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Essay
on
Teratology
By
Stephen Scott.

March 25th 1838.

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On the origin And Laws of Development of Monstrosities.

By Stephen Senn.

Read before the Hunterian Medical -
Society on Friday 27th November 1857.

So much has the study of Teratology been neglected within the precincts of this Medical school, that few, yea almost none of its pupils, entertain anything like correct ideas of its vast extent and importance; nor have they any conception of those concise arrangements, and unity of plan - reigning throughout this, as it does throughout every other department, of animate or inanimate nature, that even in the 19th Century this one of the first Medical Schools, an undisciplined notion prevails, in some degree resembling the absurd superstitions of the Ancients in regard to this most interesting - subject; a subject interesting in itself, but more especially interesting in its relations to embryological development; for how often have we the crutition of Marrow cited & its无可disputable ground-work, in the establishment of some important Law

of Development, for example take the following.
 1st The Movements of the anencephalous monster, as an argument in favour of the reflex nature of the foetal movements in utero. 2nd The tolerably well developed monster with its occluded orifices, & scaly, indurated skin, incidentally proves that the Ligum Amnii has little or no share in the nourishment of the foetus. 3rd Lastly the monster brought into the world totally destitute of the hepatic system, plainly proves that the liver is not essential to the development of the foetus or to its nourishment.

It may be well here to notice, that the term monster is only a relic of those dark ages, in which the entire subject of Teratology was enveloped in mystery; when monstrosities were regarded as evil men, or worse still, as results of unwholesome communications of the human female with the Devil or with brute animals; it must ever be regretted that this term, did not vanish with the revolting notions, with which it is so intimately associated; it is altogether unscientific & exists now only to puzzle & confuse. We call a monster, "Pays Ambrose Pere" whatever is brought forth contrary to the mere & order of nature; the

slightest deviation, as that of an artery from its course, would according to this theory constitute a monster; the term however is applied only to exaggerated forms of malformation, but the difficulty is great, to fix the standard by which to determine what is truly monstrous, & what merely abnormal; thence arises the great variety of statistical accounts, of their numerical proportion.

St. Hilair estimates in Paris at 1 in 3000. In the Sympy-in-Imperial Hospital of Paris it was 1 in 130. The difference here is great & our dependence on such statistics must be correspondingly slight. Some definite proportion however doubtless does exist, were it otherwise, it would be quite inconsistent with the strict rule, which Nature observes in the production even of the so-called monstrosities, which at some future period, or more correct series of observations may yet enable us to determine.

This subject then, to which the name Teratology has been assigned by Geoffrey St. Hilair (from *teras* a monster & *logos*) has in all ages engaged the attention of curious & observing minds; no investigations however were conducted on it, till about

the commencement of the 18th Century, at which period terminated the fabulous epoch of their history; important facts began to be observed & collected, a new light began to dawn over the total obscurity, men of science took up the subject & pursued it in a true spirit, & thus gave birth to a more positive period, before which the fabulous began gradually to disappear, as ignorance & superstition were swept before the overwhelming light of scientific research.

The most celebrated authorities about this period were members of the French Academy of Sciences, notwithstanding the numerous difficulties they encountered & consequently the number of errors they committed, the progress of the science rapidly advanced. About the middle of the 18th Century Haller committed a fundamental error in upholding the theory of centrifugal development of the fetus; according to which the heart & cerebro-spinal axis were first formed & from these the large vessels & nerves originate. The inverse doctrine of centripetal or eccentric development was strongly advocated by St Hilain & his son, & receives strong support from the following observation; that while

the heart & cerebro spinal axis are frequently found imperfect & even sometimes apparently absent; the large vascular & nervous trunks are never seen being deficient & the larger trunks more numerous and less粗壮 than the more superficial; of course our only conclusion from this, is, that the superficial parts are first formed. According to St Hilare authentic cases have been carefully observed & examined, in which not a trace of the cerebro spinal axis could be discovered ~~that~~ the monsters have lived & thrived for hours, some even for days; how then are we to reconcile these cases with the views of Physiologists of the present day, who hold that the seat of life is solely confined to that axis; - either we must conclude that such a view is too restricted; or that the cerebro spinal axis plate existed in these cases, though in a much attenuated & obscure form; nor is it altogether inconceivable, how a sort of life may be supported independently of any vascular nervous system; in many of the lower classes of the animal Kingdom, no nervous system has yet been demonstrated, & yet these animals lead a life of activity & independence.

