

GENIUS AS A BIOLOGICAL PROBLEM.*

BY DR. JON. A. MJÖEN.

Why does the great genius disappear in the next generation? The answer is: because every child has two parents. Every child has two parents belonging to two families, two stocks, and we do not inherit the qualities of our parents, but those of the stock. When father and son very often resemble each other, it is because the son belongs to the same stock, about 50% to the stock of the father, and 50% to another stock with which the father—biologically—has no contact whatever; that is to say, in the society of to-day, where marriage within the same stock is an exception. When the royal dynasties of Peru and the royal dynasties of Egypt at certain periods married within their own stocks—brother and sister marriages—we read that great intelligence or genius was kept up through many generations. It seemed as if great ability only ceased to appear, when the brother had no sister to marry. We do not recommend brother and

FAMILY: **GOETHE.**

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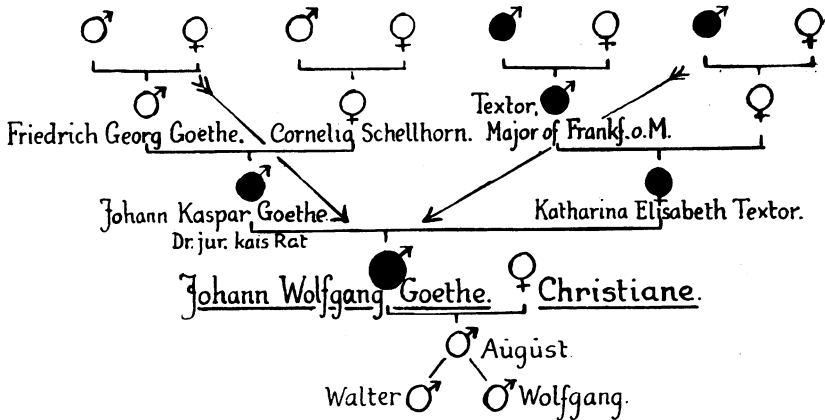


Fig. 1. Goethe himself tried to explain the appearance of his own genius in the famous words:

Vom Vater hab' ich die Statur,
 Des Lebens ernstes Führen.
 Vom Mütterchen die Frohnatur
 Und Lust zum Fabulieren.

*This paper was read at the Eugenics Congress (national) in Milan, September, 1924, in connection with the meeting of the International Commission of Eugenics (Major Leonard Darwin in the Chair).

By invitation of the Eugenics Education Society the lecture was repeated in the Rooms of the Royal Society, London, July 15, Sir W. H. Hadow, Vice-Chancellor of the University of Sheffield, presiding. This last lecture was given under the title "The analysis of the component faculties of musical ability and their inheritance."

sister marriages, but we do recommend the genius to marry into good stock. When Goethe and Napoleon took so little care of the fundamental laws governing the building up of the next generation, that they chose a woman like Christiane, or a stock like that of Marie Louise, we are not allowed to expect a second Goethe or a second Napoleon in the next generation; we are not allowed to be surprised that Goethe's son August, and his two grand-sons Wolfgang and Wilhelm led an unhappy life, "im Schatten der Titanen."

As stated above, every child has two parents belonging to two stocks, and we do not reckon only with the one and completely neglect the other unpunished.

But when the genius Johann Sebastian Bach married within his own stock (second cousin) and later into another congenial stock, we find that the great ability does not disappear.

In the Wedgewood-Darwin-Galton family the cousin marriages are frequent—the number of great talents too. But, what seems to be of much more importance, is the fact that we hardly find one member in this family who is not above average as regards mental ability and character.

If we could succeed in isolating a single psychic quality from the great complex of qualities represented by *homo sapiens*, no matter what might be the significance of the quality itself for the individual, for the race and for the community, and could establish exactly and verify its occurrence in the different members of families throughout several generations, the results of such investigations might have far-reaching consequences for the understanding of the heredito-psychological problems in particular and the elucidation of the laws of heredity in general.¹

Although the repeated occurrence of eminent talents in families points to the conditioned inheritance of musical ability, it gives but little information as to the *conditions* of heredity and the *manner* of inheritance. In order to get an insight into the problems of inheritance it is necessary to consider also the mean variations of musical ability.

Musical ability is the product of several qualities. Its nature and degree is different in every individual. If we regard musical ability as a unit, then the individual divergences are mainly of a *quantitative nature*. These quantitative divergences in musical ability form within a sufficiently large group of any population a continuous series of variations from the lowest to the highest degree of musical endowment. There exists no sharply defined dividing line between "musical" and "unmusical." Therefore these terms are just as inapplicable as a psychological standard-measure in genealogical and statistical investigations as the terms "tall" and "short" would be in an anthropological research on stature.

