

modification of the soma the potentialities of the germ-plasm have been added to and modified, then the dispute as to the inheritance of acquired characters is a futile logomachy.

The original somatic envelope must have been derived from the original plasma. Why then should their mutual potentialities be denied?

WM. H. DALL

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HEREDITY AND MENTAL TRAITS

TO THE EDITOR OF SCIENCE: In the admirable address of Professor William Bateson¹ surveying the bearing of modern views of heredity upon psychological and social problems, one admires particularly the staunch presentation of a consistent scheme of inherited traits and the readiness to apply them to a biological view of the social forces in whose intimate workings we have acquired so minute an interest. The same applies to the qualities of mind, of which alone I shall speak. One characteristic utterance is the following:

I have confidence that the artistic gifts of mankind will prove to be due not to something added to the make-up of an ordinary man, but to the absence of factors which in the normal person inhibit the development of these gifts. They are almost beyond doubt to be looked upon as *releases* of powers normally suppressed. The instrument is there, but is "stopped down."

A very differently characteristic expression occurs in comment upon the opinion of Tom Paine inveighing against the notion of hereditary political institutions, which he regards as equally absurd as a "hereditary wise man" or a "hereditary mathematician."

We on the contrary would feel it something of a puzzle if two parents, both mathematically gifted, had any children *not* mathematicians.

The point which I wish to raise interrogatively rather than critically is this: How far have the holders of such views—for there are many similar expressions in the recent literature—considered the problem of the assumptive nature of the unit of mental expression which is involved in such concepts as "artistic gift," "mathematically gifted?" Take the last of

the expressions, and put the matter in extreme form: Suppose both parents to have specialized on quaternions, would one expect the children also to be quaternionists? Would it answer the biological requirement if the children showed ability in physics? in engineering? in science in general of any quantitative form? in a facility for abstract thought, say philosophical or economic? in a taste for study and an intellectual type of mind? Where shall we stop in considering that the trait in the child is of the same nature as the trait in the parents? We seemingly expect that the children of musicians will be musical and not the one a painter and the other a musician; on what is that expectation based, biologically considered? In brief it seems impossible to discuss mental heredity without coming to some understanding of its evidences and the modes of its expression. The equation is defective without a specific reference to the meaning of both sets of terms. Quite probably the definition is beset with large uncertainties; but it seems to a psychologist that the writers upon heredity, in applying their principles to mental traits, are in duty bound to bring the conception of a mental trait within the scheme of their considerations.

Similarly one asks in the same spirit of seeking information, why artistic gifts are in the nature of a *release* of powers which everybody has but few show, and why are mathematical gifts not of the same description? Is it the sensory dependence of the musical gift that places it in one category, which is a different category from that of the mathematical gift? And fundamentally is there such a thing as either? If so is there also a gift for steam-engineering? and why not? And what would have become of one of similar brain inheritance if he happened to be born before the days of steam? The reduction ad absurdum lies near at hand. The moral is simple. It enforces that the application of principles of heredity to mental traits can not go farther and go consistently until a reasonable understanding is reached of the probable nature of a unit of mental trait and of the equivalent forms of its possible expressions.

¹ SCIENCE, September 4, 1914.

The question of the degrees and distributions of heredity awaits a proper mode of recognition of the presence of the inherited traits. These are not as obvious as tallness or color in peas; they must in some reasonable way be made distinguishable and recognizable before their evidence can support the principles which they doubtless embody.

JOSEPH JASTROW

MADISON, WIS.,
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QUANTITY AND RANK OF UNIVERSITY ATTENDANCE

RECENTLY published statistics on student attendance at our leading colleges are more notable because of certain necessary conclusions omitted than for inferences plainly intended to be drawn. The figures are overwhelmingly convincing when quantity alone is considered. When we attempt to evaluate university powers for administrating to the advancement of civilization—the primal purpose for which these institutions are established—naked quantity is the one factor of all which we should most wish to forget. Quality is the feature which ought to be most assiduously cultivated. It is not what goes into the mill, but what comes out of it, that counts.

In this last conspectus of attendance, for example, thirty American universities are considered. From institutions having the highest number of students, where the figures reach nearly 10,000, there is graduated precedence down to the thirtieth and last worth mentioning school. This last listed school becomes especially conspicuous because of the fact that its place is last.

The attendance table mentioned might have placed even greater emphasis on the quantity feature. Only the two hundred odd graduate students of this thirtieth and last listed institution might have been taken into account and this thirtieth school would then be made to assume the rôle of the tail-end among 400 colleges of the land. But it is in this small body of students that lies the very essence of that quality of mental aptitude to which special attention is here directed, and which is entirely overlooked in the comparison.

Now it so happens that we have some very exact figures by which to express the quality of American intellectuality. They are far more reliable than any statistics which relate to mere numbers, because of the fact that they represent the mature and composite opinion of our most eminent scientific minds. It is well known how, by the one hundred authorities in science, there were selected the names of 1,000 men most distinguished in the several branches of knowledge; and how this list was recently published by Prof. J. McKeen Cattell.

Among the thousand American men of science who have become during their generation especially distinguished, who have maintained themselves as leading figures in advanced thought of the nation, and who have acquired something of an international reputation let us briefly trace the spell of the last and thirtieth school—the Johns Hopkins University. In the accompanying table is given the number out of the thousand of “starred” men who belong in each of the twelve principal branches of science. Then follows the number out of each group which has been directly associated with the Johns Hopkins University. In the third column are the percentages of Johns Hopkins men in each department.

Department	No.	J. H. U.	Per Cent.
Pathology	60	18	30
Chemistry	175	35	20
Astronomy.....	50	5	10
Zoology	150	35	23
Anthropology.....	20	0	0
Psychology.....	50	10	20
Mathematics.....	80	20	25
Geology.....	100	25	25
Physics.....	150	47	31
Botany.....	100	8	8
Physiology.....	40	22	55
Anatomy.....	25	15	60
Totals.....	1,000	240	

During the next generation, in spite of loud prediction to the contrary, these percentages will probably increase rather than diminish. The first generation of Hopkins men is yet in its prime. In a remarkable way it is copiously and creatively productive. Over all American competitors it has the start of 20 years. Whether in the third generation there