Memoir on the Sex of the Child as a cause of Difficulty and Danger in Human Parturition.

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My object in the following observations is to show that the Sex of the child has a very marked and demonstrable influence upon the difficulties and dangers of human parturition, in relation both to the fate of the mother and of the infant.

Two winters ago I had occasion to undertake some investigations into the causes of the difficulties attendant upon parturition in the white, as compared with the black tribes of mankind; and in the human female, as compared with the female of the lower animals. In consequence of these investigations I was led to conclude that the adaptation of the head of the fœtus to the maternal canals is so very close and accurate in the process of parturition as it occurs in the female of our own race, that deviations of a

very slight degree in the relative size of the cranium of the child, and of the pelvic passages of the mother, should, when viewed on the large scale, lead to differences of a very appreciable and notable extent in the relative safety or danger of the whole process.

On further considering the subject, it appeared to me that in the slight difference which is known to exist between the size of the head of the male and female child at birth, and in the effects which this difference might or might not be traced to produce upon the results of parturition,—a criterion existed by which the truth of the opinion in question might be fully tested. It was at the same time manifest that the subject was one of such a nature that the only evidence by which it could be settled obviously consisted of an appeal to an extensive body of statistical facts. The first difficulty was the difficulty of obtaining these required data. The numerous and excellent reports of instances of morbid and instrumental labour published by various authors, are, however valuable in other respects, totally useless in regard to the present subject,—in consequence of the sex of the child being rarely or never mentioned by them in the details which they give of their individual cases. The only exception to this general remark that I am acquainted with is to be found in the admirable Practical Treatise of Dr Collins.* In his invaluable record of the morbid cases which occurred in the Dublin Lying-in Hospital during his Mastership,† Dr Collins gives, at the end of the different chapters that treat of the individual difficulties and complications attendant upon labour, a table showing, amongst other items, the *sex* of the infant in each case. Dr Collins himself properly suggests, that "an extensive record" of the kind which he has published might "materially assist the physician in obscure investigations," (Preface, p. 1.) For the data forming the grounds of the following calculations I am, as will be seen in the sequel, principally indebted to the facts recorded in Dr Collins' work, and while the inferences I am about to draw form one instance of the fulfilment of his own suggestion, regarding the utility of such data as he has collected, my deductions will, I doubt not, be regarded as the more valuable and trustworthy, seeing that the facts on which they are chiefly founded were originally collected and published by Dr Collins without apparently any view whatever to the special inquiry upon which we propose to enter.

Having made these preliminary remarks, I shall now proceed to show that the sex of the child exerts a manifest influence upon

* "A Practical Treatise on Midwifery, containing the result of 16,654 births occurring in the Dublin Hospital, during a period of seven years, commencing November 1826." London, 1836.

† "*Master* is the title of the physician to whose care this hospital is entrusted for a period not exceeding seven years." See Dr Collins' preface.

the general maternal mortality accompanying human parturition, upon the frequency and fatality of its individual morbid complications, and upon the safety and life of the infant itself, both during birth and for some time subsequently to it. In all of these respects the birth of male children is attended with much greater danger than the birth of females. In proof of this, I have to adduce different series of corroborative details. These details will probably be exhibited with the greatest clearness, in the form of such a series of propositions as the data which I have to bring forward may seem to warrant. And I may further arrange these propositions into more general heads or chapters, so as to show the effect, during parturition, of the sex of the child as bearing—1. Upon the safety and life of the mother; and—2. Upon the life and safety of the infant itself;—3. I shall enter into some investigations with the view of developing the cause of the greater comparative dangers accompanying the parturition of male children; and, *lastly*, I shall allude to some practical inferences, and attempt to point out the extent to which the mortality in childbirth and early infancy is influenced by the mere sex of the offspring.

Chapter I.—The dangers and difficulties of parturition are greater to the mother in male than in female births.

The greater danger and difficulties which the mother incurs in connection with male births may be demonstrated by an appeal both to the general mortality among parturient mothers, and by a reference to the sex of the infant in a variety of the most formidable complications that are found to accompany the process of labour.

One or two propositions, and the statistical proofs on which they are founded, will illustrate this remark.

First Proposition.

Of the mothers that die under parturition and its immediate consequences, a much greater proportion have given birth to male than female children.

During Dr Collins's term of mastership 16,414 women were delivered in the Dublin Lying-in Hospital. Of these, 164 died. Of the 164 that died, 7 had been delivered of twins, and 157 of single children. In searching for the effect of the sex of the infants in relation to the maternal mortality, I shall on this, as on other occasions, in the following remarks, reject from the calculations the twin cases, because the plurality of the offspring is an element that would obviously disturb and pervert, in different

ways, the accuracy of any investigations like the present; for the fœtuses, in compound births, are frequently of opposite sexes,—they are in general considerably below the average size and weight,—and the expulsion of the second of them, when once the maternal canals are dilated, is not attended with such obstacles, nor hence with such danger, as the passage of the first or the transit of a single child. If we confine, then, our attention to the 157 cases in which the mothers died in connection with the birth of a single child, we will find that in 3 the sex of the infant was not noted; in 105 it was male; and in 49 female. The number of maternal deaths was therefore much higher after male than after female births. But, to show with more clearness and precision the relative excess of mothers that died after giving birth to male, as compared with those that died after giving birth to female children, I shall, on this as on other occasions throughout the present essay, compute the casualties connected with female births as equal to 100, and calculate the proportion of those connected with male births in reference to this fixed standard. In this manner the absolute numbers and relative proportion of maternal deaths, after male and female births, contained in Dr Collins' returns, would, according to the above data, stand as follows:

Total maternal deaths.	In these the sex of child		Or in proportion of male to female as
	Male.	Female.	
154	105	49	214 to 100

It is proper further to remark, that 38 out of the 157 cases appear to have died from "causes not the result of childbirth." I have not been able, from the details given by Dr Collins, to separate these 38 cases from the general number, but if they were so subtracted, the remaining 119 cases would not improbably shew a greater proportion of male births in connection with those maternal deaths that thus directly resulted from parturition or its immediate effects.

Second Proposition.

Among labours presenting morbid complications and difficulties, the child is much oftener male than female.

This proposition may be proved by a reference to many of the more formidable accidents that are found to accompany labour, as convulsions, laceration of the uterus, post-partum hæmorrhage, instrumental cases, &c.

Convulsions. Of 28* cases of convulsions described by Dr

* Here, as in most other cases, our calculations include only, (as already stated,) the results of uniparous births.

Collins, in 17 the offspring was male and in 11 female; of the male children, 8 were still-born; of the female, 4.

Rupture of the Uterus. This formidable accident occurred in 34 instances during Dr Collins' mastership. In 23 cases the rupture was in connection with the birth of male children, and in 11, or in less than the third of the whole, it occurred in connection with the birth of female children.*

Puerperal Fever. From November 1826 to November 1833, 88 patients were attacked with puerperal fever in the Dublin Lying-in-Hospital. Among these 88 women, 54, or five-eighths, had given birth to male, and 34, or three-eighths, to female children.

Post-Partum Hæmorrhage. This complication is known to occur especially after those confinements in which the contractile powers of the uterus have been unusually taxed and exhausted during the previous stages of the labour. Dr Collins reports 44 cases of hæmorrhage after the expulsion of the placenta. In 31 of these the child was of the male, and in 13, or less than one-third, it was of the female sex.

Tedious and Difficult Labours. The duration of the labour was noted by Dr Collins in 15,580 cases. In 264 of these cases the process was prolonged beyond 24 hours. Dr Collins has not, in his chapter on tedious labours, published the particulars of all these 264 instances, nor given such data as to enable us to ascertain the sex of the children in them. These data would, in all probability, have shown a great overproportion of male infants,—more especially in that class of instances in which the delay was produced by protraction of the second stage of labour, in consequence of want of proper relative size between the fœtal head and the maternal passages.

In another part of his work Dr Collins details a set of facts that may in a great measure fill up the deficiency to which we allude. In his chapter on "Still-born Children" he notes a variety of important circumstances, relative to 1121 cases in which the child was dead at birth. He further observes, p. 462, "In 106 of the 1121, the labour was extremely severe, and in nearly half of these the patients had been *one, two, three,* days ill, or even more, before admission into the hospital, and most of them grossly mismanaged." He gives a short outline of 49 of the 106 cases of tedious labour in the General Table on Still-born Children, and marks out by asterisks 60 additional instances, which were, (to use his own words,) "similar in most respects to those detailed," p. 485. These two sets of cases of protracted labour

* Dr Collins adduces 20 cases of rupture of the uterus mentioned by Dr M'Keever, and out of these, in 15 the child was male, and female in the remaining 5, or in about one-fourth of the whole.

with death of the infant, amount in all to 109 instead of 106.* Out of this number the sex of the child was male in 65, and female in 44.

Forceps Cases. The forceps were used in 24 cases during Dr Collins's mastership. Of the children thus delivered, 16 were males, and 8 females. (See pp. 11 and 15.)

Crotchet Cases. "Of the 16,654 births which occurred in the hospital, in 79, (says Dr Collins, p. 486,) delivery was effected by lessening the head, on account of extreme difficulty in the labour, or where the child was dead and interference necessary for the patient's safety." In the section on Still-born Children 41 of the 79 are recorded, and references given to other 33 of the cases, (see p. 487.) Among these 74 crotchet cases that are thus noted, the offspring was male in 50, and female in the remaining 24 instances.

If we attempt to throw the proofs that we have collected of our present proposition under the seven preceding heads into a tabular form, and, taking again, for the facility of comparison, the female births at the fixed standard of 100, calculate the proportion of males to them, we shall find the result to be as follows:—

Nature of Complication.	Total Cases.	No. Male Children.	No. Fem. Children.	Propor. of Males to Females as
Tedious Labours,	109	65	44	148 to 100
Convulsions,	28	17	11	153 to 100
Puerperal Fever,	88	54	34	161 to 100
Rupture of Uterus,	34	23	11	207 to 100
Post-Partum Hem.	44	31	13	240 to 100
Forceps Cases,	24	16	8	200 to 100
Crotchet Cases,	74	50	24	208 to 100
Total	401	256	155	165 to 100

It is unnecessary to qualify the proof which the above table affords of the proposition that we have laid down by venturing to offer any comments. It is proper, however, to add that here, as elsewhere throughout the calculations of the present essay, it should be held in recollection that about 6 per cent. ought always to be deducted from the column of the male children, in consequence of there having occurred, (in concurrence with an acknowledged law in human statistics,) that proportion of male over female births during Dr Collins' term of mastership in the Dublin Hospital. He noted 8548 male births, and 8068 female births, being in the proportion of 106 males to 100 females.

* In 97 of these 109 instances of tedious labour, the number of hours during which the patients were in labour is stated. Five were under 12 hours in labour; 14 were from 12 to 24 hours; 19 were from 24 to 36 hours; 27 from 36 to 48 hours; 21 from 48 to 60 hours; 10 from 60 to 72 hours; and 1 was 90 hours ill.

Whilst it is requisite to correct our arithmetical results and tables to this extent, it will, at the same time, at once be seen that the required deduction is so slight as not in any material degree to interfere with the essential evidence of our various propositions.

Chapter II.—The dangers and accidents from parturition and its results are greater to the child in male than in female births.

The increased danger to infantile life dependant upon the sex at birth, may be demonstrated by a reference to the sex of the children in those cases in which the mothers die from labour or its consequences. It may be proved still more strongly and easily, by an appeal simply to the sexes of those children that are dead at the moment of birth, (and without any regard to the fate of the mother;) and by the consideration of the comparative number of accidents and deaths among male and female infants, consequent upon delivery.

We proceed to illustrate each of these points in the form of two or three propositions and their proofs.

Third Proposition.

Amongst the children of the mothers that die from labour or its consequences, a larger proportion of those that are still-born are male than female; and, on the contrary, of those that are born alive, a larger proportion are female than male.

This proposition may evidently be considered under two heads. In the first place, we shall show that a greater proportion of male than female children are found among those infants that were brought forth still-born, by mothers who themselves died from labour or its consequences.

During Dr Collins's mastership there occurred, as we have formerly seen, 154 cases in which the mother died after the birth of single children. The 154 mothers produced 105 male and 49 female children.

The result of the mortality of these infants at birth relatively to their sex, may be reduced to the following short tabular form.

Total male births 105; of these born dead 50, *or* 49 *per cent.*
Total female births 49; of these born dead 16, *or* 34 *per cent.*

In the second place, we remark, that, of those children who were born alive by mothers that died from labour or its consequences, a greater proportion were females than males.

Here we must again take into our calculation the number of mothers who died after uniparous births in connection with the absolute number of male and female children which they produ-

ced, when the result, as far as regards those children who were born alive, may be stated in the following form :—

Total male births 105; of these born alive 55, *or* 52 *per cent.*
Total female births 49 ; of these born alive 33, *or* 67 *per cent.*

The general proposition may be further proved and illustrated by throwing the results we have just given into one such common table as the following:

Sex.	Total number.	Of these dead.	Of these living.	Proportion of dead to living as
Male,	105	50	55	95 to 100
Female,	49	16	33	48 to 100

Or to state it conversely :—

Sex.	Total number	Of these living.	Of these dead.	Proportion of living to dead as
Male,	105	55	50	110 to 100
Female,	49	33	16	206 to 100

We thus observe, that, amongst the children of mothers dying after uniparous labours, males are born *dead* in the ratio of 95 to 100 living, while with females the ratio amounts only to 48 dead to 100 living. But we find, on the other hand, under the same circumstances, that males are born *living* in the ratio of 110 to 100 dead, while among females the average amounts to the ratio of 206 living to 100 dead.*

Fourth Proposition.

