

On the alleged Infecundity of Females born Co-Twins with Males ; with some Notes on the Average Proportion of Marriages without Issue in General Society.
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“ IT is (says Dr Burns) a popular opinion, and I do not know any instance to discountenance it, that if twins be of different sexes the female is sterile.”—“ I have never (he adds) had an opportunity of examining the state of the uterus and its appendages after death.”*

Some years ago I took considerable pains to collect a series of data for the purpose of testing the validity of the opinion alluded to by Dr Burns in the preceding paragraph. The results of the inquiry were, in 1839, laid before the Edinburgh Medico-Chirurgical Society in the following form.† I venture to publish the observations now, with a few additions and corrections, under the idea that the subject is not devoid of interest in relation to physiology and legal medicine, and involves one or two correlative questions worthy of some degree of investigation. Besides, I know well the many difficulties connected with a statistical inquiry like the present, however brief and simple it may appear when condensed into its ultimate results ; and the publication of the evidence that I have obtained upon the topics in view may probably be fortunate enough to save others from expending time and trouble upon the same research.

* See the last edition (1843) of his well known Principles of Midwifery, p. 236.

† In an article on Hermaphroditism in Dr Todd's Cyclopaedia of Anatomy, Part xvi. (1839) p. 736, I have stated some of the results of the earlier part of this inquiry.

ON THE REPRODUCTIVE POWERS OF FEMALES BORN CO-TWINS WITH MALES AMONG OUR DOMESTIC UNIPAROUS ANIMALS, AND IN THE HUMAN SUBJECT.

Mr John Hunter, in an essay read before the Royal Society of London in 1779, and afterwards published both in the *Philosophical Transactions* for that year, and in his work on the *Animal Economy*, showed that, when among black-cattle "the cow brings forth a male and female at the same birth, the male is a perfect bull calf, but the apparent female is almost always imperfect in its sexual organization. Female cattle of this kind, born co-twins with males, have long been distinguished in this country under the name of free-martins. In external appearance and form of body, they usually resemble the ox and spayed heifer more than either the entire male or entire female of the species. They commonly grow to a larger size than either the bull or the cow, and have horns like those of an ox, and a tone of bellowing similar to his, with the same marked disposition to become fat under the use of nourishing food. In general they do not show any sexual desire for the bull or the bull for them.

The defective sexual conformation of free-martin cattle is attested, not only by the observation of their sterility during life, but also by the anatomical examination of their reproductive organs. Mr Hunter had an opportunity of dissecting several free-martin cows. In all of them the external sexual organs were of the female type—the *vulva* and *os vaginæ* being in general well developed. The vaginal canal, however, was contracted at its upper part, and the internal female organs (the uterus, Fallopian tubes, and ovaries,) were altogether rudimentary and imperfect in their structure. In some there was an apparent superaddition of male organs (*testes* and *vasa deferentia*) probably from a permanence of the Wollfian bodies and ducts of the early embryo; and in one case the ovaries were replaced by bodies having all the external characters of male testicles.

Mr Hunter's observations have been since corroborated by additional cases and dissections made by Scarpa,* Gurlt,† and Allnatt.‡ I have myself had an opportunity of dissecting the sexual parts of two adult and a third young free martin, killed in the shambles of this city, and have found all of them formed after the anormal and imperfect sexual type pointed out by Mr Hunter.§

* *Mem. della Societa Italiana*, Tom. ii. p. 846.

† *Lehrbuch der Pathologischen Anatomie der Haus-Saugethiere*, Bd. ii. s. 188. Tab. xxi. Fig. 2, 3, and 4.

‡ *London Medical Gazette*, Vol. xviii. p. 528.

§ I have described at length the particular anatomical appearances met with in these cases in Dr Todd's *Cyclopedia of Anatomy*, Vol. i. p. 702 and 707.

My friend Dr Allen Thomson made some years ago a similar observation upon a free-martin twin foetal calf.