(1) Cf. publications from Winderen Laboratorium 1908, "Syn og Segn" 1911, "Naturen" (Bergen) 1914, "Harmonische und unharmonische Kreuzungen," Vortrag, in der Anthropologischen Gesellschaft Berlin 1921, and paper read at the International Eugenics Congress N. York 1921, (published in "Eugenics in Race and State"). Cf. also "Zur Erbanalyse der musikalischen Begabung," by Jon Alfred Mj en, "Hereditas," Bd. VII. Heft 1 Lund Sweden.

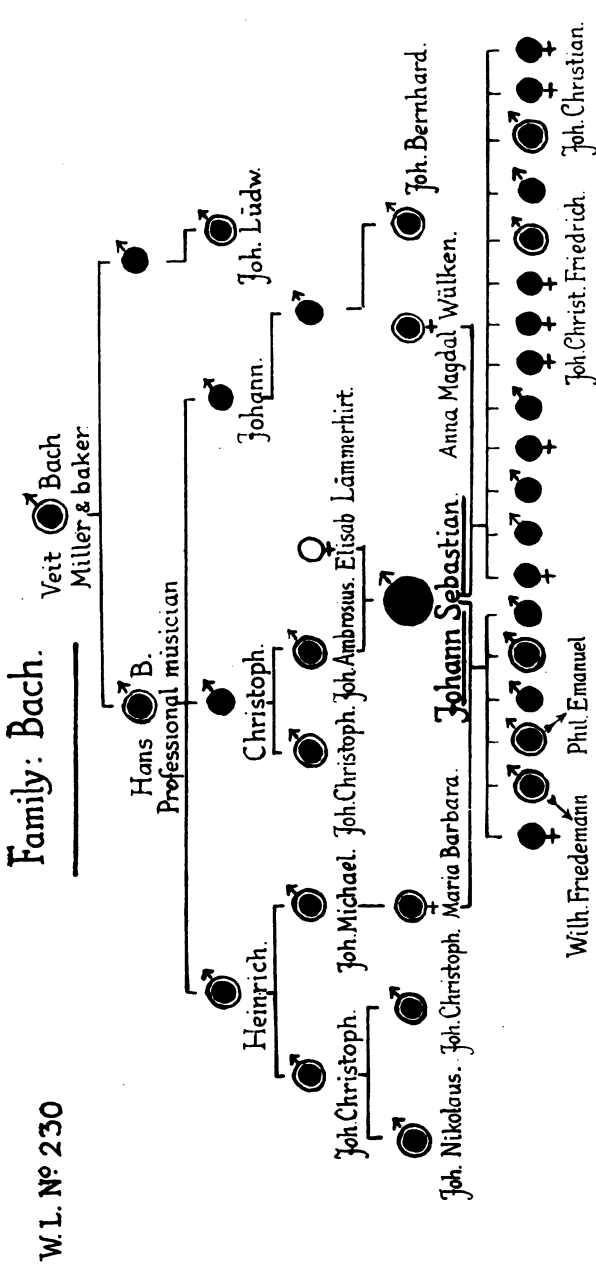


Fig. 2. In the Bach family high musical ability is traced in a continuous succession through many generations. 15% of the children of Johann Sebastian Bach by his second marriage were extraordinarily gifted, and not less than 100% of them were above average in regard to musical ability. When he married within his own stock—second cousin—we find that not less than 50% of his children were of eminent talent and that 100% were above average. That cousin marriages are to be avoided when certain defects are frequent in the stocks, is another question which we do not discuss here. There also appeared a pair of twins (evidently uni-ovular), namely the father of Johann Sebastian Bach, Johann Ambrosius, and his brother Johann Christoph. They were equally talented and played so alike that even their wives had difficulty in distinguishing them.

