



PROCEEDINGS

OF THE

AMERICAN ASSOCIATION

FOR THE ADVANCEMENT OF

PHYSICAL EDUCATION,

AT ITS

SIXTH ANNUAL MEETING

HELD IN

BOSTON, MASS.,

APRIL 3 AND 4, 1891.

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ITHACA, N. Y.  
ANDRUS & CHURCH,  
1891

With this brief introduction I shall invite your attention to a series of views which I shall show as suggestions for further remarks.

Dr. Hartwell then showed a series of stereopticon views of gymnasia and play grounds in Europe and America, including representatives, both of ancient and modern types; adding in conclusion that though the buildings and appliances in this country are often more elaborate and costly than those in Europe, the results attained abroad are usually more considerable and worthy of praise.

### USEFUL ANTHROPOMETRY.

BY FRANCIS GALTON, F.R.S., 42 RUTLAND GATE, LONDON, ENGLAND.

So much labor is being applied to Anthropometric observation in various American Colleges, that we may appropriately consider whether it is employed in the best possible direction, and to what really valuable results it is likely to lead. It is a human frailty to which statisticians are eminently liable, to look upon means as ends. They learn to take keen pleasure in the mere accumulation of neatly tabulated figures, carefully added and averaged, quite irrespectively of any use to which those figures can be applied. They are like money makers, who spend their lives in piling up wealth for the pure pleasure of doing so, as if wealth were an end in itself, and not a mere instrument for making life more full, more useful, and more bright.

It seems to me high time to consider with much deliberation, what varieties of information the data already collected at American colleges are capable of affording, and judging from the title of the Association to which I have been invited by your Secretary to contribute this brief memoir, I imagine that it might perform important service in doing so. A working committee of really capable statisticians might lay down reasonable, and business like lines of investigation, having strict regard to the quantity and apparent quality of the data to be dealt with, these would embrace the effects of race and those of environment upon development; correlation of the bodily dimensions, etc., variability,

and normality of distribution. The last mentioned subject deserves a few further remarks. It should be regarded as a golden rule in statistics that no group of data can be homogeneous and therefore suitable to be dealt with, unless their variability is approximately of the normal type; that is to say, conformable to the law of "frequency of error." When the variability is not normal we may feel assured that classes of data are included in the same group that ought to have been treated separately, and that require to be disentangled before useful statistical results can be achieved. On the other hand, whenever the variability is fairly normal, we know that the variations of the individuals are due to a multitude of petty causes, while the exceptionally important influences are felt by all. In other words, the group is homogeneous, and its statistical discussion may be proceeded with, in security from gross blunders.

An inquiry such as I have ventured to suggest, would probably show that many classes of observation might for the future, be dispensed with. A very great deal of work has to be done, and the principle of economy of effort exacts that, when a sufficiency of any class of observations have been collected, their further accumulation should cease.

The inquiry might next be extended to new objects of investigation, of a kind that the imperfect character of the present observations render impossible, and to determine the minimum of additional data that would be required. I would ask to be permitted to suggest a subject, or rather a very interesting class of subjects that fall under this head. It is to investigate the best method of assigning marks for Physical Efficiency, based on anthropometric test. This is already becoming a practical question in England, and I trust will be thought of no less importance in other countries. A serious movement has just been instituted, to establish a system of assigning marks on these grounds, in competitive examinations for those government posts in which high physical powers are especially desirable. The existing examinations for all such posts, are of a purely literary character. It is true that there is a subsequent pass examination to weed out those who are quite inefficient physically, but so long as the mere pass ordeal is successfully got through, the possession of bodily powers above the average, does not help a candidate. It is desired to reform this rather absurd and pedantic system, in

the examinations for entrance into our Army, Navy, and Indian services. I brought the subject before the notice of the British Association last autumn. It was provisionally approved by them, subject to confirmation after leisurely investigation by their Council. This has taken place, and I enclose a printed copy which has reached me this very day, of the circular which they have addressed in suitable covering letters to the heads of the great department of state just mentioned, in the name of the British Association. I cannot express my meaning clearer in a few words than by submitting this circular, which without reprehensible breach of confidence, I may say, that I drafted myself :

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

22 Albemarle Street, LONDON, W., March, 1890.

The Council of the British Association for the Advancement of Science desire to submit the opinion expressed by the Anthropological Section of the Association last year, and subsequently confirmed by a Committee appointed by the Council, of the feasibility of assigning trustworthy Marks for Physical qualifications, and briefly to state some of the reasons for that opinion.