The butchers in Edinburgh and its neighbourhood, at a number of whom I have made inquiries upon the subject, seem to be perfectly familiar with the fact, that in the free-martin, (whose flesh they usually reckon of a superior quality,) the womb, or calfbed, as they term it, is in almost all cases apparently wanting; and all our intelligent agriculturists in the Lothians are acquainted with the sterile character of these animals.

Though we are certainly indebted to the sagacity of Mr Hunter for first fully appreciating the value of the physiological sexual anomaly observed in free-martins, and for confirming the fact by accurate anatomical investigation, yet it is but proper to mention that the circumstance itself of the infecundity of the free-martin cow has long, as was indeed pointed out by Mr Hunter himself, been notorious among agriculturists in Great Britain, and is prominently mentioned by Leslie, and some of the older authors on husbandry.

Indeed, the Roman agriculturists seem not to have been unacquainted with the variety of barren female cattle under consideration; or at least their attention appears to have been so often attracted by cases of sterility in the cow, that they found it a matter of convenience to employ, as we do, for their designation and distinction, a specific noun, and named them *Tauræ*. Thus Varro in his work "*De Re Rustica*," tells us "*Quæ sterilis est vacca taura appellatur*,"* and Columella, in speaking of the sorting (*delectus*) of the flock, directs that "those which have brought forth, and the old cows which have ceased to breed are to be removed, and so also the *tauræ*, which occupies the place of fertile cattle, are to be set aside, or to be trained to the plough, since they are not by their sterility rendered less fit for labour than the common heifer."† There is no direct evidence, however, to show that the Romans were aware of the particular circumstances, in respect of plural births, under which such *tauræ* were produced.

Though the infecundity of free-martin cows be a very general fact, still it is by no means an universal one. Mr Hunter, in his original essay on the subject, mentions that in one instance, in examining a free-martin that died when about a month old, he found all the organs of generation well formed. After stating this case, he adds, "I have heard of other twin cows breeding; but as I cannot call to mind the names of the individuals who communicated the circumstances to me, I have only mentioned one of undoubted authority."

* *Libri de Rustica Catonis, Varronis, Columellæ &c. Paris Edit. (Liber ii) p. 82.*

† *Enixæ et vetustæ quæ gignere desiderint summovendæ sunt, et utiquæ tauræ, quæ locum foecundarum occupant, ablegandæ, vel aratro demandæ, quoniam laboris et operis non minus quam juvencæ, propter uteri sterilitatem patientes sunt. Ibid. Lib. vi. Cap. xxii. p. 232.*

An anonymous author in the Farmers' Magazine for November 1806,* has described such an instance in a free-martin belonging to Mr Buchan of Killingtringham. This cow was well made and a good milker; she produced one calf. The same gentleman (Mr Buchan) had a second free-martin which never bred. Another writer in the same Magazine for November 1807, makes the following statements. "On the 11th of November 1804, a cow of mine brought forth two calves, one a bull, and the other a cow calf; and in spring last the female twin produced a very good male calf; yet a neighbour of mine assures me that a female twin belonging to him would never take the bull, and was sold on that account to the butcher at the age of four or five." Dr Moulson of Halifax mentions, in Loudon's Magazine,† the case of a free-martin cow reared by Joseph Holroyd, Esq., of Withers, near Leeds, which copulated with its own twin bull. "In due time," he adds, "the heifer brought forth a bull calf, and she regularly had calves for six or seven years afterwards."

In the course of making some inquiries in West Lothian after cases of free-martin cows, I have become acquainted with two well authenticated instances in which these animals proved capable of propagating. One of these cases occurred some years ago at Newton, near Queensferry. The second was reared by Mrs Cochran of Stewartsfield, Broxburn, and produced several calves. Such exceptional cases, however, as those to which I have alluded, appear, on the whole, to be comparatively so rare in their occurrence, as not to invalidate the generality of the fact with regard to the sterility of the free-martin twin cow, and render it a question of interesting inquiry whether this law of infecundity in the female of male and female co-twins be confined only to plural conceptions among black-cattle, or extends also to twins among other species of uniparous animals.