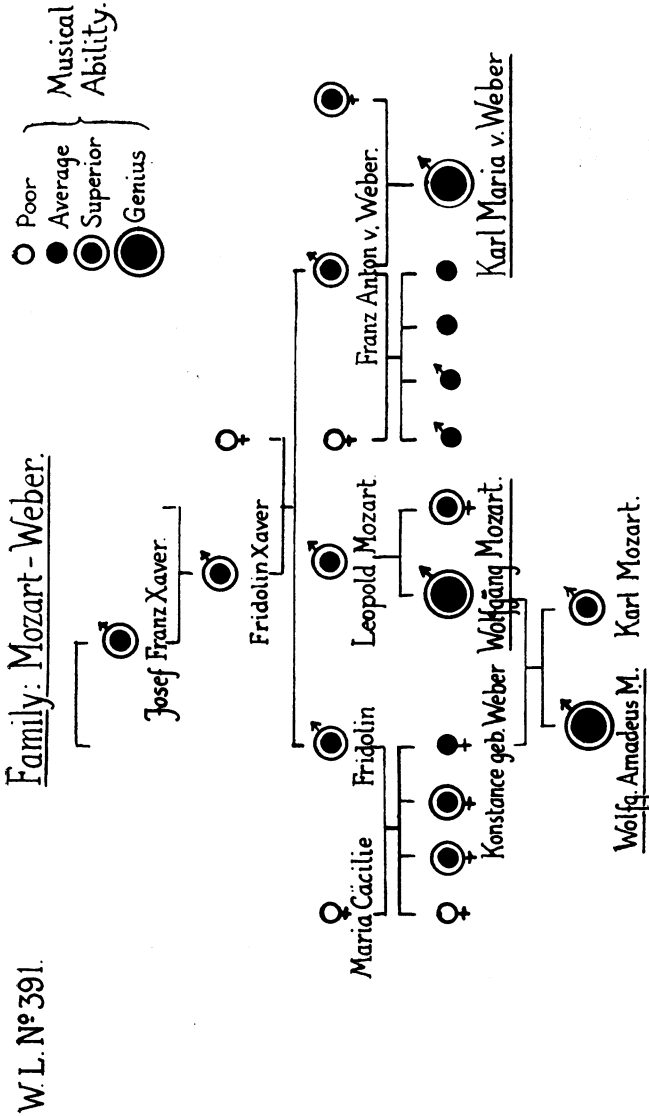


Fig. 4. In Franz Anton v. Weber's writings we find the statement that he had a strong desire to get a son, as talented as the little Wolfgang Mozart. He had married into an unmusical stock (first marriage) and was greatly disappointed that not one of his four children was more than of average musical ability. Then he married into a highly musical family, and as a result of this connection a little genius appeared: Karl Maria v. Weber.

As a psychological standard measure of musical ability we have in our laboratory adopted a graded musical index from 0 to 10. This graded musical index can be set up either on the basis of subjective observations or of objective examination (measurement). An index expressed in numbers will always, even if it is based upon subjective judgment, be a far more accurate expression of a person's musical ability than any descriptive epithet can ever be.

For the purpose of getting an idea of the distribution of the individual variations in families, we will at first classify the individuals in two classes, namely: positive—all individuals with the musical indices from 6 to 10—and negative—individuals with the indices from 0 to 5. We have in the following chosen some characteristic pedigree-types.

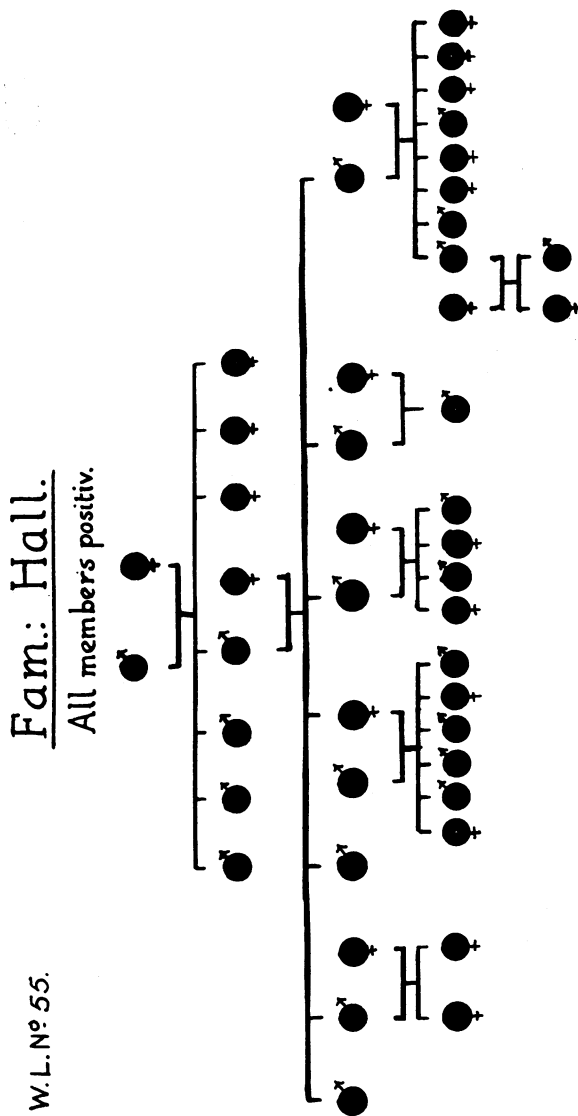


Fig. 5. Among the 37 members of this family we find several singers, violinists, pianists, composers, etc., all of them being above average as regards musical ability.

