

RETROSPECT OF WORK DONE AT MY ANTHROPOMETRIC
LABORATORY AT SOUTH KENSINGTON.

By FRANCIS GALTON, F.R.S.

It was mentioned at the last meeting of this Institute that my Anthropometric Laboratory had been closed, owing to the previously unoccupied ground on which it was permitted to stand having become the property of the Imperial Institute, and being placed in the hands of their builders. Since then, however, the authorities of the South Kensington Museum have placed a larger and better lighted space under their own roof at my disposal. It is now in an unfinished state, but I hope to re-establish the laboratory before long, and in the meantime I will take this opportunity of saying a few words in retrospect.

My principal object in establishing the laboratory was to familiarise the public with the methods of anthropometry, and at the same time to register facts that might hereafter be of use in individual life histories. As regards this it was successful. The number of different persons each measured in many and various ways during the three years of its existence is 3,678, but the same person has often been measured repeatedly. So the total number of sets of measurements all made by the same person, its Superintendent, Sergeant Randall, is considerably greater than the above figure. Persons of all ranks went to it, a knowledge of its existence was extending, and it was becoming increasingly frequented up to the day of its closure. Many correspondents in the United Kingdom, in America, and elsewhere, have more or less adopted its methods, and it was, I may add, a great consolation to me to receive on the very day that I began to dismantle it, the proof sheets of the register, and other forms in many respects like my own, that are to be used in the laboratory at Dublin, which has been set on foot through the efforts, and will be carried on under the superintendence, of Professors Cunningham and Haddon.

The data collected at my laboratory have been of service in many ways, of which I will mention a few. They enabled me to work out in some detail (the results are not yet published) the subject of correlation between various bodily attributes, as between the length of different limbs, between stature and strength, weight and lung capacity, and very many other related measures. This was done on an entirely new principle, described in a memoir read before the Royal Society two years ago ("Proceedings, Royal Society," vol. xlv, p. 135), and alluded to here in my Presidential Address in 1889. It is too

technical a subject to enter into now; I need only say that it deals with entire systems of possibilities, and not with mere averages which, as I have shown, lead to erroneous results, and that it reduces all forms of correlation, including hereditary qualities, to one simple law, namely, that of the relation between two variables partly dependent on a common set of influences.

The exact value of anthropometric measurement as a clue to personal identification on the system of M. Alphonse Bertillon, admits of being tested in some essential respects by the measures already obtained at the laboratory. I have done so to some degree, but postponed a more minute inquiry until more experience should have been gained. What has been, or can be done with the materials in hand is this. First, as to the sufficient variety among adults to afford a satisfactory basis for classification, having due regard to the limitations introduced by correlation. Secondly, as to the changes during youth and early manhood in the size and proportions of the body, and especially of the head. Thirdly, in respect to the precision of measurement as affected by temporary changes in the size of the parts measured, and by fallibility on the part of the measurer. I should speak technically if I entered further into detail, and can therefore only add that the inquiry is full of interest in a purely scientific sense, quite apart from its important practical bearings.

As an allied inquiry to this, I was able to utilise the laboratory for an investigation into the curious patterns seen in finger marks, which are caused by the embranchments of papillary ridges. I have recently read a memoir on this subject before the Royal Society, which is on the point of being published in their "Philosophical Transactions." It turns out that these minute ridges are unexpectedly instructive and important. The patterns are seen to fall of a necessity into a small and definite number of distinct classes; it also appears that these classes resemble the genera or species of plants and animals, in that the individual forms of each genus which depart but little from the ideal average of all of the individuals of that genus, are far more numerous than those which depart from it more widely. It follows that although very wide departures from the average may be possible, yet that even much less wide departures are so rare as to be practically non-existent. It is argued that we have here an instance in which natural selection, whether sexual or other, has had no influence in moulding the patterns, and yet that a result which is exactly similar to that which can be produced by their influence has been attained through the agency of internal causes alone. The important conclusion