In reference to the females of opposite sexed twins among sheep, I have been assured from different quarters that the law of the sexual imperfection and infecundity of the free-martin cow does not hold good with respect to them. Several varieties of sheep, particularly some of those belonging to the white-faced breeds, produce twins with such constancy that we may truly consider this as one of their occasional hereditary characters. These twins are not unfrequently of different sexes, and yet instances of sterility are rarely if ever observed among such flocks.‡

I have not been able to learn how the matter stands with regard

* See Youatt on Cattle, p. 539.

† Magazine of Natural History, Vol. v. p. 765.

‡ The tendency to the production of twins in the human subject is sometimes so marked in particular families as to entitle it to be considered as almost a hereditary peculiarity. I know of one family, in the different branches of which twelve pair of twins have been born within three generations.

to twins among goats, not having access in this district of country to any information or direct observation upon the subject in that animal.

I have hitherto been equally unsuccessful in tracing out any instance of a twin mare or she-ass, born under the circumstance already pointed out, being reared to maturity. The mare, indeed, appears only in extremely rare cases to produce twins, and these twins are almost always endowed with such feeble powers of life as seldom to survive for any length of time after birth.

Sir Everard Home, in a paper "On Animals preternaturally formed at the time of birth," inserted in the *Philosophical Transactions* for 1799, and in the third volume of his *Comparative Anatomy*, after assuming that certain sexual organs in the male and female are originally identical or neuter in their character, and are only afterwards changed to the male or female type according to ulterior circumstances, adds the following observations:—"If it is allowed that the sex is impressed upon the ovum at the time of impregnation, it may, in some measure, account for the free-martins occurring when two young are to be impressed with different sexes at one impregnation, which must be a less simple operation, and, therefore, more liable to a partial failure than when two or any greater number of ova are impressed with the same sex."

"It may also account," he remarks in reference to the human subject, "for twins being most commonly of the same sex; and when they are of different sexes, it leads us to inquire whether the female, when grown up, has not, in some instances, less of the true female character than other women, and is not incapable of having children." "In warm countries," Sir Everard adds, "nurses and midwives have a prejudice that such twins seldom breed."*

In reference to this last remark it is not unimportant to observe, that, as I have repeatedly found during the course of my inquiries upon this subject, a similar prejudice in reference to the infecundity of human females born co-twins with males, exists to a considerable extent among the peasantry of the Lothians, and has very probably been derived from the analogy of the free-martin cow. "The mischief," justly observes a late physiological author, "to which the opinion might give rise in causing a girl to be rejected as a wife for a defect, or taken for an excellence, (according as sterility might be regarded,) which she did not possess, is incalculable."†

The truth or falsity of the opinion itself can only be satisfactorily settled by an appeal to a sufficient number of accurately ascertained histories of cases in which women, born co-twins with males, have reached an adult age and become married.

I have collected what may probably be considered as a suffi-

* *Comparative Anatomy*, Vol. iii. pp. 333-4.

† See foot-note at page 74 of Dr Fletcher's *Rudiments of Physiology*.

cient number of such cases for forming some just conclusions upon this subject.

Before, however, bringing forwards the results derivable from these collected cases, as bearing upon the question of the fecundity or sterility of human females born under the circumstances in question, I may, in the first place, mention that instances of twins in the human subject, of whom one child is male and the other female, seem not to be at all rare in their occurrence, though the contrary position is generally believed, and as we have seen was assumed by Home, and made by him at one and the same time a deduction from, and an argument in favour of the particular theory which he held, in respect to sexual development. In proof of this statement, I have analyzed the records of all the labours that occurred in the Edinburgh General Lying-in Hospital from 1823 to 1836, both years included, as well as the published returns of all the cases occurring in the Dublin Lying-in Hospital from 1787 to 1793, as given by Dr Clark, and from 1826 to 1833, as given by Dr Collins,* as also those occurring in the London Maternity Charity from 1828 to 1840,† which are the only returns that I am aware of in which the average number of twin labours and the sexes of the different co-twins have been noted. The three following tables have been constructed from these reports. The first of them shows the average number of twin labours as they occurred in these institutions respectively; the second presents the sexes of the different pairs of twins as they occurred in each; and the third illustrates the proportion in which the different sexed co-twins were to the general number of labours.