It strikes one at once that there exist families so uniform in their musical powers, that it seems as if one generation is not only a recapitulation of the preceeding one, but even that a certain inequality, which might have been discernible in the ancestors, has disappeared and given place to a homogeneous blend.

In fig. 6 we see how a 'musical' strain meets with an 'un-musical' strain.

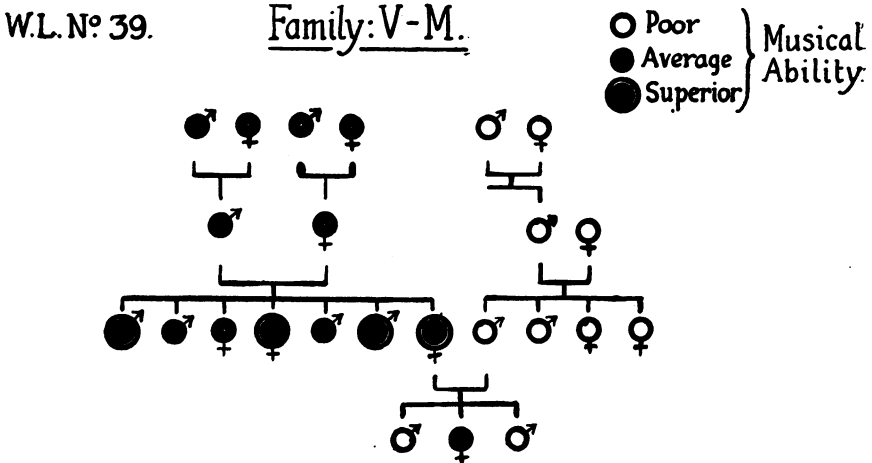


Fig. 6. The result of this meeting between a uniform positive and a uniform negative strain shows an evident decrease in regard to the 'musical' family and a slight increase as regards the 'unmusical' one.

Much more illuminating is the family shown in fig. 7, where a person, highly gifted, and from a musical stock, marries twice.

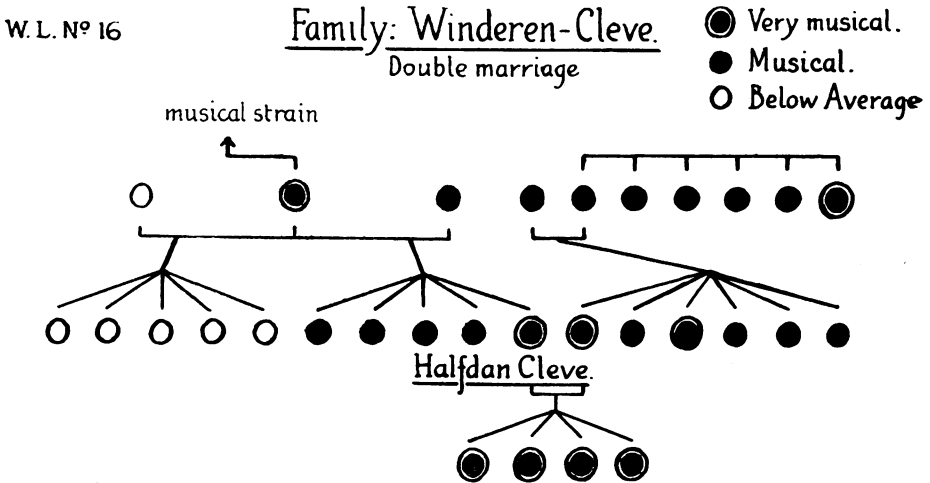


Fig. 7. The family of Halfdan Cleve, the famous Norwegian composer. His father married twice, first a lady who in regard to music was much below average. The result was five children below average. In the second marriage with a 'musical' lady we find five children all above average, one of these being the composer Halfdan Cleve, who married Berit Winderen, the well-known pianist, and with her got four children of very promising musical ability.

From these genealogical records it has been possible to establish that the hereditary aptitudes mean much more than external influences. Genealogical records are, however, not sufficient to give a real insight into the manner of inheritance. This has to be obtained through geneo-statistical investigation, where the investigations of different families are summed up and treated by statistical methods.

In the following pages some results of such geneo-statistical investigations are shown. The musical abilities of the members of 114 families have been recorded on the basis of measurements, each individual being graded from 0 to 10.

In order to give a clear illustration of the relation of the abilities of the children to those of the parents, the individuals have been classified in three classes: 'Superior' (8, 9, & 10), 'Musical' (3, 4, 5, 6 & 7) and 'Poor' (0, 1, & 2). According to this classification 6 groups of marriage-types can be established, namely: S x S, S x M, (or M x S), S x P (or P x S), M x M, M x P (or P x M) and P x P.