is inductively drawn from this, that natural selection cannot justly claim a monopoly of influence in the manufacture of species, but that internal causes are by themselves able to create them. I have shown elsewhere ("Natural Inheritance," pp. 119-123), the way in which these two distinct influences may co-operate. Proceeding further with the same subject, I procured and have been able to minutely compare the impressions made in ink by the same finger at the beginning and end of periods of many years, as from childhood to youth, from boyhood to early manhood, from early to late manhood, and from manhood to incipient old age. I find from twenty to forty definite points of comparison in each couplet of finger marks. In eight such couplets that are photo-lithographically reproduced on an enlarged scale in the memoir just alluded to, there is a total of 296 points of comparison, and not one of them failed to appear in both impressions. Hence it appears that peculiarities in the lineation, made by the papillary ridges of the palms of the hand, and as I infer in the sole of the foot also, are by far the most permanent of all external human peculiarities and the surest known means of personal identification.

Some tables of growth and development have been calculated from the data collected at the laboratory, and an attempt has been made to compare the physique of persons and of different professions, &c., so far as the paucity of the numbers admitted.

The experience of the laboratory has also been of considerable service in estimating how far it was practicable and advisable to introduce physical tests into competitive examinations.

Latterly I have been collecting data bearing on the symmetry of the two sides of the body, but too little has been done to deserve more particular mention.

In brief, what little has been accomplished at the laboratory during the three years of its existence justifies to my own mind the trouble and expense I have been put to in building, equipping and maintaining it. But it never reached to my ideal. Besides the objects already named, I was almost equally desirous of establishing a place where the keenness of the senses and other faculties in any individual who applied, might be measured with all the accuracy and painstaking that is achieved by the few biologists who occupy themselves seriously in such pursuits. To effect this, it would be necessary to secure the occasional services of a skilled experimenter and to ensure at the same time that a sufficiency of persons should come to be measured. The time did not seem to have arrived for such an enlargement of the existing methods, though I hoped and still hope that it may not be far distant, as the utility of the laboratory becomes more widely appreciated. The measurements that have thus far been

employed are of a comparatively rude but not ineffective character.

It would give me pleasure at any time to receive suggestions as to new and useful special inquiries, such as might be carried on and brought to conclusion without a too serious expenditure of time and effort.

Professor CUNNINGHAM gave an account of the Anthropometric Laboratory in Dublin, founded by himself and Professor HADDON.

The ANTHROPOMETRIC LABORATORY of IRELAND.

By Professor D. J. CUNNINGHAM, M.D., and Professor A. C. HADDON, M.A., F.Z.S.

WE had not intended making any formal communication to the Anthropological Institute upon the anthropometric work which we propose to carry out in Dublin until this work had been actually commenced and we had some results to show. But Mr. Galton, who has given us at every stage of our preparations the greatest encouragement and the fullest assistance, thought that it might be of advantage to our new laboratory and not without interest to the members of this Institute, if we were to give a brief account of the steps we have already taken to introduce anthropometric work into Ireland, and also to state the chief objects which we have in view in so doing.

We need hardly explain in this Institute where the important and interesting results obtained by Mr. Galton in this field of inquiry have been so largely made known, that it was these that stimulated us to endeavour and do likewise in Ireland.

Anthropometric work may be made to serve many purposes, but there are two which seemed to us as specially desirable in our own case. It is very questionable whether any university or other educational institution should be regarded as being thoroughly equipped without such a laboratory. Mr. Venn, of Cambridge, has shown us how interesting the results are which may be obtained from an examination of students alone. In all our great centres of education we have the most intricate and elaborate machinery for testing the mental capacity of a student, and for estimating his standard of knowledge in different branches; but so far as I am aware, only in Cambridge and Eton are there any means in this country by which his physical endowments can be ascertained and their gradual development watched. And yet these are qualities which, in