I. Total number and proportion of twin-labours.

	Total number of Labours.	Number of Twin Labours.	Proportion of Twin Labours.
Edinburgh Hospital,	2888	46	1 in 63
Dublin Hospital, (Clark,)	10387	184	1 ... 56
Dublin Hospital, (Collins,)	16414	240	1 ... 65
London Maternity Charity,	29489	318	1 ... 93
	59178	788	1 in 75

II.—Sexes of the different co-twins in the above 788 cases.

	Two males.	Two females.	Male and female.	Tot. number of twins.
Edinburgh Hospital,	16	17	13	46
Dublin Hospital, (Clark)	47	66	71	184
Dublin Hospital, (Collins)	73	67	100	240
London Maternity Charity,	93	111	114	318
	229	261	298	788

III. Proportion in which the different sexed co-twins occurred to the whole 59.178 cases of labour :

Male and female twins once in every 199 labours.

Two female twins once in every 226 labours.

Two male twins once in every 258 labours.

* Dr Collins's Practical Treatise on Midwifery, 1836, table beginning p. 331.

† Dr Ramsbotham's Principles and Practice of Obstetric Medicine and Surgery, p. 621, foot-note.

The result of these two last tables goes to show, in opposition to the opinion of Sir Everard Home, that twins of opposite sexes are not by any means uncommon.* And this circumstance, of co-twins of opposite sexes occurring so proportionally frequent, may perhaps be adduced as bearing somewhat against the opinion of Mr Girou, that the sex of the offspring is determined by the sex of that parent whose reproductive power or organism (*puissance prolifique*) is at the time of conception either absolutely or relatively in the greatest degree of vigour.

But to return from this digression. The only data hitherto published, (as far, at least, as I am aware,) containing an appeal to actual facts for the determination of the question of the fecundity or infecundity of the human female, when born a co-twin with a male, are to be found in a short paper published by Mr Cribb, in the Medical Repository for 1823,† and in the notice of a single case of this kind brought forward by the late Professor Meckel, in his essay on Hermaphrodites in Reil's Archives.‡

In the paper referred to, Mr Cribb has adduced the histories of seven married women, who were born co-twins with males, of which the following is the result: six had a family; one had no children, though married several years; or one in six was without issue.

The woman mentioned by Meckel was a mother.

I have endeavoured to obtain as accurate and authentic reports as possible of the married history of various females born co-twins with males, and have so far been successful in gaining such information as I could implicitly rely upon in relation to 113 females born under such circumstances.§ Of these 113 female co-twins, 103 had a family; 10 had none; or about one in ten was without issue. Of the ten cases in which there was no family, 1 had been married above five years; 9 from ten to forty years.

The history of the male co-twin in the 103 cases in which the female was productive was as follows; in 53 he was the father of a family; in 24, he died in early life, or unmarried; in 8, he remained unmarried; in 2, he was married but had no issue; and in 14, his history could not be accurately ascertained.

In addition to the above cases of twins of opposite sexes, I have traced the married history of the female in four instances of triplets, in which there were born either two males and one female,

* As far as the data of these tables go, they would seem also to show, that, among twin births as a whole, more female than male children are produced. Out of the 1576 children born in the above 788 twin cases, 756 were male, and 820 female.

† London Med. Repos., Vol. xx. p. 213—16.

‡ Reil's Archives für die Physiologie, Bd. xi. p. 282.

§ For assistance in the collection of these cases, I am much indebted to various professional friends, and particularly to Mr F. Angus of Holytown, Mr Girdwood of Falkirk, Dr Gilchrist of Leith, and Dr Cowan and Mr Carmichael of Edinburgh. Tables, containing the name, address, and other particulars of each case, are in the hands of the Secretary of the Medico-Chirurgical Society.

or two females and one male.* In all of these four cases the female, whose history I ascertained, had a family. In a case of quadruplets, recorded in the Medical Repository for 1827, there were three males and one female. The males were all reared, and the female became herself the mother of triplets.