TABLE I.

Group	Parents	Numbers of Marriages	Numbers of Children	Percentage of Children in Classes			Parents in Average	Children in Average
				S	M	P		
1	S x S	7	23	72% ± 9	28% ± 9		7,5 ± 0,68	7,6 ± 0,54
2	SxM, MxS	40	175	60% ± 4	34% ± 4	6% ± 1	6,4 ± 0,28	7,1 ± 0,2
3	SxP, PxS	9	34	26% ± 8	37% ± 8	37% ± 8	4,9 ± 0,6	4,0 ± 1,45
4	M x M	30	113	39% ± 5	49% ± 5	12% ± 3	4,9 ± 0,33	5,7 ± 0,24
5	MxP, PxM	21	75	7% ± 3	40% ± 6	53% ± 6	3,1 ± 0,39	2,8 ± 0,8
6	P x P	7	22		10% ± 6	90% ± 6	1,1 ± 0,68	1,4 ± 0,58

In table I we see the percentual distribution of the children in the three classes according to the 6 types of matings, and in fig. 8 these results have been illustrated by means of '10-children-marriages.'

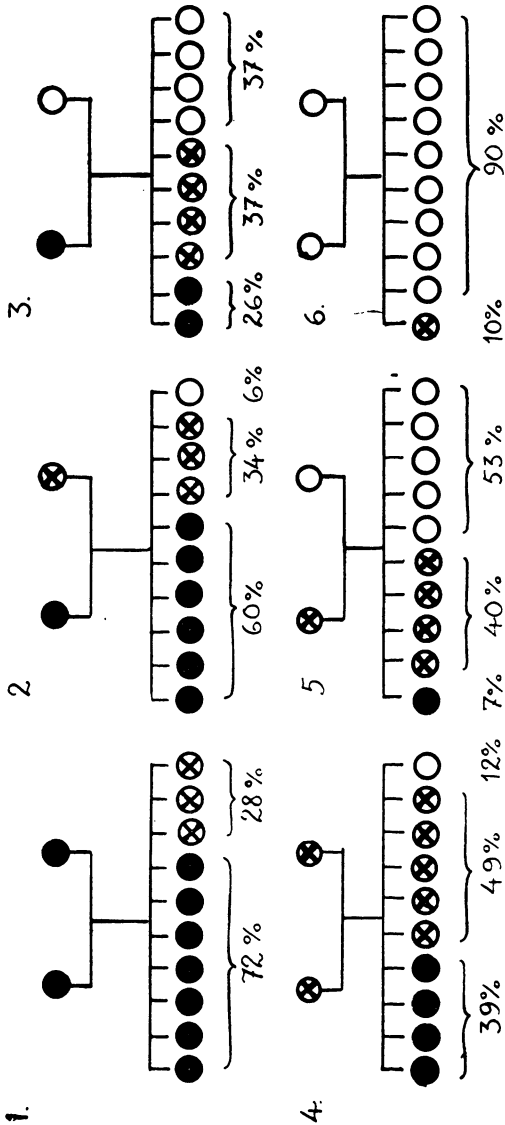


Fig. 8. Schematic view of the relation between the musical ability of parents and offspring, the distribution of the children and the 6 types of matings being illustrated by means of "10-children-families."

The results of these investigations show: The higher the average talent of the parents, the higher is the average talent of the children. In our material "very talented" parents (8, 9, & 10) have no "untalented" children (0, 1 & 2), and "untalented" parents no "very talented" children.

The endowment of the parents is, however, not always sufficient to explain the endowment of the children. We all know families

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Family. H-M-N.