Of still-born children a larger proportion are male than female.

It has already been stated, that, including the whole births in the Dublin Hospital, the male children born were, to the female, in the ratio of 106 to 100. By extended statistical returns, a similar observation has been proved to hold good as a general law in human reproduction, at least among European females.† M.

* It was not till after the preceding calculations and remarks had been written out that I met with the following confirmatory statement in Dr Clarke's able letters to Dr Price. (See Philosophical Transactions for 1786, p. 349.) Speaking of the maternal mortality in the Dublin Lying-in Hospital from 1757 to 1784, Dr Clarke observes—" I found that of 214 women dead of single children, 50 were delivered of still-born males, and 15 of still-born females; 76 of living males, and 73 of living females." Hence, calculating upon these data of Dr Clarke, it would appear that, during the above period, male children were born dead in the Dublin Hospital in the ratio of 66 to 100 living, while with female children the ratio amounts only to 20 dead to 100 living; and, on the other hand, the males were born living in the ratio of 152 to 100 dead, whilst the females were born living in the much higher ratio of 487 to 100 dead.

† For an exception among the free population residing at the Cape of Good Hope see Hawkins' Medical Statistics, p. 51. It is not unworthy of remark, that, among twin children, there seems to be more females than males born. In the Edinburgh Medical and Surgical Journal for January 1844, p. 113, I have reported the sexes of the children in 788 twin cases. Among these there were 756 males and 820 females, or the males were to the females in the proportion of 92 boys to 100 girls.

Bickes, whose results are founded on seventy millions of observations, has shown the proportion of male births to female births to vary in European nations from 104 to 108 boys for every 200 girls.*

All writers on human statistics seem further to acknowledge, that, among still-born children, males occur in a much greater ratio than females. This ratio exceeds very considerably the normal disproportion between the sexes at birth, and is therefore not explicable by it.

The excess of male still-births and the different degrees of it in different returns may perhaps be exhibited most simply in the form of a table, such as we have used in speaking on this subject in our lectures, and which we here insert.

Locality.	Proportion, among Still-born Children, of Males to Females.	*Reporters.*
In Amsterdam,	120 to 100	*Lobatto.*
Geneva,	125 — 100	*Mallet.*
Wurtemburg,	127 — 100	*Riecke.*
Prussia,	135 — 100	*Hoffman.*
Halle,	140 — 100	*Guele.*
London,	140 — 100	*Bland.*
Berlin,	142 — 100	*Süssmilch.*

During Dr Collins's superintendence of the Dublin Hospital, 1121 children were born dead. The number of males to females among these 1121 children stood as follows:

Still-born males	Still-born females.	Or in proportion of males to females as
614	507	122 to 100.

In Dr Collins's reports, the over-proportion of still-born males, though strongly marked, is not so great as in some of the other returns we have quoted. We believe that probably the variation in this respect among the evidence adduced in the preceding table, may be partially explained by the supposition, that, in some of the returns, premature children, and perhaps in others those that were putrid at birth, have not been included. At all events, whenever these are omitted, the number of still-born males in proportion to females will be found to increase. In other words, if we limit our calculations to infants still-born at the full time, and if we consider only those that die during the process of labour, we shall find among them the ratio of males to females to be greatly higher than the average is among still-born children taken indiscriminately, and without reference to the time and cause of their death.

We shall devote our next proposition to the proof of this.

* Die Bewegung der Bevölkerung mehrerer Europ. Staaten.

Fifth Proposition.

Of the children that die during the actual progress of parturition, the number of males is much greater than the number of females.

It will easily be seen that the data required in proof of this proposition are very difficult to be obtained. Indeed, they could only be accurately ascertained by a series of minute observations instituted through the medium of the stethoscope. This has not yet been done, as far as we know, by any observer. From the want of such evidence, we are under the necessity of approaching as nearly as possible the proper proof, by taking advantage of a mark entered in the elaborate tables of Dr Collins. He has placed a note of "p," (signifying putrid,) opposite to all those children that were born in that state. These "putrid" children had evidently all, or almost all,* died from causes that had operated during intra-uterine life, and before the commencement of parturition. We may, therefore, properly reject such infants from our present calculations, inasmuch as these calculations refer only to children dying *during* the continuance and progress of the parturient process. Of the 1121 children that were still-born, as many as 527 were found putrid at birth. The sexes of the remaining 594 stand in the relation shown by the following table.

Still-born children not putrid.	No. of Males.	No. of Females.	Proportion of males to females as
594	357	237	151 to 100

In the general rate of infantile mortality at birth, we have already seen, under the previous proposition, that in Dr Collins's cases the proportion amounted to about 122 males for every 100 females. In the present instance, and when the children that had died some time before labour began, are excluded, the ratio rises as high as 150 boys to every 100 still-born girls, or as 3 to 2. We might further, from the 594, exclude 62 premature still-born children that were not putrid, (viz. 37 males and 25 females) and retain only those that had reached the full time. This, however, would not alter our results above 1 in the column of 151 males.

But the ratio of these male still-births would probably have been made somewhat greater, and our present proposition still more strongly borne out, had we been able, on the one hand, to take into the calculation those children only who died subsequent to the commencement of the process of parturition, and to ex-

* For two remarkable exceptions see Dr Collins's treatise, p. 470 and 483, cases 461 and 1058. In a paper on Peritonitis in the Fœtus, (Edin. Med. and Surg. Journal, Vol. L, p. 390,) I have attempted to show that a large number of those children that are still-born and putrid have died of peritoneal inflammation.

clude, on the other hand, all those that perished, however shortly before, under the influence of other morbific agents than the effects of labour. The fact of the still-born children being "putrid," shows generally that death has occurred several days at least before birth. It is a condition which has enabled us therefore to exclude most, but not all, of those who had died antecedently to the commencement of actual labour. I repeat that, if we had possessed the power of excluding all—and thus so far improving our data—the proportion of male to female children who died during labour (high as we have shown it to be,) would, in all probability, have been found raised still higher.

Sixth Proposition.

Of those children that are born alive, more males than females are seen to suffer from the morbid states and injuries resulting from parturition.

Among the accidents and injuries to the child, more immediately resulting from parturition, no one has, of late years, been made the subject of such minute pathological investigation as the "bloody tumour" or "ecchymosis" of the head,—the *Cephalæmatoma neonatorum* of Naegele, Valleix, Dubois, Walshe, and various other modern authors. "The unequal pressure," says Velpeau, "which the cranium experiences, and the tendency that its bones have to over-ride one another, during most labours, when the head is traversing the pelvis, and whether the labour be natural or artificial, is incontestibly the most common cause of this tumour." (*Traité Complet des Accouchmens*, Tom. ii. p. 594.) No author, that I am acquainted with, has given any statistics regarding the sexes of the infants affected with cephalomatomata, with the exception of Burchard. The data which he adduces are not so extensive as could be wished, but still they furnish strong and indubitable proof of our present position. In his essay, "De tumore cranii recens-natorum sanguineo," he mentions that out of 43 cases, which he had observed at the Breslaw Hospital, the child was male in 34 and female in 9 of the instances, so that the relative frequency of the disease in the two sexes stood thus:—

Male Children.	Female Children.	Proportion of Males to Females.
34	9	377 to 100

I am not aware that there has been hitherto published such data regarding serous swellings of the infant's scalp (the *caput*

succedaneum of the older authors), or the asphyxia or apoplexy of children at birth, or any of the other accidents to which they are subjected during labour, as would enable us to make similar calculations with respect to them. As they are all confessedly more or less direct results of the physical pressure which the infant's head suffers during parturition, the calculations, derived from one, would probably apply with greater or less force to each of the others. Since additional data from *individual* morbid states and injuries are thus wanting in support of the proposition we have laid down, we shall appeal, in confirmation of it, to some calculations we have made from Dr Collins's data regarding the *general* mortality observed among children immediately after delivery. In his chapter on "Children dying in the Hospital," Dr Collins observes, "thirty-two children born at the full period died a few minutes after birth; in six of these respiration could not be established, though the heart's action continued for some time." (P. 501.) Dr Collins does not offer any clue by which these 32 cases can be discovered in the table attached to this chapter, and thus their sexes ascertained. I find, however, in that table, that 17 single children, born at the full period, are marked as dying within the first half-hour after birth. They hence probably perished from morbid states the more immediate results of labour. Of the 17 children, 9 died within five minutes after birth; 1 in 10 minutes; 4 in fifteen minutes; and 3 in thirty minutes. One of the 17 children was female, and 16 of them males. If we might venture to make the same form of calculation, as we have hitherto used, of the respective sexes of the children from these very small and insufficient data, it would stand thus:

Male Children.	Female Children.	Proportion of Males to Females as
16	1	1600 to 100

Seventh Proposition.

More male than female children die in the earliest periods of infancy; and the disproportion between the mortality of the two sexes gradually diminishes from birth onwards till some time subsequently to it.

This proposition follows as almost a necessary corollary from those that have preceded it. If, in consequence of the pressure and greater injuries to which male children are subjected during birth, more male than female infants perish during labour; and if, again, among those born alive more males than females are found to suffer under such morbid states as are the immediate results of parturition, it might justly be *a priori* expected that the same

causes which produced these results during delivery and immediately after it, would so far *continue* to affect the male constitution, for some time subsequently, as to predispose it more to disease, and likewise render the diseases which did occur in it more dangerous and fatal in their course than those that affect the female. Further, if this greater liability to morbid action, and its greater intensity and fatality in the male, as compared with the female infant, were the consequence of the male being subjected to greater physical injuries at the time of parturition, the pathological characteristics in question should be observed to diminish more and more in the male system from the moment of birth onwards, because the morbific effects, resulting from any cause or causes operating during birth, would thus progressively diminish, and ultimately pass away. At last, therefore, at some date in early infantile life, the mortality among male and female children, though very different at first, should become nearly or entirely equal. And such, indeed, is the actual state of facts, when the mortality during infancy is investigated upon a large scale. Thus in his observations regarding the "influence of sexes" upon mortality, Quetelet, in his elaborate "Treatise on Man," remarks, as a matter of statistics, that among male as compared with female children, "the ratio of deaths before [during] birth is as 3 males to 2 females; during the first two months after birth the ratio is as 4 to 3; during the third, fourth, and fifth months as 5 to 4; and (he adds) after the eighth or tenth month a difference scarcely exists."*

I shall endeavour to bring forward some statistical evidence in support of the preceding statements.

Dr Collins has given in his Treatise, (p. 519, &c.), a table containing a variety of particulars regarding 284 children that died in the Dublin Hospital within a few days after their birth. Excluding twins and premature children, the date of the death of 148 of these infants is noted in the table referred to. Six of them died on the 8th day after birth; two on the 9th; and one on the 10th. These nine included 5 boys and 4 girls. With regard to the remaining 139 infants that died during the first seven days after birth, the following table, which has been compiled with considerable care, will show the periods of their demise, and the relative proportion which the mortality among the male and female children presented at different dates during the first week of life.†

* Treatise on Man, Chambers's English edition, p. 50.

† The time the mothers remained in the institution in most instances was for "a period of eight, nine, or ten days after delivery."—P. 500 of Dr Collins' Treatise.

Period of Death.	Males.	Females.	Proportion of males to females.	*Ratio of excess of male mortality.*
Within first half hour,	16	1	1600 to 100	1500
Within first hour,	19	2	950 to 100	850
Within first 6 hours,	29	7	414 to 100	314
Within first 12 hours,	34	15	226 to 100	126
Within first 18 hours,	36	19	191 to 100	91
Within first day,	49	28	175 to 100	75
Within first week,	80	59	136 to 100	36

The last column in the above table shows in the most striking manner both the great proportion of male over female deaths in the first few hours and days of extra-uterine existence, and the rapid diminution which takes place from the moment of birth onward in the relative superabundance of the male over the female mortality. The principal and strong objection that may be urged against the table is the small number of data which is made in it the basis of such interesting statistical deductions. I have given it, however, such as it stands, in consequence of the want, as far as I know, of any more numerous or complete series of similar facts bearing upon the relative male and female mortality in the first week of life. Against the table which I have next to bring forward the same objection cannot be urged, as the individual data are sufficiently ample, and yet the results are exactly the same in their nature, and equally confirmatory of the proposition we are discussing. For the data upon which I have constructed the table, I am indebted to an elaborate extract of deaths at different ages, contained in one of the invaluable reports of the Registrar-General of England. At pp. 144 and 145 of his Fifth Annual Report, (the last published), are given, in two separate tables, the numbers, ages, and sexes of all the individuals that died in England and Wales in the year 1841. In that year 134,563 died who had not passed the age of five; namely, 71,595 males and 62,968 females. In the following table I have arranged these data regarding the male and female deaths, and made calculations from them of such a kind as bear upon the objects of our present proposition

Total number and relative proportion of male and female deaths, during the year 1841, in England and Wales, within the first five years of life.