If we unite together all the various facts I have alluded to, we shall have the married history of 123 females born co-twins with males. The results, so far as they refer to the question we are discussing, may be stated in the following form; of 123 females born co-twins with males, 112 had a family; and 11 had no issue, though married for several years. In other words, the marriages of the females, born under the circumstances we are considering, were *unproductive in the proportion of one in ten*.

It may be at first sight supposed that this result, though it may not bear fully out, yet that it supports rather than otherwise the popular opinion and the statement of Sir E. Home with regard to the infecundity of the female in twins of opposite sexes. Before, however, assenting to such a modification of the view, it is incumbent on us to inquire

WHAT IS THE AVERAGE PROPORTION OF PRODUCTIVE AND UNPRODUCTIVE MARRIAGES IN GENERAL SOCIETY?

On this point I have been able to gain but little precise information from the statistical or physiological works that I have had an opportunity of consulting. I have made personal inquiry on the same matter at several of our most eminent statisticians without being able to obtain any accurate facts bearing on the subject. In the Dictionnaire des Sciences Medicales, Vol. vi. p. 245,† it is stated that Hédin, a Swedish minister, had noticed that in his parish, composed of 800 souls, one barren woman is not met with for ten fertile. It is further stated, that Frank asserted, (from what data is not mentioned,) that it would be found on investigation, that in most communities containing 300 to 400 couples, at least 6 or 7 would be sterile, without anything in their physical condition to explain the fact. It seems to have been from this assertion of Frank's, that Burdach, who is almost the only author who even alludes to the matter, has given the general statement that one marriage only in 50 is unproductive.‡

* In one of these cases of triplets the three, (two males and one female,) all reached adult life. Dr Merriman, (Synopsis of the various kinds of Difficult Parturition, 4th edition,) observes, p. 260, "So many years had elapsed, notwithstanding repeated inquiries, before I could meet with a well-authenticated instance of three children at a birth being all reared, that I began very much to doubt the fact." Besides the above, three other well-authenticated instances have been reported to me of triplets being viable and reared to manhood. Most certainly, however, one or more generally die shortly after birth.

† See also Neue Abhandlungen der Schwedischen Akademie der Wissenschaften, Vol. xi. p. 70.

‡ Dr Allen Thomson's excellent Essay on Generation in Todd's Cyclopaedia, Vol. i. p. 478, foot-note.

For the purpose of ascertaining the point by numerical data, I had a census taken of two villages of considerable size, viz. Grangemouth in Stirlingshire, and Bathgate in West Lothian,*—the one consisting principally of a seafaring population, and the other of persons engaged in agriculture and manufacture.

The following form the results in these two places :

Of 210 marriages in Grangemouth, 182 had offspring ; 27 had none ; or about one marriage in 10 was without issue.

Of the 27 unproductive marriages, all the subjects had lived in wedlock upwards of five years, and in all the female had been married that period before she reached the age of 45.

Again, of 402 marriages in Bathgate, 365 had offspring ; 37 had none ; or about one marriage in eleven was unproductive. There were at the same time living in the village 122 relicts of marriages, and of these 102 were mothers ; 20 were not mothers ; or about one in six had no family. In all, of 467 wives and widows, 410 had offspring ; 57 had none ; or about one marriage in 8 was unproductive. Of these last 57, six had not been five years married, and there were other six above the age of 45 when married. If we subtract these twelve, we have, of 455 marriages, 410 productive ; 45 unproductive ; or one in 10½th without issue.

Returns such as I have just now adduced are exceedingly difficult to obtain, in consequence of no registers being anywhere kept, as far as I know, that could be brought to bear upon the question. If it had been otherwise, I would here, if possible, have gladly appealed to a larger body of statistical facts, in order to arrive at a more certain and determinate average of the proportion of unproductive marriages in the general community. For the purpose, however, of extending this basis of data, I have analyzed with some care and trouble the history of 503 marriages detailed by Sharpe in his work on the British Peerage for 1833.