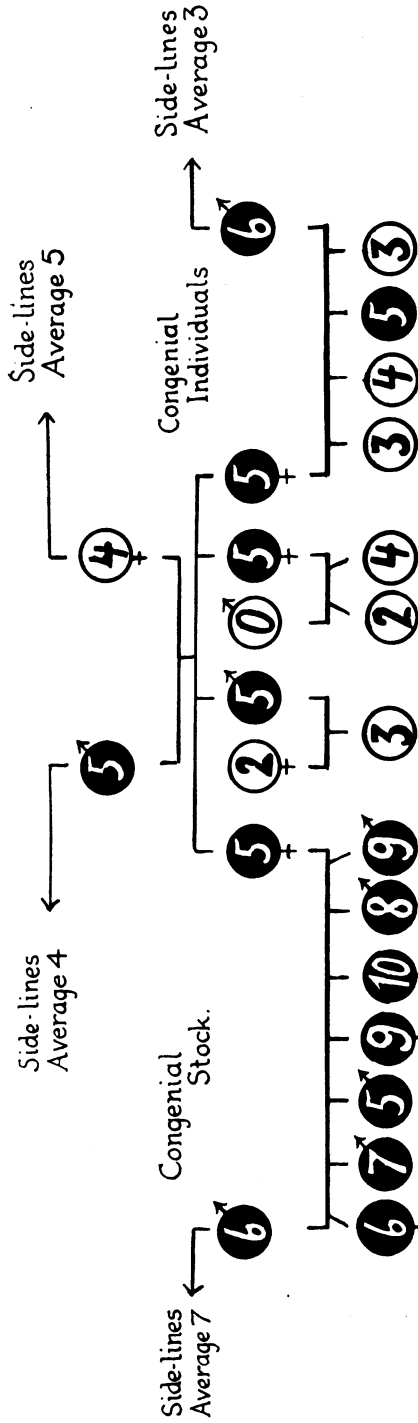


Fig. 9. An illustration to the old proverb from Western Norway: You must not marry a maid who is the only fine maid of her breed. ("Du ska ikkje gifte Deg me ei jenta som å den einaste fine jenta i si ått.")

where no correlation seems to exist between the mental or physical traits of parents and offspring, and we often meet with results that are widely divergent from those obtained from geneo-statistical investigations. Thus we find in some families that the average for the children is very much higher than for the parents, while in other families we can observe an excessive decline of the children's average from that of the parents.

Fig. 9 gives a striking illustration to the fact that we do not inherit from our parents.

Here we see in the first place that the grand-parents are both equally or almost equally talented. Also their collaterals (4 and 5). The four children of the F¹ generation show uniform talent, each with the figure 5. Let us first take the two in the middle: the son marries a 2, the daughter actually a 0, as regards musical talent. The result in the F² generation lies at about the average for the parents, the one couple has a child with index 3, the other couple two children with 2 and 4. But it will now be interesting to note the fate of the musical endowment of the eldest and the youngest children of the F¹ generation: Both of them married equally talented men. Nevertheless, the four children of the younger sister have an index-average of only 3.⁷⁵ whilst the eldest sister's 7 children have an average of 7.⁷ with one of 10 (musical optimum), two 9 and one 8. The explanation lies in the average-indices of the collaterals of the equally talented husbands: on the one side 7, on the other only 3. *The eldest sister of the F¹ generation married into an equally talented stock, an equal heritage, or even somewhat above, the youngest married an equally talented individual with materially inferior hereditary endowments.* Or in other words: the crossing in the case of the elder sister was congenial as regards musical endowment, in case of the younger sister it was not so, although the individual talents of the two husbands were equal. The younger sister sinned against the old proverb from Western Norway: 'You must not marry a maid who is the *only fine* maid of her breed.'

It is in other words the quality of the stocks rather than the quality of the parents, which determines the abilities of the children.

In the III generation in fig. 10 we find 7 brothers and sisters all being extraordinarily talented. The father himself and his family were all 'musical' though not much above average. The mother, however, was a well known European concert-player, and it seemed very natural to see herein the explanation of the appearance of the 7 eminent musicians. But according to the results mentioned above we do not inherit from the individual, but from the whole 'stock', and we therefore expect to find that the family of the mother is constituted of highly gifted, or at least very musical members. To our surprise we found that all the members of the mother's family were 'unmusical' i.e., much beneath average. According to our experiences this is an impossibility. For a long time this extraordinary case was a mysterious problem, until one day the enigmatic veil was lifted by a member of the family with the words: 'I do not see why you should not know what so many relatives and friends are acquainted

