

REPRINTS AND REFLECTIONS

Marriages between first cousins in England and their effects¹

George H Darwin

I. The Proportion of First-Cousin Marriages to all Marriages

It is well known that when the Census Act, 1871, was passing through the House of Commons, an attempt was made by Sir J. Lubbock, Dr Playfair, and others, to have a question inserted with respect to the prevalence of cousin marriages, under the idea that when we were in possession of such statistics we should be able to arrive at a satisfactory conclusion as to whether these marriages are, as has been suspected, deleterious to the bodily and mental constitution of the offspring. It is unfortunately equally well known that the proposal was rejected, amidst the scornful laughter of the House, on the ground that the idle curiosity of philosophers was not to be satisfied.

It was urged, that when we had these statistics it would be possible to discover, by inquiry in asylums, whether the percentage of the offspring of consanguineous marriages amongst the diseased was greater than that in the healthy population, and thus to settle the question as to the injuriousness of such marriages. The difficulty of this subsequent part of the inquiry was, I fear, much underrated by those who advocated the introduction of these questions into the census. It may possibly have been right to reject the proposal on the ground that every additional question diminishes the trustworthiness of the answers to the rest, but in any case the tone taken by many members of the House shows how little they are permeated with the idea of the importance of inheritance to the human race.

In the summer of 1873 the idea occurred to me that it might be in some measure possible to fill up this hiatus in our national statistics. In looking through the marriages announced in the *Pall Mall Gazette*, I noticed one between persons of the same surname; now as the number of surnames in England is very large, it occurred to me that the number of such marriages would afford a clue to the number of first-cousin marriages.

In order to estimate what proportion of such marriages should be attributed to mere chance, I obtained the "Registrar-General's Annual Report" for 1853,

where the frequency of the various surnames is given. I here found that there were nearly 33,000 surnames registered, and that the fifty commonest names embraced 18 per cent. of all the population. It appears that one in 73 is a Smith, one in 76 a Jones, one in 115 a Williams, one in 148 a Taylor, one in 162 a Davies, one in 174 a Brown, and the last in the list is one Griffiths in 529. Now it is clear that in one marriage in 73 one of the parties will be a Smith, and if there were no cause which tended to make persons of the same surname marry, there would be one in 73^2 , or 5,329 marriages, in which both parties were Smiths. Therefore the probability of a Smith—Smith marriage *due to mere chance* is $\frac{1}{5329}$; similarly the chance of a Jones-Jones, a Davies-Davies and a Griffiths-Griffiths marriage would be $\frac{1}{76^2}$, $\frac{1}{162^2}$ and $\frac{1}{529^2}$, respectively. And the sum of fifty such fractions would give the probability of a *chance* marriage, between persons of the same surname, who owned one of these fifty commonest names. The sum of these fifty fractions I find to be 0.0009207, or 0.9207 per thousand. It might, however, be urged that if we were to take more than fifty of the common names, this proportion would be found to be much increased. I therefore drew a horizontal straight line, and at equal distances along it I erected ordinates proportional to $\frac{1}{73^2}$, $\frac{1}{76^2}$, ..., $\frac{1}{529^2}$. The upper ends of these ordinates were found to lie in a curve of great regularity, remarkably like a rectangular hyperbola, of which my horizontal straight line was one asymptote; and the ordinate corresponding to Griffiths was exceedingly short. Observing the great regularity of the curve, I continued it beyond the fiftieth surname by eye, until it sensibly coincided with the asymptote, at a point about where the hundred and twenty-fifth name would have stood, and then I cut out the whole (drawn on thick paper) and weighed the part corresponding to the fifty surnames, and the conjectural part. The conjectural addition was found to weigh rather more than one-tenth of the other part; and as the chance of same-name marriages is proportional to the areas cut out, I think I may venture confidently to assert that in England and Wales about one marriage in a thousand takes place in which the parties are of the same surname, and have been uninfluenced by any relationship between them bringing them together. Now it will appear

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presently that far more than one marriage in a thousand is between persons of the same surname; and as I do not profess to have attained results of an accuracy comparable to 0.1 per cent., I am entitled to say that same-name marriages, when they take place, are due to consanguinity of the parties. If it permitted such accuracy, the method pursued would, however, include a compensation for this disturbing cause.

With the help of an assistant the marriages announced in the *Pall Mall Gazette* in the years 1869–72, and part of 1873, were counted, and were found to be 18,528. Out of these 232 were between persons of the same surname, that is 1.25 per cent. were same-name marriages. The same marriage is occasionally announced twice over, but as there can be no reason to suppose that this course has been pursued oftener or seldomer with same-name marriages than with others, the result will not be vitiated thereby. In order to utilise this result it now became necessary to determine-

- (1) What proportion of this 1.25 per cent. were marriages between first cousins.
- (2) What proportion marriages between first cousins of the same surname bear to those between first cousins of different surnames.

If these two points could be discovered, the percentage of first-cousin marriages *in the upper classes* could be at once determined. I have endeavoured to find out these proportions in several ways.

An assistant was employed to count the marriages of the *men* in the pedigrees of the English and Irish families occupying about 700 pages of "Burke's Landed Gentry," marking every case where the marriage was "same-name". I then tried in every such case to discover, from a consideration of the pedigree, whether the marriage had been between first cousins. I found that in a certain number of cases I was unable to discover this. The total number of pedigrees in the 700 pages was about 1,300; and of these I had to exclude 71, thinking that by only including family trees where I could discover the relationship of the parties, I should not obtain an unfair selection of the whole. The marriages of the men alone were included, because, had I included those of the women, many marriages would have been counted twice over – once in the pedigree under consideration, and again in that of the husband. In this way, then, I found out of 9,549 marriages given by Burke 72 were same-name first-cousin marriages, and 72 were same-name marriages not between first cousins. This gives the percentage of same-name marriages as 1.5 (not strikingly different from the 1.25 deduced from the *Pall Mall Gazette*), and of this percentage 0.75 is to be attributed to first-cousin marriages.

