

CHAPTER X.

DISEASE.

Preliminary Problem.—Data.—Trustworthiness of R.F.F. Data.—Mixture of Inheritances.—CONSUMPTION: *General Remarks*; *Parent to Child*; *Distribution of Fraternities*; *Severely Tainted Fraternities*; *Consumptivity*.—Data for Hereditary Diseases.

THE vital statistics of a population are those of a vast army marching rank behind rank, across the treacherous table-land of life. Some of its members drop out of sight at every step, and a new rank is ever rising up to take the place vacated by the rank that preceded it, and which has already moved on. The population retains its peculiarities although the elements of which it is composed are never stationary, neither are the same individuals present at any two successive epochs. In these respects, a population may be compared to a cloud that seems to repose in calm upon a mountain plateau, while a gale of wind is blowing over it. The outline of the cloud remains unchanged, although its elements are in violent movement and in a condition of perpetual destruction and renewal. The

well understood cause of such clouds is the deflection of a wind laden with invisible vapour, by means of the sloping flanks of the mountain, up to a level at which the atmosphere is much colder and rarer than below. Part of the invisible vapour with which the wind was charged, becomes thereby condensed into the minute particles of water of which clouds are formed. After a while the process is reversed. The particles of cloud having been carried by the wind across the plateau, are swept down the other side of it again to a lower level, and during their descent they return into invisible vapour. Both in the cloud and in the population, there is on the one hand a continual supply and inrush of new individuals from the unseen; they remain a while as visible objects, and then disappear. The cloud and the population are composed of elements that resemble each other in the brevity of their existence, while the general features of the cloud and of the population are alike in that they abide.

Preliminary Problem.—The proportion of the population that dies at each age, is well known, and the diseases of which they die are also well known, but the statistics of hereditary disease are as yet for the most part contradictory and untrustworthy.

It is most desirable as a preliminary to more minute inquiries, that the causes of death of a large number of persons should be traced during two successive generations in somewhat the same broad way that Stature and several other peculiarities were traced in the pre-

ceding chapters. There are a certain number of recognized groups of disease, which we may call A, B, C, &c., and the proportion of persons who die of these diseases in each of the two generations is the same. The preliminary question to be determined is whether and to what extent those who die of A in the second generation, are more or less often descended from those who died of A in the first generation, than would have been the case if disease were neither hereditarily transmitted nor clung to the same families for any other reason. Similarly as regards B, C, D, and the rest.

This inquiry would be more difficult than those hitherto attempted, because longevity and fertility are both affected by the state of health, and the circumstances of home life and occupation have a great effect in causing and in checking disease. Also because the father and mother are found in some notable cases to contribute disease in very different degrees to their male and female descendants.

I had hoped even to the last moment, that my collection of Family Records would have contributed in some small degree towards answering this question, but after many attempts I find them too fragmentary for the purpose. It was a necessary condition of success to have the completed life-histories of many Fraternities who were born some seventy or more years ago, that is, during the earlier part of this century, as well as those of their parents and all their uncles and aunts. My Records contain excellent material of a later date, that will be valuable in future years; but they must

bide their time; they are insufficient for the period in question. By attempting to work with incompletd life histories the risk of serious error is incurred.

Data.—The Schedule in Appendix G, which is illustrated in more detail by Tables A and B that follow it, shows the amount of information that I had hoped to obtain from those who were in a position to furnish complete returns. It relates to the "Subject" of the pedigree and to each of his 14 direct ancestors, up to the great-grandparents inclusive, making in all 15 persons. Also, to the Fraternities of which each of these 15 persons was a member. Reckoning the total average number of persons in each fraternity at 5, which is under the mark for my R.F.F. collection, questions were thus asked concerning an average of 75 different persons in each family. The total number of the Records that I am able to use, is about 160; so the aggregate of the returns of disease ought to have been about twelve thousand, and should have included the causes of death of perhaps 6,000 of them. As a matter of fact, I have only about one-third of the latter number.

