. This race also invaded Ireland and in some parts of the latter country seems at the present day to constitute fully a half of the population. Judging by analogy it must have had very dark hair and dark eyes and the districts in which it survives to the greatest extent at the present day are marked by swarthinness of complexion and darkness of hair. Following this there seem to have been two distinct invasions of broad headed people, both perhaps of the same race but one having an average stature of about five feet nine, and the other, apparently more nearly allied to the present day Alpine race, having an average stature of at least three inches less. Of the colour of hair and eyes of the former group we have no distinct knowledge. The latter group is markedly represented in the graves of Aberdeenshire, graves always of the short cyst type and associated with a variety of pottery having its analogies in the centre of Europe, but if the analogy holds the people of this group have medium hair and grey eyes. At the present moment the inhabitants of Aberdeenshire are the broadest headed of the British Isles. Following this came the invasion of the Celts. The true Celts seem to have been a branch of the northern race, tall, yellow haired and dolicho cephalic and as such are described by Caesar in his Commentaries on the Gallic War. At the time they invaded Britain they must have been largely mixed with the Alpine race. This invasion occurred in the early bronze age and unlike that of the pure brachy cephalic race reached Ireland and planted extensive colonies there.

When we examine contemporary races in Europe we find that there are three which exist at the present day in greatest abundance. (1) The Mediterranean race, short in stature, dark eyed and dark haired, and dolicho cephalic. (2) The Alpine race, short in stature, medium haired, grey or light hazel eyed, brachy cephalic, and (3) The Northern or Teutonic race which is of tall stature, yellow haired, blue eyed, and dolicho cephalic. If a population analysis is to be made on the Mendelian Theory of Heredity these would seem to be the colours which must be taken as a basis if we are to attempt to find out the unknown for the known.

In Dr Beddoe's book on the Races of Britain he gives a great many analysis of the different hair colour to be found in all parts of Great Britain and Ireland, and also in many parts of the Continent. I have found that by making certain assumptions these figures obey certain laws.

The method of analysis is as follows:—On the Mendelian hypothesis of x persons of constitution (A, A) inter-marry with y persons of constitution (a, a), then the stable population will ultimately have as the proportion of inhabitants x^2 of constitution (A, A), $2xy$ of constitution (A, a) and y^2 of constitution (a, a.) In this notation (A, A) and (a, a) denote pure races, and (A, a) a mixed race. If such proportions are found to exist the hypothesis may be taken as trustworthy. Now, when Dr Beddoe's observations are examined it is found that from the knowledge of the number of light and medium haired persons in any district from the north of Scotland to the south of Italy the number of dark and jet black haired persons can be predicted. That is to say, we may take the light haired persons as represented by (A, A), dark haired by (A, a), and jet black persons by (a, a). The observations made in Manchester afford a good example. In this case four hundred and seventy-five persons were examined, of these two hundred and ninety-eight had medium or light hair, one hundred and fifty-three dark hair and twenty-four black hair. The numbers which would give an exact solution of the relationship given above would be 298, 154.7 and 22.3 where the first corresponds to x^2 , the second to $2xy$, and the third to y^2 . The Mendelian proportions are thus very strictly preserved. In carrying this investigation over a wider range of instances we find that the good fits preponderate to a much greater extent than would have been expected theoretically, and consequently that we may take it that dark hair is a cross between jet black hair and lighter hairs. When the relationships of fair and medium hair are considered there is not the same complete evidence. It may be assumed, however, from direct observation that the cross between fair hair and pure medium hair is always sufficiently dark to be classed with medium hair. The percentage populations of

the fair haired and black haired races can thus be obtained by extracting the square root of the percentage number of fair haired persons and of the jet black haired persons, which give the proportion of these races present among ten persons, ten being the square root of the number one hundred taken as representing the total population. The proportion of the medium haired race will represent the difference between the latter number and the sum of the two preceding.