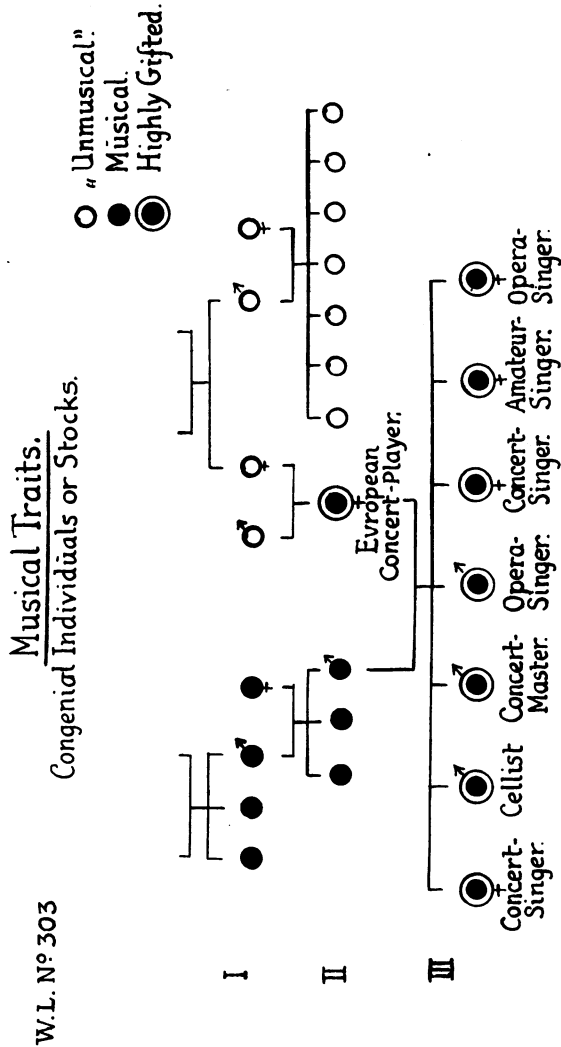


Fig. 10.

with. *She* (the European concert-player, II, 4, fig. 10) was an illegitimate child. Her real father was a great musician, belonging to a family of artists!"

As a result of our investigations we have found two categories for the explanation of the musical endowment of the offspring:

1. Children whose abilities can be explained by the abilities of the parents alone.
2. Children whose abilities can not be explained by the abilities of the parents, but by the abilities of the "collaterals."

But we find also a third category in our genealogical investigations, where neither the parents nor the collaterals appear to explain the endowment of a child. Investigations on the families of persons of eminent talent or of genius exemplify this observation.

In order to get an insight into this problem, it is not enough to regard musical ability as a unit quality.

Musical ability is a product of several separate qualities. The nature and degree of musical ability is determined by the more or less pronounced character of these separate qualities. In order to make clear the manner of inheritance of musical ability, it is necessary to examine the separate components, their relations and their significance, both psychologically and biologically.

An analysis of musical ability in its separate components or basic qualities presents, as may be understood, great difficulties. There are, it is true, some qualities, above all the most elementary qualities of sense of tone, which we with approximate certainty may regard as basic qualities. But the further we penetrate into the more purely musical field, the more difficult it becomes to distinguish the different qualities from each other, and to define them as basic qualities. Our first task is therefore to isolate the separate capacities, which we can distinguish in the perception, understanding and application of musical tone-pictures, and to examine them as regards their heredity, without considering whether in the individual case we have to do with a basic quality or not.

Firstly therefore we have measured the following acoustic-musical and musical capacities by means of psychotechnical methods¹:

1. Discrimination of pitch. 2. Discrimination of intensity. 3. Discrimination of time. 4. Discrimination of tone-interval. 5. Determination of pitch. 6. Tonal memory. 7. Determination of interval. 8. Determination of tone-purity. 9. Tune-memory. 10. Discrimination of key (Major and minor). 11. Discrimination of consonance and dissonance. 12. Analysis of tone-complexes. 13. Discrimination of harmonies. 14. Musical imagination. 15. Rhythmic memory. 16. Discrimination of species of time. 17. Reproduction of tunes. 18. Singing of a "second" part. 19. Determination of absolute pitch (qualitative). 20. Emotional musical reaction.

The methods for measuring these different musical abilities, and the recent results of our investigations on analysis of hereditary musical faculty will be brought out in another article.

It is not impossible, that these investigations will throw some new light upon very intimate reciprocity between the biological and the psychological side of music and upon the origin of the abilities and talents in general.

In order to explain the biological appearance of eminent ability, it is not sufficient to work with average values and quantitative investigations. Even if the basic qualities, which constitute

(1) Cf. C. E. Seashore: *The Psychology of Musical Talent*, Boston, 1919. Fr. Mjöen: *Die Bedeutung der Tonhöhenunterschiedsempfindlichkeit für die Musikalität und ihr Verhalten bei der Vererbung*. Diss. 1928.

eminent ability are of a higher quantitative value than in other individuals, nevertheless these quantitative divergences in basic qualities are not sufficient to explain the divergences in the psychological ability as a whole. Further investigations made on cases of eminent musical talents or even genius, show that the latter in regard to basic qualities, very often are much below the optimum for these qualities.

The explanation must lie in the fact that the nature of a quality will change under the influence of other qualities. For instance, the yellow of a book will not change very much if we place the book on a blue carpet. We perceive the two qualities separately as yellow and blue, according to the quantitative degree of the two components. But if we *mix* the two qualities blue and yellow on a painters palette, we at once get quite a new quality—green—and, what is of great importance, this new quality is to a certain degree independent of the quantity of the two components.