Ages.	Males.	Females.	Proportion of males to females.	*Ratio of excess of male mortality.*
0 to 1 month,	13,351	9,741	137 to 100	37
1 to 2 months,	4,858	3,703	131 to 100	31
2 to 3 months,	3,313	2,676	124 to 100	24
3 to 6 months,	8,008	6,451	122 to 100	22
6 to 9 months,	6,341	5,182	110 to 100	10
9 to 12 months,	5,573	5,013	105 to 100	5
1 to 2 years,	13,987	13,281	100 to 100	0
*2 to 5 years,	16,164	15,941	101 to 100	1

A different arrangement of the facts included in the preceding table may probably show still more strikingly the great proportionate male mortality in the period immediately following birth. During the second year of life, that is, from the twelfth to the twenty-fourth month, 13,987 males and 13,281 females died, or nearly an equal number of the two sexes, the excess on the part of the males amounting only to about 700. During the first month of life, that is, from birth up to the twenty-ninth day following it, there died of male infants a number nearly similar to those that perished in the whole course of the second year, namely, 13,351. But the corresponding female mortality during the same period was very much less, amounting only to 9741. Whilst the difference, therefore, between the mortality of the two sexes, during the second year, did not, in the numbers given, show an excess of much more than 700 on the side of the males, this excess ran to upwards of 3500 during the single first month of life, or was five times greater in amount. A tabular arrangement of these figures will point out this contrast more plainly.

Deaths in England in 1841.	Of male children.	Of female children.	*Excess of male mortality.*
During first month of life,	13,351	9,741	3610
During second year of life,	13,987	13,281	700

If it were necessary, and our space permitted, it would be easy to adduce additional tables, constructed from the Registrar's Returns for other years for England and Wales, and from the re-

* In England the proportion of living males and living females does not become equal till about the twentieth year of life. After that period, an excess of the living population is female; before it, a small excess of them is of the male sex, there being originally born from 105 males for every 100 females.—(Fourth Report, p. 12.) Hence, other circumstances being equal, a slightly greater number of males than of females should necessarily be found in the mortality bills in early life, as seen in the last two lines of the table.—(See the Registrar's Fifth Report, p. 23).

ports of the mortality in other countries, showing, in correspondence with our proposition, the two facts, 1*st*, that the male mortality, as compared with the female, is much greater immediately after births, and 2*d*, that the male excess of deaths gradually and regularly diminishes from that time onwards, to about the end of the first year of life. The only new and remarkable circumstance that would be proved by these additional tables is, that the rate of the decrease of the male mortality is every where nearly the same.

In illustration of this last remark, I shall content myself with giving the male as compared with the female infantile mortality in England during 1841, and in Western Flanders from 1827–30. The Flanders mortality is calculated upon a return of 37,203 deaths for the first five years of life, including 21,198 males and 16,005 females.*

Ages.	Male mortality in England.	Male mortality in Flanders.	Female mortality.
0 to 1 month,	137	139	100
1 to 2 months,	131	128	100
2 to 3 ...	124	126	100
3 to 6 ...	122	122	100
†6 to 9 ...	110	117	100
†9 to 12 ...	105	104	100
1 to 2 years,	100	103	100
2 to 5 ...	101	99	100

Chapter III.—Causes of the greater maternal and infantile danger and fatality accompanying the birth of male children.

On this point Dr Clarke, in his excellent "Observations on some Causes of the Excess of the Mortality of Males above that of Females," published in the Philosophical Transactions for 1786, justly remarks, it may be safely asserted, "that anatomy has not hitherto detected any internal difference between the animal economy of the male and female, which can be supposed to account for their difference of mortality, more especially in early infancy," p. 352. The same author then suggests two sets of causes in explanation of the higher mortality among male children, namely, *first*, their larger size and consequent more difficult delivery; and

* See Quetelet on the Natural History of Man, p. 30. The town and country mortality are given separately by Quetelet. I have added both together, and computed the proportions in the table from their conjoined sums.

† The dates of the two original returns, from the 6th to the 12th month, do not precisely correspond. In the English tables the returns are from the 6th to the 9th month, and from the 9th to the 12th; in those of Flanders the corresponding returns here calculated upon are from the 6th to the 8th month (not the 9th) and from the 8th to the 12th. The 8th month is not given separately in the published returns, for if so, we would have been enabled to equalize the two exactly.

secondly, their greater liability during their intra-uterine life to disease and debility, from their requiring, in consequence of their size, more actual nourishment from the mother than smaller female children stand in need of. We shall discuss this latter opinion before attempting to show the greater truth and correctness of the former one.

"As the stamina of the male are naturally," (says Dr Clarke,) "constituted to grow of a greater size, a greater supply of nourishment *in utero* will be necessary to his growth than to that of the female. Defects in this particular (nourishment), proceeding from delicacy of constitution or diseases of the mother, must, of course, be more injurious to the male sex."*

"It appears beyond doubt," (says Quetelet,) "that there is a particular cause of mortality which attacks male children by preference, before and immediately after their birth." "It will be interesting," (he further observes,) "to investigate the causes of a circumstance which is so unfavourable to the male sex." "If," (he continues,) "we were desirous of guessing at this point, we might say with those who suppose that a male conception requires a certain excess of energy in the woman, that this excess of energy was absent or wanting during the growth of the fœtus, and, that energy failing, the child would suffer more from it if a boy than if a girl. Hence the disproportion of dead births between the sexes," &c.†

In a review of Dr Collins' Treatise in the Dublin Medical Journal, Dr Graves makes several remarks on the same subject. After showing that Quetelet and Caspar had found respectively in Flanders and Prussia the number of still-born males to still-born females to be 140 to 100, and that in Paris the ratio was 122 to 100, Dr Graves adds, "In Dublin, Dr Collins' numbers give the proportion very nearly the same as that of Paris, so that here we have the additional fact corroborative of those already brought forward, to prove that *a greater* mortality before birth prevails among males than females,—a most curious result well calculated to puzzle both physiologists and philosophers."‡

I shall not attempt to solve, as Clarke and Quetelet have done, the problem broached by Dr Graves, but will content myself with showing, that the observations on which it is founded are in themselves erroneous, and that the tables of Dr Collins (appealed to by Dr Graves) prove, when studied minutely, that, contrary to the general opinion entertained on this point, a greater mortality does *not* prevail before birth among male than female infants. With this view, we bring forward the following as our

* Philosophical Transactions, Vol. lxxvi. p. 353.
† Treatise on Man, English edition, pp. 25 and 30.
‡ Dublin Journal of Medical Science, Vol. viii. p. 518–9.

Eighth Proposition.

Of the children that die in utero, and before the commencement of labour, as large a proportion are female as male.

I have already had occasion to state, that, among the 1121 still-born children so often already referred to as occurring during Dr Collins' mastership, 527 were putrid, and hence had perished before the supervention of parturition.

If we contrast together the proportionate number of males and females among these 527 children; as well as the sexes of the infants among them that were born at the full time, but putrid; and the sexes of all those that were still-born prematurely, whether putrid or not, we shall find the result to be as follows:—

State of the Children.	Total cases.	Male.	Female	Proportion of Male to Female.
No. of still-born putrid children,	527	257	270	95 — 100
No. of still-born at full time & putrid,	296	148	148	100 — 100
No. of premature still-births,	293	146	147	100 — 100

This table seems particularly valuable and instructive in one respect. It demonstrates satisfactorily, that the intra-uterine morbific agencies (whatever they may be) which act fatally on the fœtus before birth, act equally on the female as on the male child; and that it is to other agencies than these that we are to look for the remarkable proportion of male over female deaths which is observable among still births.

In premature births the comparative compressibility and flexibility of the bones of the cranium is so decidedly greater as to offer no such marked difference between the size and resistance of the male and female head, as we shall immediately see, to exist at the full time.

Now the last column of the table shows, that, in this class of still-births (the premature), the number of dead-born male and female children was exactly equal. The second column testifies, that the same fact holds true of children born at the full time, and in a state of putridity. Further, in looking to the evidence afforded by the first column, we may there observe, that of *all* the children that had perished from intra-uterine causes, and before the commencement of labour (as demonstrated by their putrid state), the females were even more numerous than the males.

The whole series of facts proves (contrary to what is generally alleged), that the proportion of male children that die *before* birth is not greater than the proportion of females. Indeed, if we deducted the usual 6 per cent. for the normal over-proportion of males, the ratio of girls dying before parturition would be found to be greater than that of boys,—a conclusion which the first

column would seem to go far to corroborate and strengthen, for in that computation the number of the dead females distinctly and considerably exceeds that of the dead males.

This result, with regard to the equality of the sexes among putrid and premature still-born children, becomes only the more striking when we couple and contrast it with the fact which we have already brought out, that of the children who are still-born, and *not* putrid, as many as two out of every three are boys. In other words, among the infants that die *before* labour, the females are equal, if not greater, in number than the males. Among the infants that die *during* labour the males are raised to the high proportion of 150 boys for every 100 girls. For this sudden and surprising increase, during labour, of the male infantile mortality over the female, there must be some cause or causes traceable in the conditions of the process of parturition. Let us now see, in accordance with what we have already proposed, whether the cause or causes in question be referrible to the greater size of the male infant, and the effects of this size upon the compression of the cranium and its contents. And in order to understand more thoroughly the investigation, let us inquire, in the first place, into the actual average difference between the volume and weight of the male and female at birth.

RELATIVE WEIGHT AND SIZE OF THE MALE AND FEMALE AT BIRTH.

In the Dublin Hospital, Dr Clarke long ago endeavoured to discover the relative weights of the new-born male and female child, by observations made upon 60 children of each sex. In his paper in the Philosophical Transactions of 1786, (to which we have repeatedly referred), he gives both the absolute and average weights of these 60 male and 60 female infants.

The 60 males weighed in all 442 lbs.*

The 60 females weighed in all 404¼ lbs.

The average weight of the male was 7 lbs. 5 oz. 2 dr.

The average weight of the female was 6 lbs. 11 oz. 2 dr.

The average difference between the weight of the male and female child, as calculated from these 120 instances, thus amounted to about nine ounces.

In the Edinburgh Lying-in Hospital, 50 male and 50 female children, born during the latter months of 1842 and the earlier part of 1843, were weighed by my friend and assistant, Dr Johnstone.

The 50 males weighed in all 383 lbs. 11 oz. 4 dr.

The 50 females weighed in all 342 lbs. 12 oz. 4 dr.

* The Troy or Apothecaries' weight is there used.

The average weight of the male was 7 lbs. 9 oz. 1 dr.

The average weight of the female was 6 lbs. 12 oz.

The difference between the weight of the male and female child, as calculated from these 100 cases, thus amounted to about ten ounces on the average.

The respective lengths of these 50 male and 50 female children were also carefully ascertained in the Edinburgh Hospital.

The total length of the 50 males was 1020½ inches.

The total length of the 50 females was 990½ inches.

The average length of the male child was 20 inches 5 lines.

The average length of the female child was 19 inches 10 lines.

The average difference between the length of the 50 males and 50 females thus amounted to 7 lines, or somewhat upwards of half an inch.

These results are sufficient to prove, that at birth, as at other subsequent periods of life, the male is usually of a greater weight and size than the female. The general volume, however, of the *body* of the child is not, in relation to the mechanism of parturition, a matter of such immediate importance as the size of the *head* itself, the facility or difficulty of the progress being principally dependant upon the relative size of the latter. The greater weight and volume of the male than the female child at birth might, *a priori*, entitle us to calculate that the head of the male would, in correspondence with the other parts of the body, be larger than the head of the female. In such an inquiry, however, as the present, it is better to refer to direct arithmetical facts than indirect though probable inferences, and Dr Clarke has left us a series of measurements of the heads of male and female children, at birth, that are valuable in giving us more precise ideas upon this point. His observations were made upon the 60 male and female children whose respective weights we have already detailed. "For measuring their heads, I made use," he observes, "of a piece of painted or varnished linen tape, divided into inches, halves, and quarters. I took *first* the greatest circumference of the head from the most prominent part of the occiput around the frontal sinuses; and, *secondly*, the transverse dimensions from the superior and anterior part of one ear across the fontanelle to a similar part of the other ear." These data appeared to me the most likely to afford data for determining the respective sizes of the brain in the different sexes." (P. 358).

The result of Dr Clarke's measurements may be exhibited in the following manner.

Since these remarks were sent to press, I have incidentally met with the following remark in Dr Forbes's Quarterly Medical Review, Vol. x. p. 492. "M. Nevermann gives us the results of the measurements of the heads of 384 children by Professor Thulstrup of Christiana, which fully bear out Dr Clarke's statements."

	Absolute dimensions in 60 males.	60 females.	Average dimensions in 60 males.		60 females.	
	Inches.	Inches.	Inches.	Lines.	Inches.	Lines.
Circumference of head,	839	817	13	11⅔	13	7⅔
Dimensions from ear to ear,	445¾	433¼	7	5⅐	7	2¾

The difference brought out in the preceding table, between the male and female head, may appear more precise if we reduce them to decimal figures.

	Average circumference of head.	Average dimensions from ear to ear.
	Inches.	Inches.
In male child,	13.983	7.429
In female child,	13.617	7.221
Difference,	0.366	0.208

According to these observations upon new-born children it would appear that,

1. The head of the male infant, when measured across from ear to ear, over the fontanelle, is about 2⅐ lines, or nearly two-eighths of an inch greater than that of the female.