Trustworthiness of R.F.F. data.—The first object was to ascertain the trustworthiness of the medical information sent to me. There is usually much disinclination among families to allude to the serious diseases that they fear to inherit, and it was necessary to learn whether this tendency towards suppression notably vitiated the returns. The test applied was both simple and just.

If consumption, cancer, drink and suicide, appear among the recorded cases of death less frequently than they do in ordinary tables of mortality, then a bias towards suppression could be proved and measured, and would have to be reckoned with ; otherwise the returns might be accepted as being on the whole honest and outspoken. I find the latter to be the case. Sixteen per cent. of the causes of death (or 1 in $6\frac{1}{2}$) are ascribed to consumption, 5 per cent. to cancer, and nearly 2 per cent. to drink and to suicide respectively. Insanity was not specially asked about, as I did not think it wise to put too many disagreeable questions, however it is often mentioned. I dare say that it, or at least eccentricity, is not unfrequently passed over. Careful accuracy in framing the replies appears to have been the rule rather than the exception. In the preface to the blank forms of the *Records of Family Faculties* and elsewhere, I had explained my objects so fully and they were so reasonable in themselves, that my correspondents have evidently entered with interest into what was asked for, and shown themselves willing to trust me freely with their family histories. They seem generally to have given all that was known to them, after making much search and many inquiries, and after due references to registers of deaths. The insufficiency of their returns proceeds I feel sure, much less from a desire to suppress unpleasant truths than from pure ignorance, and the latter is in no small part due to the scientific ineptitude of the mass of the members of the medical profession two and more generations ago, when even the stetho-

scope was unknown. They were then incompetent to name diseases correctly.

Mixture of Inheritances.—The first thing that struck me after methodically classifying the diseases of each family, in the form shown in the Schedule, was their great intermixture. The Tables A and B in Appendix G are offered as ordinary specimens of what is everywhere to be found. They are actual cases, except that I have given fancy names and initials, and for further concealment, have partially transposed the sexes. Imagine an intermarriage between any two in the lower division of these tables, and then consider the variety of inheritable disease to which their children would be liable! The problem is rendered yet more complicated by the metamorphoses of disease. The disease A in the parent does not necessarily appear, even when inherited, as A in the children. We know very little indeed about the effect of a mixture of inheritable diseases, how far they are mutually exclusive and how far they blend; or how far when they blend, they change into a third form. Owing to the habit of free inter-marriage no person can be exempt from the inheritance of a vast variety of diseases or of special tendencies to them. Deaths by mere old age and the accompanying failure of vital powers without any well defined malady, are very common in my collection, but I do not find as a rule, that the children of persons who die of old age have any marked immunity from specific diseases.

There is a curious double appearance in the Records.

the one of an obvious hereditary tendency to disease and the other of the reverse. There are far too many striking instances of coincidence between the diseases of the parents and of the children to admit of reasonable doubt of their being often inherited. On the other hand, when I hide with my hand the lower part of a page such as those in Tables A and B, and endeavour to make a forecast of what I shall find under my hand after studying the upper portion, I am sometimes greatly mistaken. Very unpromising marriages have occasionally led to good results, especially where the parental disease is one that usually breaks out late in life, as in the case of cancer. The children may then enjoy a fair length of days and die in the end of some other disease; although if that disease had been staved off it is quite possible that the cancer would ultimately have appeared. I have two remarkable instances of this. In one of them, three grandparents out of four died of cancer. In each of the fraternities of which the father and mother were members, one and one person only, died of it. As to the children, although four of them have lived to past seventy years, not one has shown any sign of cancer. The other case differs in details, but is equally remarkable. However diseased the parents may be, it is of course possible that the children may inherit the healthier constitutions of their remoter ancestry. Promising looking marriages are occasionally found to lead to a sickly progeny, but my materials are too scanty to permit of a thorough investigation of these cases.