Such a theoretical scheme might illustrate how the same quality f. i. music—combined with other qualities—f. i. imagination or voice—not only will change its phenotypical appearance, but even that the combined traits (illustrated by such a colour-mixture), will reach a degree of development, which in relation to the possibilities for development of each of the single traits isolated, might become unduly high.

As Fig. 11 shows, it is the combination of the traits available more than the quantitative degree of the single quality, which determines the genesis of eminent ability.

A peasant in Valdres (fig. 11, Gen. I, 1.) known in the parish for his many ideas and plans, and for his restless temperament. He was successful in nothing. His son (Gen. II. 3) went to Oslo, where he intended to become an artist and where he tried "everything possible." He ruined himself financially, and also his relatives, with his fantastic impossible projects. Finally he became a decorative painter. His first wife was of a musical family, which, however, had not succeeded in gaining distinction (want of imagination?). From this marriage, however, where a restless fantasy is coupled with solid musical faculty, three highly gifted children sprang, one of them being the most talented composer in the North, *Rikard Nordraak*, who died at the age of 24. Fortunately for us biologists, the father married for the second time an "unmusical" lady of "unmusical" family. Of their four children only one was above average. And the two groups from the two marriages demonstrate most convincingly the importance of the choice of the partner. From the same source of imagination (Nordraak) there arose through conjunction with intelligence and energy (Peder Björnson) the poetic genius *Bjørnstjerne Björnson*. (Fig. 11—III, 1.)

SUMMARY.

The nature and degree of musical ability is different in each individual according to the more or less pronounced character of the different component faculties. The divergences in musical ability form within a sufficiently large group of the population a continuous series of variations from the lowest to the highest grade of musical endowment.

Family: Björnson-Nordraak.

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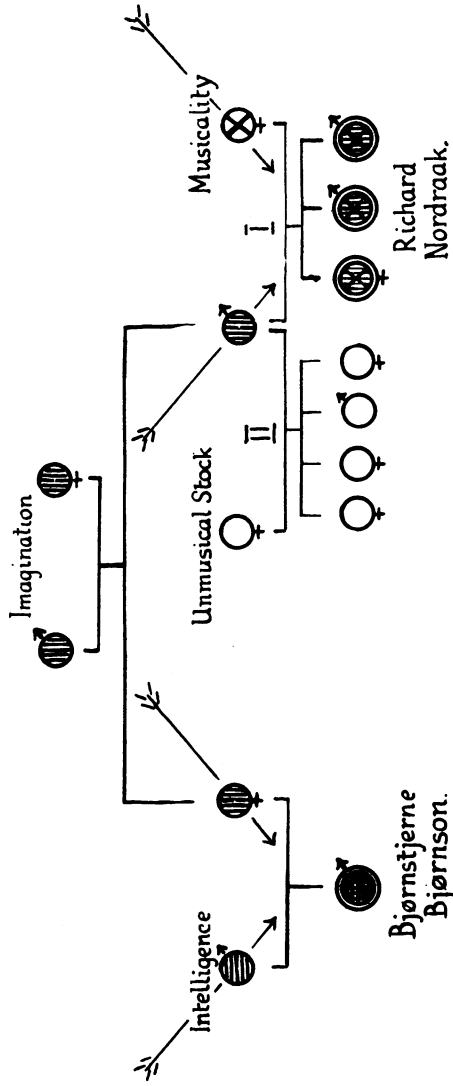


Fig. 11. From the same source of imagination (Nordraak) there arises, through conjunction with intelligence and energy, the poetic genius Bjørnstjerne Björnson, and through conjunction with a musical vein, the musical genius Rikard Nordraak.

The accumulative occurrence of musical talent in families speaks for the heredity of the factors determining musical ability, but gives little information as to the conditions of heredity and the manner of inheritance.

An insight into the conditions of heredity can only be obtained by subjective and objective measurements of the family members in two or three generations and examining the results as regards the *single family* as well as the whole *geneo-statistical material*.

Our first geneo-statistical result shows that the higher the average talent of the parents, the higher is the average talent of the children.

By considering the distribution of talents *within the single family* we often meet with results that are widely divergent from those obtained from *geneo-statistical investigations*. We find for instance that the endowment of the parents is not always sufficient to explain the endowment of the children. Thus we find in some families that the average for the children stands much higher than for the parents, whilst in other families we can observe an excessive decline of the children's average from that of the parents. An explanation of this is found in considering the collaterals,

It is the quality of the stocks more than the quality of the parents which determines the ability of the children.

Thus the biological appearance of eminent ability can be explained:

1. By the ability of the parents.
2. By the ability of the stocks.
3. By the combination of congenital traits.