2. In circumference, the head of the male is 4⅔ lines, or almost precisely three-eighths of an inch greater than that of the female. Hence,

3. The *transverse* diameter of the male head is nearly one-eighth of an inch greater than the transverse diameter of the head of the female child.*

The preceding difference between the absolute size and weight of the male and of the female child at birth, and between the relative dimensions of the male and female infantile head, may appear to some to be on the whole so slight, as not to afford in themselves any sufficient explanation of the differences that we have seen to exist, between the dangers and mortality incident respectively to male and female births. The general greater size of the head and body of the boy at birth may not seem adequately to account, by any influence traceable to it alone, for the general

* Calculating upon the accuracy of Dr Clarke's linear measurements of the fœtal head, it would appear that the *surface* of the cranium of the male infant, (*above* the circumferential line of measurement,) is about 27.8 square inches; that of the female about 26.3 square inches. The arch of the male cranium, at birth, is therefore, superficially, upwards of one square inch greater than that of the female. To state it in other words, the proportion of the surface of the head of the male new-born child to that of the female is nearly as 19 to 18,—or the surface of the head of the female is one-nineteenth part less than that of the male.

greater peril and fatality accompanying the birth of male as compared with female children. The alleged cause may appear unequal to the production of the alleged effects. Let us state, therefore, the reasons that induce us to hold the contrary opinion, and which impress us with the belief that the difference between the size of the male and female head at birth (inconsiderable as it may seem) is the true cause of the greater danger and fatality to mother and child, which accompanies the parturition of male infants.

Before doing so it may be proper to premise, that under our fifth and eighth propositions I have already shown, on the one hand, the explanation of the cause of the greater number of male than female still-born infants proposed by Clarke, Quetelet, &c., as depending upon intra-uterine agencies, is totally incorrect, and disproved by statistical facts; and, on the other hand, we have seen that the increased mortality of children of the one sex over the other at the time of birth is a result of some circumstance or circumstances connected with, or at least only in operation during the process of labour. Whilst this holds true as regards the child, it is of consequence, at the same time, to recollect that the complications and dangers on the part of the mother, which we have found so much more frequently attendant upon male than female births, are all of such a nature as to be confessedly the direct or indirect consequences of causes acting during parturition Further, it will, we imagine, be granted by every accoucheur, that whatever circumstance or circumstances may, by operating as a cause of obstruction, lead to the greater danger and fatality of the male infant during the progress of labour, will, at the same time, in all probability, equally explain that greater peril and fatality to the mother during the process, which is incident to the births of males.

For the solution of the present problem, both as regards the fate of the mother and of the infant, we believe that we ought to look alone to the greater size of the head of the male infant, and that for a variety of reasons which we shall now endeavour to state *seriatim*, adding such illustrative remarks and evidence as they may seem to require, and throwing the more important deductions that may seem to flow from the statistical proofs brought forward into the shape of additional propositions.

Reasons for considering the greater size of the head of the male child as the cause of the greater number of complications and casualties accompanying male births.

We shall begin our enumeration of these reasons by stating that,

***First**, For the very marked differences existing between the difficulties and perils of male as compared with female births, there is no other traceable cause in the mechanism of parturition except the larger size of the head of the male child.*

Parturition, at the completed term of pregnancy, is a process consisting of a combination of mechanism, intended for the extrusion of the full-grown infant from the cavity of the uterus. For the perfect action of this mechanism, three sets of physical conditions are essentially necessary. *First*, A certain degree of mechanical expulsive power is required, and this is supplied principally by the vital contractions of the uterus. *Secondly*, An adequate degree of capacity and dilatation is necessary on the part of those maternal passages through which the child is to be expelled. *Thirdly*, The body which is to be expelled (viz. the infant) must be of such size, and be placed in such a position or positions as to allow of its sufficiently easy entrance and progress through these maternal passages. A perfect and equitable adjustment between these three different conditions is necessary to the constitution of natural labour; and on the other hand, a deviation—absolute or relative—in any one or more of these conditions leads on to tedious and difficult parturition, and its results. In which of these three essential conditions could a deviation be possibly effected by the sex of the child, so as to account for the greater dangers and complications attendant upon male births?

The mere sex of the child, and the circumstance, whether it was a male or female, could evidently produce no primary effect upon the vital muscular contractions of the uterus, so as to alter them in any morbid manner. Consequently we may exclude from our consideration the first set of physical conditions that we have above named.

We may do equally the same with the second, because it is impossible to conceive that the measurements of the pelvis and maternal passages could be directly altered in any way by the child which was to pass through them being male rather than female.

In searching for a possible cause of deviation in the mechanism of parturition, explanatory of the facts which we have traced, we are thus by a method of exclusion compelled to look to the third set of physical conditions of labour, viz. the position and size of the infant.

The consideration of the position of the infant will afford us no clue to the problem, because in most of the cases from which we have drawn our data the presentation and position were natural. When it was otherwise, the deviation was as frequently on the part of the female as of the male child.

The only item, therefore, that is left in which we may trace any

distinction whatever between the mechanism of labour in male and in female births is the relative greater size of the infant of the male sex, and this relative greater size could only influence labour or its consequences in as far as it affected the dimensions of the *head* of the child,—the increased volume of its body never, unless when excessive in degree, retarding or complicating to any extent the progress of the labour in cases of cephalic presentations. The difference between the male and female infant's head is indeed slight, but we are forced, at this stage of the inquiry, to believe it to be the probable origin of the greater dangers and more numerous complications accompanying male births, simply in consequence of our being utterly unable to trace any other appreciable difference, or imagine any other possible circumstance, in the conditions of parturition, that could afford the most distant explanation of the series of phenomena that we are discussing. It is the only circumstance which we can detect as an apparent and constant antecedent to the consequences we have described; and hence seems to be that particular condition which we ought to look upon as the cause of these effects.

In the foregoing remarks we have arrived at the conclusion that has just been stated by a kind of reasoning by exclusion. The argument we have been considering is in a great measure negative. But others of a more positive character are not wanting in confirmation of the same view. For,

Secondly, An increase in the effects may be shown to be connected with an increase in the alleged cause.

"When," observes Dr Hamilton, "the head of the infant is pushed foremost, and the labour is not completed within twenty-four hours from its actual commencement, the case is styled laborious, and it may terminate in one of three ways. Thus, the natural powers may at last complete the delivery; or, though these fail, it may be possible for the practitioner to complete the delivery by mechanical means, with safety both to mother and child; or it may be impossible to draw the infant alive through the natural passages. These *three* several terminations constitute *three different orders of laborious labours.*"* (Outlines, p. 45.)

Now, if it were granted us, for the sake of argument alone, that the greater obstacles and perils attendant upon male births are attributable to the larger size of the male infant's head, it would almost necessarily follow, that as in proportion as the difficulties connected with the above three different orders of labori-

* "It is," says Dr Churchill, "peculiar to midwifery operations, [and the same remark applies equally to the different orders of laborious labours,] that they form an ascending series, increasing in gravity from the simplest to the most severe,—no two being equal."—Researches in Operative Midwifery, p. 12.

ous labour progressively increased over one another in intensity, the amount of male children connected with these labours would, in like manner, probably progressively increase in number.

Let us interrogate the data to be found in Dr Collins' reports in order to test practically the truth of an opinion which is so far merely theoretical.

Under the second proposition, we have had already occasion to state that, during Dr Collins' mastership in the Dublin Lying-in Hospital, among the 16,414 labours which he has reported, the sexes of the infants born were in the proportion of 106 males to 100 females.

Out of 109 tedious and difficult labours, in which Dr Collins has recorded the sex of the infant, and that occurred among these 16,414 deliveries, 65 of the children were male and 44 female.

In 24 forceps cases met with by Dr Collins, the proportion of male to female children was still greater, the males being 16 and the females 8 in number.

The ratio of male infants mounts yet higher, when we turn to the cases in which the labour was so difficult as to require craniotomy. Among 74 instances in which the crotchet was used by Dr Collins, and where the sex of the child is mentioned, the infant was male in 50 instances and female in 24.

A tabular arrangement of the above results will show the proportion of male to female children under these different classes of head presentations.

Nature of the Labour and Complication.	Total Cases.	No. of Male Children.	No. of Female Children	Proport. of Males to Females.	*Ratio of Excess of Males.*
Labours generally,	16,654	8548	8069	106 to 100	6
Tedious labours,	109	65	44	148 to 100	48
Forceps cases,	24	16	8	200 to 100	100
Crotchet cases,	74	50	24	208 to 100	108

The preceding data prominently show, that as the classes of labours increase in severity and difficulty, the proportion of male to female children in them increases in a corresponding degree. Evidence of exactly the same kind, in support of the same opinion, may be gathered from a tabular extract of the cases that occurred in the Dublin Hospital during the mastership of Dr Clarke, (viz. from 1787 to 1793), published by that gentleman in the first volume of the Transactions of the King's and Queen's College of Physicians of Ireland, p. 400. In this abstract Dr Clarke states the sex of those infants that were still-born in the three classes of 1. ordinary, 2. tedious, and 3. laborious labours.

During Dr Clarke's mastership there occurred 10,199 cases of single or uniparous births. Among these, 340 children were still-born though the labour was natural, that is, was terminated within 24 hours, and with the head of the fœtus presenting. Of these 340 still-born children, 170 were male and 170 female. The ratio of the sexes shows this perfect equality in consequence probably of this list including principally putrid and premature children, among whom we have already found (see the eighth *proposition*) the number of still-born boys and girls to be nearly alike, and the over proportion, if any, to be rather on the side of the females.

Under the term "Tedious Natural Labours," Dr Clarke includes those which exceeded 24 hours in duration, but where there was no such disproportion between the head of the fœtus and the mother's pelvis, as to render *destructive* instruments necessary. This class of labours is produced either (he observes, p. 371) "by causes weakening the expelling powers of the mother, or increasing resistance to the passage of the fœtus." In Dr Clarke's report, 134 cases are referred to this division, including 16 forceps cases. In these 134 labours, the child was still-born in 41 cases. Among these 41 still-born children, 26 were male and 15 female.

Dr Clarke further reports the sex of the child in 48 cases of what he terms "Laborious Natural Labours," and where," (to use his own words,) "the disproportion between the head of the fœtus and the pelvis was so great that it became necessary to diminish the bulk of the former to save the life of the latter." Among these 48 crotchet cases, 32 of the children belonged to the male, and 16 to the female sex.

Of the 429 children that there were still-born, in these different classes of natural or head presentations in Dr Clarke's practice, the proportion of the sexes was therefore in the following ratio :—

Nature of the Labour and Complication.	Total No. of still-born children.	Of these were male	Of these were fem.	Proport. of males to females.	*Ratio of excess of males.*
Ordinary natural labour,	340	170	170	100 to 100	0
Tedious natural labour,	41	26	15	173 to 100	73
Laborious natural labour, (crotchet cases,)	48	32	16	200 to 100	100

The preceding data, from Dr Collins' and Dr Clarke's returns, will be probably admitted to be sufficient to prove the point that we have in view, and to warrant the following inference as a

Tenth Proposition.

In "laborious labours," with the head presenting, in proportion as the order of labour rises in difficulty the amount of male births in them rises in number.

To the proof that I have just given, from the reports of Drs Collins and Clarke, of the truth of this proposition, it gives me much satisfaction to add the following general confirmatory statement contained in an analysis of Riecke's elaborate obstetric statistics of the kingdom of Wurtemberg, published in the Archives Générales.* As one of the results of these statistics, (the most extensive hitherto published in midwifery,†) it is stated that "the proportion of boys to girls is much greater in 'artificial' than in ordinary labours, for it includes 7 boys for every 5 girls, [or 140 male children for every hundred female.] There is the same fact observable among the sexes of those children that are the products of artificial births, and who are either dead born or die shortly afterwards, for among them the proportion of boys to girls is as 8 to 5, [or as 160 male to every 100 female infants.] Often enough, (it is added,) it happens that the same woman cannot, without aid, be delivered of a boy, who, at all her other confinements, when the child was female, required no assistance." p. 88.

THIRDLY, *A diminution of the cause, leads to a diminution in the effects ascribed to it.*

We have alleged the cause of the increased casualties connected with male births to the greater size of the head of the male than of the female infant.

In premature infants there does not exist so great a difference, as in those born at the full time, between the size of the head of the male and female child. The fœtuses of the two sexes ap-

* Archives Générales de Médecine, Tom. xx. p. 76.

† They include 219,353 deliveries which occurred in Wurtemberg during the four years, 1821–25. The artificial deliveries, (*accouchmens artificielles*,) or those requiring some special aid or interference, amounted to 7949. In these 7949 cases, 630 of the mothers and 3754 of the children were lost. The generalization in the text seems to be founded upon the sex of the infant in these 7949 labours, and 3754 still-births.

proach one another more and more in physical and other characters, the earlier the period at which we compare them. Besides, the cranium of the premature child is so compressible, from its deficiency of ossification, as to be much more easily reduced in size under the pressure to which it is naturally subjected in the process of parturition, and hence the slighter difference which may actually exist between the dimensions of the heads of male and female premature infants, is still more diminished in its effects and operation during the course of labour.

Possessing such physical conditions, the birth of premature children should, from the diminished size and diminished resistance offered by their heads, give rise to fewer of those casualties in labour that we have attempted to trace to the influence arising from the greater size of the head of the full grown male child.

