

ACCOUNT
OF
A CHILD,
BORN WITHOUT A BRAIN,
WHICH LIVED FOUR DAYS;

WITH A SKETCH OF THE PRINCIPAL DEVIATIONS FROM
THE ORDINARY FORMATION OF THE BODY; REMARKS
ON THEIR PRODUCTION; AND A VIEW OF SOME PHY-
SIOLOGICAL INFERENCES, TO WHICH THEY LEAD.

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A DEFICIENCY of the brain and its coverings is not very uncommon; and it constitutes what have been called acephalous (i. e. headless) foetuses. The bones which form the top and sides of the skull, viz. the superior convex part of the frontal, the whole of the parietal, the squamous portions of the temporal, and the greater part of the occipital bone behind the foramen magnum, are wanting: as the brain does not exist, the bony cavity is not formed. The basis of the cranium is covered,

partly by the skin, and partly, in a greater or less extent, by membrane; which latter is united at the edge of the cranium with the common integuments, and hair grows on them in this situation, although there is none in the corresponding part, nor within some distance of it, in individuals naturally formed. As the surface of the head recedes immediately behind the eyes, they appear very prominent, and give to the whole a striking resemblance to the head of a cat; hence these fœtuses have been called in Germany cats' heads (*katzenköpfe*.)

In some of these cases the whole brain is deficient: the medulla spinalis, and the nerves usually connected to the basis of the brain begin at the openings, by which they go out of the head, and are perfectly formed in all respects. In others a small portion of brain exists, connected to the commencement of the nerves, covered by a soft vascular membrane, and forming a dull red or brownish tumor on the basis of the skull. Some cerebrum and cerebellum were recognised in a case recorded in the 2d volume of the Transactions of this Society, art. 6.

My friend Mr. Armstrong, of Islington, was kind enough to send me an acephalous child, which was born on a Sunday, and lived till the following Thursday evening. The brain and cranium were deficient, and the basis of the latter was covered

by the common integuments, except over the foramen magnum, where there existed a soft tumor, about equal in size to the end of the thumb. The smooth membrane covering this was connected at its circumference to the skin. The child, as is generally the case in such instances, was perfectly formed in all its other parts, and had attained its full size. It moved briskly at first, but remained quiet afterwards, except when the tumor was pressed, which occasioned general convulsions. It breathed naturally, and was not observed to be deficient in warmth, until its powers declined. I regret, that from a fear of alarming the mother, no attempt was made to see whether it would take the breast; a little food was given to it by the hand. It voided urine twice in the first day, and once a day afterwards: it had three dark-coloured evacuations. The medulla spinalis was continued for about an inch above the foramen magnum, swelling out into a small bulb, which formed the soft tumor on the basis of the skull. All the nerves, from the fifth to the ninth, were connected to this. The intestines contained a moderate quantity of the usual dark-coloured substance: and there was a little fluid, of the ordinary appearance, in the gall-bladder. Scemmerring and Morgagni have observed that most of these acephalous children are females: and it has been found in many instances that the renal capsules were very small*.

* Scemmerring, *Abbildung und Beschreibung einiger Missgeburten*, &c. p. 7.

The present case exemplified both these observations.

Some time ago I had an opportunity of examining another malformed child, not indeed until it had been kept so long that several interesting points could not be ascertained. With the circumstances attending its birth I was unacquainted. It had neither brain nor spinal marrow: the whole of the spinous processes were deficient, and the place of the medulla spinalis supplied by a vascular membrane, like that which covers the basis cranii in acephalous children, united in the same way to the surrounding skin. The heart, lungs and liver were deficient; the ribs short and imperfect, lay close to each other, and did not form a thoracic cavity; the face was malformed in many respects; the fingers and toes were under the usual number; with these exceptions, the formation of the body and the size of the limbs were tolerably natural. I know no instance of want of the heart without considerable deviations from the ordinary structure in other parts of the body. In an example described by Mr. Brodie*, the fingers and toes were not perfect, nor in the right number; the palate was divided, the liver deficient, and the œsophagus ended in a *cul de sac*. We may state, in general, that where any principal organs are wanting, or any considerable deviation occurs in leading points, there is always great confusion in the sub-

* Philos. Transact. 1809, Part I.

ordinate parts. This is exemplified in the two following cases: the acephalous children however form an exception to this remark.

I saw, in the possession of Mr. Norman of Bath, a production consisting of the lower half of the body, from the kidneys downwards, and consequently destitute of heart and brain. The umbilical vein ended in a large venous trunk, placed between the two kidneys, and occupying the situation of the vena cava inferior, and the umbilical arteries took their usual course. There was a serous cavity containing a portion of intestine. The pelvis and its contents, and the external organs of generation were tolerably perfect; the lower limbs ill formed, but they contained muscles, vessels, nerves, &c.

Dr. Clarke has described a case of malformation similar to the preceding, in the *Philosophical Transactions*, Vol. 83. It was expelled after the birth of a well formed and healthy child. There were two projections on it, each ending in three imperfect toes. It contained an os innominatum, femur, and tibia and fibula: and a small portion of intestine, covered by peritoneum, was found on the inside of the former bone. There was no vestige of heart, brain or nerves*.

* Analogous instances, in which the upper half of the body was deficient, and where there was consequently no brain, heart, lungs, or liver, are recorded in the *Hist. de l'Acad. des Sciences* 1720, and 1740; and in the *Philos. Transact.* 1767. It is stated
by

Should any doubt be entertained, whether the examination of these productions can lead to interesting or useful results, we may observe, that our conceptions of nature will be more correct in proportion as they are drawn from a more extensive survey of her works; and, that we cannot fail to learn something of her mode of proceeding by attending even to the imperfect sketches, which she seems to have abandoned as incapable or unworthy of being completed. The causes of these failures, and the conditions necessary to the production of perfect beings, cannot be understood without carefully noting in what the imperfections consist, and the circumstances under which they are produced. This subject too elucidates several questions in the hypotheses concerning generation. By shewing us what happens when an important organ is wanting or malformed, it contributes to fix our opinions respecting its uses. It also exemplifies the general fact of the regularity of nature's works; since we see her, even in these abortive attempts, acting according to a rule, and deviating from her accustomed mode of proceeding, not capriciously, but in a certain series and order. Neither should we overlook these productions in our attempts to infer from the phænomena of nature, and particularly from organized beings, the character of the cause which has produced them. Creatures so imperfectly constructed, as to be incapable of independ-

by Mr. Brodie, in the paper abovementioned, that two such examples were contained in Dr. Hunter's Collection.

ent vitality, and consequently perishing immediately after they are born; and those whom the malformation of some organ dooms, after a life of pain and misery, afflicting to themselves, and burthensome to others, to a premature death*, offer an apparent exception to the inferences, which have been drawn from the animal kingdom in general, concerning some attributes of the creating power†.

In the remainder of this communication, I shall give a sketch of the principal deviations from the

* I allude to the malformations of the heart in which there is a mixture of the arterial and venous blood: and to those of the urinary organs, in which the ureters open on the surface of the body.

† Haller was aware of the difficulty; but he has eluded instead of solving it. "*Monstrum malum physicum esse dicitur absque demonstratione. Infinitissima pars seminum ad maturitatem pervenit, reliqua dispereunt. Major pars infantum prius interit, quam possint animi dotes ad Dei voluntatem utiliter expedire. Nihilo plus in germine alienæ fabricæ vitii est, quam in abortu.*" *Oper. Minor. tom. 3. p. 173.* Archdeacon Paley has passed over the subject in silence. It will be obvious that the remark in the text is merely an extension of the common argument (on the merits of which I pronounce no opinion) concerning the character of the creative energy, as deduced from the works of creation, to a case which is generally omitted, because the results do not agree with the conclusions which it is usually the object of such arguments to establish. It cannot in any way affect our notions of the Deity, which are derived from an infallible source: the clear and steady light of revelation precludes the necessity of recurring to the faint and uncertain glimmerings of natural theology.

usual structure of the body, that I may have an opportunity of stating my views concerning their causes, a subject on which I find nothing satisfactory in any physiological works: and I shall conclude by pointing out the inferences, to which the facts related in the beginning more particularly lead.