I further collected in the same way 1,989 marriages from the "English and Irish Peerage," and of these 18 were same-name first-cousin marriages, or 0.9 per cent. The number of same-name marriages not

being first-cousin marriages was not, however, compared in this case. It will be observed, that the proportion is nearly 0.2 per cent. higher than with the "Landed Gentry," and as the nobility are known to marry much *inter se*, this was perhaps to be expected; however, 2,000 is too small a number on which to base a conclusion on this head with safety. The Peerage and Burke combined give 90 out of 11,538, or 0.78 per cent., of same-name first-cousin marriages.

The next step was to send out a large number of circulars (about 800) to members of the upper middle and upper classes, in which I requested each person to give me the names of any members of the following classes, who married their first-cousins; viz., (1) the uncles, aunts, father, and mother of the person; (2) the brothers, sisters, and the person himself; (3) the first cousins of the person. I further asked for the names of any persons in the above classes who contracted same-name marriages *not* with first cousins. I confined my question to near relations, because, had the more distant ones been included, a risk was run of getting a selected set of marriages – a risk which I am inclined to suspect was not avoided, as will hereafter appear.

In about 300 of the circulars, I further asked for the total number of marriages contracted by the persons included in the Classes 1, 2, and 3. Care was taken to exclude, as far as possible, those persons who had cousins in common, so that each answer should embrace a fresh field. I must here return my thanks to the many persons who so kindly filled in and returned the circulars.

The following result was obtained:-

TABLE A

| Same-Name First-Cousin Marriages | Different-Name First-Cousin Marriages | Same name <i>not</i> First-Cousin Marriages |
|----------------------------------|---------------------------------------|---|
| 66 | 182 | 29 |

From 181 circulars returned in which the total number of marriages in each class was given, the following was the result:-

TABLE B

| Total Number of Marriages | Total Number of First-Cousin Marriages | Percentage of First-Cousin Marriages | Percentage of Same-Name marriages, whether Cousin or not Cousin |
|---------------------------|--|--------------------------------------|---|
| 3,663 | 125 | 3.41 | 1.38 ² |

Persons having no cousin marriages to fill in were asked to return the circular blank in those cases where the total number of marriages was not asked for. Of such blank returns, together with those where

the total number of marriages was not given, 207 came back to me; and the results derived from them were found to agree closely with those in Table B.

From Table A it is seen that there were 182 different-name cousin marriages to 66 same-name cousin marriages; *i.e.* for every same-name cousin marriage there were $2\frac{3}{4}$ different-name cousin marriages.

And again there were 66 same-name cousin marriages to 29 same-name-not-cousin marriages; that is rather more than two to one. This last result disagrees so much with that obtained from Burke and the Peerage, where the proportion was, as above stated, found to be as 1 to 1, that I am inclined to suspect that I had either a run of luck against me, or more probably that a considerable number of marriages between persons of the same surname, not being first cousins, escaped the notice of my correspondents. This latter belief is somewhat confirmed by what follows. If, however, I combine the results obtained from Burke with those from my circulars, I obtain the following:-

$$\frac{\text{Same - name cousin - marriages}}{\text{All same - name marriages}} = \frac{142}{249} = .57$$

And in default of anything more satisfactory I am compelled to accept this result as the first of my two requisite factors.

As to the second factor, - the proportion $2\frac{3}{4}$: 1 for different-name cousin marriages to same-name cousin marriages is, I fear, also unsatisfactory. But before entering on this point I will indicate the sources of error in my returns:-

- (1) The sensitiveness of persons in answering the question in cases where there are cousin marriages, particularly when any ill results may have accrued.
- (2) The non-return by persons who had no such marriages to fill in, and who would say, "I have no information, what is the use of returning this?"³
- (3) The ignorance of persons of the marriages of their relations. This ignorance would be more likely to affect the returns of different-name marriages than of same-name ones. I feel convinced that this has operated to some extent, as will be seen hereafter.
- (4) In the cases of same-name marriages, persons would be more likely to know of the marriages between first cousins than of other such marriages. The discrepancy between Burke and my circulars leads me to believe that this too has operated.

I have been much surprised to find how very little people know of the marriages of their relations, even so close as those comprised in my three classes. As it is clear that the marriages contracted by a man's uncles and aunts, and by his brothers and sisters, would be less likely to escape his notice than would

those contracted by his first cousins, I made an analysis of my circulars, including only the first two classes, *viz.*: (1) uncles, aunts, father, and mother; (2) brothers and sisters and the person himself. And the results from this analysis made a nearer approach to those derived from Burke. But even then it seemed so unsatisfactory, that I feel sure that the indirect method, to which I now proceed, is on the whole more reliable.

It is possible to discover the proportion between the same-name and different-name marriages in an entirely different way, and this I have tried to do. A man's first cousins may be divided into four groups, *viz.*: the children of (*a*) his father's brothers, (*b*) of his father's sisters, (*c*) his mother's brothers, (*d*) his mother's sisters. Of these four groups only (*a*) will in general bear the same surname as the person himself. On the average the number of marriageable daughters in each family of each of the four groups will be the same. Were the four groups then equally numerous, we might expect that the same-name would bear to the different-name marriages the proportion of one to three. Since, however, a man cannot marry his sisters, this cannot hold good; for the classes (*a*) and (*d*) are clearly on the average smaller than (*b*) and (*c*), and the proportion we wish to discover is $\frac{(a)}{(b)+(c)+(d)}$, which must evidently be less than $\frac{1}{3}$. To take a numerical example: A's father is one of 3 brothers, who married and have children, and A's father had 2 sisters, who married and have children. A's mother had 1 brother, who married and has children, and was one of 5 sisters, who married and have children. Then clearly the class

- (a) consists of 2 families.
- (b) consists of 2 families.
- (c) consists of 1 family.
- (d) consists of 4 families

So that the above fraction becomes $\frac{2}{2+1+4} = \frac{2}{7}$. In this case we may conclude that if A marries a first cousin, it is 5 to 2 that he will marry one of a different surname. In another case the numbers might have been different, and therefore the fraction and the betting also different. And what we wish to discover is the *average* value of this fraction. But for the various members of a large community there will be a very large number of such fractions, and some will occur more frequently than others; so that in finding this average value, each fraction should have its proper weight assigned to it.