I have no evidence to bring forward with a view of showing the influence of the birth of premature children or their sex, on the difficulties of the labour in reference to the safety and life of the mother, because the labours with them are seldom or never so difficult as to induce any marked maternal complications. But we may derive equally good evidence in illustration of the point we are discussing, by studying the effects of the labours with premature children,—not upon the *mothers* but upon the *infants* themselves. With this view I shall collect, from the data contained in Dr Collins' report, the number of male and female children expelled *prematurely* and not putrid, in order to contrast them with the proportion of males and females among still-born children expelled at the *full time* and not putrid. Of the former there were born in all 62, of the latter 532. The ratio of the sexes in each series stands thus :—

Non-putrid Children still-born.	Total.	Males.	Females.	Proportion of Males to Females.
At full time,	532	320	212	151 to 100
Prematurely,	62	34	28	121 to 100

The comparison of the two columns in the above table shows that, among the children who died immediately before or during labour, and who had reached the ninth month of utero-gestation, the proportion of males to females lost was considerably greater than among still-born children born prematurely,—and, as we believe, for this reason, that in the latter, (the premature still-births,) there is not, as we have pointed out, so great a distinction be-

tween the male and female heads as among children at the full time. The comparison of the proportion of males to females who died within ten days after delivery among, 1st, children born at the full time, and 2d, those born prematurely, leads to the same inference, viz. that as in the latter the alleged cause of distinction between the relative size of the male and female head is diminished, the alleged effect upon the differences displayed between the mortality of the two sexes is also proportionally lessened. The following table is intended to illustrate this point. The calculations are from the data in Dr Collins' chapter on children dying in the hospital.

Children dying within 10 days after birth.	Total.	Males.	Females.	Proportion of males to females.
Born at full time,	171	106	65	163 to 100
Born prematurely,	102	56	46	121 to 100

The remarks that we have made regarding the heads of premature children should apply equally to those of twins. Twin children, like those born prematurely, are in general below the standard size and weight, and, in the same manner, have their heads less ossified, and hence are more compressible than those of single infants at the full time. There is, consequently, also a less marked difference between the relative size of the male and female head, among twin children, than among single children at the full time; and for the same reason, if our views are true, there should be a similar less marked difference between the mortality of the two sexes among twins, at birth and for some time after it. That such is in reality the case I shall allow Dr Clarke to state in his own words. Speaking of the relative male and female infantile mortality in the Dublin Hospital, he observes, (Philosophical Transactions, Vol. 76, p. 354,) "it is worthy of observation that though *double* the numbers of twins die and are still-born, compared to single children, yet the proportion of male twins lost to females is *less*. Only one-fifth more of the male sex die than of the female, and only one-third more is still-born. Whereas of single children, whose proportional mortality is one-half less, *one-fourth* more of the male sex die, and near double the number is still-born. To what, then, are we to attribute this lessened mortality in favour of male twins? Probably to their brain and nervous system suffering less during delivery, on account of their heads being much smaller than those of single children."* In

* In the Dublin Hospital, from the year 1757 to 1784, it appears from Dr Clarke's tables, that among the twin-births 29 males and 20 females were still-born, and 116 male and 91 female children died within a fortnight after delivery; on the

other words, the cause of the higher mortality, or the relative size of the male over the female head, being diminished, the effects which we attribute to it, viz. the higher infantile mortality among male children, is also proportionally diminished.

FOURTHLY, *In those morbid complications in labour in which the cause is in abeyance, the effect is also absent.*

There are some morbid complications during labour which are independent of the presence, and hence of the sex or size of the infant. I allude especially to those complications which occasionally occur during the third stage of labour, and consequently after the total expulsion of the child. It would afford no small corroboration of the preceding remarks and inferences, if in these cases (where all agency from the conditions of the infant was for the time being excluded,) the morbid complications which may take place, were found to occur as frequently in connection with the birth of female as of male infants. And such, we believe, may be shown to be the fact.

The two principal complications that occur during the third stage of labour are morbid retention of the placenta and hæmorrhage.

Dr Collins reports 70 cases of retention of the placenta, 35 of them after male, and 35 after female births.

Hæmorrhage took place during the third stage of labour, or between the birth of the child and placenta, in 71 cases during Dr Collins' mastership. In 36 of these 71 labours the child was of the male, and in 35 of the female sex.

These observations, when thrown into a tabular form, would consequently stand thus:—

Nature of complication.	Total cases.	With male children.	With female children.	Proportion of males to females.
Retention of placenta,	70	35	35	100 to 100
Hæmorrhage during third stage,	71	36	35	100 to 100

The evidence afforded by the above table is probably sufficient to entitle us to add to those inferences that we have already laid down, the following deduction as a

other hand, among the uniparous or single births 602 males and 351 females were still-born: and 1656 males and 1247 female children died within a fortnight after birth. These data form the ground of the inferences drawn by Dr Clarke in the passage quoted in the text.

Ninth Proposition.

Of the morbid accidents that are liable to happen in connection with the third stage of labour, as many take place with female as with male births.

To prove that the slight increase of size of the male over the female infant's head is the true antecedence or cause of the greater number of casualties accompanying male births, we may so far change the ground of direct proof which we have been hitherto attempting to pursue, and proceed to show, as a matter of strong though indirect evidence, that,

FIFTHLY, *Similar effects upon the mother and child are produced by other causes similar in their character and amount.*

If the larger dimensions of the head of the male infant be the immediate cause of the larger number of accidents and deaths attendant upon male births, its greater degree of *size* could only possibly lead to the results in question, by offering a greater proportionate degree of impediment to the passage of the fœtus through the pelvic canals. Its effects, therefore, upon the mother and child should be such as are produced by obstructed labour. That the various consequences which we have previously traced are all of that description, it is unnecessary for us to point out to the obstetric pathologist. It might be considered, however, as confirmatory of this fact, and, at the same time, as the strongest correlative evidence that could be adduced of the power of *slight* obstructions, during labour, to lead to these effects, if we could prove that in any other extended series of cases, in which obstructions of the same amount existed, the same or similar effects resulted both to the mother and child. Our evidence would only be the stronger if, in this class of cases, we could so far reverse the state of matters as to transfer the existing slight obstruction from the body passing to the passages themselves. The circumstances connected with first labours offer the exact conditions which we seek.

In first labours, taken as a class, there is a greater obstruction to the transit of the child than in subsequent deliveries, in consequence of the maternal passages being less dilatable than afterwards. The two obstructions, viz. the increased size of the fœtal head, and the diminished size of the maternal passages, though different in their seat, are nearly analogous in the *nature* of their influence, and in the amount of that influence.

In male births, the body passing, (the head of the infant) is

slightly *greater* than in female births, whilst, *cæteris paribus*, the maternal passages are the same. In first labours the capacity or dilatability of the maternal passages is slightly *less* than in subsequent labours, whilst, *cæteris paribus*, the head of the infant remains the same, there being at least an equal number amongst them of males and females. Having stated these premises we shall go on to point out, as another reason for supposing the size of the male head to be the sole cause of the danger of male births, that, in accordance with our proposition, most of the complications and accidents, which have been already described as arising in male, as compared with female births, from the comparatively slight increase in the dimensions of the male head, occur also in first, as compared with future labours, in consequence of the comparatively slight diminution of the dimensions or dilatability of the passages in these labours.

We shall give the proofs of this as an illustration of another, or

Tenth Proposition.

More dangers and deaths occur both to mothers and children in first than in subsequent labours.

Among the 16,414 women delivered in the Dublin Hospital during Dr Collins' seven years mastership, 4987 were confined for the first time. First deliveries occurred, therefore, in the proportion of about 30 in every 100 cases. If, however, in studying the various morbid complications which have been statistically reported by Dr Collins, we find the proportion of these complications in first labours to be greatly above the ratio of 30 per cent., it would tend to show that there is a stronger liability to their occurrence in first than in future deliveries. To gain some data in this question, let us examine into the facts which may be gathered from Dr Collins' returns in regard to the proportion of these morbid accidents arising from obstruction during parturition, which were met with in first as compared with subsequent labours.

Convulsions.—Of 30 cases of convulsions described by Dr Collins, 29 occurred in women who were pregnant for the first time, (page 201.) Thus they were found in connection with first pregnancies in the ratio of 96 in 100.

Crotchet cases.—Of the 79 cases which Dr Collins mentions as requiring craniotomy, the number of the pregnancy in each can be made out only in 75. Of these, 51 were first labours, (Table, page 490, et seq.) ; or out of every 100 cases in which the crotchet was used 68 were first deliveries.

Forceps cases.—The forceps were employed in 24 instances.

Of these, 18 were first labours, (page 15.) Hence out of every 100 instances in which this instrument was used, the proportion of first labours, according to this average, would be 75.

Tedious labours.—Under our second Proposition I have already stated that Dr Collins has given so far the history of 109 instances of tedious labours, (page 462, et seq.) Of the 109 cases, 75 were first confinements, (Table, page 490, et seq.); thus giving for every 100 cases a proportion of 69 as pertaining to first deliveries.

Puerperal fever.—Out of 88 women attacked with puerperal fever, 44 were confined for the first time, (page 284.) Thus this complication supervened upon first labours in the ratio of 50 in every 100 cases.

Maternal deaths.—We have already seen, under the first Proposition, that of the 16,414 women delivered in the Dublin Hospital during Dr Collins' charge of it, 164 died, (page 363.) Of these 164 mothers, 86 had given birth to first children, (page 363); or of every 100 women who died, 53 had been confined for the first time.

Still-births.—Under this head we exclude from our calculation all those children who were born putrid either prematurely or at the full time. Of 1121 still-births in all, observed by Dr Collins, 594 were born not putrid. Of these 594 children, 260 were the product of first confinements; or, in other words, they were found in connection with first pregnancies in the ratio of 45 to 100.

Infantile deaths during the first eight or ten days after birth.—The mothers and their infants generally, (as we have seen,) remained for that time in the hospital after delivery. During it 284 of the children died. Of these, 170 were single children born at the full time, (analysis of table, page 519, et seq.) Of the 170, 75 were the offspring of primiparæ; or infantile deaths, during the first ten days, among single children born at the full time, occurred in connection with first pregnancies in the ratio of 44 in every 100.

The preceding series of facts, if arranged together into a general tabular form, would stand as follows. In reading these arranged results it is to be recollected that the *standard proportion of first pregnancies, in the general sum of the labours, amounts only to* 30 *per cent.*; whilst, as shown by the table, the proportion was much higher in the various complications under mentioned.

Complication.	Total Cases.	1st Pregnancies.	Proportion of 1st pregnancies
Convulsions,	30	29	96 in 100
Forceps cases,	24	18	75 in 100
Crotchet cases,	75	51	68 in 100
Tedious labours,	109	75	69 in 100
Puerperal fever,	88	44	50 in 100
Maternal deaths,	164	86	53 in 100
Still births, not putrid,	594	260	45 in 100
Infantile deaths during 1st 10 days; born single and at full time.	170	75	44 in 100

The results which the above table is intended to display might perhaps be brought out more strongly by another arrangement, if our data for it were more complete. Dr Collins mentions the number out of the 16,414 patients that were delivered for the first time, viz. 4987; of these 72 were twin births. Unfortunately, however, for our present purpose, he has omitted to give the exact numbers of those that were confined in their second, third, and other subsequent labours. But an approximation, sufficiently near for the purpose we have in view, may perhaps be made without any probability of a very serious error. To have the required standard of comparison, I shall take it for granted, (for reasons which it is unnecessary to dwell upon,) that the per centage of first and future labours in the Dublin Hospital was nearly as follows:—Of all the cases, about 30 per cent. were first pregnancies; 22 per cent. second pregnancies; 15 per cent. third pregnancies; 11 per cent. fourth pregnancies; 8 per cent. fifth pregnancies; 5 per cent. sixth pregnancies; 3 per cent. seventh pregnancies; 2 per cent. eighth pregnancies; 1 per cent. ninth pregnancies; and 3 per cent. belong to women who were confined for the tenth time or upwards.* If we compare with this given standard the proportion of instances in which the different complications we have been considering occurred in different pregnancies, we will see in a marked degree the great over-proportion of them in connection with first deliveries. I have constructed the following table with this view.

* This calculation of per centages proceeds on the assumed probability that, of the 16,414 women delivered in the Dublin Hospital under Dr Collins, 4924 were cases of first labour; 3611 were of second labours; 2462 third labours; 1806 fourth labours; 1313 fifth labours; 826 sixth labours; 495 seventh labours; 328 eighth labours; 164 ninth labours; and 494 were instances in which the women were delivered for a tenth or later time.

Table showing the per centage of cases of natural and morbid labours belonging to different pregnancies.