Haller, notwithstanding his errors, gave & fertilized

An importance & a standing among the various branches of Science, which reached its for some time & kept pace with its rapid progress; towards the middle of the 18th Century in his treatise "De Mensura" he collected & analysed all the facts connected with the subject of that period, & deduced many conclusions well calculated to forward the progress of the study; I may even be said to have commenced a new era, when the subject was pursued with energy & zeal.

The Law of eccentric Development comprises the theory that originally distinct distinct halves of single organs such as the heart, approach & unite in the middle line. While endeavouring to establish this Law, M. Serres observed that there existed originally two distinct uteri, which during the course of development approached & united into one organ; thus, he argued, in all those organs that seem to be two stages of development, in the first they exist as double organs, separate & distinct, such is the normal state of the twin eggs: in the second stage, the two lateral parts become united into one, constituting the natural condition of the uterus; if however there exist in the original Ovary an excess of formative power, the

Kidneys, under the influence of this excessive power, regulated by the law "*de sui generis*" instead of remaining as two distinct organs, they go on to the second stage of development, & become united into one organ; thus by the Law of excessive formative power & the Law of Attraction. At Hilum accounts not only for the union of two organs ^{one, two} instead of whole systems of organs seen of entire beings: & regarding which Frolik says, "that he finds good evidence of its existence, we can find anything more in it than a pleasant expression of the fact, it in no wise explains. Without further noticing this great diversity of opinion between these authorities, I beg to submit another theory, which appears to me quite as feasible as an explanation, & perhaps less hypothetical than the above. It is evident that the organs situated in close proximity to ^{the} mesial line of the body, are most liable to approach & unite, as is well illustrated in the case of the Brain, Heart, Liver & Spleen; & the Kidneys when similarly disposed by nature, also approach & become united into one, forming, what is termed the horse-shoe kidney; & on the same principle may be explained the union of Testes, Ovaries let us suppose from two germs contained in

a single ovum, the Mesial line in such a case, of course, is between the two germs, & as they grow & become developed, the parts & organs from their proximity to the Mesial line, approach & unite, in the case of United Twins as naturally as do the two testes under ordinary circumstances. —

Another important difficulty, one giving rise of much discussion, arose at this period, regarding the question whether the malformation originally existed in the germ, or whether it was accidentally acquired during the course of development of the embryos. The two celebrated authorities on the subject, Lenny & Winslow headed the controversy, the former contending that the one disease was produced accidentally, the latter that, it was in all cases original. Men of Science, interested in the subject, all took part in the discussion, ranged themselves on either side. Winslow's view followed seemed to prevail at the time, but later investigations tend more to support the view of his opponents, the fact that no organs preexist in the ovum, nor does it in structure hold the slightest relation to the being afterwards formed,

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was per to establish the latter view. To not
this matter as yet, Dr. Milani made a number
of experiments upon eggs; During the process
of incubation, he placed some in a vertical po-
sition, thus he purported to bars again the
penetration of air; this experiment
resulted in the production of a number of
monsters, & in confirming more than once, Dr
Milani in his theory of acquired monstrosity.
Such a conclusion however was hasty &
illfounded, for he came the agency employed
in this experiment cannot, for a moment be
supposed to resemble the causes usually
affecting their production, even when accidental
I ~~now~~ ^{now} I can do no more, than prove that
monsters can be produced accidentally, &
if doubtless great proportion are so produced;
but it is still no argument whatever, against
original monstrosity also: the fact that
the worm bears no resemblance in form or
structure to the after embryo, applies as well to
natural as it does to monstrous productions, the
worm is a mere cell & as far as its individual
component parts are concerned, has nothing to

do with the development of the embryo; but it
 possesses an inherent power, (the nature of which
 we may not comprehend), & directed by this power
 it is enabled to undergo its many wonderful
 transformations, which prepares it at last
 to produce a being in the form of its parents,
 to both of which it usually presents a
 striking resemblance, a proof by the way
 of the actual incorporation of the male
 with the female elements. Is it then this
 power or directing influence which is at fault
 in the production of the monster, for should
 it be wrongly or excessively distributed in
 the primary vesicle, it is easy to conceive
 how the embryo must become in the one case
 perverted in its development, & its growth,
 in the other be excessive, & produce super-
 numerary organs: by this theory I think alone
 can we satisfactorily explain, the numerous
 cases of hereditary malformation & of similar
 forms of malformation occurring in several
 members of the same family; should the
 deformity resemble the female parent, we
 conclude, that the fault is in the germ cell.

but if the male is in heret in the sperm cell;
or should it occur in general members of
of the family, resembling neither of the parents
it must originate from a combination of the
elements derived from both; it is evident
both contribute to the development of the
cause & to the production of the monster.