In order to assign the weight to - say the above fraction $\frac{2}{7}$, we must take a thousand families and find in how many of them there were 3 sons and 2 daughters who married and had children, and in how many there were 1 son and 5 daughters who married and had children. Having sufficiently indicated how the required proportion depends on probabilities, I may state that I sent out a number of circulars to

members of the upper middle, and upper classes, and obtained and classified statistics with respect to a considerable number of families. I treated the question in four different ways. It might be supposed that a man, who had five families of first cousins in relation to himself, would be five times as likely to marry a first cousin as a man who had only one such family, or again it might be supposed that he would be only equally likely. The truth, however, will certainly lie between these suppositions. The question, when treated from this point of view, leads to the result that

$\frac{\text{Same-name cousin-marriages}}{\text{Different-name first-cousin marriages}}$ is greater than $\frac{1}{4.44}$ and less than $\frac{1}{4.12}$. So that the true proportion would be about $\frac{1}{4\frac{1}{4}}$.

The two other methods are founded on the same grouping of families, and depend on the fact that my class (a) will on the average be equal in number to class (d), and class (b) to class (c), and all that is necessary is to find what value should be assigned to the ratio (a) or (d): (b) or (c). It would be tedious to indicate the precise method employed, but suffice it to say, that after a correction for the greater prevalence of the second marriages of men than of women, the result comes out that

$\frac{\text{Same-name cousin-marriages}}{\text{Different-name first-cousin marriages}}$ is greater than $\frac{1}{4.23}$ and less than $\frac{1}{4.14}$, so that the proportion would be really about $\frac{1}{4\frac{1}{6}}$; a result which differs but very slightly from that given by the two other methods.

The amount of arithmetical labour was so great that I was obliged to make an approximation, which would, however, hardly affect the results, but as far as it went it would make the above fractions too small.

I think on the whole it may be asserted, that the same-name first-cousin marriages are to the different-name first-cousin marriages as 1 to 4. It may perhaps be worth mentioning that a second grouping of families from "Burke's Landed Gentry" led to almost identical results, notwithstanding the bias introduced by the fact that the eldest sons have a constant premium on marriage.

It appears to me on the whole that this latter result is considerably more reliable than that from my circulars, and this, as before stated, I can only explain on the supposition that many different-name marriages have escaped notice. The whole is very perplexing, and may perhaps be held to make all my results valueless. My final result then for the two required factors is, that-

$$\frac{\text{Same - name cousin - marriages}}{\text{All same - name marriages}} = .57$$

And

$$\frac{\text{Same - name cousin - marriages}}{\text{Different - name first - cousin marriages}} = \frac{1}{4}$$

If this be applied to the percentage 1.25 of the *Pall Mall Gazette*, we get 3.54, or $3\frac{1}{2}$ per cent., as the proportion of first-cousin marriages to all marriages in the middle classes. If it be applied to the percentage we get $4\frac{1}{2}$ per cent., and for the landed gentry $3\frac{3}{4}$ per cent., and for both combined $3\frac{9}{10}$ per cent. To sum up, the direct statistical method gives from $3\frac{1}{5}$ to $3\frac{2}{5}$ per cent., or including only the classes (1) and (2), comprising uncles, aunts, brothers, and sisters, $4\frac{1}{2}$ per cent., the indirect method $3\frac{1}{2}$ per cent.; and the partly indirect and partly statistical, founded on the Peerage and Burke, gives $3\frac{9}{10}$. There is, however, some reason to suppose that the proportion is really higher amongst the landed classes. There is a serious discrepancy between the direct and indirect methods as to the proportion of same-name and different-name marriages, which goes far to invalidate the results.

Whether, however, these proportions are actually correct or not, there can be little doubt, that if the area taken is large enough the percentage of first-cousin marriages in any class is proportional to the percentage of same-name marriages; so that if the latter is, say, only half the former, the cousin marriages are also only half. I therefore obtained from the General Registry of Marriages at Somerset House a return of the proportion of same-name marriages in 1872 in various districts, namely, (1) London, (2) large towns, viz., Bradford, Leeds, Manchester, Portsmouth, Southampton, Exeter, Plymouth, Birmingham, Northampton, &c., and (3) Agricultural districts of Hampshire, Devonshire, Middlesex, Herts, Bucks, Oxon, Northampton, Huntingdon, Bedford, and Cambridge. I must take this opportunity of returning my warm thanks to the superintendent of the statistical department, Dr. Farr, for the very great kindness both he and Mr. N. A. Humphreys, of the General Registry Office, have shown in helping me in this inquiry by every way in their power. The following Tables, in which the third column is introduced for the sake of comparison with the statistics from the *Pall Mall Gazette*, give the results:

| | Number of Marriages Registered | Per Cent. of same-name Marriages | Approximate Ratio to the Number (1.25) from <i>Pall Mall Gazette</i> | Per Cent. of First Cousin Marriages as deduced by previous method |
|--------------------------|--------------------------------|----------------------------------|--|---|
| I. Metropolitan District | 33,155 | 0.55 | $\frac{1}{2}$ | $1\frac{1}{2}$ |
| II. Urban Districts | 22,346 | 0.71 | $\frac{7}{12}$ | 2 |
| III. Rural Districts | 13,391 | 0.79 | $\frac{2}{3}$ | $2\frac{1}{4}$ |

