

SCIENTIFIC BOOKS

Genetic Studies of Genius. Vol. I, "Mental and Physical Traits of a Thousand Gifted Children."

By LOUIS M. TERMAN, et al., XV + 648 pp., 35 figures, Stanford University Press, 1925.

THIS book reports the results of an elaborate study of approximately one thousand bright California school children. That the flames of genius are kindling in the hearts or heads of even a considerable proportion of this group of young Californians, as the main title of the book would seem to suggest, is an implication which the rest of the country will properly take with a grain of salt. In fact, an examination of the methods of selection of these children offers no guarantee that any potential geniuses are included in the study. It probably still takes a genius to catch a genius, and the intelligence test, which was the ultimate basis of the selection of this group, has by no means as yet attained to this eminence. The present intelligence tests are designed to give an estimate of the general level or average of an individual's abilities; they take account of specialized abilities only as they affect the average, and they unfortunately, as it seems to the reviewer, prefer for the most part a *reactive* rather than a *creative* type of mind. The ordinary conception of genius is quite the opposite of this: an unusual equipment of rather specialized or "one-sided" abilities with the *sine qua non* of creation rather than of reaction. To the reviewer's mind, therefore, this book makes an important contribution to our knowledge of the mental and physical characteristics of very bright or clever even, rather than of necessarily gifted, school children.

The purpose of the research was to locate subjects of a degree of brightness well within the top one per cent. of the school population. The survey was limited to certain of the large cities of California. The main experimental group of 644 children was selected from six cities; the proportion selected was one for each 258 individuals in the canvass. The group is therefore, in the first place chiefly urban in character. The children were selected first by the nomination of teachers, and secondly by the intelligence test. The range of intelligence quotients of the main experimental group thus selected was from 130 to 190. Somewhat over one half of this group had intelligence quotients between 140 and 149, inclusive. In addition to nominating the three brightest children in their classes the teachers were also asked to name the youngest child. An interesting finding in this connection is that nomination as youngest yielded more subjects who would otherwise have been missed than any other kind of nomination, about 20 per cent. of the total nominated group. In other words, as the author notes, "if one would identify the brightest

child in a class of thirty to fifty pupils it is better to consult the birth record than to ask the teacher's opinion."

Of the children in the main experimental group 54.7 per cent. were boys and 47.3 were girls, giving a sex ratio of 1.21. This ratio is higher than that of the comparable school population in the cities covered by the survey, which is 1.05. Various explanations of this finding are suggested by the author, including the possibly greater variability of the male and the differentiated death-rate of embryos.

Reliable data on the relative frequency of the different racial stock represented in the cities covered by the survey were not available. About 10 per cent. of the experimental group were found to be of Jewish extraction, which, it is estimated, is about twice that to be expected from the proportion of Jews in the population of the cities covered. The largest percentage of the group were of British extraction, the percentage of Scotch being especially high. The percentage of Latin blood was very low. The Chinese and Japanese children were not included in the study.

Over 80 per cent. of the fathers of the children of this group came from the professional or semi-professional classes; 12 per cent. of them were classified as skilled laborers; between 6 and 7 per cent. as semi-skilled and only about one tenth of one per cent. as common laborers. The average schooling of the parents was approximately twelve grades, which is about twice that of the average adult in the population at large. The schooling of even the grandparents of these children was approximately ten grades. One fourth of the subjects had at least one parent who was a college graduate. Unfavorable home conditions were found in only about 8 per cent. of this group, as compared with about 24 per cent. of the control group. Rating by the Whittier Scale for home grading substantiated this finding in regard to the superiority of the homes of these children. Nearly half of the children had learned to read before starting in school and by seven years of age had read more books than unselected children of fifteen years. Despite these evidences of the possible influences of cultured homes the author concludes his chapter on racial and social origins with the remark that it offers considerable indirect evidence that the heredity of these children is much superior to that of the average individual. The author also believes that his data on intellectually superior relatives, "fragmentary as they are," give considerable support to Galton's theory of the hereditary nature of genius. A further argument for the greater potency of heredity over environment in explaining the intellectual superiority of these children is found in the preponderance of first-born gifted children in families of two or more. To state

the conclusion in the author's own words: "The fact that superiority of the first born registers in childhood as clearly as in the achievement of adult life suggests that the causes are to be sought in native endowment rather than in environment and education." It is, however, not at all clear why it is better thus to assume that such vigorous heredity so readily peters out than to assume that, for various reasons, parents may do more for their first born, in the way of intellectual stimulation and advancement, than for their subsequent born.