Per centage of	1st Preg.	2d Preg.	3d Preg.	4th Preg.	5th Preg.	6th Preg.	7th Preg.	8th Preg.	9th Preg.	10th & subseq. Pregs.
Total No. delivered in Hosp.	30	22	15	11	8	5	3	2	1	3
Convulsions,	96	4	0	0	0	0	0	0	0	0
Tedious labours,	69	9	7	3	2	3	2	1	3	1
Forceps cases,	75	?	?	?	?	?	?	?	?	?
Crotchet cases,	68	10	7	4	0	3	?	0	2	4
Puerperal fever,	50	19	10	7	8	0	2	4	0	0
Maternal deaths,	53	16	7	7	5	4	1	3	1	3
Still-births,	45	17	11	8	5	5	4	3	4	8
Infantile deaths for 10 days after birth,	44	15	11	8	8	7	2	3	1	2
Post-partum hæmorrhage,	33	16	10	9	9	5	4	6	3	6
Rupture of uterus,	21	18	18	6	6	15	6	3	3	10

In regard to the two complications which we have placed at the bottom of the above table, viz. *post-partum* hæmorrhage and rupture of the uterus, it will be observed that our present proposition does not hold out so strictly towards them, and that they do not occur comparatively more frequently in first than in subsequent labours. But this does not detract in any way from the previous view which we took of them, as occasional results of the partial obstruction offered by the male head. For there are sufficient reasons why they should occur more rarely in first labours, though these labours are more obstructed than those that occur subsequently. In regard to rupture of the uterus, for example, it is now well known to obstetricians that two causes may give rise to its occurrence, namely, *first*, over-action of the uterus, in consequence of impediment to the passage of the child;* and, *secondly*, any such diseased condition of a portion of the uterine parietes as renders that portion less resistant, and hence more easily lacerated than the other parts of the uterine walls. The first of these two causes is in much stronger operation in male than in female births, and in first than in future labours; but the second cause comes more and more into action with the frequency of the previous parturitions, the uterine tissues being more and more liable

* "There is one fact," observes Dr Collins, "which clearly shows disproportion to be a frequent cause, namely, its being oftener met with in the expulsion of male children. Thus, of 34 cases which I am about to state, 23 of the children were males, &c. This is satisfactorily accounted for by the greater size of the male head, as proved by accurate measurements made by Dr Joseph Clarke."—Chapter on Rupture of the Uterus and Vagina, in Practical Treatise, p. 242.

to disease under the strain of each successive pregnancy and labour. Hence, though lacerations from obstruction are more common in first confinements, the same accident, as a result of disease of the uterine structures, is far more frequent in subsequent and later parturitions, so much so indeed, as to cancel any argument that might be derived in favour of its origin from mere obstruction, by the study of it in primaparous mothers.

Again, *post-partum* hæmorrhage, though more apt, as we have already stated, to occur in cases in which the uterine action has been protracted, and the contractile powers of the organ morbidly exhausted, is not so liable to appear after tedious first labours as after tedious subsequent labours, because it is a well-known and acknowledged fact, that altogether the uterus contracts more perfectly and securely after first labours than after others. Hence the well-known rarity of after-pains subsequently to first parturitions. "A woman," says Dr Power, "experiences little or no after-pain with her first parturition, because the parietes of the uterus, not having been weakened by previous distension, contract more perfectly and permanently, so as to obliterate and empty the cavity thoroughly."*

In reference to the bearing of some of the results included in the above tables upon the question we are discussing, it is proper also to add, that the ratio in which some of the complications occurred in first pregnancies is greater in degree than can be accounted for upon the doctrine of obstruction, and is partially dependant upon other coexisting causes. I allude more particularly to the case of puerperal convulsions. It is well known that in the practice of all accoucheurs this complication is met with, principally in first, and comparatively rarely in future deliveries.† The mere amount of obstruction present in first labours is not the sole explanation of the large percentage of convulsions occurring in first confinements, for impediments in the maternal passages in future deliveries are not followed in any such degree by the same conse-

* Treatise on Midwifery, p. 190.

† The following table will show this fact better than any lengthened commentary.

Total No. of Puerperal Convulsions.	No. of these occurring in first labours.	Reported by
59	45 or 57 per cent.	F. Ramsbotham
22	15 or 68 —	J. Ramsbotham
46	30 or 65 —	Lee
48	36 or 75 —	Merriman
19	15 or 79 —	Clarke
9	8 or 89 —	Johns
30	29 or 96 —	Collins
233	178 or 76 per cent.	Total cases.

quence; and, further, obstetric pathologists are now well aware that in almost every case of puerperal convulsions, a predisposition to the affection is given by one or more particular pre-existing morbid states of the system. Various authors, as Demanet,* Osiander, Chailly, Johns, &c. have correctly described the most common pre-existing morbid condition as one marked by dropsical effusions in the face and elsewhere. Of late years the pathology of these cases has been advanced a step farther, and the complication of convulsions shown to occur only, or almost only, in women who have such confirmed or temporary renal derangement as is marked by an albuminous state of the urine. Dr Lever suggests that this albuminous state of the urine, (the common state predisposing to puerperal convulsions,) is produced by pressure of the enlarged uterus upon the renal veins. If this were the explanation, this complication should occur as frequently in subsequent as in first labours, because the renal veins are not more specially compressed in the one than in the other. But to discuss any such question at present would be wandering from our subject. We have said enough to show that, in regard to puerperal convulsions and their frequency in first labours, we must take other points into consideration than the mere degree of obstruction, in order to account for their high over-proportion in first pregnancies.

Before we proceed farther let us pause for a minute, and simply recapitulate the reasons that we have already given for considering the greater size of the head of the male child as the cause of the greater number of complications and casualties connected with male birth. *First*, I have shown that for the very marked differences existing between the difficulties and perils of male, as compared with female births, there is no other traceable cause, in the mechanism of parturition, except the larger size of the head of the male child. We have seen, *Secondly*, that an increase in the morbid effects may be proved to be connected with an increase in this reputed morbific cause; *Thirdly*, that when the alleged cause is diminished the effects are diminished; and *Fourthly*, that in those morbid complications in labour in which the cause is in abeyance the effect is also absent. *Lastly*, we have found that similar effects upon both mother and child are produced by other causes which are similar in their character and amount.

Now, if in conducting any investigation into the explanation or mode of production of a number of ascertained and acknowledged facts, we found, amidst the assemblage of phenomena submitted to our study, one supposed antecedent condition or probable proximate cause perfectly answering the various reasons and tests to which, in the preceding pages, we have already subjected

* "Regarde l'anasarque comme une de leurs causes *essentielles*."—Recueil Periodique de la Société de Médecine, Tom. ix. for 1800–1, p. 110.

the increased size of the male over the female infant's head as the alleged cause of the reputed greater danger and mortality attendant upon male births, the evidence, in support of that circumstance as the *vera causa* of these consequences, would be deemed of a very strong and decided character. The evidence would become still more conclusive if it could be shown, that though this *vera causa* appeared at first sight to be in itself an agent quite inadequate for an explanation of the various important effects traced to it, yet, when studied in its full and proper relations, might be shown to have necessarily sufficient power and influence for the production of the results. Such we will now endeavour to prove to be the case with the slight increased volume of the head of the male over the female infant, as the cause of the greater number of the casualties accompanying the birth of male children.

SIXTHLY, *The greater size of the male than of the female infant's head is sufficient in itself to explain the greater dangers attendant upon male than female birth, when we consider it in relation to its absolute and cumulative effects.*

"No arguments are required (as Dr Denman observes) to prove that a small body will pass through a small space with more facility than one that is large; the size of the body being supposed to bear any reasonable comparison to the dimensions of the space. Of course it may be presumed that the larger the head of the child is at the time of birth, with the greater difficulty it will be expelled." Nor does the well-known compressibility of the human cranium at birth alter this view in regard to the effects which an increased size of the head is calculated to produce. "For though nature has, with admirable wisdom, (I quote the words of Dr Osborne,) by means of sutures and fontanelles, so constructed the head of the human fœtus that, in the passage through the pelvis it may suffer the form to be altered and the volume to be considerably diminished without such injury to its contents as shall necessarily destroy life; yet as there is a volume beyond which each fœtal head cannot suffer compression with safety—so there is another and still smaller into which it cannot be compressed at all."*

No one will be inclined to doubt the fact, that when the fœtal head is *much* increased beyond the common size at birth, its expulsion will be attended with more than the usual degree of difficulty. But exactly the same effect may be produced by the infantile head exceeding the required dimensions in only the most trifling degree, provided it happens, from the particular conformation of the mother, that the maternal pelvis and fœtal cranium are

* Essays on the Practice of Midwifery, p. 188.

otherwise very nearly and accurately adapted to one another. In such instances a difference in the size of the head of the smallest amount may involve and change the whole question of the physical possibility or impossibility of the passage of the infant. Dr Hamilton, in his "Practical Observations," when speaking of the occasional difficulty of determining in individual cases in practice, whether the maternal passages are or are not of such dimensions as to allow the child to pass, and whether the infant's head may or may not require to be diminished by craniotomy, strongly remarks, "that in this question even a miscalculation of the *sixteenth part of an inch* might be fatal to the life of the infant." "The author, (he adds in a foot-note,) has been accustomed to illustrate this practical remark to his pupils by a very simple mechanical demonstration. He first shews the smallest possible aperture through which the fœtal head of the ordinary size can be squeezed, and he then covers the head with a common towel, and proves the utter impossibility of its then passing through the same aperture. He does not believe that the addition of a common towel can increase the diameter of the head more than the sixteenth part of an inch."*

If Dr Hamilton's calculation regarding the increase of the diameter of the head in this experiment be true, viz. one-sixteenth of an inch, then here we have the transit of the fœtal head entirely prevented by an increase of size which is not more than half of that difference, (one-eighth of an inch,) which we have seen to exist between the diameter of the standard male and the standard female head at birth.

In relation to the question of the greater difficulties attendant upon male births, it ought further to be always held in view, that, when the fœtal head is notably above the medium standard, the infant is, in a great majority of instances, of the male sex. Among the 120 infants whose heads were measured by Dr Clarke only six were above 14½ inches in circumference. These six were all males. Twenty-nine of the children were as high as 8 lbs. and upwards in weight. Of these 29, as many as 19 were of the male and 10 only of the female sex. Such facts require no comment.

But let us throw altogether out of consideration the more extreme cases to which we have adverted, and look upon the question of the more numerous dangers attendant upon male births as the result merely of the average slight increase of the standard male over the standard female head at birth. Even under this limited view the normal difference in size between them (about one-eighth of an inch in diameter), inconsiderable as it may at first appear, will, we believe, afford us a perfectly sufficient expla-

* Hamilton's Practical Observations, Second Edition, p. 254.

nation of the statistical facts which we have brought forward in the preceding pages, provided we consider what the *accumulated* mechanical effects of this difference in measurement would be when operating over a very wide and extended range of cases of parturition. A few remarks will illustrate our meaning. We take for granted, that the act of parturition consists of the dilatation of the female passages, and of the expulsion of the fœtus through them. Before the process can be terminated, a very considerable amount and continuance of expulsive and dilating force is in general required. During it the parietes of the maternal passages are necessarily subjected to pressure from the advancing fœtal head, and in turn the wedge-like fœtal head itself is compressed by the resisting passages. The whole process is rendered the more tedious and difficult in consequence of the size of the head of the fœtus being nearly proportioned to the size of the passages of the mother. What, then, will be the effects upon this whole process of such a difference in the dimensions of the fœtal head, as holds good with regard to the relative sizes of the male and female at birth, supposing the mother's pelvis and passages to be always, *cæteris paribus*, the same in their capacity? If the female infant's head, when of the standard size, require for its transit a certain extent of dilating and expulsive force,—if it necessarily produce, during its egress through the maternal passages, a certain amount of pressure upon their walls in order to overcome the resistance which they offer,—and if, in turn, the head of the child is, under the same action, compressed itself to a certain degree;—then the standard male infant's head (as being an eighth of an inch greater in diameter, and consequently demanding more actual space for its transit), will require proportionally a greater extent of dilatation in the maternal passages, and a greater expenditure of force to effect this greater dilatation; it will hence also produce, during its egress through the maternal canals, a greater amount of pressure upon their parietes, and be itself reciprocally compressed to a greater degree. The difficulties and dangers to child and mother entailed by this latter state of matters might well *a priori* be supposed to be exactly those that we have shown them really to be, under the various propositions that we have previously laid down.

But that the birth of the male, as compared with the female child, is accompanied with more obstacles and delay, need not be an inference resting solely, as it does above, upon abstract though satisfactory reasoning,—for it is a matter which should admit of direct statistical and arithmetical proof. If our data were sufficiently precise and extensive we ought to be able to prove, that, as an

Eleventh Propositium,

The average duration of labour is longer with male than with female children.

Dr Collins has given a table (p. 22), showing the number of his patients that were delivered in "one quarter of an hour," "in one hour," "in two hours," &c., from the commencement of labour. The sexes, however, of the children are not distinguished, so that the data are of no avail in regard to their bearing upon the proposition we have just stated. Nor am I aware that there has been, as yet, any where published such a series of facts as would enable us to prove statistically that the birth of the male child is absolutelyl onger than that of the female, in the time required for its completion. The average duration of labour in the European females is about four or five hours. The average duration of male births will probably be found, when sufficient evidence is collected, to be about a quarter of an hour or half an hour longer than that of females. I venture to make this allegation, in regard to the common run of labours, upon the evidence afforded by an assemblage of cases, now lying before me, in which the progress was somewhat protracted beyond the usual standard. The cases I allude to were collected under the following circumstances. In 1836 a separate register was begun in the Edinburgh Lying-in Hospital of those labours in which the date of the commencement of the process and the comparative length of each successive stage could be ascertained with sufficient accuracy. Those cases in which the labour was very speedy, and indeed all that were less than three or four hours ill, were not entered, because in most of them the duration of the labour and its stages could not be noted with the accuracy required; many of these patients only entering the hospital a few minutes before delivery. About half of the labours in the Dublin Hospital appear to have been terminated within the first two or three hours,* so that our Edinburgh register, as wanting that proportion of the more rapid cases, cannot show the average length of the process in ordinary instances. The records, however, which it contains of the cases protracted beyond the period mentioned have, I know, been kept with adequate care,† and seem capable of furnishing us with sound and unprejudiced evidence upon the present topic, inasmuch as they were originally noted without any view to such an inquiry as this into the comparative duration of male and female births. In analyzing the register I find, that, from 1836 to 1841 inclusive, 249 male and 178 female

* Of the 15,850 cases noted by Dr Collins, 7063 were terminated within two hours, and 9550 within three hours from their commencement.