The general conclusion thus far is, that owing to

the hereditary tendencies in each person to disease being usually very various, it is by no means always that useful forecasts can be made concerning the health of the future issue of any couple.

CONSUMPTION.

General Remarks.—The frequency of consumption in England being so great that one in at least every six or seven persons dies of it, and the fact that it usually appears early in life, and is therefore the less likely to be forestalled by any other disease, render it an appropriate subject for statistics. The fact that it may be acquired, although there has been no decided hereditary tendency towards it, introduces no serious difficulty, being more or less balanced by the opposite fact that it may be withstood by sanitary precautions although a strong tendency exists. Neither does it seem worth while to be hypercritical and to dwell overmuch on the different opinions held by experts as to what constitutes consumption. The ordinary symptoms are patent enough, and are generally recognized; so we may be content at first with lax definitions. At the same time, no one can be more strongly impressed than myself with the view that in proportion as we desire to improve our statistical work, so we must be increasingly careful to divide our material into truly homogeneous groups, in order that all the cases contained in the same group shall be alike in every important particular, differing only in petty details. This is far more important than adding to the number

of cases. My material admits of no such delicacy of division; nevertheless it leads to some results worth mentioning.

In sorting my cases, I included under the head of Consumption all the causes of death described by one or the other following epithets, attention being also paid to the context, and to the phraseology used elsewhere by the same writer:—Consumption; Phthisis; Tubercular disease; Tuberculosis; Decline; Pulmonary, or lung disease; Lost lung; Abscess on lung; Hæmorrhage of lungs (fatal); Lungs affected (here especially the context was considered). All of these were reckoned as actual Consumption.

In addition to these there were numerous phrases of doubtful import that excited more or less reasonable suspicion. It may be that the disease had not sufficiently declared itself to justify more definite language, or else that the phrase employed was a euphemism to veil a harsh truth. Paying still more attention to the context than before, I classed these doubtful cases under three heads:—(1) Highly suspicious; (2) Suspicious; (3) Somewhat suspicious. They were so rated that four cases of the first should be reckoned equivalent to three cases of actual consumption, four cases of the second to two cases, and four of the third to one case.

The following is a list of some of the phrases so dealt with. The occasional appearance of the same phrase under different headings is due to differences in the context:—

1. *Highly suspicious*:—Consumptive tendency, Con-

sumption feared, and died of bad chill. Chest colds with pleurisy and congestion of lungs. Died of an attack on the chest. Always delicate. Delicate lungs. Hæmorrhage of lungs. Loss of part of lung. Severe pulmonary attacks and chest affections.

2. *Suspicious*:—Chest complaints. Delicate chest. Colds, cough and bronchitis. Delicate, and died of asthma. Scrofulous tendency.

3. *Somewhat suspicious*:—Asthma when young. Pulmonary congestion. Not strong; anæmic. Delicate. Colds, coughs. Debility; general weakness. [The context was especially considered in this group.]

Parent to Child.—I have only four cases in which both parents were consumptive; these will be omitted in the following remarks; but whether included or not, the results would be unaltered, for they run parallel to the rest.

There are 66 marriages in which one parent was consumptive; they produced between them 413 children, of whom 70 were actually consumptive, and others who were suspiciously so in various degrees. When reckoned according to the above method of computation, these amounted to 37 cases in addition, forming a total of 107. In other words, 26 per cent. of the children were consumptive. Where neither parent was consumptive, the proportion in a small batch of well marked cases that I tried, was as high as 18 or 19 per cent., but this is clearly too much, as that of the general population is only 16 per cent. Again, by taking each fraternity separately and dividing the quantity of consumption in it by the number of its members, I obtained the average

consumptive taint of each fraternity. For instance, if in a fraternity of 10 members there was one actually consumptive member and four "somewhat suspiciously" so, it would count as a fraternity of ten members, of whom two were actually consumptive, and the average taint of the fraternity would be reckoned at one-fifth part of the whole or as 20 per cent.