Notwithstanding the general similarity of parts in the same species of animals, there is considerable variation in those details of structure, which do not affect the execution of the functions, nor interfere with the general form and relations of organs. The smaller parts, and particularly the bloodvessels, differ in almost every two bodies; so that it would be very difficult, if we descended into minutiae, to settle precisely what ought to be regarded as the most frequent, and therefore the *natural* structure. In parts, however, where one model is generally adhered to, deviations occasionally take place: these aberrations from the accustomed type, are called by anatomists *varieties*, or *lusus naturæ*: when the body in general, or some large and conspicuous part of it, deviates from the accustomed formation, which deviation is accompanied generally with imperfection in some of the functions, the creature is called a *monster*. No very accurate line can be drawn between these and varieties; nor can we assign a rigorous meaning to the former term, which is generally used in

a loose and popular manner*. A considerable anomaly in the form or structure of a particular organ is often called by anatomists a *monstrous* formation.

In the articular ends of bones there is little variety : a particular shape is best adapted to a particular kind of motion ; but in other parts, as the foramina, depressions, ridges, and sutures, deviations from the accustomed model are often observed. The same general rule will apply to the varieties of muscles: the principal object is a certain insertion near a joint, giving a determined direction to the motion produced. These insertions vary very little ; but there are many differences in other points, which have no share in regulating the motion. The biceps flexor cubiti has often an additional slip from the humerus, and the latissimus dorsi from the angle of the scapula. The palmaris longus and the plantaris are often absent ; but the other flexors of the wrist and extensors of the ankle supply their place.

In no part of the body, are the arrangements less confined to a particular model, than in the

* “ *Monstri vox,*” says Haller, “ *ex ipsa linguæ natura videtur designare aberrationem animalis a consueta suæ speciei fabrica adeo evidentem, ut etiam ignarorum oculos feriat. Nobis vis vocis perinde videtur indicare fabricam, etiam grandium & conspicuarum partium, alienam a solita.*” Oper. Minor. tom. III. p. 3.

distribution of the blood-vessels. Whether the blood pass by one route or another is of no importance. The great arterial trunks of the body and limbs are not exposed to these varieties; because they generally occupy situations, in which they are most effectually protected from external injury. We may remark, also, that the arteries of the upper are much more liable to varieties than those of the lower limbs. The latter are almost constant in their distribution, while those of the forearm and hand are hardly alike in any two subjects taken together. There is no obvious principle, by which this difference can be accounted for. One or two examples have been observed, in the vena portarum, of a departure from the usual arrangement, completely deciding an important physiological question, which it had not been possible to settle by direct experiment. The trunk of this vein, instead of branching out in the liver, has terminated in the inferior vena cava. Mr. Abernethy* found this in a child about ten months old, in which the gall-bladder contained bile, and the body had been well nourished. Another instance, not yet published, was met with by a teacher of anatomy in London, in an individual several years old. As the blood, which had circulated through the digestive organs, passed immediately into the general venous system in these cases, the bile must have been secreted from the blood of the he-

* Philos. Transact. Vol. 83.

patic artery; although so many ingenious physiologists have proved, quite to their own satisfaction, that the blood acquires in its circulation through the intestines, omenta and spleen, various properties which are indispensably necessary to the formation of bile.

There is less variety in the nervous system of animals of the same species, than in most parts of the body. Scarcely any differences are observed in the appearances of the brain, and much fewer in the distribution of the nerves, than of the blood-vessels.

There is very little variety in the organs of sense: perhaps the mechanism of these, and of the brain and nerves is nicer, so that a considerable deviation from the ordinary structure would interfere with their peculiar functions.

Irregularities in the organization of the skin, are more conspicuous in the coloured, than in the white races of mankind. One of the most striking is the entire absence of colouring matter, constituting the albino, which was first noticed in the negro: this peculiar formation, however, occurs also in the white races, and in various genera, both of mammalia and birds. The colouring matter is equally deficient in the hair and eyes: hence the former is white, and the choroid coat, iris, and pupil of the latter pink.

Individuals of the black races are sometimes marked by spots of white, of various size and number, without any thing like disease of the skin. This circumstance occurs most frequently in negroes*. But such spots are not peculiar to the dark-coloured races. Blumenbach saw two instances in Germany, one of a youth, the other of a man sixty years old. They both had a rather tawny skin, marked here and there with various spots of the clearest white. They appeared first in the former in infancy, and in the latter at the age of manhood. Patches of the skin are sometimes thickly covered with hair, like that of the head; such occurrences have given occasion to reports of persons having hides like animals. Scemmerring saw a woman said to have the skin of a deer, and shewn in many parts of Europe. He found the peculiarity to consist of numerous and large elevations of the skin, covered by thick and strong hair. They were of the nature of the moles often seen on the face of very fair persons, and generally giving origin to hair: he could not discover a single hair resembling that of a deer†.

A very singular structure of the skin exists in some individuals of an English family, called the

* Blumenbach, *Abbildungen naturhistorischer gegenstände*, 3^{te}. heft. Buffon, *supplem. tom. 4*, p. 565, tab. 62. Byrd in *Philos. Trans. vol. XIX.* p. 781. *Trans. of the Philos. Society of Philadelphia*, tom. II. p. 392.

† *Abbildung und Beschreibung einiger Missgeburten*, p. 32.

Porcupine men. It occurred in a man, and his six children, in all of whom it began about nine weeks after birth. The skin of the whole body, except the head and face, the palms and soles, is covered by an innumerable company of warts, of a dark brown colour, and a cylindrical figure, about an inch in length at their full size, growing as close as possible to one another, but so stiff and elastic, that when the hand is drawn over them they make a rustling noise. They are shed annually in the autumn or winter months, and succeeded by young ones of a paler brown. The health of these individuals was not affected*.

The various appearances of the skin, comprehended under the name of *nævi materni*, and commonly supposed to be produced by the influence of the mother's imagination, are natural varieties in the structure of this organ.

The diverticula of the small intestine, the union of the two kidneys into one mass, and the supernumerary spleens, are examples of varieties in the viscera, which do not affect their functions: the latter depend on structure, not on form or size.

The internal organs are sometimes completely transposed: all the parts, which are commonly on the right side, being on the left, and *vice versa*.

* Philos. Trans. No. 424; and Vol. 49. p. 21. Edwards's Gleanings of Natural History, Vol. I. Blumenbach, in Voigt's Neue Magazin, Vol. III. Part 4.

A very detailed and perfect account of such an arrangement, which included all the thoracic and abdominal viscera, with their nerves and blood-vessels, and the thoracic duct, is given by Dr. Baillie, in the 78th Vol. of the Philosophical Transactions. There are several other minute and well authenticated accounts of similar transpositions.

An example is related by Dr. Sampson, in one of the early volumes of the Royal Society's Transactions. "But that, which most of all surprised us, was the inverted order of his bowels: his liver, which was very large, lay in the left hypochondre, and his spleen in the right; the cone of his heart was on the right side, and accordingly the larger and thinner ventricle was on the left; and the thick one, which is in others on the left side, was in him on the right. The great artery descended on the right side, and the vena cava ascended by his liver on the left. The œsophagus descended to the first orifice of the stomach on the right side, which made the pylorus and entrance of the pancreas to be on the left, and the first flexure of the small guts to be towards the right: so that the beginning of the colon, with its appendicula, lay on the left os ilion, and the flexura sigmoidea towards the right. Other things, that necessarily followed this site, need not be mentioned. It was not thought on to inquire, on which side the lacteous thoracic ductus ascended, or where it ended; nor, on which side the recur-

rent nerves took their places of returning about the trunks of the great artery and the auxiliary; nor had we time to do it. This person in his lifetime was never observed to have any distemper, or usage, which might discover this inverted situation of his bowels, nor had this contra-position any evident influence upon his diseases and death. He was about thirty years of age, a married man, had several children, was of a middle stature, healthful till towards the latter end of his time: had no prominency on his left side, more than on the other; was not left-handed, nor had any weakness on his left side." Philosophical Transactions, No. 107. Mery found all the parts of the abdomen and chest in this inverted state in a soldier, who died at the age of seventy-two; and has left a very accurate narrative of the dissection*. Another instance is recorded by Bartholin†, and by Riolan‡, in his *Disquisitio de transpositione partium naturalium et vitalium in corpore humano*; and another by F. Hoffmann, in his *Cardianastrophe, seu cordis inversio memorabilis, observata a collegio medico civitatis Hallensis, in anatomia cadaveris femine*; Leipzig, 1671.

In the cases which have been just mentioned, the functions are still perfectly executed; the change

* *Recueil des anciens mémoires de l'Acad.* Tom. X. Also *Mem. de l'Acad.* An. 1733, p. 374.

† *Histor. anat. rar.* Cent. 2. his. 29.

