

## HEREDITY AND EDUCATION<sup>1</sup>

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Every human being begins life as a microscopic speck of jelly—the fertilized egg cell. From this in the course of nine months, with the addition of nothing from the outside except food and water, he develops into the baby we see at birth.

Obviously, the traits he shows at birth are not the product of education in any ordinary sense of the term. They are the product of the development of inborn potentialities that are largely independent of educators.

The same is true of many other traits that appear not at birth but some time later. The teeth will appear in due time, the beard in due time, the bald spot in due time—no one imagines that the appearance of these has been brought about or largely influenced by education.

Should we not begin to recognize that the same is true of many other traits, intellectual and emotional as well as physical? Recent breeding experiments with lower animals, showing clearly that such traits as temperament and emotional sensitivity are inherited, should lead us to be more realistic in our treatment of students either in higher or lower schools.

To a greater degree than we have sometimes admitted, a large part of the child's development represents not the skill of his teachers, but the unfolding of his inherent potentialities. These appear at definite rates of maturation, and nothing can be done to hurry them. The parent who tries to teach a child to walk simply interferes with his ability to walk. The child does not learn to walk—he grows to walk and will do so best if left alone and given a chance.

Just as every trait has its own rate of maturation, so every child has his own rate. Every child is unique, and "standard tables" of heights, weights, ages of walking, talking, teething and the like, have little meaning or value for use with individuals.

If we are to take account of these inherited differences in dealing with children, we should pay more attention to the greatest inherited difference that can exist between two chil-

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dren—that which makes one male and the other female, respectively.

Not only do the two sexes differ, literally, in every cell of their bodies, but they differ in many ways, biologically, that are of profound importance in education. They differ in their viability (more boys dying at every age); they differ in their basal metabolism—girls averaging 10% lower than boys, a fact that may be associated with the greater aggressiveness of the male. They differ in structure, in function, in glandular make-up and balance, in emotional equipment. They mature at different rates, girls being a year or more ahead of boys by the time they reach high school.

This difference in rate of maturation causes many difficulties. Because we start boys and girls off together in the first grade at the age of six, and move them along together from year to year, we are always forcing boys to compete with girls who are superior to them—more mature socially and emotionally. Such a handicap is bad for both sexes.

Development of the reproductive system offers one of the difficult problems that educators have failed to take into account. The long period of years during which the reproductive system is developing makes it much more susceptible to damage from outside conditions than is the digestive system, the nervous system, or some other part of the body that has a short, direct process of development concluded largely in a few months, even before birth, as compared with a quarter of a century during which the reproductive system is developing in women. There are two serious consequences that educators should take into account:

1. At adolescence, the girl's reproductive system has to undergo profound transformations to change in a few years from that of a child to that of a woman. This process—much more profound than in boys—makes a heavy demand on the girl's store of vitality. If she has not enough vitality—if she is using up her vital capital by too great physical activity as in competitive athletics, too great intellectual activity as in working for a scholarship, too great emotional activity as in an immoderate social life—the transformation of the reproductive system can not take place. She remains a child in that respect, though she becomes a woman in other respects. This failure of development of the reproductive system, due to carrying too heavy a load of activity during adolescence, is

apparently the most important single cause in the permanent sterility of so many educated women. In a study of sterility among such women, it was found that one-third of them suffered from this form of physical infantilism.

2. This profound change in the reproductive system, on the other hand, seems to influence the girl's intellectual development unfavorably. In a study at Stanford University, of very bright girls in the California public schools, it was found that they showed a decline in average intelligence, amounting to 13 points on the scale of intelligence quotients, during adolescence, while their brothers showed little or no such change. When a girl is born with the highest possibilities of intellectual achievement, it appears that she must sacrifice some of that possibility during her adolescence in order to prepare herself biologically for motherhood.

This problem of dealing with intelligent girls at adolescence, in such a way as to promote both motherhood and intellectual development, is one which educators have almost wholly ignored. Sometimes the results of this ignorance have been disastrous.

Constitutional differences within each sex also deserve more attention. Two extremes can be recognized readily enough, with most of us somewhere in the middle. At one extreme is a slender type of body-build associated with the introvert personality—a mind which tends to turn inward, to be concerned with its own thought processes. At the other extreme is the thick-set type of body-build associated with the extravert whose attention is turned outward—who is concerned with other people rather than himself, with what is going on around him rather than what is going on inside his own skull.

A gathering of scientists, inventors, or poets is likely to consist mainly of introverts. It will look different and behave differently from a gathering of extraverts such as one would find at a convention of Elks or Shriners or in a caucus of politicians.

These contrasted types often appear in the same family, because of the mixture of traits in the ancestry. They need to be handled differently. The introvert child must be continually pushed out and made to associate with people, so that he will not become a timid recluse. The extravert child needs to be encouraged to concentrate, so that he will not become a superficial show-off.

Their vocational futures will normally be different. The introvert will excel in a job requiring persistence and attention to detail. He will work well alone. The extravert will do best when associating with other people.

Because the child's traits are the outcome of his ancestry, and because his parents know his family background better than anyone else does, his parents should be the best educators. Under city conditions, it is inevitable that the job of educating children be turned over largely to school teachers; but it is easy to carry this too far. Parents are still mainly responsible for the child's education in matters pertaining to health, character, and religion. With better training for parenthood, such as the schools are now beginning to give, parents should be able to do a much better job, particularly in the development of such parts of the child's heredity as form the basis of good character and personality, and the suppression or circumventing of such of his potentialities as are socially undesirable. Beyond this, a closer tie-up between home and school is obviously needed, if the teachers are to understand the material they have to work with.

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