However gross this deviation
from the natural standard, Monsters never-
theless lose generic distinction; nor do we
ever observe dissimilar organs & parts united,
as the intestine with the ureter or nerves with
arteries; but as in cases of duplicity, Stomach
united with Stomach, & pelvis with pelvis, etc.
soi pour soi is a principle faithfully &
strictly carried out. According to St Hilari
there is one type, & according to Cuvier others
thus we get two types & which all animals
vertebrate & invertebrate are referable, both are
correct only St Hilari overlooks superficial dis-
tinctions; this law must extend also to the anomalous
department of animal creation; from the simplest
to the most complex forms of monstrosity there is
every variety & grade, & so many degrees moreover of the

same form of monstrosity, that Monstrosities may yet
 be conveniently reduced to so many genera, & these
 varieties constituting so many species; thus giving
 rise according to Meckel to a new organic Kingdom
 differing only from the others in its less constancy
 of form, but likewise referrible to the one great
 type of St. Hilaire or to one or other of the 4 great
 types of Cuvier. This naturally brings us to the
 consideration of the great Principle of Unity of
 organic construction, this universal law of nature
 reigns throughout the whole animal Kingdom;
 & renders it as easy as it is natural, to refer the
 various forms of Monstrosities to a common type,
 it clearly indicates, that they are not as is too gene-
 rally supposed, mere freaks of nature, but un-
 disputably proves that they are regulated by
 constant & precise laws: & by this law are
 explained the numerous cases of resemblance
 between the anomalous condition of one species
 & the natural form of another. It is applicable
 however in Teratology more to individual parts &
 organs, than to entire Systems; If we only con-
 ceive this principle of unity of plan, reigning over
 the entire animal Kingdom, bring our minds to

regard Uninstructed Nature as one immense whole
 & the innumerable species composing it, as so
 many varieties & parts of one great archetype; it
 must be, that when any part or variety is ar-
 rested in its growth & development, it will pre-
 sent a striking resemblance to another part of this
 great whole or to another variety of this one type;
 in short, it will resemble another species of animal
 lower in the scale. On the contrary excess of de-
 velopement must produce a form resembling
 a variety higher in the scale of being: Hence an-
 imals presenting one anomalous conformation
 as regards their own species must present the
 natural form or an approach to it of another
 species of a lower or higher grade. Numerous ex-
 amples might be adduced, illustrations of this
 firmly established principle; Such as the
 persistence of the tail in the human foetus &
 the stunted form of the trunk, with shortened
 limbs, resembling the lower animals as the peacock
 while the double, whose ill-developed brain approx-
 imate is to the Rodentia. The foetal condition
 of higher animals, presents striking resemblances
 to certain mature forms of those, lower in the scale;

in the different stages of the development. There are also abnormal conditions of the human embryo, strongly resembling varieties of some of the lower animals; thus the position of the heart may be altered variously, sometimes it is placed in the neck immediately above the thorax, showing tendency to approach the natural character of some fishes.

Originally peritoneal openings may continue so during the course of existence; as for example the ducts of the intestines, this condition is usually complicated with a curious arrangement in the cardiac region, instead of free, it is reduced to two compartments, by a communication established between the two auricles & the ventricles; the origin of the pulmonary artery sometimes early obliterated; the circulatory system is of course completely altered, resembling in its arrangement more or less the condition presented by the lower invertebrate tribes such as the Reptiles &c.

Another curious fact, worthy of notice is, that while we find frequent changes in the number of dorsal columnar vertebrae, never save one here the cervical been known to vary, this is accounted for by the fact that the number of in the

critical region is universal all over the Mammiferous Class of Animals. Another item regarding the

Development of Monstrosities is; that, arrested growth in one part is often fully compensated for by the excessive development in another opposite part.

Before proceeding to treat of the Causes of Monstrosity, let us here in a few words enquire, why the proportion of deformities in the female sex is more than double that of the male sex? This is rather a difficult question. Any thing said explanatory of it, must be rather of a speculative description; still, when we consider that in elementary composition, the parts of the two sexes are exactly similar; so that the difference is only in the mode & degree of development; the chorion being the first & the perine the last stage of organic evolution; in cases then of arrested development of the entire foetus (be the cause what it may, for arrest is certainly the most frequent form of Monstrosity, bearing in mind that at different stages of development, the parts sometimes appear male & sometimes female) it is easy to see that

Natural & conclude, that this process of evolution is more likely to be checked at the first stage & from the Clitoris, than go on to the last stage & from the penis; & the more especially if the cause of error, arose from a deficiency of formative power in the original vesicle. It may be very properly urged against this theory, that we have unsterile males, as well as females; & excessively developed females as well as males, & this objection has nothing to do with ^{the} general principle, & as there is no rule known good, without exceptions, this one, so young & so crude cannot be supposed altogether exempt from them.