‡ *Opuscula Anatomica varia & nova*; Paris, 12mo, 1652.

of position in the transposed viscera, or of size and figure in the united kidneys, leaves these organs just as capable of answering their usual purposes as when the ordinary arrangement is observed. But the heart is often the seat of deviations from the accustomed structure, which essentially affect its functions, and thereby exert such an influence on circulation and respiration, as to give a very peculiar character to the whole state of the individual, and generally to shorten very considerably the term of existence. In animals which breathe, the passage of the blood through the lungs produces a remarkable change in its properties and appearances; the right performance of the various vital processes requires that the organs of the body should be supplied with blood, that has undergone this change; and this object cannot be accomplished, unless the cavities of the heart holding the two kinds of blood, are kept perfectly free from all communication with each other. In many instances the heart is so formed, that the two sides constantly communicate; this is of no consequence, so long as foetal existence continues, in which the blood is all of one kind; but afterwards it produces a mixture of the arterial and venous bloods, and the greatest disturbance of respiration and circulation. The body, particularly its extremities, is cold and livid; the slightest exercise produces anxiety, and often a suffocating sensation, accompanied with fits of insensibility; the growth is impeded, and the whole being so altered, that

the individual is unfit for any active employment, and has a truly miserable appearance. The black and red bloods will be more or less completely mixed in these cases, according to the degree of malformation, and the individual will either die very soon after birth, or exist in a state of languor, suffering, and constant prospect of death, for a few weeks, months, or even years.

The imperfect organizations of a more striking kind, most of which come under the notion commonly affixed to the term monster, may be arranged under the four divisions of 1, unnatural formation; or 2, unusual position of certain organs; 3, of deficiency; or 4, redundancy of certain parts. The kinds of monstrosity are not kept distinct in each case: they may all be united in one specimen, and the want of one part is often attended with unnatural position of another, &c.

1. The hare-lip, and the frequently accompanying fissure of the palate, constitute a striking example of unnatural formation.

The urinary and generative organs in both sexes are frequently the seat of unnatural arrangements. The anterior part of the urinary bladder, and the integuments covering it may be wanting; the posterior portion projecting between the recti abdominis muscles, and forming by its mucous lining a soft, red, sensible protuberance on the surface

of the lower part of the abdomen, contiguous at its circumference with the common skin, with the ureters opening on it; and constantly allowing the passage of the urine. The ossa pubis do not come together in these cases, but are separated by an interval of an inch or two: hence the recti muscles are unusually far apart, and allow the projection of the back of the bladder. So extensive a malformation could not exist in this part of the body without disturbing the arrangement of the generative organs, particularly in the male. The wide separation of the ossa innominata occasions an unusually long portion of the penis to be concealed under the integuments; hence the loose portion of the organ is very short. It deviates again very widely from its ordinary appearance in consequence of not being perforated by an urethra: or perhaps we may say that the urethra, like the urinary bladder, is laid open. The scrotum is divided into two lateral folds, each containing its testis. In the female, the labia are wide apart, instead of being joined by the usual commissures, the nymphæ deficient, &c*. It has been observed much more frequently in the male, than in the fe-

* A male subject of this kind was examined by Dr. Baillie, and is described by him in the Transactions of a Society for the improvement of medical and surgical knowledge, Vol. I. Mr. A. Cooper has described the external appearance, and the dissection of a female in the Edinb. Med. and Surg. Journal, Vol. I. Dr. Duncan, Jun. has made an extensive collection of all the recorded cases in the same Vol. of the Edinb. Journal.

male subject. Many of the individuals have exhibited themselves for money, and have often been supposed to be hermaphrodites; a supposition which they have encouraged for the purpose of increasing public curiosity*.

These cases prove to us clearly, what we should have supposed *a priori*, viz. that the urinary bladder is not a part essential to the body, but subservient only to our convenience and comfort, by retaining the urine, and preventing its constant discharge. A person may exist in perfect health and strength, although the urine should run off as it is secreted.

Other examples of unnatural formation are seen in spina bifida, in the imperforate rectum, œsophagus, urethra, &c.; in various imperfections of the extremities, and in the union of the two eyes into one, placed in the middle of the forehead, in the situation of the nose, which is deficient. This is not an uncommon kind of monstrosity, and seems to realize the ancient fables of the Cyclops: The single eye is large, and has the appearance of two confounded together. Thus each lid is composed of two, united in the middle by their extre-

* I have considered this subject, as well as all those unusual formations of the sexual organs, which have given rise to a notion of the mixture of the two sexes, at greater length, in the article GENERATION, of Dr. Rees's Cyclopædia, under the head of *Hermaphroditism*.

mities, and having their respective tarsi, meibomian glands, &c. There may be two optic nerves joined into one, two lacrymal glands, and one large crystalline lens. The iris in one case was almost double, the lens simple. Indeed, in all the instances, there have been more or less plain marks of the apparently single organ being composed of the parts of two eyes. This kind of deformity is not uncommon in animals*.

2. The unnatural positions of parts are exemplified in the passage of the abdominal viscera through an aperture of the diaphragm into the thorax; and in their protrusion at the navel.

3. The want of brain and spinal marrow, and of heart, as in the cases related at the beginning of this communication, illustrate the third species of unnatural formation†.

4. Supernumerary fingers and toes do not constitute a sufficiently striking deviation to deserve

* See Haller, *Oper. Minor.* tom. III. p. 38, for an example in the lamb; *Sømmerring, Abbildung, &c.* p. 31, in the pig; *Mem. de l'Acad. des Sciences*, 1703 and 1744, in the dog; *Philos. Transact.* No. 456, in the sheep; *Buffon, Descr. du cabinet du roi*, tom. XIV. pp. 392, 394, in the dog and pig; *Hist. Nat.* tom. VI. p. 58, in the cat.

† The examples of deficiency of less important parts are numerous, as of the external ears, the soft palate, of some fingers and toes, or of the whole limbs. The absence of the front limbs we have recorded in the cat, dog, and horse.

the name of monstrosity. There may be five fingers, or a small additional thumb in the hand ; and six toes in the foot. In some instances this variety has existed in several individuals of the same family, and has been transmitted through two or more generations, both by the father and mother*. Analogous appearances have been noticed in animals, as the dog, pig, sheep, and common fowl. Supernumerary horns sometimes exist in the cow, sheep, and deer : and in the *ovis polycerata* this variety seems to have become permanent, like that of the supernumerary toes in the *gallus pentadactylus*. Supernumerary extremities are by no means uncommon in animals. Examples may be seen in Haller, in all the domesticated species, as

* Reaumur has published an account of a family, in which this unusual number of toes and fingers, beginning in a male, existed in three generations. *Art de faire éclore, &c. les oiseaux domestiques*, tom. II. p. 377.

Maupertuis gives a corresponding example, where it began in the female, and had recurred in four generations. *Cœuvres*, tom. II. p. 275. Mr. Carlisle has also recorded the occurrence of supernumerary fingers and toes in four generations, of a family into which it was introduced by the female. *Philosophical Transactions*, 1814, Part I.

In all these families, several of the children were naturally formed. One of the children of a six-fingered and six-toed father, had only five fingers and toes ; but some deformity was observable in the thumbs, and two first toes. His offspring had six fingers and toes. Reaumur, lib. cit. See also, on this subject in general, and on the anatomy of the supernumerary parts. *Recherches sur quelques conformations monstrueuses des doigts dans l'homme*, par M. Morand, in the *Acad. des Sciences*, 1770.

the horse, dog, cat, cow, sheep, pig, goat, also in the hare, in the common fowl, duck, goose, sparrow, dove, goldfinch, and in the frog*.

Examples of any other parts, besides the limbs, being thus attached to bodies otherwise perfect, are less common. An ox is mentioned in the Philosophical Transactions, Vol. XLIX. with an additional head attached under the lower jaw; and a cow was exhibited as a public show, with two heads and necks.

The Indian child with a double head, described by Sir Everard Home, in the Philosophical Transactions, Vol. LXXX. is an instance of a very rare kind of deformity.

Winslow saw in 1698, an Italian, who had another head much less than his own, connected to the chest below the cartilage of the third rib. It had been baptized separately from the other. It adhered by the lower half of the right side of the face and head; so that the right ear and surround-

* Oper. Minor. tom. III. p. 50, *et seq.* See also Mem. de l'Acad. des Sciences, 1733, p. 141, for an instance of two additional lower extremities projecting between the hind legs, in a full grown and perfectly well formed sheep dissected by Morand. This additional part had its own kidneys, organs of generation, large intestine and anus, and branch of the aorta and vena cava. For a similar instance in the cow, see Philosophical Transactions, Vol. XLIX. p. 183.

ing parts were not seen. All the rest of the head and face, with the hair, and most of the neck, the eyes, nose, mouth, teeth and chin, were very distinctly visible. This Italian felt whatever affected the additional head*. The same anatomist saw a girl twelve years old, well formed, and of the ordinary size, with the abdomen and lower extremities of another body hanging from the left side of the epigastric region. This second body was small; it had a row of vertebræ connected to the sternum of the larger; and fæces were discharged from it. The formation of the parts composing it seemed natural in every respect. The girl felt perfectly whatever touched this additional body. In this instance there was a doubt whether the child should be considered as one or two; and Winslow was sent for, not only to afford his medical assistance, but also to consider whether extreme unction should be administered to the little sister as well as to the entire body†.