Among British Peers there were 401 marriages with issue ; 102 without issue ; or of

503 existing marriages among British Peers in 1833,

74 were without issue after a period of five years. Of those who had not yet lived in the married state for five years 28 were still without family, and in Burke's Peerage for 1842, there still remained among these 28 marriages

7 without issue, making

81 as the total number of unproductive marriages among the ori-

* My young friend, Mr Thomas Girdwood of Falkirk, was so good as make the census of Grangemouth for me. For the data relative to Bathgate I am indebted to the kindness of Mr William Dick of that place.

ginal 508; or the proportion of the unproductive to the productive marriages among this number is as nearly as possible, 1 in $6\frac{2}{3}$.

In the above calculation I have excluded eight unproductive marriages, in which the age of the husband at the date of marriage exceeded 56. These eight, however, ought to be deducted from the original sum of total marriages that were included, or, in other words, the 508 should be reduced to 495, and then the whole result would stand thus; among 495 marriages in the British Peerage, 81 were unproductive, or 1 in $6\frac{1}{3}$ were without any family.

The total result of the three series of facts that I have brought forward with regard to the average number of unfruitful marriages may be tabulated, then, as follows,—

	Total marriages.	Marriages without issue.	Proportion of unprod. marriages.
In Grangemouth,	202	20	1 in $10\frac{1}{2}$
In Bathgate,	455	45	1 in $10\frac{1}{2}$
In British Peerage,	495	81	1 in $6\frac{1}{3}$
	1252	146	or 1 in $8\frac{1}{2}$

We thus see that if the marriages of females born co-twins with males are, as we have found them, unproductive in the proportion of one in 10, they do not, in this respect, exceed the degree of unproductiveness of marriages in other portions of the general community. Nor would I be inclined to forego this deduction, even if the average of unproductive marriages in society should be found, on a broader and more extensive basis of data, to be less than the above facts would seem to show. For certainly my own impression is, that probably I have had reported to me, and have entered among my notes and calculations, a greater proportional number of unproductive females among opposite sexed twins than may actually exist. In relation to such a question as the present all minds are too liable to be impressed with, and recollect instances illustrative of the supposed rule and common opinion, whilst the apparent exceptions to it are unattended to or forgotten. In the earlier part of the inquiry I happened to take notes of several cases that had, in this way, been long stored up, by those that reported them to me, as evidence of the infecundity of the female co-twin, and who deemed them so far to afford sufficient proof of the popular opinion. The latter part of the investigation has, in a great measure, if not entirely, escaped this source of fallacy.

Before finally attempting to draw all the conclusions that are deducible from the facts we have collected, let us consider for a moment the question under another point of view, and inquire—

WHAT IS THE AVERAGE PRODUCTIVENESS OF MARRIAGES IN GENERAL, AND DOES THAT OF THE FEMALE IN OPPOSITE SEXED TWINS COME UP TO THE COMMON STANDARD?

Various authors, in treating of statistics and population, have calculated the average degree of fecundity of marriages in different climates and districts, as Malthus,* Macculloch,† Hawkins,‡ Suddler,§ Sussmilch,|| Quetelet,¶ and others.** Their observations show this average to vary from the number of 3 children to each marriage as a minimum, to $5\frac{1}{2}$ or $5\frac{3}{8}$ as a maximum. In an elaborate investigation into the subject made by Benoiston de Châteauneuf,†† that eminent statistician states as average results upon a large series of observations, the following general conclusions:—

In southern Europe, 457 births result from every 100 marriages, or about $4\frac{1}{2}$ from each; in northern Europe, 430 births result from every 100 marriages, or about $4\frac{3}{8}$ from each.

Mr Farret‡‡ calculates the mean fruitfulness of marriages in England in ordinary periods to be in every

Marriages.	No. of children.	Prop. of children to each mar.
100	420	$4\frac{2}{5}$

In relation to Scotland Benoiston de Châteauneuf states,§§ that he had the patience to go over the tables of population in seventeen out of the twenty-one volumes of Sir John Sinclair's Statistical Account of this kingdom, and found in every

Marriages.	No. of children.	Prop. of children to each mar.
100	430	$4\frac{3}{8}$.