We come next to discuss what may be more strictly denominated the Cause of Monstrosities, & should a little very speculative present itself, it must be a subject so obscure, be held quite excusable. Nature is so much addicted to presenting effects merely, & our observation, & reasoning, freed from all their primary influences, hence our ignorance regarding the causes influencing the various stages of Embryology; & if this apply to the normal, what must the

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state of our knowledge as of its monstrous development, for the cause of the latter must to a great degree correspond to the cause of the former. One very evident cause of Monstrosity is that of Accidents, such as blows or falls, received by the Mother during or before an early stage of pregnancy; it is quite conceivable how the position & relations of the foetus may be so altered, even though very slightly, as to prevent that mode of development, which Nature at first intended it to follow; & continuing in that altered course although apparently at first very trifling, becomes ultimately an exaggerated form of Monstrosity. Another more extensive source of anomalies is to be found in the diseases to which the embryo itself is subjected, during its intra uterine existence; the foetus in utero is liable to many febrile & contagious diseases such as small pox, measles, plague &c all of which must exert a derogatory influence upon its healthy development. But more especially it is prone to diopical effusions, particularly Hydrocephalic disease: this may

be followed by protrusion & even total destruction
 of the cerebral mass, & hence the production of
 the anencephalic monster. Prof. Simpson in
 his article upon Diseases of the Placenta, throws
 considerable light upon this subject as well
 as on Diseases of the fetus in utero;
 he considers abnormal adhesions of the em-
 bryo to the membranes as a prolific source
 of these productions. In support of this many
 cases may be quoted; in four out of five cases
 recorded by the above Author, no adhesion
 to the placenta, the trunk was more or less
 completely folded upon itself, in three of these
 the one side of the body was completely de-
 ficient. A case occurred to Dr. Lu of
 India, in which the placenta was attached
 to the forehead of the child by a membranous
 band, arresting the development of the skull
 the hands of the cranium remained deficient.
 The abnormal windings of the umbilical
 cord also produces deformities, by tightly en-
 circling & compressing limbs, & in this manner
 can mutilating & checking the progress of the
 fetus. In such cases, it is worthy of remark

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that Nature seems to make every effort in her power at reproduction, as testified by the appearance of miniature parts & organs, which are not little frequently observed & occupying their place; in the same manner as she at all stages of life, reproduces the lost limbs of the lower classes of animals, such as the Crabs &c.

Another Cause of Monstrosities "Some hold", is, that of an influence produced on ^{the} development of the foetus in utero, through the imaginations of the mother; & by the supporters of this doctrine many cases are quoted as examples: we shall mention a few of the principle; First Cases are by no means rare, in which the children of a second marriage, present striking resemblances to the first husband, & this is explained on the ground of Mental influence of the Mother; Another case is that of an unmarried girl, who became impregnated by a Negro, & though forth a black child; she afterwards became the wife of an individual of her own race, & then first child presented a striking resemblance to the Black. The case of the Mare & the Quagga is sufficiently familiar need not be detailed, it has

furnish a beautiful illustration of a most un-
 tualia thing, for who can for one moment
 suppose, that the female in ^{each of} the three instances
 just quoted, could transfer the impressions
 (suppose there was one) from her own mind,
 through the nerveless cord of communication,
 stamp the likeness of the first male, upon
 her unborn offspring? In particular do
 I refer to the case of the Man O'War. But
 these are authentic cases & have we a better ex-
 planation? Yes, an explanation better con-
 sistent, & satisfactory, viz this, that the blood of
 the mother becomes inoculated through the
 child of her first husband, in this man-
 ner she is enabled to transmit to the offspring
 of another, in part the constitutive appearance
 of her first husband, this may also be
 applied to the other two cases mentioned.