Montaigne has related a similar instance with his accustomed clearness and *naïveté*. “Je vois avant-hier un enfant que deux hommes & une nourrice, qui se disoient estre le pere, l'oncle, et la tante, conduisoient pour tirer quelque soul de le montrer à cause de son estrangeté. Il estoit en tout le reste d'une forme commune, et se sustenoit sur ses pieds, marchoit et gazouilloit, à peu près comme les autres de mesme aage. Il estoit

* Mem. de l'Acad. des Sciences, 1733, p. 366.

† Ibid.

aagé de quatorze mois justement. Au dessous de ses tettins, il estoit prins et collé a un autre enfant, sans teste, et qui avoit le conduict du dos estoppé, le reste entier ; car il avoit bien l'un bras plus court, mais il lui avoit esté rompu par accident, à leur naissance : ils estoient joincts face à face, et comme si un plus petit enfant en vouloit accoller un plus grandelet. La jointure et l'espace par où ils se tenoient n'estoit que de quatre doigts, ou environ, en maniere que si vous retroussiez cet enfant imparfait, vous voyiez au dessous le nombril de l'autre : ainsi la cousture se faisoit entre les tettins et son nombril. Le nombril de l'imparfait ne se pouvoit veoir, mais ouy bien le reste de son ventre : voylà comme ce qui n'estoit pas attaché, comme bras, fessier, jambes et cuisses de cet imparfait, demeuroient pendants et branslants sur l'autre, et lui pouvoit aller sa longueur jusques à my jambe. La nourrice nous adjoustit qu'il urinoit par toutes les deux endroits ; aussi estoient les membres de cet autre nourris et vivants et en meme poinct que les siens, sauf qu'ils estoient plus petits et menus*."

A more remarkable instance, in which at least the additional being was more perfect, was exhibited in many of the principal cities of Europe. It was seen by Zacchias†, and Bartholin‡, who

* Livre ii. Chap. 30.

† Question. Medico-legal. lib. vii. tit. i. quest. 9.

‡ Hist. Anatom. cent. 1. hist. 66.

viewed it, as he says, with great astonishment (*cum stupore*). The individual, Lazarus Colloredo, was 28 years old, well formed, and of the usual stature: he had a deformed twin brother, hanging by the chest from the lower part of the sternum, who had been christened by the name of Johannes Baptista. The latter had two arms, with three fingers only on each hand, and one imperfect lower extremity. The head was larger than that of Lazarus, but not well formed; it was well covered with hair, and there was no beard; the trunk seems, from the figure, to have been very imperfect; the eyes were generally closed, the mouth open, and yielding a constant flow of saliva; respiration was hardly perceptible: there was a pulsation in the chest; the hands, ears and lips could be moved; John Baptista was nourished by the food taken by Lazarus. Zacchias, who was chief physician in the Ecclesiastical States, enters into a discussion whether John Baptista had a rational soul, which he determines in the negative, and hence seems to have doubted whether it was right for him to have undergone the holy rite of baptism. “*Scio hunc puerum seorsim a perfecto fuisse baptizatum: an recte, et secundum rationem id factum, neque affirmo, neque nego; quod enim ecclesia catholica in hoc determinet, expecto, cui et in hoc et in ceteris omnibus humiliter me subjicio**.” He determines that the additional

* Question. Medico-legal. lib. vii. tit. i. quest. 4.

beings in these cases are, "*additamentu ex luxuriantē semine enata, et quod nullam, ne per somnium quidem, rationalis animæ potentiam sortirentur.*"

In the LXXIXth Volume of the Philosophical Transactions, there is an account of a handsome and well-made Gentoo boy, of good sense and sagacity, who has a little brother suspended by the pubes, and consisting of pelvis and lower limbs. He feels what is done to the brother, but cannot move the legs and feet, which are cold.

The united foetuses form a very numerous class of monsters, both in the human subject and in animals ; and we meet with this kind of unnatural arrangement in almost every possible degree, from the slight indication of a head composed of two joined together, to two bodies, apparently perfect in all their parts, adhering at some point to each other. We might form a series, having at one end a body naturally constructed, and at the other two natural bodies joined, in which the intermediate gradations should be filled by individuals differing almost imperceptibly from each other. In all these specimens, the parts placed at the point of union are the most worthy of notice ; they are not like the organs of a natural body, but exhibit unions of the parts of two bodies in various degrees and shapes. If it were possible for two heads, from each of which one-third or one-fourth had been

cut away, to be joined and grow together by the cut surfaces, we should have the appearances exhibited in these cases. In the same way two trachæas or œsophaguses, coming from the two halves of a double head, are united below into one tube; or the small or large intestines from two distinct upper portions of a body are joined into one canal, or the blood-vessels united in the same way, or the skeletons joined in various manners; or, on the contrary, the organs may be simple above, and bifurcated downwards, to produce double parts for double bodies. In all such instances organs are formed, for which there is no model in the common structure; the points of bifurcation, or division of the various canals mentioned above, are like nothing in the naturally formed body. A very complete series of fœtuses with compound heads is exhibited in Scemmering's work*. The first† has a broad head, with a fissure in the nose and upper lip, on each side of which are two-thirds of a nose. The next in order is a head of such size and form, as would result from joining two two-third heads‡. The halves of this double head are symmetrical, and resemble each other in all respects; the features are perfectly alike, and each upper lip has a cleft in it. The same close resemblance of the features is observed in other instances. In the middle of this broad-head,

* *Abbildung und Beschreibung einiger Missgeburten, &c.*

† *Lib. cit. pl. II.*

‡ *Lib. cit. pl. III.*

of which each lateral division contains its nose, mouth and eye, there is a large eye; each lid of this is composed of two united by their outer extremities in the middle of the lid; a deep depression divides the globe behind into two parts, each of which has its optic nerve. A sharp projecting ridge, corresponding to this depression, formed the back of a septum, dividing the interior of the globe; the two choroids, lying in contact, continued this partition, but it did not reach to the cornea. The two irises were united, and formed one large pupil; a pointed projection in the middle of the upper and lower edge of this, as well as its breadth, shewed that it was made of two joined together; we have then a head formed of two three-quarter faces, containing four well-formed eyes, of which the two middle have their outer angles united in the middle of the head*. In the next specimen the two inner eyes are apart from each other, and a depression above marks the distinction of the two heads: the bottom of this is filled by an irregularly formed external ear, appearing as if it had been made by blending the opposed ears of the two heads†. In the preceding instances there have been only two ears; here there were three, two of the ordinary structure, and a third compound one. There is a still more complete division of the head into two lateral heads: in this there are four ears, and the two middle ones are in

* Lib. cit. pl. V.

† Lib. cit. pl. VI.

contact at their convex surfaces*. The cases just described are followed by others, in which there are two completely distinct heads, joined higher or lower in the neck†. In following the series we come to specimens, in which the double parts of the body are continued farther down than in the preceding class. There are two heads, and necks, and two arms; the double parts join in the chest, and the body is single below‡. The union may take place lower down in the chest, or in the abdomen or pelvis: there are three or four arms in such cases, and two lower limbs§.

There is a class of monstrous foetuses exactly the reverse of the preceding: these creatures are double below and single above. Like the former, they may be arranged in a regular series, according as the double parts ascend higher and higher in the body. In the simplest specimens the body is single down to the pelvis, and double from that point; or it may be double up to the abdomen, to the chest, neck, or head. Haller|| has given a very detailed account of a pig, in which the face

* Lib. cit. pl. VII.

† See Sahler, Diss. de foetu bicipiti, Desil 1786. Prochaska, Annot. Acad. fascic. 1, tab. 1. Monro on the Nervous System, tab. 8.

‡ Hist. de l'Acad. des Sciences, 1745, p. 29.