What is the usual degree of fruitfulness in married life of females born co-twins with males? To make as near an approximation as possible to the solution of this question, I have added together the total number of children produced by 94 of those female co-twins, whose history I have collected. We omit the others remaining on the list, merely because we have no notes taken of the exact extent of their families. The total number of children produced by the 94 mothers alluded to, amounts to 409, or the result when stated in relation to the standard of every 100 marriages of them, would be as follows:—In

Marriages.	No. of children.	Prop. of children to each mar.
100	424	$4\frac{2}{5}$

* Essay on the Principle of Population (1803) p. 224.

† Statistics of the British Empire, Vol. ii. p. 413.

‡ Elements of Medical Statistics, p. 221.

§ The Law of Population, Vol. ii. p. 380, &c.

|| Gottliche Ordnung. Th. iii. s. 64.

¶ Sur l'Homme, ou Essai de Physique Sociale, (1836) Tome i.

** See a collection of evidence on the point in the Report from His Majesty's Commissioners for inquiring into the Poor Laws, (1834.) Appendix F. of Foreign Communications, and table in Preface, p. xcix. &c.

†† Annales des Sciences Naturelles, Tome ix. p. 431. "Notice sur l'Intensité de la Fécondité en Europe au commencement du dix-neuvième siècle."

‡‡ See Macculloch's British Empire, l. c.

§§ Annales des Sciences Naturelles, Tome ix. p. 447.

But in 15 of the 94 cases, the mother had as yet only one child at the time her case was noted, having either only lived in wedlock for a year or two previously, or the single child being the result of illegitimate intercourse. If we deduct these 15 cases only (though other mothers with a young and increasing family of two or three children might be excepted from the calculation in the same way, and on the same grounds,) we will have then 79 mothers producing 364 children; or, again, to state it in reference to the supposed standard of 100 marriages, we have this result as the degree of fruitfulness of such co-twin females. In every

Marriages.	No. of children.	Prop. of children to each marriage.
100	460	4 $\frac{4}{5}$

The whole inquiry detailed in the few preceding pages forms an apt illustration of an old remark, that in medicine it often requires a much greater extent of observation and research to disprove satisfactorily an alleged and accredited fact than was ever expended, either upon the original development or subsequent confirmation of it. In the present instance, the results have turned out to be perfectly contradictory of the opinion which I, in common with others, held regarding the infecundity of the female in double sexed twins, when I commenced looking into the subject; and instead of finding my preconceived ideas confirmed by the investigation, they have, on the other hand, been completely confuted by it. For the data that I have adduced do, so far as they go, evidently prove:

1. That, in the human subject, females born co-twins with males are, when married, as likely to have children as any other females belonging to the general community.

2. That, when they are married and become mothers, they are, in respect to the number of their children, as productive as other females.

3. That the same law of the fecundity of the female in opposite sexed twins seems to hold good among all our uniparous domestic animals, with the *exception* of the cow alone.

Indeed, the strong confirmatory evidence which the preceding inquiry affords of this last exceptional point constitutes one of its most interesting results. For certainly it cannot but be considered as an extraordinary circumstance, that, in the cow, the twin existence *in utero* of a male along with a female should, as a general principle, lead, 1. To so great a degree of malformation as we have described in the sexual organs and in the sexual organs only. 2. That this malformation should be limited entirely to the reproductive organs of the female twin, while those of the male twin are perfectly and fully developed. 3. That this sexual malformation should, apparently as far as we yet know, occur in the case of twins in the cow only, and in this species of uniparous animal alone. The curiosity of the fact becomes heightened and increased when we

recollect that when the cow has twins both of the same sex, as two males or two females, these animals are always both perfectly formed in their sexual organization, and both capable of propagating. The whole series of circumstances, when considered in conjunction with each other, seems to form, in relation to the origin of malformations, one of the strangest and most inexplicable facts to be met with in the study of anormal development.