It thus appears that in London, comprising all classes, the cousin marriages are about half what they are in the upper middle class, that is, probably $1\frac{1}{2}$ per cent. In urban districts they are about $\frac{7}{12}$ ths of what they are in the upper middle classes, that is probably 2 per cent. In rural districts they are about two-thirds of what they are in the upper middle classes, that is probably $2\frac{1}{4}$ per cent. In the middle and upper middle class or in the landed gentry probably $3\frac{1}{2}$ per cent. In the aristocracy probably $4\frac{1}{2}$ per cent. This is in accordance with what might have been expected *à priori*: for the aristocracy hold together very much, the landed gentry slightly less, the business class again less. And beginning from the other end, London is an enormous community, recruited from every part of England; the large towns form communities, only one degree less heterogenous; and the country is still less heterogenous. I am, however, somewhat surprised at finding the proportion in the rural population so small, for one would imagine that agricultural labourers would hold together very closely.⁴

Persons accustomed to deal with statistics will be able to judge, better than myself, what degree of reliance is to be placed on the previous results. My own *impression* is that there is not an error of one per cent. in asserting that amongst the aristocracy the proportion of first-cousin marriages to all marriages is $4\frac{1}{2}$ per cent., and that for the upper middle classes, and the urban and rural districts the error in the percentages is somewhat less, and lastly for London decidedly less. But this is an impression that I hardly know how to justify, and I therefore leave an ample field for adverse criticism.

II. Inquiries in Asylums

I now pass on to the second part of my inquiry, namely, the endeavour to discover, by collecting statistics in asylums, whether first-cousin marriages are injurious or not.

The method I intended to pursue was as follows: to get the superintendents of asylums to ask each one of the patients under their charge, either personally or through their subordinates, the question, "Were your father and mother first cousins or not?" In the case of the insane, I thought, in my ignorance, that those who had charge of them would have so intimate a knowledge of the character of each individual case as to be able to sift those whose answers could be depended on from those who were quite untrustworthy. In this it appears that I was mistaken, as will be shown by the remarks sent me by the various gentlemen who so kindly took up this inquiry. I cannot help thinking, however, that they under value the statistics which they have collected for me. I must take this opportunity to return my warm thanks to all the gentlemen mentioned below for the immense pains they have been at in collecting these results. I could hardly have believed that so many men, much occupied by their business, could have shown a stranger so much kindness, more especially as many of them seemed convinced that their labours were almost in vain. To Dr. W. Lauder Lindsay, Dr. Crichton Browne, Dr. Maudsley, and Dr. Scott, I must return my especial thanks for the really extraordinary vigour with which they took up the subject, and gave me every help in their power. I have also to thank Dr. Wilkie Burman, of Devizes; Dr. Bacon, of Fulbourn; Dr. Shuttleworth, of Lancaster; and Dr. Clouston, of Edinburgh, for their kind offers of help. The table of results is as follows:-

| English and Welsh Asylums | Number of Patients | Answers to "were Parents First Cousins?" | Offspring of First Cousin | Observations |
|--|--------------------|--|---------------------------|--|
| 1. West Riding, Wakefield (lunatics and idiots) Dr. Crichton Browne | 1,407 | 655 | 31 | Examination conducted with great care; cases of doubt excluded. Almost all who gave answers were lunatic and not idiotic. |
| 2. Hanwell (lunatics) Dr. Rayner | 380 | 255 | 2 or 3 | Only those are given as trustworthy where the history of the patient could be ascertained. Amongst the males there were twelve cases of doubtful consanguinity, but whether first cousins or not, is not stated. |
| 3. Warneford, Oxford (lunatic) Dr. Byewater Ward | 59 | 20 | — | Patients of the farmer and tradesmen class. |
| 4. Mickleover, Derby (lunatics) Dr. Murray Lindsay | 364 | 198 | 4 | Dr. Lindsay thinks these statistics worth little. |
| 5. Metropolitan District, Caterham (lunatics) Dr. Adam | 1,904 | 560 | 20 | Statistics very imperfect; trustworthiness of answers uncertain. |
| 6. Glamorgan County (lunatics) Dr. Yellowlees | 492 | 218 | 9 | Statistics worth little. Of those who did not answer, 137 were ignorant, and 137 incapable. |
| 7. Chester County (lunatics) Dr. Lawrence | About 450 | 225 | 3 | Patients of the labouring class. |

| | | | | |
|--|----------------------|-------|---------------|--|
| 8. County Lunatic, Snen-ton, Nottingham Dr. Phillimore | 390 | 200 | 4 or 9 | Statistics to be little depended on. |
| 9. Grove Hall, Bow Dr. Mickle | 427 | 181 | 8 | Patients old soldiers. |
| 10. Hatton, Warwick Dr. Oscar Woods | 537 | 258 | 8 or 9 | Patients, labourers and artisans. The offspring of first cousins belonged to seven families. Examinations conducted with great care. |
| 11. Earlswood, Surrey (idiot) Dr. Grabham | – | 1,388 | 53 | Facts derived from parents, and therefore tolerably trustworthy. |
| 12. Broadmoor Criminal (lunatic) Dr. Orange | 370 | 150 | 2 | Dr. Orange places little reliance on these results. |
| Totals for England and Wales | 8,170 very nearly | 4,308 | 149 or 142 | Between 3.46 and 3.20 per cent. of the patients who answered said they were offspring of first-cousin marriages. |

Scotch Asylums

| | | | | |
|---|-------|-----|----|---|
| 1. Montrose (lunatic) Dr. Howden | 406 | 141 | 8 | Dr. Howden thinks the inquiry useless. No inquiry was made of the idiots in this asylum. |
| 2. Crichton Royal Institution, Dumfries Dr Gilchrist | 146 | 51 | 4 | |
| 3. Southern Counties, Dumfries Dr. Anderson | 318 | 200 | 8 | |
| 4. Murray Royal Institution, Perth Dr. Lauder Lindsay | 80 | 44 | 4 | Dr. Lindsay thinks the results very doubtful. The failure to get answers was due to incapacity and refusal. |
| 5. Perth District, Murthly Dr. McIntosh | 220 | 78 | 3 | Patients paupers. |
| Totals | 1,179 | 514 | 27 | 5.25 per cent. of the patients who answered said that they were offspring of first-cousin marriages. |

Irish Asylums

| | | | | |
|--------------------------------------|-----|---|---|---|
| 1. Maryborough Through Dr. Courtenay | 217 | – | 2 | Patients agricultural labourers. |
| 2. Limerick District Dr. Courtenay | 434 | – | 3 | Twenty patients of better class; the rest labourers. |
| Totals | 651 | – | 5 | No information as to numbers who failed to answer. Dr. C considers these statistics of little value. Roman Catholics do not marry first cousins. 0.77 per cent. of all the patients say they are offspring of first-cousin marriages. |

The columns of observations show how very unsatisfactory the collectors consider these results. From various circumstances, it appears that the results from Earlswood, Hatton, and the West Riding Asylums are considerably more trustworthy than the others.