The arithmetrical results of the process are somewhat surprising. Thus if there be only nine fair haired persons out of one hundred we find that in reality the race of the district depends on the Teutonic immigration to the extent of three out of ten or 30 per cent. the remainder of the light blood being masked by darkened elements present in mixed breeds. The black element on the other hand tends to be diminished. In a population consisting of 49 (X^2) persons with light and medium hair, 42 ($2xy$) of dark hair and 9 (y^2) of jet black hair the tendency is to think of half the population as of Mediterranean extraction where as only 30 per cent. again is due to the latter.

The results of the analysis are as follows:—

The Teutonic race is found in great abundance in the shires which border the north sea south of the Forth. In these the average proportion contributed by it is fully 50 per cent. This becomes less as you pass westwards into Ayrshire, Galloway and Dunfriesshire where it falls to a general average of a little under 40 per cent. In the east highlands from Fifeshire northwards the percentage ranges from 35 per cent. to 40 per cent. and does not change much until Shetland is reached where it again reaches 50 per cent. In some few places on the east coast it rises higher as in the region of the great glen and the black isle, where it ranges from 46 per cent. to 47 per cent. In the western isles high percentages are found as at Stornoway, Portree, Seal and Luig and these probably may be held true for a considerable number of the other islands not visited by Dr Beddoe. In no place does the amount contributed by the Teutonic race fall below 30 per

cent. the lowest figures being those found in Lorn, Sonachan, Dalmally, Arrochar and Tarbet.

The Mediterranean race is much less important as a factor in the population. In the great bulk of the country it accounts for no more than about 15 per cent., the percentage falling specially low in the border counties where it ranges from 9 to 12. In certain localities it seems to maintain, however, a pretty firm hold. In Portree, in Skye and in the region of Glencoe, Onich, Ballachulish, Lorn and Arrochar with an extension into Breadalbane the average is 30 per cent. In parts of the great glen also proportions rose to about 25 per cent. and in central Perthshire, Comrie to Callander the same amount is preserved. In the southern lowlands the only place which has any high percentage is Stranraer and that is obviously due to Irish immigration, the percentage of Irish born in that town being considerable. With regard to the medium haired race the variations are not so interesting. The percentage falls lowest in Midlothian and the Merse. In some parts of the great glen again it is somewhat deficient falling as low as 30 per cent., and in Breadalbane the proportion is just under that figure. Elsewhere it ranges commonly from 35 to 45 and only rises higher than this in one instance in the town of Brechin where the figures are specially untrustworthy. It may be taken to range in the great bulk of instances from 34 to 44 and thus to show a much less departure from the average than the other three races. The main results of this investigations are to show that the amount of Teutonic blood in Scotland is considerably higher than is generally believed. That the amount of Mediterranean blood is less than that assumed by some anthropologists and that the medium haired or Alpine race is very uniformly distributed from one end of the country to the other.

HYGROMETERS AND HUMIDITY.

By W. J. MILLAR, C.E.

[Read 26th November, 1912].

When speaking or writing about the weather we use the terms dry and wet to express certain conditions which occur from time to time, and we also make reference to the readings of the barometer and of the thermometer, whose records tell us of the pressure of the atmosphere, and of the temperature of the air at the time.

The atmosphere consists mainly of two gases, oxygen and nitrogen, with a proportion of watery vapour. The gases are invisible to us but we can readily distinguish the presence of the vapour by noticing the formation of cloud, fog or mist. The formation of mist quite suddenly may be noticed sometimes when on a mountain top, where, standing on some isolated rocky peak, with a clear view all around, all at once a cap of mist envelopes the rocks beside us and soon extends over the summit.

This phenomenon shows at once that, in the apparently dry and clear air through which we saw the landscape spread out before us, there lay concealed a proportion of watery vapour, which by some cooling process was rendered visible to us in the form of haze or mist.

Again, on fine evenings with a clear sky, heat radiates readily from the earth's surface and we find that the vegetation at the same time has now received a damp and watery coating and which we know as dew, being the condensed watery vapour existing at the time in the atmosphere. The same