They feel it to be unnecessary to dwell on the desirability of including such marks in the examinations for entrance into services where high physical powers are important, but would merely allude to the fact that it was fully recognized by the War Office in 1878, at which time a joint Committee of the War Office and of the Civil Service Commissioners was appointed to inquire into the question "whether the present literary examinations for the army should be supplemented by Physical Competition." Also that it was agreed to almost unanimously by the various speakers in the House of Lords in connection with that report, on May 21 and June 7, 1878, and on February 28, 1879. (*See Hansard for those dates, pp. 352, 1328, 1941.*) The report was presented June 28, 1878.

The recommendations of the Joint Committee referred almost wholly to marks to be assigned for athletic performance. Objections to this method of examination were, however, pointed out by some of the witnesses ; they were appreciated by the responsible authorities, and were strongly insisted upon by them in the concluding debate. These objections applied principally to the costliness

of the necessary preparation, to the difficulty of conducting the tests, to the additional strain they would impose on the already severely-taxed energies of the candidates, and to the interference of physical training with due preparation for the literary examinations. The consequence was that the recommendations of the Committee were not adopted by the responsible authorities, and the subject was laid aside.

The Council of the British Association now desire to point out that, in the opinion of Anthropologists, athletic performance is by no means the only basis upon which trustworthy marks for physical qualifications may be assigned.

This opinion is confirmed by some experiments made at Eton College, of which an account was submitted to the British Association. Thirty-two youths, most of whom were candidates for the army, were inspected and marked by two medical men, sitting in separate rooms. The medical men had, previously received the same general instructions, but otherwise acted independently. The marks they severally assigned to the youths were afterwards found to agree with considerable precision. Then, nineteen of these youths were set to write an English essay, and their performances in that respect were submitted to two examiners in turn, to be marked independently by them. The marks given by these examiners agreed together only one-half as closely as those given by the medical men. No one disputes the substantial trustworthiness of such literary examinations as these, however much they may be thought capable of improvement. But this experiment (so far as it goes) proves that the trustworthiness of physical examinations would be still greater.

The difficulty of formulating a system for the use of inspectors, according to which marks should be assigned on a common and easily understood principle, is greatly lessened by the use of anthropometric tests. Much experience testifies to the quickness and adequate precision with which the chief elements of physical efficiency admit of being measured. These are the breathing capacity and the strength, both of them to be regarded with reference to the stature and to the weight; the rapidity of muscular action; the quickness of response to a signal made either to the eye or to the ear; the keenness of eyesight, and that of hearing, and whether the colour-sense is normal or not.

An experiment made at Marlborough College, which has just been published, shows how small may be the difference between the class-places determined by these measures and those determined partly, in some cases, by the physical aspect, but principally by proficiency in the various school games, or, in other words, by athletic competition. Seventeen youths were measured by such apparatus as was then available at the College, and copies of their measures were distributed among the masters, to be marked by them on whatever principle they severally thought best. The individual results proved to be very discordant, but their averages, which express the result of the aggregate common sense of all the masters, ranked the boys in closely the same order as that independently assigned to them according to their proficiency in the various school games and to their apparent physique. It will be observed that if the masters had previously conferred and come to a mutual understanding on the principle according to which the marks should be assigned, they must necessarily have arrived at identical results, as they had definite and identical data to work upon. There happened to be one case of failure, which was instructive. This was due to the absence of any test at the College for rapidity of muscular action, or of promptness of response to a signal. The consequence was that an agile youth was rated too low.

The Council would point out that the experience gained by the measurement of about 2,000 students at Cambridge conclusively proves that success in literary examinations is in no manner connected with stature, weight, strength, or breathing capacity, and but slightly with keenness of eyesight. Such differences as there appear to be in these respects between the men who obtain high honours and those who take an ordinary degree are small, and can be accounted for. Successful literary men have probably great nervous energy, perseverance, and great power of concentrating their efforts, which would cause them to utilize such physical powers as they possessed with much effect, but they are shown to be neither superior nor inferior in the above-mentioned particulars to those who fail.

The Council of the British Association have noted with pleasure the opinion expressed by the Civil Service Commissioners in their Report of 1889 (xxxiii. p. 15), to the effect that they anticipate no greater difficulty in ranking candidates according to their

physical, than according to their literary qualifications. The Council thereupon beg to express the views at which they themselves have arrived, as follow :

It seems to them that the paucity of available data makes it scarcely possible at the present moment to elaborate as complete a system of assigning marks for physical qualifications as is desirable, and as, in their opinion, would be otherwise feasible. They therefore think it very important that suitable steps should be taken to obtain these data. For instance, if a temporary system of marks were tried, with the avowed determination of reconsidering the subject after some experience had been gained, the desired information would rapidly accumulate in the hands of the inspectors, the attention, of schoolmasters would be strongly aroused, and it is probable that they would attempt a variety of experiments analogous to those alluded to at Eton and Marlborough, but on a much larger scale. In a very few years it might then become feasible to arrange a system that should be generally acceptable.