§ Duverney in Comment. Acad. Petrop. t. 3. p. 188. Philos. Trans. No. 138. Mem. de l'Acad. des Sciences, 1724. p. 63. Haller, de Monstris, lib. 1. cap. 21, 28. in Oper. Minor. t. 3.

|| Haller, de Monstris, lib. 1. cap. 16. in Oper. Minor. t. 3.

and upper part of the cranium were single, the lower portion of the cranial cavity, and all the organs thence downwards were double. The bones in front of the head were single; there were two occipita, and two skeletons from this point downwards, differing from the ordinary arrangement only in the sterna; each of which received a row of ribs of each body, *i. e.* to one sternum were attached the right ribs of one body, and the left of the other, and *vice versâ*.

To a simple cerebrum were connected a fissured medulla oblongata, two cerebella, medullæ spinales, &c. The blood-vessels of the two bodies were curiously arranged about the hearts, of which there were two, one receiving the veins of the left body, and sending an aorta to the right, while in the other these relations were reversed. Just behind their arches the aortæ were joined by a short but large communicating branch.

Haller has collected many instances of this formation in the human subject, and in animals, as the dog, cat, goat, horse, hare, rabbit, fowls, &c.*

Through the preceding classes there is a gradual approach from the single body to the union of two, in other respects perfect bodies. Haller has given a detailed description of a double child, consisting of two perfectly formed girls, of the ordinary

* Lib. cit. c. 17 and 18.

size, united by the chests and epigastria. There was one large liver with two gall-bladders; one heart with a double set of vessels; the veins all opened into a single auricle, and there were two ventricles, from each of which an aorta and a pulmonary artery proceeded; all the other parts were double; indeed, there were two bodies almost entirely distinct; the two sterna were both common to the two bodies, each receiving a series of ribs from each child, and a clavicle of each*.

The formation of the bodies is so perfect in many of these cases, that it will be inquired, why they should not continue to live after birth. Probably the violence to which they are exposed in parturition, and the duration of that process consequent on this difficulty, may be the cause of their destruction. The malformation of the heart in some cases would hardly admit of the continuance of life after birth; but in other instances there have been two well-formed hearts. In a few cases they have lived for a longer or a shorter time. Two children joined by the abdomen, double above, and having one pelvis and penis, and two lower limbs, but no rectum, lived seven days†.

The most extraordinary instance of this kind is

* Lib. cit. c. 29. In the 30th, 31st and 32d chapters, Haller has collected a great number of instances of similar monsters, both in animals and in the human subject.

† Journal des Savans, 1684, p. 27.

that of the united twins, born at Szony in Hungary, in 1701, publicly exhibited in many parts of Europe, and among others in England, and living till 1723, when they were buried in the convent of the nuns of St. Ursula, at Presburgh. They were joined at the back, below the loins, and had their faces and bodies placed half sideways towards each other. They had one anus and one vulva. The viscera were all double, except that the two vaginæ united into one towards the external aperture, and the two recta were joined in the same way. There were two bladders and urethræ opening separately. The two sacra were blended into one, and had a single os coccygis connected to the lower end. The two aortæ were joined into one tube before their division into the iliacs; and the inferior venæ cavæ were united at the same part. They were not equally strong nor well made; and the most powerful, (for they had separate wills) dragged the other after her, when she wanted to go anywhere. At six years one had a paralytic affection of the left side, which left her much weaker than the other. There was a great difference in their functions in health and disease. They had different temperaments. Neither the alvine nor urinary evacuations were always performed at the same time by both sisters; the menses happened at different times, one having them a week or more after the other; sometimes one, sometimes the other would be most disordered at such periods; when one was asleep the

other was often awake; one had a desire for food when the other had not, &c. They had the small-pox and measles at one and the same time, but other disorders separately. Judith was often convulsed, while Helen remained free from indisposition. One of them had a catarrh and a colic, while the other continued well. Their intellectual powers were different; they were brisk, merry, and well-bred; could read, write, and sing very prettily; could speak several languages, as Hungarian, German, French, and English. They died together*.

Beings included in the bodies of others are the most uncommon kind of monstrosity; yet we have some well authenticated cases.

In the Gentleman's Magazine for December, 1748, mention is made of a child born with a large bag, extending from the fundament to the toes. It burst a few days after birth, and exposed an irregular mass of florid flesh, in which a hand and foot with perfect fingers and toes could be distinguished. There was no other visible distinction of parts or sex. The child fed heartily.

A foetus was lately discovered in the abdomen of a boy fourteen years old in Paris. I have seen

* Phil. Transact. Vol. I. G. C. Drieschii historia magnæ legationis cæsareæ, &c. p. 41. Haller, lib. i. cap. 28. and lib. ii. cap. 26, where some other instances are quoted.

no detailed account of this occurrence, which is mentioned in the "Bulletin de l'Ecole de Medecine," in the "Gazette de Santé, 1804," No. 1. and the "Journal de Medicine," an. 13.

But the instance recorded by Mr. G. Young in the "Medico-Chirurgical Transactions," Vol. I. is the most minutely described, and the best authenticated, as the parts were seen at the time by the principal medical men in London.

Another example has occurred in this country, within a short time, in which the containing boy lived in good health to the age of about fifteen years. The contained child (a female of considerable size, wanting the hand and one lower extremity) was found in a cyst largely communicating with the duodenum; it adhered to this cyst by a firm cord of the size of the little finger, attached to its body in the situation of the umbilicus. A description of it, by Mr. Highmore who found it, is advertised.



Remarks on the production of these unusual formations.

There is a very important ground of distinction, in conformity to which, on the first view, we separate them into two classes: those which are, and

those which are not capable of supporting life after birth. To the former belong all varieties, and some of the monstrous formations; to the latter most of the monsters, as the headless and heartless children; those with imperforate anus, with communication between the trachea and œsophagus, with uncovered viscera. In the former there is another distinction between the instances, in which the natural functions are all perfectly executed, and those in which life is continued for a certain length of time with inconvenience and suffering, and then prematurely ended. The varieties of a slighter kind, and in unimportant parts, belong to the first of these divisions; malformations of the heart and of the urinary organs, spina bifida, &c. to the second.

Again in some kinds of malformation, the vital powers seem as perfect as in the ordinary formation, but the mechanism is imperfect, as in club-feet and other erroneous organizations or deficiencies of the limbs.

It is very clear that the great deviations from the accustomed standard, producing monstrosities, are generally incapable of life; and we can understand the reason of this in many cases, where the heart or brain is deficient, &c. But in other instances where no such satisfactory cause is apparent, experience shews us that these monsters are generally cut off.

The foetus is often ill-formed in abortions*; the vital powers in monsters do not seem adequate to maintain the comparatively simple existence of the foetal state: if, however, they get over this danger, the hour of birth is generally with them the hour of death. There are many possible arrangements differing from the ordinary type in which the functions would have been all preserved; but this would interfere with another principle, which seems

* I have stated this point at greater length in the following passage of the article *Embryo*, in Dr. Rees's *Cyclopædia*. "It is true, indeed, that the foetus in abortions is often ill-formed, being smaller than it should be, deviating from the usual proportions or monstrous; and very probably this malformation may be one of the causes why such embryos die, and are separated with the ovum from the uterus; just as we see that mis-shapen or worm-eaten fruits seldom arrive at maturity, but have their further growth impeded by that very cause." To the same purport it is observed by Autenrieth, "that he found three monstrous foetuses out of nineteen, whose parts could be distinguished; that Wrisberg met with two among five, which he examined; and Ruysch two in twelve; the proportion of the whole being seven in twenty-nine. This large number, (if we consider at the same time, that all collections of anatomical preparations abound with monstrous foetuses, which have died immediately after birth, while adult monsters are extremely rare) renders it very probable that nature employs the short but effectual means of extirpation, in order to preserve the genuine figure of the human frame, and that one model only of all those into which the human frame may pass, is endued with permanent vital powers." *Supplementa ad histor. embryonis humani*, sect. 8. This author observes, also, that a greater number of abortive embryos are of the male than of the female sex, and this observation is confirmed by Sæmmerring, who extends it likewise to monsters.

to prevail extensively in the operations of nature, viz. preservation of uniformity in the species.

Physiologists for a long time believed, and mankind in general are still firmly convinced, that the mind of the mother exerts a very potent influence on the formation of the child; and that her imagination or some peculiar mental state, is capable of producing even very signal deviations from the accustomed formation, after the natural development and growth have been very considerably advanced. It has been supposed that a sudden fright will cause a resemblance to the animal or object producing it, and that a violent desire or longing for any thing, particularly if it be not gratified, will cause a resemblance of the thing to be marked in some part of the child's body. The names given to the marks sometimes observed in newly born children, shew how generally the opinion has prevailed; viz. *nævi materni*, in Latin; *muttermahl*, or *mutter flecken* (mother's spots), in German; *envie* (longing) in French. Matrons and nurses, the hereditary priestesses of Venus and Lucina, and the great authorities to the uninitiated, on all the mysteries of generation, often contrive to keep a mother doubly anxious for herself and her offspring, in a state of alarm throughout her pregnancy, lest the sight of something frightful or disgusting, the longing after some object, &c. should convert the child in her womb into a monster.