† A number of the entries were made by myself when annual pupil at the hospital in 1836-7, and have been continued by others in that office.

births are entered, with notes of the precise length of the labour in each. The following table will show the absolute and average duration of the labours with male and female children in these 427 cases.

Labours.	Absolute duration of the whole cases.		Average duration of each labour.	
	Hours.	*Minutes.*	*Hours.*	*Minutes.*
With male children, [249 in number,]	2646	33	10	38
With female children, [178 in number,]	1702	29	9	34
Average greater length of the male birth,			1	4

In those classes of labour in which the process becomes morbid from tediousness or other complications and difficulties of a more serious character, the difference between the duration of the male and female births would seem to be even greater than the above table displays. At least such an inference appears deducible from the analysis which I have made, from Dr Collins' tables, of the comparative length of the male and female births in the records which he has given of 407 still-born children, (including the putrid and premature), of 97 morbidly tedious labours, of 68 crotchet cases, and of 135 instances in which the mother died in connection with delivery. The preceding numbers include *all* the cases under these several heads in which the exact duration of the labour is mentioned in Dr Collins' tables. The result is this :—

Labours.	The average duration of the male births was,		The average duration of the female births was,		The aver. greater length of the male births was,	
	Hours.	*Minutes.*	*Hours.*	*Minutes.*	*Hours.*	*Minutes.*
With still-births, (310 males and 197 females,)	14	27	12	10	2	17
Morbidly tedious, (56 males and 41 females,)	43	18	40	12	3	6
Requiring crotch., (44 males and 24 females,)	42	22	38	20	4	2
Leading to death of the mother, (86 males and 44 females,	18	9	12	58	5	11

The evidence afforded by the foregoing table appears almost enough to warrant us in qualifying the proposition we have laid down, to this extent, that " the average duration of labour is larger with male than female children, and the difference in this respect between male and female births becomes increased in length

when the labours become more severe and dangerous in their character."

The remarks and proofs that we have now offered may tend to remove the difficulty which the inquirer may at first entertain regarding the supposed inadequateness of the slightly increased size of the male head to produce all the greater number of casualties and complications that we have traced to be connected with male births. For it will probably be allowed that the principal, or indeed sole obstacle, which the mind has to contend with, in allowing the very small size of the male over the female infant's head to be the cause of the remarkable differences which we have traced between the results of male and female births, consists in the difficulty of at first supposing so slight an apparent cause to be the agent by which such remarkable consequences are brought about. But in considering this and the analogous questions, it must be held in recollection, that in all processes, whether vital or physical, in which, as in parturition, an established relation of mechanical conditions is required, any disturbance in these conditions, however small and trifling in itself, will ultimately, and when followed out through numerous and extended series of observations, be found to lead to results the magnitude of which could scarcely have been previously surmised. These results may not be appreciable when we confine ourselves to the study of the agency in an individual case, or in a small number of cases merely, but they become more and more marked in proportion as the number of our instances become more and more extensive. The effects cannot be distinctly seen when we look for them in a limited series of data, but they may be evoked with all the force of a mathematical demonstration, when we prosecute our calculations for them among large and accumulated masses of observations. From any study, however minute and accurate, of a limited number of cases of labour, no man would probably feel himself entitled to conclude that male are in any notable degree more difficult and dangerous than female births; but this, as we have seen, becomes a demonstrable and strongly marked fact, when we direct our inquiries after the truth of it into the records of hundreds or thousands of carefully reported observations, such as we have made use of in the course of the preceding inquiry.

The remarks we have hitherto made upon the male sex of the child as a cause of delay, difficulty, and danger during labour, have referred principally to the larger size of the male infant's head or cranium. In that condition, and its effects, we have so far found a satisfactory explanation of the numerous complications and casualties to which the mother herself is subjected in male births. One or two additional observations may be required to show more specifically in what manner the safety and life of the

male child during labour, and for some time after it, is endangered by the same circumstance. We believe that the larger size of the contents of the male, than of the female cranium, or, in other words, the larger size of the male brain or encephalon at birth, and the consequent greater compression and injury to which it is subjected during birth, affords us the proper clue to the explanation of these peculiarities in the male infantile mortality.

The weight, and hence the size of the brain, is now well ascertained to be absolutely more in the adult male than in the adult female. From measurements of the interior of numerous crania,* Sir William Hamilton computes the male adult encephalon as weighing 3 lbs. 8 oz., Troy, and that of the adult female as 3 lbs. 4 oz. Professor Reid carefully weighed in the Edinburgh Infirmary the encephalon of 53 adult males and 34 adult females. The average weight of the male brain in these observations was 3 lbs. 2 oz. 3½ drachms; that of the female, 2 lbs. 12 oz. 8½ drachms; and the average difference in favour of the male encephalon thus amounted to 5 oz. 11 drachms.† This difference in weight between the encephalic contents in the two sexes exists also at birth. In an elaborate paper on the weights of the brain in the different sexes, &c., founded on numerous observations, and published by Professor Tiedemann in the London Philosophical Transactions for 1836, that distinguished anatomist states, (p. 502,) "the female brain weighs on an average 8 ounces less than that of the male, and this difference is (he adds) already perceptible *in a new-born child.*" In one of his tables Tiedemann adduces the weight of the brains of two male and two female infants at birth. The average weight of the two male brains was 13 oz. 6 drachms 20 grains; the average weight of the two female, 10 oz. 44 grains; and the average excess of size of the encephalon of the male infant, as deducible from these four observations, 3 oz. 5 drachms 36 grains. But this result is probably much higher than a more extended number of data would give, in consequence of one of the female children in the table being evidently below the standard size and weight of the girl at birth.

There is another way by which, in the present deficiency of direct facts bearing upon this point, we may arrive at the same conclusion with equal or greater certainty. "The weight of the brain," says Tiedemann, "of a new-born child is relatively to the size of the body as one to six." The male infant at birth is, as we have seen, on an average, about nine or ten ounces heavier than the female. If the above ratio between the brain and whole body holds equally true, (as there is every reason to be-

* Monro's Anatomy of the Brain, 1831, p. 12.

† London and Edinburgh Monthly Journal for 1843, p. 322. See also Dr Sim's paper in the London Medico-Chirurgical Transactions, vol. xix., for similar results

lieve), of the two sexes, the male brain should, on an average, be one-sixth part of this heavier than the female brain at the time of delivery. Hence the male encephalon is, in the infant at birth, about 1½ ounces heavier than the female encephalon, and the male brain and cerebellum altogether about one-ninth or one-tenth greater in weight, and consequently in size, than the brain and cerebellum of the female.

The immediate effects, during parturition, of this much greater size of the male encephalon upon its own delicate structures are evident. For as, *cæteris paribus*, the pelvic passages are always the same in their dimensions, the larger and heavier male brain will, in its forcible transit through the given standard space of the maternal canal, of necessity suffer more physical compression and injury than the smaller female head and brain.

Connected with the structural economy of the brain of the new-born infant, there are some circumstances which are calculated to render such degrees of injury, as we have adverted to, more extensive in their influence, and more permanent in their results, than similar amounts of injury of these same parts at other later periods of life. For *First*, the brain of the infant at birth is still so soft and almost semifluid, and its vessels so large, as to be more easily lacerated than years afterwards under the same extent of pressure. *Secondly*, the brain at that particular period of life, and for ten or twelve months afterwards, is undergoing great and rapid normal changes from its imperfect embryonic state to the anatomical consistence, form, and organization which it is to present during the remainder of life. "From birth," observes Billiard, "to the first year, the brain of the infant is in a true state of transition, so that this organ, which is scarcely formed at first, arrives, towards the ninth month or first year, at the organization proper to the brain of adults. Ought we not," he adds, "to attribute to this modification supervening in the brain of infants, the frequency of cerebral affections at the age of which we speak?"*

But there is a *third* peculiarity, probably even more important than the two others. The human brain is very much larger in proportion to the body in the infant, than it is in the adult. In a full-grown adult the proportion of the brain to the body is as about 1 to 40; in the infant it is, as we have already stated, about 1 to 6, or nearly seven times greater.

The influence of this immense difference is important both physiologically and pathologically.† The nervous system in the infant is thus rendered naturally much more susceptible and sensitive

* Billiard, Traité des Maladies des Enfans, p. 335, Brussels' Ed.

† Tiedemann, on whose authority I have given the respective proportion, stated in the text, of the whole brain in the infant and in the adult, observes, in relation to

of physical and sympathetic morbid impressions than at a more advanced age;*—pathological irritations and disturbances of other parts are far more readily and strongly reflected upon the nervous centres;—and, for the same reason, any direct lesion or disease of the brain itself comes also in turn to exert a more potent and extended effect upon the general and individual functions of the body, than at other later periods of life. All these conditions are heightened and increased in the male, as compared with the female infant at birth, both, *first*, by the greater absolute size of the male brain; and, *secondly*, by the greater lesions and injuries to which it is subjected during the process of labour. I have collected some statistical data to show that the particular diseases which destroy so many more male than female children immediately after birth and for a short time subsequent to it, and which are therefore the evident and demonstrable causes of the excess of the male over the female mortality at that early period of life, are all such as are capable of receiving an explanation of their more marked frequency, severity, and danger upon the above principles, in conjunction with the consideration of the increased size and increased injuries, at birth, of the male as compared with the female encephalon. To adduce evidence of this to the amount that might be necessary, would require us to extend this essay far beyond the limits prescribed to it, and these it has already far overstepped. I may, on another occasion, return to the subject; and, in the meantime, shall only add, that the particular affections alluded to, as producing that excess of the male over the female mortality, which is so remarkable at birth, and progressively decreases from that time onwards, are almost all referrible in their origin or course to morbid states and disturbances of the nervous

this point, (and his words apply equally to the morbid as to the healthy states of the system), "The different degrees of susceptibility and sensibility of the nervous system seems to depend on the relative size of the brain as compared with that of the body. Children and young people are more susceptible, irritable, and sensible than adults, and have a relatively larger brain. In diseases which affect the nourishment of the body, the susceptibility increases as the patients grow thinner. The susceptibility and sensibility decreases, on the other hand, with persons recovering from a long illness gradually as they regain their strength. The degree of sensibility in animals is also in proportion to the size of the brain. Mammalia and birds have a large brain, and are more susceptible than amphibious animals and fishes."—London Philosophical Transactions, Vol. cxxvi., p. 503.

* "The nervous system in infants is naturally in a very susceptible condition; it is consequently easily excited on the application of the slightest impressions. This constitutional irritability is characteristic of the infant state. . . . . The nervous sensibility is in excess at this age, and whatever be the disease with which the infant is affected, a morbid excitability and irregularity of action in the nervous system are more or less its attendants."—Stewart's Practical Treatise on the Diseases of Children, New York, 1841, p. 494. See also Maunsell and Evanson on the Diseases of Children, p. 13, &c.

system,* and to functional derangements and inflammatory action in it and other organs of the body.

Chapter IV.—Practical inferences, and extent of influence exerted by the male sex of the infant upon the general maternal and infantile mortality during parturition and for some time subsequent to it.

The subject of the preceding inquiry is certainly not without interest in a physiological point of view. Nor is it devoid of importance in a pathological and practical light. The results of the whole investigation show us with demonstrative force that the adaptation of the fœtus to the maternal passages in human parturition is, in general, so close and perfect, that a deviation in their relative size of the slightest possible extent, is capable of altering immensely, when the subject is viewed on a large scale, the consequences of the process as regards both the immediate safety and life of the mother and infant, and their subsequent welfare. We may be hence led to see more strongly than previously the advantages attendant upon the presentation of the head of the infant in its most natural position, and hence in its smallest given diameter, and the disadvantages accompanying any deviations in its presentation, seeing that all these deviations offer a larger circumference than the normal parietal case. The same inquiry illustrates well the importance of saving, and particularly in cases in any degree tedious, or in any slight malpresentation, the space of the pelvic passages as much as possible, by keeping the rectum and bladder empty, by carefully guarding against congestion and tumefaction of the soft tissues lining the pelvis, and by promoting, by all appropriate means, the dilatability of the maternal passages. We can easily, from the same data, understand how greatly the dangers of the mother and child are increased by organic contractions, however slight, in the pelvic passages and bones themselves, and by increased volume on the part of the infant, whether that increased volume be the effect merely of excessive growth or the result of actual disease.

The object of our investigation becomes one of still more practical moment when we consider it in relation to the extensive character of its operation and influence.