Treating each fraternity separately in this way, and then averaging the whole of them, the mean taint of the children of one consumptive parent was made out to be 28 per cent.

Distribution of Fraternities.—Next I arranged the fraternities in such way as would show whether, if we reckoned each fraternity as a unit, their respective amounts of consumptive taint were distributed "normally" or not. The results are contained in line A of the following table :—

PERCENTAGE OF CASES HAVING VARIOUS PERCENTAGES OF TAINI.

	Percentages of Taint.					Total.
	0 and under 9	10 and under 19	20 and under 29	30 and under 39	40 and above	
A. 66 cases, one parent consumptive.	27	20	9	15	29	100
B. 84 cases, one brother consumptive.	49	14	10	13	14	100

They struck me as so remarkable, in the way shortly to be explained, that I proceeded to verify them by as different a set of data as my Records could afford. I took every fraternity in which at least one member was consumptive, and treated them in a way that would answer the following question. "One member of a fraternity, whose number is unknown, is consumptive; what is the chance that a named but otherwise unknown brother of that man will be consumptive also?" The fraternity that was taken above as an example, would be now reckoned as one of nine members, of whom one was actually consumptive. There were 84 fraternities available for the present purpose, and the results are given in the line B of the table. The data in A and B somewhat overlap, but for the most part they differ.

They concur in telling the same tale, namely, that it is totally impossible to torture the figures so as to make them yield the single-humped "Curve of Frequency" (Fig. 3 p. 38). They make a distinctly double-humped curve, whose outline is no more like the normal curve than the back of a Bactrian camel is to that of an Arabian camel. Consumptive taints reckoned in this way are certainly not "normally" distributed. They depend mainly on one or other of two groups of causes, one of which tends to cause complete immunity and the other to cause severe disease, and these two groups do not blend freely together. Consumption tends to be transmitted strongly or not at all, and in this respect it resembles the baleful influence ascribed to cousin

marriages, which appears to be very small when statistically discussed, but of whose occasional severity most persons have observed examples.

I interpret these results as showing that consumption is largely acquired, and that the hereditary influence of an acquired attack is small when there is no accompanying "malformation." This last phrase is intended to cover not only a narrow chest and the like, but whatever other abnormal features may supply the physical basis upon which consumptive tendencies depend, and which I presume to be as hereditary as any other malformations.

Severely-tainted Fraternities.—Pursuing the matter further, I selected those fraternities in which consumption was especially frequent, and in which the causes of the deaths both of the Father and of the Mother were given. They were 14 in number, and contained between them a total of 102 children, of whom rather more than half died before the age of 40. Though records of infant deaths were asked for, I doubt if they have been fully supplied. As 102 differs little from 100, the following figures will serve as percentages: 42 died of actual consumption and 11 others of lung disease variously described. Only one case was described as death from heart disease, but weakness of the heart during life was spoken of in a few cases. The remaining causes of death were mostly undescribed, and those that were named present no peculiarity worth notice. I then took out the causes of death of the

Fathers and Mothers and their ages at death, and severally classified them as in the Table below. It must be understood that there is nothing in the Table to show how the persons were paired. The Fathers are treated as a group by themselves, and the Mothers as a separate group, also by themselves.

CAUSES OF DEATH OF THE PARENTS OF THOSE FRATERNITIES IN WHICH CONSUMPTION GREATLY PREVAILED.