In the first place monstrous productions are often brought forth, when the mother has been conscious of no cause during her pregnancy, that could be thought likely to produce them. The strong desire, common indeed to both sexes, of being thought capable of executing the generative functions perfectly, and the uneasiness accompanying any supposed failure, induce midwives, when a monster is brought forth, to conceal it from the mother's knowledge, which, as they generally die after birth, is easily done. If, however, she should learn the occurrence, she recalls to her recollection whatever has happened in her pregnancy, and can hardly be at a loss for some longing, aversion or fright, to which she refers what might otherwise bring into question her fitness for these important functions. How are *nævi* and other unnatural formations to be accounted for, when no mental cause is remembered, or, when the monstrosity not being known to the mother, she never mentions any such occurrence?

A knowledge of the different kinds, and of the anatomical structure of monsters, affords very strong, and indeed incontrovertible proofs of the absurdity of the common notions. The most zealous advocates of the opinion, which indeed only makes the matter more obscure, will hardly contend that the imagination of the mother can annihilate one-third or one-fourth of a head, and adapt to it an exactly corresponding piece of another

head, resembling it so exactly in size, form, features, &c. If it should not be difficult enough to account for the production of this symmetrical double head, a harder task remains; viz. to explain how the imagination of the mother changes nearly half the body; for the vertebral column may be double, the breast consequently broader, &c. in such an example.

We shall again ask how longing or fright can dispose of the brain, membranes, scull, scalp, &c. as in the acephali? How it can stop up the anus, or annihilate the nose, and bring together and confound in one the two eyes?

Do pigs, horses, hares, &c. long? Are pigeons and fowls given to these fancies? or does the same effect arise from one cause in men, and from another in animals?

How does the explanation apply to trees, and other vegetables, in which monstrous productions are not rare?

That the vulgar, who know only the surface of things, and are contented with the most distant resemblances and the loosest analogies, should ascribe the hare-lip to the sight of a hare, is not very strange; but we should hardly believe, if it were not before our eyes in print, that Heister*

* *Observ. Med. Miscellan. obs. 14.*

describes an acephalous foetus, with divided lip, as the result of such a cause. The mother of a similar child, described by Sandifort, ascribed the deformity to a fright caused by a monkey. Now, what resemblance is there between a hare or a monkey, and such a child? What between a hare and a monkey? All the monsters of this description are remarkably alike; in my judgment, they do not bear the most remote resemblance either to a monkey, or a hare; and I have already mentioned that they have gained the common name in Germany of cats'-heads. If we go back into times a little more remote, as 1670, we shall meet with children resembling devils. Kerkring * gives us a figure, with the following inscription: "*Monstrum cacodæmonis picturæ, quam humanæ figuræ similius.*" The fingers in the engraving have something of the character of claws; and the mother fancied that she had had intercourse with evil spirits: "*Jam sibi cum malis geniis congressa videbatur.*" The gossips thought the child like an imp; and Kerkring found it in no respect like a human being, but rather like an ugly monkey: "*Caput nihil habebat, quod hominem referret. Facies simiæ, eique deformi simillima.*" Is it not very clear that the imagination is much more powerfully at work in these good people, than in the poor mothers? Devils, apes, hares, and cats are all alike to them. It is difficult to contend

* Spicileg. Anat. obs. 23.

against such adversaries: if they are driven from their monkies and hares, they conjure up, and array against us, imps, demons, and other phantoms of their brains.

In cases of hare-lip, the parts do not resemble the snout of a hare, but are formed in quite an opposite way. The upper jaw-bones are drawn apart, and the face consequently more than usually broad, instead of being narrow and standing forwards, as in the hare. The lip of the hare is not fissured, but merely notched, and covered with long stiff bristles. The fissure of the lip is often the smallest part of the deformity in the human subject; there is a division through the whole of the bony and soft palate, to which a hare's head has nothing analogous.

The productions of the skin, which are compared to strawberries, mulberries, raspberries, &c. are so obviously unlike these objects, that it would be a waste of time to say any thing on the subject. Let it be observed too, that hare-lips, and other monstrous productions, and *nævi*, are seen in situations where there are no hares, no raspberries, cherries, &c. to cause them.

Women generally refer to frights, longings, and other mental impressions in the latter months of pregnancy: at earlier periods they do not feel the fear of such occurrences. Now, monstrous fetuses

are seen at all times of utero-gestation, from the first recognisable existence of the child; and the foetus is ill-formed or monstrous in a large proportion of abortions, which occur for the most part before the time at which the apprehensions begin.

The child does not participate in most of the bodily affections of the mother, and apparently is uninjured in many very serious and extensive disorders: at least, strong and well-formed children are brought forth by mothers, after going through such diseases. Is it reasonable to suppose that the sight of an animal, or the mere wish for an article of food, should have effects, which the much more serious causes do not produce? We know that if a pregnant woman has a limb broken or amputated, she will nevertheless produce an entire child; yet, we are gravely told, that if she sees such things in another, her child will suffer.

But it is needless to pursue further a question, on which all rational persons well acquainted with the circumstances are already unanimous; to explain that there is not a single fact even approaching to a proof, that the mother's imagination ever had any effect on the form of a child; that none of the numerous monsters resemble, in any essential character, the objects to which they are compared, and most of them, as the brainless and those without hearts, the double foetuses, those with redundant parts, as the two-headed, &c. correspond to

no archetype in nature; and that when dissection is employed, unusual arrangements of important organs, like nothing else in heaven above, or the earth beneath, are found in abundance. This belief in the power of imagination, like the belief in witchcraft, is greater or less according to the progress of knowledge, which in truth differs greatly in different countries and heads. We know that many enlightened women are fully convinced of its absurdity, while *soi-disant* philosophers are still found to support it.

The production of monsters has been explained mechanically by some physiologists: they have supposed that deficient parts are destroyed by external pressure or violence; that superfluous parts are remains of another foetus becoming adherent to a perfect one; and that compound children are made of two growing together. This is a perfectly gratuitous hypothesis, and is repugnant to all our knowledge concerning the animal economy. By what facts are we justified in believing that the ribs of two foetuses, and the clavicles, can detach themselves from their respective sterna, and become fixed, each to the sternum of the other, as in the skeleton of the double foetuses; that two perfect hearts, if the chest could be thus metamorphosed, could be united into an organ with one auricle only, and with two ventricles, of which each produces a pulmonary artery and an aorta; that a new communicating channel should be

formed between the two aortæ, as in the double bodied pig already described, and in the Hungarian sisters? If we could believe all these wonders, it would not be sufficient; for monstrosities occur when there has been no violence inflicted during pregnancy. We cannot help being surprised that Haller, who shews how inadequate this explanation is to the solution of the phænomena, in most of the monstrous births, should admit it in any kinds. Yet he considers it as perfectly applicable to most of the unnatural positions of parts; to some unnatural formations; to the absence and division of organs, and to some cases of preternatural unions: he refers the hare-lip to a want of the cellular substance, that should unite the superior maxillary bones, and conceives that parting of the bones lacerates the lip*. He ascribes the appearances in the acephali to accidents during utero-gestation, destroying the brain and its case. The respect due to the name of Haller, a name so dear to all who interest themselves in physiological pursuits, leads me to bestow on these opinions a degree of notice which they would not otherwise gain. Let us allow what is not supported by a shadow of proof, that a force can be applied to the child in utero, capable of causing this extensive destruction; how does it happen that the head should be destroyed in all cases just so far as the orbits? It must either take place suddenly or gradually. The former

* Lib. 2. cap. 13.

cannot be the case, for the brain and its membranes could not be annihilated without killing the child : moreover in the frequency of these cases how does it happen that the head is never found in this bruised condition ? If it be the consequence of gradual pressure, how surprising it is that the destruction should always be found precisely at the same point, that no specimens of an earlier or later stage should ever have been met with ! How is the presence of the hair at the edge of the integuments, where it does not exist naturally, to be accounted for ? Why are females so much oftener the subjects of such accidents than males ? Why do not other parts suffer in the same way, since the brain is protected by a bony case at an early period, while the bones in other parts are internal ? How does external force destroy the spinous processes of the vertebræ through the integuments in spina bifida ?