The importance of any cause of human disease does not so much depend upon the immediate intensity and danger of the morbid action which it is calculated to excite in single individuals, as upon the frequency and extent of its operation, and the consequent

* "The diseases of the nervous system are *twenty-three per cent.* more fatal to males than females, *the chief difference arising from the diseases which affect children.*"—Mr Farre in the Registrar-General's Second Annual Report, Appendix, p. 4.

amount of its effects upon the general community. In this way a slight disease or slight cause of disease, which acts upon a great proportion of the population, may become as important in its ultimate and practical results as a malady of the most formidable character, provided that malady is much more narrowed and limited in its attacks. "The cholera," observes Quetelet,* "and the influenza are diseases which differ greatly from each other; the one is a dreadful scourge, which manifests itself in the most dreadful manner; the other, in its ordinary external appearance, resembles a catarrh or common cold; and yet the tables of mortality prove, that, although the latter disease is not so deadly, it nevertheless, in consequence of its universality, and in consequence of the sufferings it causes, produces results nearly as extensively fatal as cholera. Facts serving to confirm this opinion may be found in the excellent work published by Dr Gluge on the History of Influenza."†

The remark which we have applied to diseases and the causes of disease holds equally true with regard to morbid complications in midwifery and their causes. Those special states which, in obstetric practice, are seen to lead to some of the most formidable causes of difficult labour, such as tumours in the pelvis, malpositions of the infant, inertia of the uterus, &c. are certainly often most disastrous in their immediate effects, but yet, upon the whole, they are comparatively so rare in their occurrence as not individually to lead, upon a large scale, to consequences of so severe and fatal a character, as disturbing agencies of a far slighter, but far more general kind, such as that inconsiderable enlargement of the male over the female head, which we have been considering in the preceding pages. A few computations will best illustrate and enforce the truth of this abstract remark. These computations I shall found on the idea that the bases of calculation offered by the data of the Dublin Hospital are sufficiently correct to serve for a ground of analysis of other analogous statistical results. To avoid as far as possible any probability of great errors, we shall keep our calculations considerably within the limits that our apparent standards might seem to warrant.

With this explanation, let us proceed to inquire to what extent the cause of difficulty and danger during labour, which forms the topic of our present essay, fatally influences each single year in England, or during a succession of years, the results of parturition, as respects the fate both of the mother and infant. Some facts, recorded by Mr Farre, in his admirable contributions to the different annual reports of the Registrar-General, will serve as

* See Natural History of Man, p. 112.

† Die Influenza oder Grippe, u. s. w. Minden, 1837, 8vo.

matters of comparison on these points with the Dublin Hospital returns.

Number of maternal deaths referrible annually in Great Britain, to the influence of the comparatively great size of the head of the male infant.

In the returns of Drs Clarke and Collins, we have reports in the Dublin Hospital of the sex of the child in 368 cases in which the mother died from labour or its consequences. In 231 instances the child was male; in 137 cases it was of the female sex. The proportion of maternal deaths, after male and female births, was therefore as follows:—

Total deaths	With male children.	With female children.	Proportion of males to females.
368	231	137	168 to 100

If we venture, then, to compute from these data, that out of 250 mothers that die in child-birth from parturition or its effects, 150 have given birth to males and 100 to females, as the above table would seem to show, then we have in every 250 maternal deaths an *actual excess* of 50 cases of loss of the mothers after male births, for which, (for reasons which we have previously stated at length,) we can find no other explanation than the greater comparative size of the male head, and we have already attempted to prove that this explanation is in itself logically and amply sufficient to account for the consequences which we have attributed to it. In other words, among every 100 parturient mothers that die, we have 40 perishing after producing female children, other 40 perishing after producing male children, and the remaining or additional 20 in the 100 perishing also after the birth of males, but so far forming a regular and constant *excess* of 20 per cent. of deaths in connection with male births, traceable to no other cause than the sex and consequent size of the infant. One in every 5 maternal deaths, or 20 in every 100, and 200 in every 1000, are so far the direct or indirect consequences of the greater dimensions of the head of the male infant. Now, at the present day in Great Britain, upwards of 3000 women die every year from child-birth or its immediate effects. Hence, according to the above computation, 600 of these 3000 cases,* as forming the *excess* of

* During the four years, from 1838 to 1841, there died in childbirth in England and Wales 11,722 mothers. In 1841, the last year of which the returns are yet published, 3007 women died in childbed in England and Wales, (Fifth Annual Report of the Registrar-General, p. 380.) If we add to these 500 deaths as occurring in childbed in Scotland, we will be much within the limits in computing 3000 maternal deaths to take place annually in Great Britain from labour or its immediate consequences. I reckon 500 deaths as occurring annually in Scotland in childbed on the calculation which seems to hold in regard to England, that nearly 200 deaths happen every year from this cause in every million of the general population.

male over female births, are more or less immediately the results of the sex and size of the male infant. In Great Britain, therefore, the valuable lives of 500 mothers, (to speak within the terms,) are lost in childbirth through the influence and agency of the cause in question.

Number of infantile deaths occurring annually in Great Britain during labour, and referrible to the sex and size of the male infant.

We have seen, under our fourth proposition, that in the Dublin Hospital there died, during the process of parturition, and probably as a consequence of the injuries to which they were subjected, 151 male children for every 100 females. According to the mode of argument followed in the preceding paragraph, there was thus an *excess* of 50 male deaths among every 250 children, or 20 in every 100, referrible to the greater size of the head of the male infant. Further, we may take it for granted that, on a low computation, 1 in every 50 children, born dies during labour, about 1 in every 25 cases being a still-birth. To be certain, however, not to overstep our limits, let us reckon only 1 in every 75 children to die during parturition, and 1 in every 5, or 20 per cent. of those that thus perish to be formed by that excess of the mortality of males over females which we can trace to no other cause than the influence of the greater dimensions of the male head. In England and Wales about 500,000 births take place annually.* By the above computation more than 6500 of the offspring of these births die during labour, and one-fifth of that number are lost in consequence of the sex and size of the male child. In Great Britain, therefore, the lives of 1500 infants are annually lost in childbirth from the operation of this agency.

Number of infantile deaths occurring annually in Great Britain within the first year of life, referrible to the influence of the sex and size of the male child during labour.

In 1841 there died in England and Wales, within the first year of life, 41,444 boys and 32,766 girls. There was thus an excess of 8678 deaths of male infants within the first year, and 3610 of this excess occurred within the first month after birth. In considering this subject under our seventh proposition, I have already stated our reasons for considering the excess in question of male over female deaths, in very early infantile life, as owing

* "In 1841, 512,158 births were registered, in 1840, 502,203, and in 1839, 492,574." Registrar-General's Fifth Report, p. 8. It seems doubtful if all the births that occurred were registered, as this, like the other branches of registration, could not at once be made perfectly efficient. Certainly it is to be greatly lamented that there is no official return of the still-births. The omission is a most extraordinary one, and surely ought to be corrected.

to the greater injury sustained by the head and nervous system of the male child in its passage through the pelvis during delivery. I have further commented on the same subject in speaking of the excess of size of the male head and encephalon as the probable cause of the greater difficulties attendant upon male births. Under these points enough has been stated to show that a large proportion, if not the whole, of the remarkable excess of the male over the female mortality, which is observable for some time after birth, is traceable to the greater dimensions of the male head and encephalon, and their consequent greater compression and injury during delivery. Supposing these views to be perfectly correct, there die annually in Great Britain upwards of 5000 children within the first year after birth, whose death is referrible to the influence of the sex and greater size of the male head during labour.

If we add together the three series of observations that have been stated under the preceding heads, the result is as follows: *upwards of* 7000 *deaths in all, namely, above* 6500 *of the deaths of infants during and after birth, and* 500 *of the deaths of mothers in childbed occurring annually in Great Britain, are referrible to the direct or indirect agency of the cause that we have been discussing, viz. the sex and larger size of the head of the male child.*

In using here the term *cause* in reference to the slightly greater size of the male head as the source of the results that we have above ascribed to its influence, it may be proper to state the precise meaning which we attach to this term. Amidst all the uncertainties of medical language, there is no phrase which has had more vague and contradictory significations attached to it. Except in the cases in which disease and death are produced by the immediate action upon the body of severe physical injuries, or strong chemical agents, it rarely or never happens that serious and fatal morbid actions are excited in the economy through the operation of one single morbific cause. In most, if not in all, other instances, a number of causes are found to have acted either in concourse or succession towards the production of the disease that may be present, and the effect to which it leads. According to the order which these several causes may occupy in the series or chain of antecedent sequences, and according, in some instances, to their supposed relative importance and intensity in the production of the existing morbid action, they are individually described by pathologists as accessory or determining,—remote or immediate,—predisposing or exciting,—in relation to the disease that has been originated by their combined influence. Hence a cause which may be termed predisposing in one case may be more properly designated exciting in another, or the reverse, and consequently different authors often describe the same cause under op-

posite heads.* Further, it seldom occurs during the course of a fatal disease that the same cause which had especially excited the original malady continues, by the intensity of its own immediate action, to lead to the fatal result. An example will illustrate our meaning. All pathologists look upon excess in eating and drinking as a common cause of disease. If the body be debilitated by previous morbific agencies, a fit of intemperance may suddenly excite in it some serious and deadly morbid action, as extensive effusions or inflammation, severe fevers, &c., and thus act as an *exciting* cause of these diseases; or when the powers of the constitution happen at any time to be impaired by intemperance, the application of an excess of cold or heat may lead to similar consequences, and then the cause we are considering, (the intemperance), would be regarded as a *predisposing* one. Further, it rarely happens that intemperance in eating or drinking leads to death by the mere excess of their own action and influence on the body. Few men, in other words, die of direct gluttony, or direct intoxication; but many die from intemperance in eating and drinking, leading directly or indirectly to a variety of maladies, such, according to Dr Copland, as "plethora, inflammatory complaints, functional and organic diseases of the stomach, liver, and bowels, gout, apoplexy, paralysis," &c.†

The view which we have stated as generally taken by pathologists with regard to intemperance as a cause of disease and death, applies exactly to the greater size of the male head as a cause of the greater number of complications and casualties connected with male births. In some instances this excess of size acts as a predisposing cause to the accidents and diseases that are consequent to it, and, without its antecedent or concurrent agency, these accidents and diseases would not be produced. In other instances, it acts as a determining or exciting cause of the morbid conditions and complications resulting from its operations. We will take an illustrative example from an accident which we have already spoken of in a previous page, viz. rupture of the uterus. When rupture of the uterus occurs in a patient, who has already borne a large family, and where the uterine parietes are, from some pre-existing disease, much more weak and lacerable at one part than another, the greater delay and difficulty of the labour in connection

* For instance, Drs Copland and Craigie, two of the latest British writers on practical medicine, speak of intemperance in food and drink under two different heads. "Amongst the most frequent *predisposing* causes to disease is," says Dr Copland, "intemperance in food and drink." (Dictionary of Practical Medicine, Part II. p. 562.) Dr Craigie enumerates the same morbific agency among his exciting or occasional causes of disease. (Elements of the Practice of Physic, p. 18.) Dr Williams, again, describes excess of aliment among his exciting causes of disease, and habitual excess in stimulating drinks among his class of predisposing causes. (Principles of Medicine, 1843, pp. 9 and 24.)

† Medical Dictionary, Part ii. p. 562.

with the larger sized male head may give rise ultimately to the complication in question, when the shorter and more easy passage of a smaller fœtal head would not have led to the same disastrous consequence. Here the previously diseased state of the uterus acts as the predisposing, whilst the larger size of the male head acts as the exciting or determining cause of the lesion. On the other hand, when rupture of the uterus occurs in a first labour in consequence of the larger size of the male head calling forth a morbid and inordinate degree of uterine contraction for its expulsion, we have this inordinate uterine contraction acting as the exciting or determining cause of the injury, and the excess of size of the male head standing now in the relation of the predisposing cause to it. Further, like other pathological causes, the excess of size of the male head does not so often lead to accidents and death by the mere influence of its own intensity, or by the effects of direct compression upon the maternal passages or infantile head, as by leading to the supervention and excitement of various other formidable and fatal complications, such as morbid delays in the labour demanding instrumental interference, eclampsia, post-partum hæmorrhage, puerperal fever, &c. on the part of the mother,—and convulsions, nervous and inflammatory diseases, &c. on the part of the infant.

Under the signification and reservations which we have thus stated, we repeat that the greater size of the male fœtal head is the more or less immediate *cause* of a large number of those maternal and infantile deaths that take place in connection with labour, or as a result of that process. In illustration of this remark, I shall venture to add another observation,—one which may at first seem sufficiently startling to those who have not practically directed their attention to the subject, though it is but a simple and direct deduction from the facts we have so imperfectly brought forward in the preceding pages. It is this:—

The official returns of the mortality of England and Wales have only, as yet, been collected for somewhat upwards of seven years, viz. from 1st July 1837 to the present date. If the calculations we have already given are accordant with truth (and we believe them to be much within the limits), *there have been lost in Great Britain during that limited period, as a consequence of the slightly larger size of the male than of the fœtal head at birth,* ABOUT 50,000 LIVES, INCLUDING THOSE OF ABOUT 46,000 OR 47,000 INFANTS, AND OF BETWEEN 3000 AND 4000 MOTHERS WHO DIED IN CHILDBED.