In furtherance of these views the Council of the British Association beg to submit the following recommendations :—

(1) That an inquiry should be held as to the best system of assigning marks for physical qualifications, on the double basis of inspection and anthropometry, with a view to its early establishment as a temporary and tentative system.

(2) That the marks to be given under this temporary system should be small, so as to affect the success of those candidates only, who would be ranked by the present examinations very near to the dividing line between success and failure, and whose intellectual performances would consequently be nearly on a par, though they would differ widely in their physical qualifications

(3) That a determination should be expressed to reconsider the entire question after the experience of a few years.

The colleges of America would greatly help in a good cause by working on the general lines suggested in this circular. I see no reason why a man's physical efficiency should not be valued in terms of a simple number of marks, awarded on a well understood system. Nor do I see any reason why an employer in making his selection among many candidates, should not hereafter at some distant time, be influenced in favor of that candidate who possessed a certificate of having been awarded high marks. Man is

a machine of flesh and bone, and a good machine of any kind is worth more than a bad machine.

Dr. Gulick moved that a vote of thanks be given to Mr. Galton.

DISCUSSION.

Charles R. Greenleaf, M. D.—Before that vote of thanks is passed I should like to say a few words commendatory. I do not know how this matter strikes civilians, but this paper contains one of the most important suggestions for improving the efficiency of our army that has been made. It may remove the physical inefficiency of many of our officers who graduate from West Point. It is true that we examine candidates for admission to West Point, physically. We also examine the graduating class before they are commissioned as officers. But there is a good deal in the personal equation of the medical examiners and the distance in time between the examinations is four years, and points that one officer might notice at the entrance are possibly overlooked at the graduating examination. It has been a matter of considerable discussion as to how we could reach the actual physical efficiency of the men. Under our present retiring laws, an officer who is found physically disqualified to perform the duties, is segregated from the active list and placed on the retired list with three-quarters pay. When that occurs to one who has been thirty or forty years in the service of the government, it is believed that that is a reward for long and faithfully serving the country, but when it is given to a young man who has been but two or three years in the military service, and who is disabled because of a defect existing before he was commissioned, you can readily see that the question assumes a considerable importance. This suggestion strikes me as being the most effective way of solving the difficulty. I therefore trust that this Association will forward to the Secretary of War a copy of this paper with its favorable endorsement, for his consideration, for I am sure he will be grateful to you for bringing to him something that will solve the difficulty that I know has worried him a good deal.

Dr. Sargeant.—We shall have a paper to-morrow morning by a pupil of Mr. Galton, when we shall hear more of this. The important part of this matter to my mind is the desire of coöperation with those in America engaged in this work, and I see in that also



the coöperation which we may get from England in regard to our measurements and the possibility of our adopting a uniform system which will give importance and dignity to our work. I think the Association can well afford to congratulate itself upon a paper from so distinguished an authority as Francis Galton, best known as the author of "Hereditary Genius," and more recently as the author of that most remarkable work on "Natural Inheritance," and "Inquiries into Human Faculty." Mr. Galton with others, is carrying on a series of experiments which are going to throw great light on the origin of human faculty, a thing the schools have been grappling with for ages and upon which very little has been accomplished.

The third session was opened on Saturday morning at ten o'clock.

### PHYSICAL TRAINING IN THE U. S. ARMY.

LIEUT. COL. CHARLES R. GREENLEAF.

It is a popular belief that our professional soldiers (those of the Regular Army) are men who should be regarded as typical examples of the good results of physical training; this belief being in accord with an ideal that has been formed from the known requirements of a soldier's life, the supposed care in his selection, and subsequent special instruction; and it is inferred that, inasmuch as a part of his professional duty is to endure the hardships of campaigns in every variety of climate, and to encounter active enemies with many possibilities of personal combat, he ought to be a model of physical perfection. Entrance into the Army is guarded by medical experts, who examine applicants for enlistment with great care, discarding all who bear physical blemishes and accepting those only who, so far as the keen senses of experts can discover, are "free from bodily defects." After enlistment accepted candidates are subjected to rigid discipline in their habits of life; they rise and retire at regular hours; their food is carefully selected and properly prepared; their clothing is well adapted to the protection of their bodies; they sleep in apartments that are usually well heated and ventilated; and they are