A case related by Harvey I quoted by Prof
 Henderson to his Class, appears to be a tolerably
 good specimen of the usual run of examples
 brought forward to support the theory; it is
 that of a favorite bitch, when desirous of
 coalesce with the male, was much courted

by a Cur, & whom, it is said, she became much attached, but her Master, wishing to preserve a pure blood, prevented "as he thought," any intercourse between ^{them}, & placed her in commanement with a dog of her own kind; at the usual period she brought forth pups, not one of them like the supposed father, but all resembling the Cur, who was doubtless the real father; such a case, I think are many such cases given, where their authenticity is so doubtful, of course all go for nothing. Some people, when very anxious to establish a theory, are very fond of having scripture evidence in their support, we have certain of the upholders of this doctrine failed to mention the case of Jacob's flocks, bringing forth spotted & speckled progeny, from being mentally impressed with ^{the} speckled appearance presented by the branches of different trees, streaked with white lines; that in the very next chapter Jacob's mind is disabused of the idea, that such was the cause of the increased proportion of speckled cattle, for he is told in a dream & lift up his eyes, & see that all the Rams which lay upon the cattle, are Ring-necked speckled egrets.

Dr Allen Thomson gives 41 Cases all most wonderful illustrations of this theory of Mental influence; but as he wisely remarks, there is not any proof of the Authenticity of a large majority of these numbers; & the minority might be very properly set down as mere coincidences, considerably exaggerated; In the advocates of this theory one very apt & forget, that ^{the} number of Monstrous deformities & some fright, or some deforming disease during the period of utero-gestation, is so incredibly small in proportion to the countless numbers of pregnant females, every day exposed to similar & worse agencies, & yet the development of their offspring not in the slightest degree affected; Moreover when a deformed child is brought into the world, the Medical mediocrity takes a survey of the past nine months, & if she be very anxious & account for it, seldom fails to pick up some few detached cause for it, at first hearing a very doubtful relation to the effect, but by repeating it some assumes the appearance of a genuine case of Mental Impressions of the Mother influencing the foetal development. In all such Cases

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We would do well to follow the example of a certain earnest inquirer after truth, who on hearing, that a man had visited three black crabs, followed up his investigation in the matter, found that the wonder diminished just a bit, then & one, having reached the author himself, learned from him that he had visited some thing as black as a crab; This case must be held excusable, on the merit of being exceedingly illustrative of the general principle, in which these statistics are collected. —

No one will doubt the principle of hereditary transmission; but there is altogether appears from an influence conveyed through a channel which does not exist; if the impression is mental, it must be conveyed through the nervous system, there being no nerve in the cord, is sufficient of itself to overturn the notion of such impressions being transferred to the future; but on the other hand the influence of parent on child is direct, hence the transmission of constitution mental qualities & passions. Culture of taste & intellect, refinement & even dispositions of vice &c all descend from pit & bone

So says Aristotle, Mankind women bring forth children like unto themselves; the lower animals too, when well treated I cannot for, - leave a progeny behind them, a grade higher as it is in advance of those originally in the same condition with themselves, but which have for generations lived in a wild unregulated state. I say ~~Alas~~ ^{of nature} however the regularity & beauty of the Persian Race, has been greatly improved by the choice of the most beautiful of Circassian & Georgian wives: There are examples of families in this country in which similar properties are hereditary: we shall not pursue the attempt which some have made to apply the principles of Cattle breeding to our own species; for however desirable successive improvement of the breed may appear to me; we fear that the mind with all its peculiar wishes & passions, has too much to do with intellectual interests to allow the interference of physiological considerations.

Previous to enquiring into the rights of double or compound marriage, permit me

first & relate as shortly as possible, the Case of
 the African Twins, which I had an opportunity
 of personally examining last winter, & whom Anne
 Fox at that time, introduced to the notice of the
 Society. This double monster, consisted of two
 sisters, in many points resembling the Case of
 the Hungarian Sisters. They were then between
 five & six years old. According to the Mother's
 account, the girl now by far the best developed
 was first born, & quite in a normal position, the
 weaker sister being dragged after her, & forced up
 & presenting the back: nor does the Mother con-
 sider the latter ^{to have been} particularly difficult, showing
 with what comparative facility, this process is
 accomplished among the black Races. The
 head of union extends from about the last lum-
 bar vertebra, & the anal orifice common & distinct;
 involving the sacral & coccygeal bones, & extend-
 ing laterally more to one side than to the other:
 it measures almost 16 inches in circumference.
 In the stronger the chest is well formed & the
 spine in the normal plane, but in the other there
 is considerable lateral curvature of the spine,
 with a marked depression on the side on which