Including, then only these three asylums, it appears that, out of 2,301 patients, 90 or 91 were offspring of first cousins, that is 3.9 per cent. The fact that this agrees pretty closely with the 3.4 per cent. deduced from the whole table, leads me to think that the trustworthiness of the results collected has been under-estimated by the collectors themselves.

At Hanwell, where also there were some circumstances leading one to believe in tolerable accuracy, the percentage is very small, and this agrees well with what I should have been led to expect, from the small percentage of cousin marriages I found in London, by the methods of the first part of this paper. It is to be

observed, however, that there were twelve cases reported of doubtful *consanguinity*.

It will be seen that the percentage of offspring of first-cousin marriages is so nearly that of such marriages in the general population, that one can only draw the negative conclusion that, as far as insanity and idiocy go, no evil *has been shown* to accrue from consanguineous marriages.

From the high percentage ($5\frac{1}{4}$) of offspring of first-cousin marriages in the Scotch asylums, I should be led to believe that such marriages are more frequent in Scotland than in England and Wales, and from the mountainous nature of the country this was perhaps to be expected.

The methods of the first part of this paper throw no light on the question as far as concerns Scotland.

From the two Irish asylums no results whatever can be deduced.

But, whatever the value of these statistics may be, the opinion of prominent medical men, who have had especial advantages of observation, and are many of them also men of science, cannot be without interest.

Dr Crichton Browne writes to me that the investigation was impossible in the case of idiots, except through the medium of the parents. "It has always seemed to me that the great danger attending such marriages consists in the intensification of the morbid constitutional tendencies, which they favour. Hereditary diseases and cachexiae are much more likely to be shared by cousins than by persons who are in no way related... (and these) are transmitted with more than double intensity when they are common to both parents... They seem to be the square or cube of the combined volume... Even healthy temperaments, when common to both parents often come out as decided cachexiae in the children." He adds, that persons of similar temperaments ought not to intermarry. Elsewhere he tells me that he did not at first make sufficient allowance for the ignorance "and stupidity of my patients." In such an investigation, congenital effects, he says, should be distinguished from the acquired. I fear, however, that I must leave this to some hands more skilful than mine.

Dr. Howden, of Montrose, says: "As regards insanity, my own impression is, that unless there exists a hereditary predisposition the marriage of cousins has *no effect* in producing it... Neither in insanity nor in any other abnormal propensity do two plus two produce four; there is always another factor at work neutralising intensification and bringing things back to the normal." Dr. Howden thus disagrees with Dr. Crichton Browne, who, I take it, would maintain that, in insanity, two plus two makes more, and not less, than four.

Dr. Lauder Lindsay is of opinion that the ill-effects of cousin marriage, including insanity, are much less than represented. He urges the "impossibility" of obtaining trustworthy answers from the patients themselves; and even the results of personal inquiries from the nearest relatives of the patients would be liable to much error. Several of my correspondents expressed a belief that consanguinity of parents was more potent in producing idiocy than insanity. The results from Earlswood do not seem, however, to confirm this, and here the results sent seemed peculiarly trustworthy.

I had intended to pursue my inquiries in hospitals and asylums for other diseases, but the attempt which I made with respect to deaf mutes has shown me that the difficulties which arise are so great that it is almost useless to persevere in this course any further. I will now give the results which I have collected.

The first return relates to the College for the Blind at Worcester. The results were communicated through the kindness of the Rev. Robert Blair and Mr. S. S. Foster. The college is small, and only 20 cases are

recorded, and particulars of each case were sent. Of these, 20, the offspring of first cousins were one, and of second cousins one case of 2 brothers. Of the 20 cases, 2 were due to accidents. Thus, out of 17 families, there was one case of offspring of first cousins.

Dr. Scott, of Exeter, has informed me that out of 241 families, in which there were children born deaf and dumb, there were 7 cases of first-cousin marriage. In three or four of these families there were more than one child so afflicted.

Dr. Scott also kindly offered to place me in communication with the superintendents of a number of institutions for the deaf and dumb, and having availed myself of his kindness, I have collected the following answers.

Mr. Arthur Hopper, of the Deaf and Dumb School near Birmingham, conducted an inquiry with the utmost care. He tells me that out of 122 pupils he has received information about the parentage of all but 9. The 113 pupils, whose parentage is known, belonged to 109 families; of these 113, there were deaf from accident or disease 37, and of 10 the cause of deafness was unknown. Of these 10 pupils and the 66 congenitally deaf, not one was the offspring of a *consanguineous* marriage. Of the 37 who became deaf from disease, one was the offspring of first cousins. I am not informed whether the cases where several were deaf in a family belonged to the congenital cases, but it is almost certain to be so, and in any case I will assume (as the most unfavourable assumption) that it is so. Thus, out of 62 congenitally deaf families, not one was the offspring of even a consanguineous marriage. If we were to assume the 10 other cases to be cases of congenital deafness, it would be, not one in 72 congenitally deaf families was the offspring of a consanguineous marriage.

Mr. Patterson, of the Manchester School for Deaf Mutes, kindly informs me that his 130 pupils belong to 123 families. Concerning 8 of these families no information could be obtained; in 67 such families the deaf-mutism results from disease; in 63 it was congenital; and only one family was the offspring of first cousins.

