

## Galton on Heredity—Continued

Filial descent had become well understood, it was seen that a general equation of the same form as that by which it was expressed, also expressed the connection between Kinsmen in every degree. The unexpected law of universal Regression became a theoretical necessity, and on appealing to fact its existence was found to be conspicuous. If the word "peculiarity" be used to signify the difference between the amount of any faculty possessed by a man, and the average of that possessed by the population at large, then the law of Regression may be described as follows: Each peculiarity in a man is shared by his kinsmen, but *on the average* in a less degree. It is reduced to a definite fraction of its amount, quite independently of what its amount might be. The fraction differs in different orders of kinship, becoming smaller as they are more remote. When the kinship is so distant that its effects are not worth taking into account, the peculiarity of the man, however remarkable it may have been, is reduced to zero in his kinsmen. This apparent paradox is fundamentally due to the greater frequency of mediocre deviations than of extreme ones, occurring between limits separated by equal widths.

Two causes affect family resemblance; the one is Heredity, the other is Circumstance. That which is transmitted is only a sample taken partly through the operation of "accidents", out of a store of otherwise unused material, and circumstance must always play a large part in the selection of the sample. Circumstance comprises all the additional accidents, and all the peculiarities of nature both before and after birth, and every influence that may conduce to make the characteristics of one brother differ from those of another. The circumstances of nurture are more varied in Co-Fraternities than in Fraternities, and the Grandparents and previous ancestry of members of Co-Fraternities differ; consequently Co-Fraternals differ among themselves more widely than Fraternals.

The average contributions of each separate ancestor to the heritage of the child were determined apparently within narrow limits, for a couple of generations at least. The results proved to be very simple; they assign an average of one quarter from each parent, and one sixteenth from each

grandparent. According to this geometrical scale continued indefinitely backwards, the total heritage of the child would be accounted for, but the factor of stability of type has to be reckoned with, and this has not yet been adequately discussed. . . .

Finally, considerations were offered to show that latent elements probably follow the same law as personal ones, and that though a child may inherit qualities from any one of his ancestors (in one case from this one, and in another case from another), it does not follow that the store of hidden property so to speak, that exists in any parent, is made up of contributions from all or even very many of his ancestry.

Two other topics may be mentioned. Reason was given . . . why experimenters upon the transmission of Acquired Faculty should not be discouraged on meeting with no affirmative evidence of its existence in the first generation, because it is among the grandchildren rather than among the children that it should be looked for. Again, it is hardly to be expected that an acquired faculty, if transmissible at all, would be transmitted without dilution. It could at the best be no more than a variation liable to Regression, which would probably so much diminish its original amount on passing to the grandchildren as to render it barely recognizable. The difficulty of devising experiments on the transmission of acquired faculties is much increased by these considerations.

The other subject to be alluded to is the fundamental distinction that may exist between two couples whose personal faculties are naturally alike. If one of the couples consist of two gifted members of a poor stock, and the other of two ordinary members of a gifted stock, the difference between them will betray itself in their offspring. The children of the former will tend to regress; those of the latter will not. The value of a good stock to the well-being of future generations is therefore obvious, and it is well to recall attention to an early sign by which we may be assured that a new and gifted variety possesses the necessary stability to easily originate a new stock. It is its refusal to blend freely with other forms. Some among the members of the same fraternity might possess the characteristics in question with much complete-

ness, and the remainder hardly or not at all. If this alternative tendency was also witnessed among cousins, there could be little doubt that the new variety was of a stable character, and therefore capable of being easily developed by interbreeding into a pure and durable race.

**Francis Galton** (1822-1911) was first cousin to Charles Darwin and a member of one of the striking families rich in members of unusual scientific attainments. In 1869 Galton published his first work on inheritance, *Hereditary Genius, its Laws and Consequences*. He then went on to a wider study of general characteristics, whose conclusions are reprinted here. Definition of inheritable traits led him to the study of anthropometric measurements and fingerprints (see *SCIENCE NEWS-LETTER*, February 11, 1928).

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### Vegetable Milk

Synthetic "milk" made out of vegetables was the means used by Dr. Ernst Tso of Peipin to give six Chinese babies a start in life.

The great scarcity of cow's milk in Oriental countries led Dr. Tso to search for a substitute to help in the rearing of young babies in North China. A milky liquid made of finely ground soy beans and water furnished the base for the vegetable milk, Dr. Tso told scientists meeting at the Thirteenth International Physiological Congress.

Fifty per cent. of the total calories of the diet are from this "milk," Dr. Tso stated. Additional foods given to the babies were cane sugar, corn or rice starch, cod liver oil, calcium lactate, sodium chloride and cabbage water. The last item contributed the scurvy-preventive vitamin C, present in orange juice.

"Six infants," said Dr. Tso, "one from birth and the others a few weeks old, were successfully fed six to ten months on this diet. Their weight curves follow closely the average weight curve of healthy nursing infants in the United States as well as the average weights of several hundred Chinese breast fed infants who visited the college dispensary for minor complaints. Their mental and muscular development and nutritional status in general appear to be as good as what one sees in normal infants reared on milk diets."

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So solid a vegetable as a potato contains 78 per cent. of water.