ORIGINAL ARTICLES.

Race Improvement.   **With Plate L.**   Galton.

The Possible Improvement of the Human Breed under the existing Conditions of Law and Sentiment. By Francis Galton, D.C.L., D.Sc., F,R.S. Abstract **132** of the Huxley Memorial Lecture, delivered before the Anthropological Institute of Great Britain and Ireland on Tuesday, October 29th, 1901.

The aim of the lecture is to give a scientific basis to the problem of race improvement under the existing conditions of civilisation and sentiment. It leads to many subsidiary problems, each interesting to anthropologists on its own account.
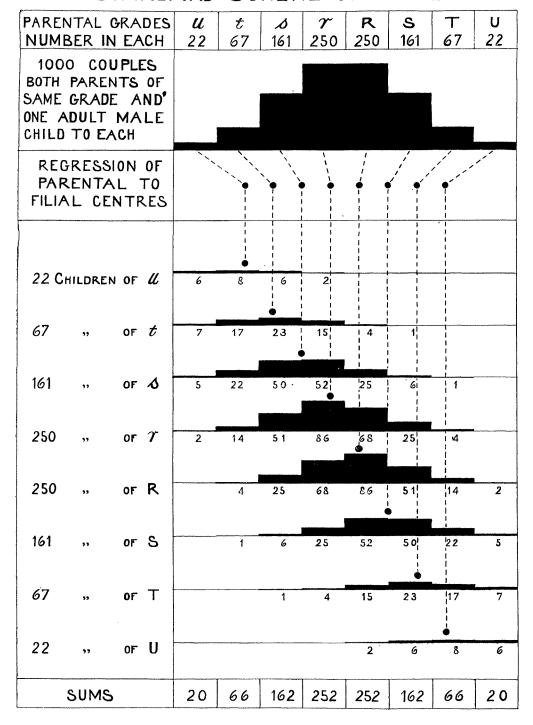
Men differ as much as dogs in inborn dispositions and faculties. Some dogs are savage, others gentle ; some endure fatigue, others are soon exhausted ; some are loyal, others are self-regarding. They differ no less widely in specialities, as in herding sheep, retrieving, pointing at game, and following trails by scent. So it is with men in respect to the qualities that go towards forming civic worth, which it is not necessary at this moment to define particularly, especially as it may be a blend of many alternative qualities. High civic worth includes a high level of character, intellect, energy, and physique, and this would disqualify the vast majority of persons from that distinction. We may conceive that a committee might be entrusted to select the worthiest of the remaining candidates, much as they select for fellowships, honours, or official posts.

Distribution in a Population.—It is a fair assumption that the different grades of civic worth are distributed in accord with the familiar normal law of frequency. This means nothing more than that the causes why civic worth varies in amount in different persons are numerous and act independently, some pulling this way, some that, the results being due to the ordinary laws of combination. As it is found that such very different variables conform fairly to this law, as Stature, Bullet holes around the bull's-eye, Error of judgment of astronomers, and Marks gained by candidates at examinations, whether in simple or in grouped subjects, there is much reason to believe that civic worth will do so also. The figures will then come out as follows : Let the average civic worth of all the male adults of the nation be determined and its value be called M, one-half of them having less and the other more than M. Let those who have more than M be similarly subdivided, the lower half will then have M *plus* something that does not exceed a sharply-defined amount, which will be called $1°$, and is taken as the unit of distribution. It signifies the height of each step or grade between the limits of the successive classes about to be described. We therefore obtain by familiar methods the result that 25 per cent. lie between M and $M + 1°$ (call it for brevity $+ 1°$); 16 per cent. between $+ 1°$ and $+ 2°$; 7 between $+ 2°$ and $+ 3°$, and 2 for all beyond $+ 3°$. There is no outer limit ; the classification might proceed indefinitely, but this will do at present. Similarly for the negative grades below M. It is convenient to distinguish the classes included between these divisions by letters, so they will be called R, S, T, U, &c., in succession upwards, and r, s, t, u, &c., in succession downwards, r being the counterpart of R ; s of S, and so on.