Mr. Neill, of the Northern Counties Institution, at Newcastle-on-Tyne says, "350 have been admitted into this institution, and I do not think more than 6 of the parents were cousins. In one family whose parents were cousins there were 4 deaf mutes."

I have thus accurate information with respect to 366 families (i.e. 241 + 62 + 63), and out of these 8 were offspring of first cousins; that is to say, nearly 2.2 per cent. were offspring of first cousins. And, including the 350 cases at Newcastle, the percentage is $\frac{1400}{716}$, or 1.9 per cent. It is curious to notice that I deduced 2 per cent. as the proportion of first-cousin marriages in urban districts, other than London. Thus as far as these meagre results go, no evil in the direction of deaf-mutism would appear to arise from first-cousin

marriages. The failure to collect more statistics of this kind does not arise from any inability to get at the best sources of information; on the contrary, I have on all hands the kindest assurances of willingness to help me.

Mr. David Buxton, of the Liverpool School, says the mode of investigation is simply impracticable; but he has sent me several pamphlets on the subject, his own excellent paper amongst the number.

Mr. William Sleight, of the Brighton School, tells me that the children know nothing, and the parents are unwilling to communicate the fact inquired after, and says, "As far as I have been able to ascertain, about 7 per cent. of born deaf children are the offspring of parents who were cousins." (Query, first cousins?)

Mr. Patterson also writes to me that he is of opinion that, "though the result of the marriage of near relatives may not be seen in the deafness of their immediate offspring, yet the result is a deterioration of the constitution of the offspring, which may show itself in deafness in a few generations."

Mr. Neill, who has been engaged in the tuition of the deaf and dumb for forty years, thinks the cases of offspring of cousins so afflicted are fewer than is supposed. He also gives me facts showing how strongly heritable congenital deafness is where both parents are deaf-mutes; marriages are, moreover, by no means uncommon between pupils of these institutions.

To sum up the results of the whole investigation: It seems probable that in England, among the aristocracy and gentry, about 4 per cent. of all marriages are between first cousins; in the country and smaller towns between 2 and 3 per cent; and in London perhaps as few as 1½ per cent. Probably 3 per cent. is a superior limit for the whole population. Turning to lunatic and idiot asylums, probably between 3 and 4 per cent. of the patients are offspring of first cousins. Taking into account the uncertainty of my methods of finding the proportion of such marriages in the general population, the percentage of such offspring in asylums is not greater than that in the general population to such an extent as to enable one to say positively that the marriage of first cousins has any effect in the production of insanity or idiocy, although it might still be shown, by more accurate methods of research, that it is so. With respect to deaf mutes, the proportion of offspring of first-cousin marriages is precisely the same as the proportion of such marriages for the large towns and the country, and therefore there is no evidence whatever of any ill results accruing to the offspring from the cousinship of their parents.

III. Marriages between Cousins in relation to Infertility and a High Death-rate amongst the Offspring

Professor Mantegazza states in a paper on consanguineous marriages⁵ that he may conclude with tolerable

safety, from his collection of 512 cases of consanguineous marriage, that consanguinity tends to cause sterility; for he found that between 8 and 9 per cent. of the recorded marriages were sterile. It is not clear, however, how he is entitled to draw this conclusion, unless he knows what is the proportion of sterile marriages in the general population, and he admits that he has no statistics on this point. M. Boudin, who wrote at an earlier date, is of the same opinion, and considers, further, that even where sterility does not afflict the consanguineous marriage itself, it is apt to affect the offspring.⁶ Dr Balley is also of opinion that the ill-effects of such marriages are liable to appear in the second generation.⁷

It appears to me that these points may be settled pretty satisfactorily by a comparison between the fertility of the marriages of first cousins and of the marriages of their offspring, as recorded in the pedigrees in "Burke's Landed Gentry" and the "Peerage," with the fertility of marriages between persons not akin.

I had already got a large number of marriages marked as being between first cousins, and accordingly proceeded to count the number of children arising therefrom. The marriages made within the twenty years immediately preceding the publication of those works were excluded; so that only complete families were counted. It soon became evident that the lists of the daughters were very incomplete, and that the daughters were perhaps sometimes omitted altogether; the sons dying in infancy are also frequently omitted (especially in the "Landed Gentry"); and when such occurred I excluded them. I think that the lists of the sons surviving infancy are, however, pretty complete, and any incompleteness will clearly affect the record of marriages between persons not akin as much as it does the first-cousin marriages. The comparison to be made must, therefore, be only between the numbers of sons. I shall use the words *sterile* or *infertile* to mean the absence of children surviving infancy. The number of daughters recorded will be given, so as to show the extent of incompleteness.

In this manner 116 families, offspring of first cousins, were collected. In all but 12 of them the marriages were between children of brothers. In 11 of the 116 it is merely stated that there was issue of the marriage, and in 8 others there is no information as to whether there was issue or not. I found in a subsequent inquiry, by cross references to other pedigrees, that where there was no information there was nevertheless often a family; so that the absence of information is no indication of sterility, and indeed is perhaps some slight indication of fertility, because the family is omitted in order to economize space, and d.s.p. (*decessit sine prole*) is frequently added where there *was* no issue. In this case, however, cross references were of no avail, because the family would be recorded in the pedigree under consideration or not at all. The absence of information is here then a slightly

greater indication of sterility than in my later inquiry, where it is no indication at all.

The cases where issue was recorded may clearly be disregarded in making the comparison, since they might be matched by similar cases amongst the non-consanguineous marriages.

Subtracting, then, the 11 recorded cases of issue and the 8 cases of no information, we are left with 97 families; these gave 202 sons and 153 daughters. It is probable that about 212 daughters should have been recorded. Now 202 sons to 97 marriages is at the rate of 2.07 sons to each marriage; or, supposing the 8 cases of doubt to have been all sterile, we get 105 marriages as giving 202 sons, that is, at the rate of 1.92 sons to each marriage.