Father.	Age at death.	Mother.	Age at death.	Order of ages at death.	
				F.	M.
Asthma	70	Consumption	40	51	40
Bronchitis	89	Consumption	43	52	42
Inf. kidneys and bronchitis .	73	Consumption	47	59	43
Abscess of liver through lung (alive)		Consumption	55	62	44
Heart	68	Consumption	65	68	47
Heart	74	Consumption	66	70	50
Apoplexy	62	Water on chest	60	73	58
Apoplexy	75	Weak chest (alive)		74	60
Apoplexy	78	(1 br. and 2 ss. d. of cons.)		74	65
Decay	74	Hæmorrhage of lungs	44	75	66
Cancer	52	Ossification of heart	50	76	73
Senile gangrene	76	Nose bleeding	83	78	74
(2 bros. d. of cancer).		Cancer	42	89	83
Mortification of toe	59	Atrophy	73		
Accident	51	Age	74		
(3 bros. and 2 ss. d. of cons.)					

Very little account is given of the fraternities to which the fathers and mothers belong, and nothing of interest beyond what is included in the above.

The contrast is here most striking between the tendencies of the Father and Mother to transmit a serious consumptive taint to their children. The cases were selected without the slightest bias in favour of showing this result; in fact, such is the incapacity to see statistical facts clearly until they are pointed out, that I had no idea of the extraordinary tendency on

the part of the mother to transmit consumption, as shown in this Table, until I had selected the cases and nearly finished sorting them. Out of the fourteen families, the mother was described as actually dying of consumption in six cases, of lung complaints in two others, and of having highly consumptive tendencies in another, making a total of nine cases out of the fourteen. On the other hand the Fathers show hardly any consumptive taints. One was described as of a very consumptive fraternity, though he himself died of an accident; and another who was still alive had suffered from an abscess of the liver that broke through the lungs. Beyond these there is nothing to indicate consumption on the Fathers' side.

Another way of looking at the matter is to compare the ages at death of the Mothers and of the Fathers respectively, as has been done at the side of the Table, when we see a notable difference between them, the Mid-age of the Mothers being 58, as against 73 of the Fathers.

The only other group of diseases in my collection, that affords a fair number of instances in which fraternities are greatly affected, are those of the Heart. The instances are only nine in number, but I give an analysis of them, not for any value of their own, but in order to bring the peculiarities of the consumptive fraternities more strongly into relief by means of comparison. In one of these there was no actual death from heart disease, though three had weak hearts and two others had rheumatic gout and fever. These nine

families contained between them sixty-nine children, being at the rate of 7·7 to a family. The number of deaths from heart disease was 24; from ruptured blood vessels, 2; from consumption and lung disease, 8; from dropsy in various forms, 3; from apoplexy, paralysis, and epilepsy, 5; from suicide, 2; from

CAUSES OF DEATH OF THE PARENTS OF THOSE FRATERNITIES IN WHICH
HEART DISEASE PREVAILED.

Causes of death.	Ages at death.		Order of ages at death.	
	Father.	Mother.	F.	M.
Heart	59, 70	61, 63, 74	53	61
Apoplexy and paralysis	74, 78	62, 70, 72	55	62
Consumption	53	...	59	63
Asthma	70	...	70	70
Gout	55	...	70	72
Senile Gangrene	81	74	74
Tumour in liver	77	75	77
Cancer	75	...	78	81
Living	old.	...	old.	85
Unknown		85 2 brs. and 1 sis. d. of heart disease and 1 of paralysis at. 40.		

cancer, 1. There is no obvious difference between the diseases of their Fathers and Mothers as shown in the Table, other than the smallness of the number of cases would account for. Their mid-ages at death were closely the same, 70 and 72, and the ages in the two groups run alike.

I must leave it to medical men to verify the amount of truth that may be contained in what I have deduced from these results concerning the distinctly superior

power of the mother over that of the father to produce a highly consumptive family. Any physician in large practice among consumptive cases could test the question easily by reference to his note-books. A "highly consumptive" fraternity may conveniently be defined as one in which at least half of its members have actually died of consumption, or else are so stricken that their ultimate deaths from that disease may be reckoned upon. Also to avoid statistical accidents, the fraternities selected for the inquiry should be large, consisting say of six children and upwards. Of course the numerical proportions given by the above 14 fraternities are very rude indications indeed of the results to which a thorough inquiry might be expected to lead.