These normal classes were compared with those of Mr. Charles Booth in his great work, *Labour and Life of the People of London.* His lower classes, including the criminals and semi-criminals, correspond in numbers with " t and below " ; those higher than small shopkeepers and subordinate professional men correspond with " T and above," and the large body of artisans who earn from 22s. to 30s. a week exactly occupy the place of mediocrity ; they include the upper four fifths of r and the lower four fifths of R. So far as these may represent civic worth they confirm as far as they go its fairly normal distribution.

The differences between the classes are exemplified by the figures relating to the stature of many thousand adult males, measured at the Health Exhibition. Their

STANDARD SCHEME OF DESCENT

PARENTAL GRADES / NUMBER IN EACH	*u* 22	*t* 67	*ð* 161	*r* 250	R 250	S 161	T 67	U 22
1000 COUPLES BOTH PARENTS OF SAME GRADE AND ONE ADULT MALE CHILD TO EACH								
REGRESSION OF PARENTAL TO FILIAL CENTRES								
22 CHILDREN OF *u*	6	8	6	2				
67 „ OF *t*	7	17	23	15	4	1		
161 „ OF *ð*	5	22	50	52	25	6	1	
250 „ OF *r*	2	14	51	86	68	25	4	
250 „ OF R		4	25	68	86	51	14	2
161 „ OF S		1	6	25	52	50	22	5
67 „ OF T			1	4	15	23	17	7
22 „ OF U					2	6	8	6
SUMS	20	66	162	252	252	162	66	20

average height was nearly 5 ft. 8 in., the unit of distribution was nearly $1\frac{3}{4}$ in., so the class U exceeded 6 ft. 1 in.; consequently even U overlooks a mob, while V, who exceed 6·ft. $2\frac{3}{4}$ in., and much more the higher grades, tower above it in an increasingly eminent degree.

Worth of a Child.—Dr. Farr calculated the value at its birth of a baby born of the wife of an Essex labourer, supposing it to be an average specimen of its class in length of life, in cost of maintenance while a child and in old age, and in earnings during youth and manhood. He capitalised with actuarial skill the prospective values at the time of birth, of the outgoings and the incomings, and on balancing the items found the newly-born infant to be worth $5l$. A similar process would conceivably bring out the money value at birth of children destined when they grew up to fall into each of the several classes, and by a different method of appraisement to discover their moral and social worth. As regards the money value of men of the highest class, many found great industries, establish vast undertakings, increase the wealth of multitudes and amass large fortunes for themselves. Others, whether rich or poor, are the guides and light of the nation, raising its tone, enlightening its difficulties and imposing its ideals. The more gifted of these men, members of our yet undefined X class, would be each worth thousands of pounds to the nation at the moment of their birth.

Descent in a Population.—The most economical way of producing such men may be inferred from the Table of Descent accompanying the memoir, calculated for an ideal population, on the supposition that all marriages are equally fertile, that the statistical distribution of qualities continues unchanged and that the normal law of frequency prevails throughout. In this particular table it was also supposed that both parents were always alike in quality. The diagram that illustrates it shows also very clearly the contributions of each class of parent to each class of the next generation. The V class of parentages number 35 per 10,000, which represents in the 40,000,000 of the population an annual output of 1,300 male youths of that class who attain their majority in the same year. Of the 34 or 35 V sons 6 come from the 35 V-class parents, 10 from the 180 U, 10 from the 672 T, 5 from the 1,614 S, and 3 from the 2,500 R. Therefore V is 3 times richer than U in producing V offspring, $11\frac{1}{2}$ times than T, 55 times than S, and 145 times richer than R. Economy of cost and labour in improving the race will therefore depend on confining attention to the best parentages. The falling off when only one of the parents is of the V class and the other unknown was shown to be a little more than $4\frac{1}{2}$.