Thus the average number of sons who survive infancy, arising from a marriage of first-cousins amongst the gentry of England, is between 1.92 and 2.07.

The next step was to collect the non-consanguineous marriages. In order to secure myself from bias, I opened my book by chance and counted all the marriages in the pedigree which fell under my eye. I then did the same in another place, and so on. In this way 217 families arising from persons not akin were collected, and found to give 416 sons and 340 daughters. Here, as before, the daughters are deficient, and about 437 daughters ought probably to have been given. Now 416 sons to 217 marriages is at the rate of 1.91 sons to each marriage. Thus the average number of sons who survive infancy, arising from non-consanguineous marriages, is 1.91.

The balance of fertility is therefore slightly on the side of the cousins, but the small difference is probably due to chance.

In order to feel greater confidence in this result, a second method of analysis was carried out. If cousin marriages tend to cause sterility, they probably tend to cause partial sterility. Now amongst the 97 cousin marriages, 14 were sterile (in the sense defined), and amongst the 217 non-consanguineous marriages 33 were sterile. Thus we have 83 fertile cousin-marriages and 184 fertile non-consanguineous marriages; the former gave 202 sons, the latter 416 sons. It will be observed that this course entitles me to disregard the 8 cases of "no information" before referred to, for

if they were sterile they are to be subtracted *ex hypothesi*, and if there was issue, they could be matched by similar cases amongst the non-consanguineous. Thus fertile first-cousin marriages produce sons at the rate of 2.43 sons to each marriage, and fertile non-consanguineous marriages produce sons at the rate of 2.26 sons to each marriage.

Therefore the analysis leads to a similar slight balance in favour of the fertility of the first cousins, just as did the former one.

I offer the following suggestion as a possible explanation of the greater fertility of the cousins, although mere chance is the more probable cause of the difference. Marriages between first cousins will be more apt to take place where there is a large group of persons who bear that relationship to one another. In such families fertility will be hereditary; hence it is possible that the comparison is to some extent being effected between abnormally fertile families and those in which fertility is only normal.

The next point to investigate is as to whether the offspring of first-cousin marriages are themselves affected by sterility.

To test this, recourse was again had to the "Peerage" and "Landed Gentry," and 136 marriages of the offspring of first cousins were collected. Concerning 29 of these no information could be obtained, and, for the reasons before assigned; these may be set aside. Of the 107 remaining marriages, it is recorded that 14 had issue. Subtracting these, we are left with 93 marriages, and these gave 180 sons and 157 daughters. It should be mentioned that some few of the marriages were recent, so that the families would be not quite complete in these cases. Now 93 marriages giving 180 sons is at the rate of 1.93 sons to each marriage.

Again, 16 of these marriages were sterile, so that 77 fertile marriages gave 180 sons, that is at the rate of 2.34 sons to each marriage. If these two numbers, viz. 1.93 and 2.34, be compared with the corresponding numbers, viz., 1.91 and 2.26, for the non-consanguineous marriages, it is clear that there is again no evidence of want of fertility in the offspring of first-cousin marriages.

The results with respect to fertility may be summed up in the following Table:

| Parentage | Average number of Sons to each Marriage | Percentage of Sterile Marriages ¹ | Average Number of Sons to each Fertile Marriage |
|---|---|--|---|
| Not consanguineous | 1.91 | 15.9 | 2.26 |
| Parents first cousins | Between 2.07 and 1.92 | Between 14.7 and 20.9 | 2.43 |
| One parent the offspring of a marriage between first cousins... | 1.93 | 17.2 | 2.34 |

¹Sterility means absence of children surviving infancy.

The comparison may be best effected by means of the numbers in the last column. The figures in the second column are not of much value, since in some cases it was difficult to decide whether the entry should be made as being a case of "no information" or of sterility.

The comparison of the figures in the first and last columns shows, without much room for doubt, that the alleged infertility of consanguineous marriages, whether direct or indirect, cannot be substantiated.

I now pass on to the question of the youthful death-rate.

It has been stated by M. Boudin and others that the offspring of consanguineous marriages suffer from an excessively high rate of infant mortality. I have tried to put this to the proof as follows:

I recurred to the families in the "Peerage" which were offspring of first cousins, and marked every case where it is recorded that a son or daughter died in infancy or youth. Where the age of the child was mentioned, ten years was taken as the standard of youth.

"Burke's Landed Gentry" was of no avail in this inquiry, because I found that children dying in infancy were never, or very rarely, mentioned therein.

From the "Peerage" I could only obtain 37 fertile first-cousin marriages; in two of these there were no children surviving youth. The 37 gave 86 sons, who survived infancy, 15 children (boys and girls) who died in infancy or youth, and 4 more as to whom the period of death was doubtful. Besides this, it is stated of one family, that "all died young except one daughter." Now in the previous part of this paper it is shown that the average number of sons to a fertile first-cousin marriage is nearly $2\frac{1}{2}$; so that it may not be unreasonable to credit this family with 4 infants who died.

On this supposition we should have 37 fertile marriages of first cousins giving 86 sons, who survived, and between 23 and 19 boys and girls who died early. Reducing these numbers to percentages, I find that -

One hundred fertile marriages of first cousins would give from 51 to 62 children who die young, and that for every 100 son, offspring of first cousins, who survive youth, there are from 22 to 27 boys and girls (their brothers and sisters) who die early.

These numbers cannot be used as giving the actual infant death rate, on account of the imperfections in the pedigrees in the "Peerage," but they may be used in a comparison with other statistics deduced from the same source.

Now 89 fertile non-consanguineous marriages (collected by chance from the "Peerage") gave 197 sons, and 44 sons and daughters who died young. Reducing these numbers to percentages as before, I find-

That 100 fertile non-consanguineous marriages would give 49 children who die young, and that for every 100 sons, offspring of fertile non-consanguineous marriages, who survive infancy, there are 22 boys and girls (their brothers or sisters) who die early.