In order to prove that a brain has existed, and has been destroyed in these cases, Haller observes that it is quite contrary, not only to the wisdom of nature, but to common sense, for arteries, veins, and nerves to be made in a skull, where there is no brain. This is a dangerous argument : is it not equally contradictory that a rectum should be formed without an anus, since life cannot be continued without such an opening ? If nature be so wise and careful, why did not she provide against the destruction of the head ? And why does she

go on working month after month, to no purpose, in constructing the numerous other monsters, which are incapable of life? Not contented with exercising his mental faculties on what comes under the operation of his senses, and exploring the instructive scenes of nature, man is ever disposed to enter the regions of imagination, and to give to the beings of his fancy, whom he first clothes with all the attributes of perfection, the designs and actions which accord only with his own shortsightedness and ignorance. He is as positive about what goes on in this unseen region, as if he directed all the operations himself, and can tell you very precisely what does, and what does not harmonize with the wisdom of the Creator, which turns out at last to be the exact representation of his own knowledge or prejudices. Why may not arteries, veins, &c. which usually belong to a brain, be formed without a brain, as well as a rectum without an anus, heads without eyes, and all other imperfect monsters? It is enough that the thing happens: whether nature has any design in these formations, or not, we leave undetermined, until we are informed of some data on which a decision may be grounded.

Morgagni has supposed that the acephali may have had hydrocephalus; and that the brain may be destroyed by the water; and this is called an explanation! A learned professor, to be sure,

would lose his character if he had not a reason for every thing that happens.

In endeavouring to fix the point of view in which these deviations ought to be regarded, I observe that they are not confined to the human subject, but are very common in animals. All the kinds of monstrosity have not been noticed in the latter : at least I find no instances recorded of hare-lip, of want of brain and heart, of spina bifida, of malformed urinary organs, nor of such general malformation as is exhibited in the two instances related in the beginning of this communication. But united foetuses, supernumerary limbs and unnatural arrangements about the eyes and nose, are very frequent. I observe further that such monstrous productions are almost, if not entirely, confined to domesticated animals.

The powerful influence of domestication on structure will be rendered evident by the slightest survey of the animal kingdom. Contrast the uniform adherence to one model in the wild species, with the endless diversities of form, size and colour in all the tamed kinds. To trace back domestic animals to their wild originals is in all cases difficult, in many impossible : long slavery has so degraded their nature, that the primitive animal is lost, and a degenerated being, running into endless varieties, is substituted in its place. Naturalists are by no means agreed about the wild stock, from

which the sheep, cow, dog and common poultry have descended*. When the bodily characters are thus changed, can we expect that the functions should remain the same? The wild sow brings forth only once a year, while the tame one farrows twice : the latter very often produces monstrous births, which are unknown in the former. The hydatids interspersed through the body, in the interior of muscles, viscera, &c. and constituting measly pork, are asserted with every appearance of truth, to be peculiar to the domestic pig†. If this assertion be correct, we have a new species of animal created by domestication ; a new link added to that chain of beings, of which the completeness and perfection form so favourite a theme with many writers. The changes produced by the state of domestication in the animal economy are further evinced by the diseases of our more valuable domestic animals, which are sufficiently numerous to employ a particular order of men. The horse and dog‡, like

* I have stated this argument at greater length in discussing the *causes of the varieties of the human species*, in the article MAN of Dr. Rees's Cyclopædia.

† Blumenbach, *Abbildungen Naturhistorischer Gegenstände*, 4es. heft. No. 39. He gives good figures of the animal which he calls *Hydatis Finna*.

‡ The dogs in Kamtschatka, where they are raised in great numbers, and trained and attended with the greatest care, on account of their invaluable services as draught animals, are subject to ruptures, dysenteries, and according to the assertion of the Kamtschatkans, almost all the diseases incident to mankind. Langsdorff's *Voyages and Travels*, vol. ii. p. 288.

their master, are provided each with its respective medical attendants; and the poor Canary birds seem equally to want professional assistance, since Buffon has enumerated inflammation of the bowels, asthma, epilepsy, chancres on the bill, and scabs among the diseases to which they are subject*.

The circumstances just mentioned; the great abundance and numerous kinds of monsters found in the human subject, their comparative rareness and fewer species in the domestic animals, and their entire absence in the wild races, lead us to suspect that they owe their origin to something connected with our peculiar mode of existence in this respect; in short they resemble our diseases, which I believe to be altogether unknown to animals in a state of nature, and to exist in greater number, in proportion as they are more and more completely domesticated. At the top of the scale, whether we regard the number, the complication, or the severity of his diseases, stands the lord of the Creation; he has in truth created arts and sciences, made wonderful progress in knowledge and civilization, and he may boast that he has subdued both animate and inanimate nature; but the long and appalling catalogue of the nosologist is well calculated to

* Natural History, Ed. in 20 vols. by Wood, vol. XIV. p. 87. For a further prosecution of these views, see the article MAN quoted above, in the account of diseases peculiar to the human subject.

check his triumph, and make him doubt whether he has not paid too dear a price for empire.

Generation is a function not differing in its essential characters from the other processes of the animal economy. The production of a new being seems on a superficial view so much like creation, according to the notions which men have amused themselves with framing on that subject, that they have conceived it to require some preternatural agency. Regarding this business then as the work of God, and having already assumed that all his works are perfect, they maintain that the young animal is originally perfect, and degenerates into a monster through the action of external forces. More accurate observation discloses to us in this affair merely the operation of secondary causes, and exhibits to us the production and development of the foetus, as the result of vascular action in secretion and nutrition : in short, however his pride may be offended at hearing it, the simple truth is, that man, considered at the epocha of his first formation, is merely a secretion from the vessels of the ovary.

The function of generation is not more exempt from the operation of disturbing causes than any other in the animal economy. Any violent and sudden impression interrupts it at once by causing abortion : but minor causes, although their effects are not seen, are not to be deemed inoperative.

Particular bodily formations, particular mental characters, and dispositions to certain diseases, &c. are transmitted to the offspring. Indeed, how can we expect that when all the rest of the being is artificial and vitiated, this one part should be undisturbed? I ascribe then the aberrations from the usual form and structure of the body, which constitute monsters, to irregular operation of the powers concerned in generation, and place them on a level with respect to their cause, with unhealthy executions of the nutritive, secretory and exhalant functions. I only mean by these observations, to refer the aberrations of the formative process to the same general principles as the other deviations from the healthy execution of functions, and to protest against the considering them as forming a peculiar case out of the common rules applying to organized beings.

The cases of creatures contained in the bodies of others must be regarded in the same light as the double foetuses, or the examples of additional parts annexed to a natural body: they are neither more nor less difficult to be accounted for. I can only view them as the result of original malformation. The recent case of this kind has been explained by supposing that the containing child has swallowed an ovum in utero, or that it had been impregnated by unnatural practices: these speculations being too ludicrous for any serious discussion, I pass them by without further notice.

Monsters, in which considerable parts are wanting, seem peculiarly likely to assist in the prosecution of physiological researches. If we never saw animals, except in a perfect state, we could not form just ideas of the comparative importance of the different organs. And if we attended only to the complicated structure of the more perfect animals, we should probably conclude that the connection of parts found in them was essential to the execution of vital functions. Of these parts, the brain and nerves, the alimentary canal and its appendages, the heart and lungs, seem so important, that we should probably conclude life could not go on without them. But, in the simple animals, which compose the lower orders, many of these parts do not exist, although they can execute the most important animal functions. This great simplicity of structure is observed chiefly when the body is homogeneous, not consisting of parts so different from each other as skin, muscles, viscera, bone, &c. We might, therefore, still suppose, that all the complicated mechanism, found in the more perfect animals, is essential to the construction of such heterogeneous substances, as those of which they consist. The monsters just described prove that this is not the case ; they shew us that cartilage, bone, ligament, cellular substance, membrane, intestine, can be formed, where no brain or nerve or heart exists, and where there is nothing further than the actions of the vascular system ; and they lead us to conclude that the formation

and nutrition of our organs are the functions of the blood-vessels only. At all events they exclude the brain, nerves and heart, from all participation in this process.