Accepting the general truth of the observation that consumptive mothers produce highly consumptive families much more commonly than consumptive fathers, it is easy to offer what seems to be an adequate explanation. Consumption is partly acquired by some form of contagion or infection, and is partly an hereditary malformation. So far as it is due to the latter in the wide sense already given to the word "malformation," it may perhaps be transmissible equally by either parent. But so far as it is contagious or infectious, we must recollect that the child is peculiarly exposed during all the time of its existence before birth, to contagion from its mother. During infancy, it lies perhaps for hours daily in its mother's arms, and afterwards, lives much by her side, closely caressed, and breathing the tainted air of her sheltered

rooms. The explanation of the fact that we have been discussing appears therefore to be summed up in the single word—Infection.

Consumptivity.—Before abandoning the topic of hereditary consumption, it may be well to discuss it from the same point of view that was taken when discussing the artistic temperament. Consumption being so common in this country that fully one person out of every six or seven die of it, and all forms of hereditary disease being intermixed through marriage, it follows that the whole population must be more or less tainted with consumption. That a condition which we may call “consumptivity,” for want of a better word, may exist without showing any outward sign, is proved by the fact that as sanitary conditions worsen by ever so little, more persons are affected by the disease. It seems a fair view to take, that when the amount of consumptivity reaches a certain level, the symptoms of consumption declare themselves; that when it approaches but falls a little short of that level, there are threatening symptoms; that when it falls far below the level, there is a fallacious appearance of perfect freedom from consumptivity. We may reasonably proceed on the hypothesis that consumptivity might somehow be measured, and that if its measurement was made in each of any large group of persons, the measures would be distributed “normally.”

So far we are on fairly safe ground, but now uncertainties begin upon which my data fail to throw

sufficient light. Longevity, marriage, and fertility must all be affected by the amount of consumptivity, whereas in the case of the faculties hitherto discussed they are not affected to any sensible extent. It however happens that these influences tend to neutralize one another. It is true that consumptive persons die early, and many of them before a marriageable age. On the other hand, they certainly marry earlier as a rule than others, one cause of which lies in their frequent great attractiveness; and again, when they marry, they produce children more quickly than others. Consequently those who die even long before middle age, often contrive to leave large families. The greater rapidity with which the generations follow each other, is also a consideration of some importance. There is therefore a fair doubt whether a group of young persons destined to die of consumption, contribute considerably less to the future population than an equally large group who are destined to die of other diseases. I will at all events assume that consumptivity does not affect the numbers of the adult children, simply as a working hypothesis, and will afterwards compare its results with observed facts.

I should add that the question whether the sexes transmit consumption equally, lies outside the present work, at least for practical purposes; for whether they transmit it equally or not would not affect the results materially. Our list of data is therefore limited to these:—that 16 per cent. of the population die of consumption, that consumptivity is normally distri-

buted, and that the law of hereditary regression from a deviation of three units on the part of either parent to an average of one unit in the child, may be supposed to apply here, just as it did to Stature and to the other subjects of the preceding chapters.

Let the scale by which consumptivity is measured be such that the Q of the general population = 1. Let its $M = N$, when measured on the same scale; the value of N is and will remain unknown. Let $N + C$ be the number of units of consumptivity that just amount to actual consumption. Our data tell us that 16 per cent. of the population have an amount of consumptivity that exceeds $N + C$. On referring to Table 8, we find the value of C that corresponds to the Grade of ($100^\circ - 16^\circ$), or of 84° , to be 1.47. Therefore whenever the consumptivity of a person exceeds $N + 1.47$, he has actual consumption.