An investigation of the economic status of 170 representative families of the group found a median income of \$3,333. Thirty-five per cent. of these families reported an income below \$2,500, which is about equal to that of the average skilled laborer; only 17 per cent. reported an income above \$7,500 and 4 per cent. above \$12,000. This finding would seem to indicate that gifted children and wealth are not associated, whereas the biographies of men of genius often indicate that the leisure which money can provide has made the fruition of genius possible.

One possibility which may bear on these various arguments is, as it seems to the reviewer, this: that the tests and teachers alike have selected as gifted or as geniuses those who as a result of their early training and influences at home have acquired scholastic interests or academic turns of mind and have overlooked those who have not.

Anthropometric measurements as well as records of the health of these children showed that the gifted as a whole were superior with respect to physical size and condition to the children of the control groups. Pubescence appears somewhat earlier in the gifted boy than among unselected boys—although this conclusion is tentative because of the small number of gifted boys in the study above twelve years of age—and menstruation appears earlier in gifted girls than in the girls of the control group. Eighty-five per cent. of the gifted children were found to be accelerated and not one to be retarded in school. The average progress quotient of the group was equal to 114, which means that the average gifted child is accelerated 14 per cent. of his chronological age.

The contrast between grade location and the performance in tests of school accompaniment, namely the Stanford Achievement tests, is striking. The superiority of the gifted amounts in most cases to from three to four times the standard deviation of the unselected group. In knowledge of the subject-matter of instruction gifted children are at a point 40 per cent. above their chronological ages, although, as noted, they are held back to a grade location only 14 per cent. beyond the norm of their chronological ages. Chiefly on this account, doubtless, their ac-

complishment quotients do not equal their intelligence quotients; the A. Q.'s tend to run only from three fourths to four fifths as far above the average as did the I. Q.'s.

The gifted children showed no greater specialization of abilities in school subjects than did the average child, a finding which may possibly be taken as another indication that such geniuses as the study has discovered are concealed as to their characteristics by the mass of simply bright children from whom they have not been differentiated. The author of this section of the book, Professor James C. DeVoss, also finds evidence of the relatively greater potency of heredity over environment in the fact that there is a lack of parallelism in the development of abilities to deal with school subjects which is too great to be accounted for, as he thinks, by the differences in training.

Remaining chapters of the book deal with the rating of the scholastic, occupational, play, reading and other intellectual, social and "activity" interests as well as of the character and personality traits, in all of which the gifted children are for the most part superior to the average child. These chapters provide a wealth of information which the specialist in the various fields may be able to relate to his special problems, and which the lay readers, including those especially who may wish to compare their own offspring in these respects with the subjects of the study, will find interesting although perhaps not particularly illuminating.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

ON THE RETENTION OF A BALL BY A VERTICAL WATER JET.

THERE is a strangely wide-spread belief that the quasi-stable support of a light ball in a vertical water jet is due to forces that may be accounted for by the principle of Bernoulli. The experiment described below shows that at least 98 per cent., if not the whole of these forces, comes from the change in momentum of the water as its direction is altered by adhesion as it passes over the curved surface of the wet ball.

Fig. 1a and b show a light wire frame supported on needle points so that it may swing in one plane only. Near its lower end is carried a wooden ball *B* (about 7 gm diam., 2.6 cm) on which the jet *J* (Fig. 1b) may be adjusted to impinge. Just behind the ball are two light metal plates *CC* that may be separated, as shown in Fig. 1a, to let the deflected water pass freely through the frame or that may be