The numbers to be compared are therefore 51 or 62 with 49, and 22 or 27 with 22.

These are merely two different ways of consulting the facts, and it appears that both methods give some evidence of a slightly lowered vitality amongst the offspring of first cousins.

Thirty-seven cases form, however, far too small a total on which to base satisfactory statistics. The numbers thus collected are far scantier than those collected by others, but as far as I am aware this is the only occasion in which the method of collection has been one in which the unconscious bias of the collector could not operate. In all these inquiries I was ignorant as to whether the figures were tending until I came to add up the totals.

This last inquiry is, I fear, worth but little, but so far as it goes it tends to invalidate the alleged excessively high death-rate amongst the offspring of cousins, whilst there remains a shade of evidence that the death-rate is higher than amongst the families of non-consanguineous parents.

IV. Conclusion

In my paper as read before the Statistical Society, the writings on this subject of some previous authors were reviewed. I may mention that Dr. Arthur Mitchell, of Edinburgh, conducted an extensive inquiry, and came to the conclusion that, under favourable conditions of life, the apparent ill-effects were frequently almost nil, whilst if the children were ill fed, badly housed and clothed, the evil might become very marked. This is in striking accordance with some unpublished experiments of my father, Mr. Charles Darwin, on the in-and-in breeding of plants; for he has found that in-bred plants, when allowed enough space and good soil, frequently show little or no deterioration, whilst when placed in competition with another plant, they frequently perish or are much stunted.

It will be observed that my investigation, so far as it is worth anything, tends to invalidate this opinion; but perhaps the apparent invalidation is due to the fact, that a large majority of Englishmen live under what are on the whole very favourable circumstances. Some authors (notably M. Boudin) express the most alarming opinions as to the evils of consanguineous marriage and support the opinion with large arrays of figures. Almost on all sides is found a general consent, as to the ill-effects of cousin marriages, which must certainly have far greater weight than my purely negative results. But it strikes me that in no case has the investigation been free from flaws, for in no case has it been really determined what is the proportion of consanguineous marriages in the whole population. The very various estimates which different people have given me of the frequency of cousin-marriages (from 10 per cent. down to 1 in 1,000, if my memory serves me right), lead me to believe that general

impressions on this point are almost valueless. Every observer is biased by the frequency or rarity of such marriages amongst his immediate surroundings.

My own opinion is that the evil has been often much exaggerated, but that there are nevertheless grounds for asserting that various maladies take an easy hold of the offspring of consanguineous marriages.

My paper is far from giving anything like a satisfactory solution of the question; but it does, I think, show that the assertion that it has already been set at rest, cannot be substantiated.

The subject still demands attention, and I hope that my endeavour may lead more competent investigators to take it up from some other side.

1 Darwin GH. Marriages between first cousins in England and their effects. *Fortnightly Review* 1875;24:22–41.

This article is a part of a paper read before the Statistical Society of London, on the 16th of March last.

The Society has courteously permitted its publication in this Review simultaneously with its appearance in their Journal for this month. The reader will find in the Journal further details, and a discussion of some of the previous writings on the subject of consanguineous marriages.

2 Compare this with 1.25 deduced from *Pall Mall Gazette*.

3 The circulars were ready stamped for return, which would induce many to return them by saving trouble.

4 I may mention that Mr. Clement Wedgwood made very careful inquiries for me concerning 149 marriages of skilled artisans in the Potteries, and did not find a single case of first-cousin marriages, and only three where there was any kind of relationship between the husband and wife. He was further assured, that such marriages never take place amongst them.

5 "Studj sui Matrimonj Consanguinei." Milan 1868.

6 "Annales d'Hygiène Publique," tom xviii. Pp 5–82.

7 "Comptes Rendus." Tom. lvi. P. 135.

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Commentary: A Darwin family concern

Adam Kuper*

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'I'm not quite sure that it's a good thing for cousins to marry', remarks Dr Crofts in Trollope's *The Small House of Allington*, published in 1863. 'They do, you know, very often', he is reminded, 'and it suits some family arrangements'.¹ To be sure, the doctor had a personal interest in the matter. A young woman he hoped to marry had just become engaged to her cousin. However, Dr Crofts was talking as a responsible medical man. The British medical press was raising questions about the risks to offspring of cousin marriages,^{2,3} and a bright young doctor would have been familiar with the professional debates. (And in the end he gets his girl.)

Charles Darwin had picked up on these concerns very early. He was worried about heredity and also about the consequences of cousin marriage. Shortly before his own marriage to his first cousin,

Emma Wedgwood, he had consulted a new book, Alexander Walker's *Intermarriage: Or the Mode in Which, and the Causes Why, Beauty, Health, and Intellect Result from Certain Unions, and Deformity, Disease and Insanity from Others* (1838). It touched a sensitive nerve. His Darwin grandmother, the wife of Erasmus Darwin, was addicted to gin and suffered from bouts of madness. Charles Darwin's own mother, unwell throughout his childhood, had died from an agonizing stomach ailment, probably peritonitis, at the age of 52 years. Charles was 8 years old when she died, and as an adult he was obsessively concerned with his own ill-health, particularly the recurrent stomach complaints that recalled his mother's fatal illness. Both his mother and Emma were Wedgwoods, and the Wedgwoods were notorious for their ill-health.⁴ Whenever one of his children fell ill, Charles was inclined to see the same symptoms in himself, and to worry that it exposed a family propensity.

Or were the frequent illnesses of his children, and the health problems of the Wedgwoods, perhaps the consequence of cousin marriages?⁵ This was a growing concern in scientific circles in Britain in the 1860s.

Department of Anthropology, Yale University, New Haven, CT, 16 Muswell Road, London N10 2BG, UK.

E-mail: adam.kuper@googlemail.com

* This commentary is drawn from my book, *Incest and Influence: The Private Life of Bourgeois England*. Cambridge MA: Harvard University Press, 2009.