The nature of foetal existence is considerably elucidated by these monsters. Superficial observation will convince us that the life of the foetus is very different from that of the animal after birth. The former is the most simple kind of vitality; it includes merely the developement and growth of parts, which, although useless in this stage, are essential afterwards. That the lungs are of this kind, is generally admitted: we must adopt the same conclusion concerning the heart. A little reflection shews us, that the brain and nerves are equally inessential to foetal existence. The nerves transmit impressions from without; the brain perceives these, reflects and wills; the nerves again convey the influence of the brain to the muscles. Although we cannot clearly prove the point, we think there is very little reason for hesitation in affirming, that none of these processes take place in utero; consequently, that the brain and nerves are completely inactive. The alimentary canal, and the organs connected with it, the urinary apparatus, which disposes of the residue of nutrition, are suited to the subsequent stage of existence, and bear an obvious relation to the mode in which the body is nourished after birth; they are dormant while the animal remains

in utero, during which time the materials of its nourishment and growth are drawn from the mother, through the placenta and umbilical cord. It is hardly necessary to say any thing of the generative organs, as they are not called into action until many years after birth, and are then not very closely connected to the rest of the system; at least their absence or inaction does not produce any consequences that endanger the existence of the animal. We should infer then, that the whole growth and formation of a foetal body depend on the actions of the vascular apparatus, which appear from cases, related and quoted in this paper, to be fully equal to the task.

The acephalous monsters shew us the independence of the nerves on the brain, so far as their formation goes; and they evince very clearly the independence of the formation and growth of the organs in general on the brain. For these individuals are perfect in the size and form of all their parts: any organ or limb could not be distinguished from that of the most regularly constructed foetus with a brain*.

* However obvious these conclusions may appear, they have been overlooked, even by modern and celebrated writers. Cabanis states expressly that the heart and brain are the first parts organised, the first which receive vital impressions and execute functions; that their functions are identified with existence itself; that they are to be regarded as necessary conditions, and in a manner as the basis of life. *Rapports du physique & moral de l'homme*, Ed. 2. tom. 2. p. 351 & 352. Haller regards the heart, not only as the source of all motion, but also as the agent
by

Many circumstances concur in proving to us the great influence of the brain in modifying the form of the skull, and shew us indeed that the configuration of the latter depends entirely on, or results from, that of the former. The external protuberances corresponding to the front lobes of the cerebrum, and to the lobes of the cerebellum, in the natural state, cannot escape even superficial observation; and hydrocephalus illustrates the same point in disease. This fact, which is of great importance in the craniological doctrines of Drs. Gall and Spurzheim, receives a further and very striking confirmation from the entire want of cranium consequent on deficiency of the brain.

The brainless children are incapable of executing the functions necessary for the continuance of existence after birth. Respiration is performed by muscles deriving their power from the brain, and consequently cannot take place where there is no brain. If artificial breathing were carried on in these creatures, life might no doubt be prolonged for a certain time, as it is in decapitated or pithed animals under the like circumstances. We then come naturally to the question; what is the part of the brain, which exerts this influence over the respiratory organs? A question which has been solved by Dr. Le Gallois, an ingenious French ex-

by which the organs of the body are originally evolved and formed. *Elem. Physiol. lib. 4, sect. 4. § 27 & 28.* See also his last volume, on the development of the *foetus*.

perimentalist. "Respiration," says he, "does not depend on the whole brain, but on a rather limited portion of the medulla oblongata, situated at a small distance from the occipital foramen, and towards the origin of the pneumo-gastric, or nerves of the eighth pair. If we open the cranium of a young rabbit, and extract the brain in successive slices from before backwards, we may remove all the cerebrum, and cerebellum, and a part of the medulla oblongata, without arresting the respiratory process. But this ceases as soon as we comprise in a slice the origin of the nerves just mentioned*."

"This part," he adds, "cannot exert its influence in maintaining respiration, unless it continues in a natural state. Now the great hemorrhage, occasioned by the operation in warm blooded animals, destroys circulation in the extremity of the medulla oblongata; and the serious wounds inflicted in the experiments have an influence on the surrounding parts, which quickly reduces the cut end of the medulla to a state of inactivity. Hence the experiments succeed only on very young animals, and for a space of time not greater than half an hour; but with these restrictions, the success is unequivocal†."

The result of these researches is remarkably con-

* *Experiences sur le principe de la vie, &c.* p. 37. Paris, 1812.

† *Lib. cit.* p. 39.

firmed by what happened in the case of the child mentioned in the beginning of this paper. Here the part of the brain, asserted by Le Gallois to be the spot, from which the respiratory muscles derive their power, existed, and very little more. This creature was formed in the condition to which the experimentalist reduced his rabbits: and we thus had an opportunity of seeing how long that place in the medulla oblongata could maintain respiration, when the deep wounds and hemorrhage of a severe experiment did not interfere with the process. Breathing went on as naturally as in a child with a perfect brain, and so far as this function is concerned, the creature in question might undoubtedly have continued to live. Why then, it will be asked, did it die? I really could not procure a sufficiently accurate history of its life to answer this question. Probably the same scruples, which led the nurse to keep it away from the sight of the mother, may have inclined her to doubt whether any attempts ought to be made to prolong its life: hence, we may perhaps infer, that it died for want of food.

The functions of the heart were executed perfectly in this child, and are equally well performed in those acephali, in whom the whole medulla oblongata, as well as the rest of the encephalon, is deficient. This coincides with the results of the very scientific and highly interesting researches of Mr. Brodie and Dr. Le Gallois, which have proved

that the heart's action is completely independent of the brain, and that the source of motion in this organ, is an influence exerted upon it by the medulla spinalis. If these views are correct, it will follow, that the heart cannot exist without a medulla spinalis; and, in all the recorded instances of malformation, there is no example of the former of these organs being found in a body, which had not the latter.

It is still a question in physiology, whether the process of glandular secretion be under the influence of the brain, and some attempts have lately been made, to shew that this question ought to be answered in the affirmative. There are many difficulties in the way of deciding the point by direct experiment, but there are strong analogies on the negative side. Secretion is performed by the minute vessels, all the other actions of which are manifestly exempt from the brain's influence. Capillary circulation; nutrition, in which the capillaries separate from a common fluid, the materials which they convert into all the various animal structures, and thus build up and support the different organs; the serous and mucous exhalations are all performed in foetuses without brain or spinal marrow*: they go on when the influence of the

* In the intestines of the foetus, included in the body of a boy, of which Mr. Young has given us so full, clear, and satisfactory a description, there was a considerable quantity of meconium. *Medico-chirurg. Trans.* vol. I. p. 245.

brain is suspended in apoplexy, compression, and concussion: the two former and cutaneous exhalation are kept up in the limbs of the paralytic, and of animals, in whom all the nerves have been divided. Nutrition is performed in structures, which possess no nerves, as tendon, cartilage, &c. Serum and pus are formed when blisters are applied to paralytic limbs. When the nerves of the eighth pair have been divided, the air vesicles and tubes of the lungs become loaded with mucous fluid; the same phænomenon takes place in a still greater degree, when artificial respiration is carried on in decapitated animals, and it even seems in this case to be the immediate cause of death*. The

* In describing the lungs of animals, which have suffered the division of the eighth pair, Le Gallois says, "On rencontre le plus souvent dans les voies aeriennes un fluide écumeux, et par fois rougeâtre, assez abondant pour remplir les vesicules pulmonaires, et la plus grande partie des bronches, et qui boursouffle les poumons dans les espaces qui ne sont pas gorgés de sang. C'est surtout dans les lapins et dans les cochons d'Inde que ce fluide est abondant; on le voit souvent sortir par leur bouche et par leurs narines dans les derniers instans de leur vie. Après leur mort, il s'écoule par les incisions que l'on fait aux poumons, et meme il suffit souvent de faire une ouverture à la trachée, et de comprimer le ventre et la poitrine pour le faire affluer à cette ouverture." Exp. sur le principe de la vie, p. 221. He thus mentions the same fact in animals, where artificial breathing has been carried on after decapitation: "On trouve toujours les poumons gonflés et remplis d'un fluide écumeux. J'ai vu quelques fois l'épanchement de ce fluide porté au point de rendre l'insufflation impossible en moins d'une heure. Il survient plus promptement qu'après la section de la paire vague, et je l'ai toujours considéré comme la principale cause de la mort, toutes les foisqu'elle n'a pas dépendu de quelqu'accident manifeste." p. 240.

evidence afforded by the case at the beginning of this paper, coincides with these analogies in proving the independence of secretion on the nervous system; as urine was secreted when neither cerebrum nor cerebellum existed. On the other hand, many phænomena may be adduced, which can be accounted for only by the agency of the nervous system; as, for example, the increased flow of saliva on the sight of food, the augmented lacrymal secretion under various affections of the mind, the copious pale urine suddenly excreted in hypochondriacal and hysterical persons, &c. and the decided affection of the biliary secretion in some cases by mental emotion.