In dealing with large numbers the statistical constancy of the result resembles those of a fixed law. The above figures might then be accepted as certainties like those in tables of mortality, if they are founded on a correct hypothesis. It is not claimed that the hypothesis is more than approximately correct, but in any case the results will be constant and probably not very different from those given in the table. They showed that 35 marriages of two persons each of class V will produce five adult sons and five adult daughters of that same V class. They will also produce ten of each sex of the U class and 12 of the T. A discount will have to be taken off these figures in deducting their significance, because the performance in mature life often falls short of its promise in youth. The lecturer strongly condemned the neglect by educational authorities to investigate the correlation between youthful promise and subsequent performance, by the closeness of which the value of the present huge system of examinations can alone be judged.

Augmentation of Favoured Stock.—Enthusiasm to improve our race might express itself by granting diplomas to a select class X of young men and women, by encouraging their intermarriages and by promoting the early marriage of girls of that high class. The means that are available consist in dowries, where a moderate sum is important, help in emergencies, healthy homes, pressure of public opinion, honours, and the intro-

duction of religious motives, which are very effective as in causing Hindoo girls and most Jewesses to marry young. The span of a generation would be thereby shortened, which is equivalent to increasing the fertility of one that was unshortened. It would also save the early years of the child-bearing period from barrenness. Healthy homes would diminish mortality among children, and in that way increase the output of adult offspring. There is a tendency among girls to shrink from marriage on prudential grounds. This feeling might be directed in the opposite way, by making it an imprudence in an X girl not to gain the advantages that would reward the indulgence of a natural instinct. It was concluded that the effect of a widely-felt enthusiasm for improving the race might be expected to add an average increment of one adult son and one adult daughter to the prospective offspring of each X girl. These would be distributed among the X, W, and V classes much as the offspring of V parentages are distributed among the V, U, and T classes, but not in quite such high proportions, which were five of each sex to the first, ten to the second, and so on.

Economical Problem.—The problem to be solved now appears in a clear shape. An X child is worth so and so at birth and one of each of the inferior grades respectively is worth so and so ; 100 X-favoured parentages will each produce a gain of so many ; the total value of their produce can therefore be estimated by an actuary, consequently it is a legitimate expenditure to spend up to such and such an amount on each X parentage. The distinct statement of a problem is often more than half way towards its solution. There seems no reason why this one should not be solved between limiting values that are not too wide apart to be useful.

Existing Agencies.—Leaving aside profitable expenditure from a money point of view the existence of large and voluntary activities should be borne in mind that have nobler aims. It appears that the annual voluntary contributions to public charities in the British Isles amount on the lowest computation to 14,000,000*l.*, and that, as Sir H. Burdett asserts on good grounds, is by no means the maximum attainable (*Hospitals and Charities*, 1898, page 85).

A custom has existed in all ages of wealthy persons befriending poor and promising youths which might be extended to young and promising couples. It is a conspicuous feature in the biographies of those who have risen from the ranks, that they were indebted for their first start in life to this cause. Again, it is usual among large landowners to proceed not on the rackrent principle, but to select the worthiest all round for tenants and others in their employ, and to give them good cottages at low rents and other facilities. The advantage of being employed on one of those liberally-conducted properties being thoroughly appreciated, there are usually many applicants to each vacancy, so selection can be exercised. The result is that the tenants and servants of all kinds to be found about them are a finer stamp of men to those in similar positions elsewhere. It might easily become an avowed object of noble families to gather fine specimens of humanity around them, as it is to produce fine breeds of cattle and so forth, which are costly in money but repay in satisfaction.

Finally, there are building societies that have higher ends than mere investments and which have been endowed with princely generosity. A settlement of selected persons might conceivably be maintained that should bear some analogy to colleges with their fellowships, and include a grant of rooms for a term of years at low cost. A select class would create through their own merits an attractive settlement, distinguished by energy, intelligence, and civic worth, just as a first-rate club attracts desirable candidates by its own social advantages.

Prospects.—It is easy to indulge in Utopias, including a vast system of statistical registration, but the pressing need is to establish a firm basis of fact for the roads that lead towards race improvement. The magnitude of the inquiry is great, but its object is one of the highest that man can hope to accomplish, and there seems no reason to

doubt its practicability to a greater or less degree. The question of how much may be reasonably anticipated must be delayed until the problems that have been indicated are more or less satisfactorily solved.   FRANCIS GALTON.