& her sister, with a corresponding elevation on
 the opposite. This seems to be caused by an-
 drawing & stand side by side, which, by a
 little twisting, they can almost do, by turning to
 towards that side, & which the bond of union ex-
 tends to the greatest degree. During this so-
 journ in this City, considerable interest was
 excited by their exhibitions; & I give some
 idea of the impression they left on some minds,
 I will take the liberty of quoting a paragraph
 which appeared in the newspapers at the time.
 The African Twins are objects of great interest &c.
 has from the bond of union being ^{so} close shown
 in the back, the spectator can scarcely believe
 they are one individual, & adds, that the union
 involves the sacrum & coccyx immovably, & in
 all probability uniting the sacral nerves &
 spinal cords, so as to constitute one individual,
 or two girls with one nervous system. Signed
 John Liggins. In opposition to this, I have
 the following observation to offer. I find that
 being one individual or two girls with one nervous
 system. Their dispositions are remarkably
 dissimilar. The one being self-willed, the other

gluteo sciendans; while one is pinning the other may be talking; they have numerous frequent general-
 ists; the one may be fast asleep, the other wide awake; the one desires to go in one direction the other pulls in the opposite; & lastly, although they call hands of two a single arm, each independent of the other takes the use of it, when she thinks proper. 2nd The union of the spinal
 Cords, would bring the four lower extremities under subjection to the will of each; & what is a still more fatal objection than this, is the fact, known to all Anatomists, that the spinal
 Cord only extends to the lower margin of the first lumbar vertebra, so that no cord exists at the base of union, which only commences at the upper border of the sacrum. 3rd The close
 contact or even union of the spinal & sacral nerves near their origin is not improbable, but certainly there is no interchange of fibres, that is to say, the spinal cord of the one does not supply nervous filaments to the extremities of the other; & of this I was satisfied from the fact that the one girl could not be made conscious of an impression made upon the extremities of the other, & again I placed the

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tip of my finger exactly on the point of union & both stated that they slightly felt it, but on moving it a very little to one side, it became more distinct & the one inappreciable by the other.

To my mind this argument satisfactorily proves, that they are two individuals, possessing each a nervous system, quite independent of the other, that they think, speak, feel, act almost in every respect, as two separate beings.

The question of separation by the knife simply resolves itself in this, that while they enjoy health & life, the proceeding would be most unwarrantable, considering the importance of the parts involved, but should we, by accident or otherwise, die, the other being unaffected, surely an operation might at least be attempted, as a free flap could then be taken from the glutens of the dead child; & so placing close of the part of the living child, might we not anticipate a favorable prognosis? Even in the case of failure, we at least succeed in placing the child from dragging out a few miserable days beside the perishing corpse of her dead sister. Most likely they shall die of the same disease. —

To explain the origin of Double Monstrosities, ~~the~~ three 3 hypotheses have been proposed. 1st Originally double buds. 2nd Excess or wrong distribution of formative power in a single germ. 3rd Adhesion & fusion of two single germs. The first supposition here refers to a fault of form, not of power, since the latter only is capable of determining the development of the monster, as shown in a previous part of the paper, it cannot of course be held good in reference to double any more than to single monsters. With regard to the second, it doubtless must be considered applicable to many forms of monstrosity, such as one excessively developed or possessed of supernumerary organs; but it cannot explain how a single germ however excessive its formative power originally be, can be capable of producing cases like the Siamese Twins. & Bengolian Sisters or the African Dwarf just quoted. For an explanation of ^{these} the power to consider No 3. The adhesion & fusion of two single germs. Of the three hypotheses just given, I do not for a moment hesitate to give the preference to No 3. The only one indeed at all tenable, I think upon the whole very rational.

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factory; but how this condition, is brought about, is a question more difficult to solve.

In referring to the subject of United and Double organs the principle of excretive Development, & the Law of Attraction of one organ for another & similar organs, either in the same or opposite bodies, when introduced, seems to me to be also capable of accounting for the production of the Double Monstrosity; the theory is very ingenious, but rather far-fetched; Another theory of Union I ventured to hint at & suggest, viz, the Union & adhesion of corresponding organs, from their proximity to the Mesial plane, which of course in the case of twins grows lies between them; this theory is not intended to apply to the numerous class of Monstrosities called Heteradelphina, when there is a parasite or some portion of another foetus attached to a totally well developed child, these may be accounted for by Hypothesis No 2. But in the case of United Twins such as the African & Siamese, I consider it more simple, & more comprehensible than the other theory, I certainly not a less scientific method of disposing of the Subject.

March 23rd 1858