Adding together the tabular values in Table 8 at all the odd grades above 84° , we shall find their average value to be 2.23. We may therefore assume (see p. 160) that a group of persons each of whom has a consumptivity of $N + 2.23$ will approximately represent all the grades above 84° . The Co-Fraternity descended from such a group will have an M whose value according to the law of Regression ought to be $[N + \frac{1}{3} (2.23)]$ or $[N + 0.74 \text{ units.}]$

Those members of the Co-Fraternity are consumptive whose consumptivity exceeds $N + 1.47$; these are the same as those whose deviation from $[N + 0.74]$ which is the M of the Co-Fraternity, exceeds + 0.73 unit.

Let the Q of the Co-Fraternity be called n . The Grade at which this amount of deviation occurs should be found in Table 8 opposite to the value of 0.73 divided by n .

Next as regards the value to be assigned to n , we may be assured that the Q of a Co-Fraternity cannot exceed that of the general population. Therefore n cannot exceed 1. In the case of Stature the relation between the Q of the Co-Fraternity and that of the Population was found to be as 15 to 17. If the same proportion held good here, its value would be 0.9. This is I think too high an estimate for the following reasons. The variability of the Co-Fraternity depends on two groups of causes. First, on fraternal variability; which itself is due in part to mixed ancestry, and in part to variety of nurture in the same Fraternity, both before as well as after birth. Secondly, it depends upon the variety of ancestry and nurture in different Fraternities. As to the first of the two groups of causes, they seem to affect consumptive fraternities in the same way as others, but not so with respect to the second group. The household arrangements of vigorous, of moderately vigorous, and of invalided parents are not alike. I have already spoken of infection. There is also a tradition in families that are not vigorous, of the necessity of avoiding risks and of never entering professions that involve physical hardship. There is no such tradition in families who are vigorous. Thus there must be much greater variability in the environments of a group of persons taken from the population

at large, than there is in a group of consumptive families. It would be quite fair to estimate the value of n at least as low as 0·8.

We have thus three values of n to try; viz. 1, 0·9, and 0·8, of which the first is scarcely possible and the last is much the more suitable of the other two. The corresponding values of 0·73 divided by n , are + 0·73, + 0·81, and + 0·91. Referring to Table 8 we find the Grades corresponding to those deviations to be 69, 71, and 73. We should therefore expect 69, 71, or 73 per cent. of the Co-Fraternity to be non-consumptive, according to the value of n we please to adopt, and the complement to those percentages, viz. 31, 29, or 27, to be consumptive. Observation (p. 173), gave the value of 26 by one method of calculation, and of 28 by another.

Too much stress must not be laid on this coincidence, because many important points had to be slurred over, as already explained. Still, the *prima facie* result is successful, and enables us to say that so far as this evidence goes, the statistical method we have employed in treating consumptivity seems correct, and that the law of heredity found to govern all the different faculties as yet examined, appears to govern that of consumptivity also, although the constants of the formula differ slightly.

Data for Hereditary Diseases.—The knowledge of the officers of Insurance Companies as to the average value of unsound lives is by the confession of many of

them far from being as exact as is desirable. [See, for example, the discussion on a memoir by G. Humphreys, Actuary to the Eagle Insurance Company, read before the Institute of Actuaries.—*Insur. Mag.* xviii. p. 178.]

Considering the enormous money value concerned, it would seem well worth the while of the higher class of those offices to combine in order to obtain a collection of completed cases for at least two generations, or better still, for three; such as those in Examples A and B, Appendix G, but much fuller in detail. Being completed and anonymous, there could be little objection on the score of invaded privacy. They would have no perceptible effect on the future insurances of descendants of the families, even if these were identified, and they would lay the basis of a very much better knowledge of hereditary disease than we now possess, serving as a step for fresh departures. A main point is that the cases should not be picked and chosen to support any theory, but taken as they come to hand. There must be a vast amount of good material in existence at the command of the medical officers of Insurance Companies. If it were combined and made freely accessible, it would give material for many years' work to competent statisticians, and would be certain, judging from all experience of a like kind, to lead to unexpected results.