

Hermaphroditism.

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Sir W. Hamilton

With the Author's sincere respects

HERMAPHRODITISM.

BY

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1839.

HERMAPHRODITISM.

HERMAPHRODITISM, or HERMAPHRODITISM;* *Hermaphrodisia*; *androgynisme*, *gynandrisme*; *hermaphroditisme*, &c., of the French; *ermaphrodisimo* of the Italians; *Zwitterbildung* of the Germans, &c.

Many different definitions of hermaphroditism, and almost an equal number of different classifications of the malformations usually comprehended under it, have been proposed by the various authors, ancient and modern, who have directed their attention to this subject. Without stopping to discuss the merits or errors of these definitions and classifications, and without inquiring, as some have done, into the propriety of the word itself, we shall content ourselves with stating that under it, as a convenient generic term, we purpose in the present article to include an account—1st, of some varieties of malformation in which the genital organs and general sexual configuration of one sex approach, from imperfect or abnormal development, to those of the opposite; and 2d, of other varieties of malformation, in which there actually coexist upon the body of

the same individual more or fewer of the genital organs and distinctive sexual characters both of the male and female.

To separate from one another, by as strong a line as possible, the two distinct varieties of hermaphroditic malformation marked out in this definition, we shall divide hermaphroditic malformations, considered as a class, into the two orders of *Spurious* and *True*; the spurious comprehending such malformations of the genital organs of one sex as make these organs approximate in appearance and form to those of the opposite sexual type; and the order, again, of true hermaphroditism including under it all cases in which there is an actual mixture or blending together, upon the same individual, of more or fewer of both the male and female organs.

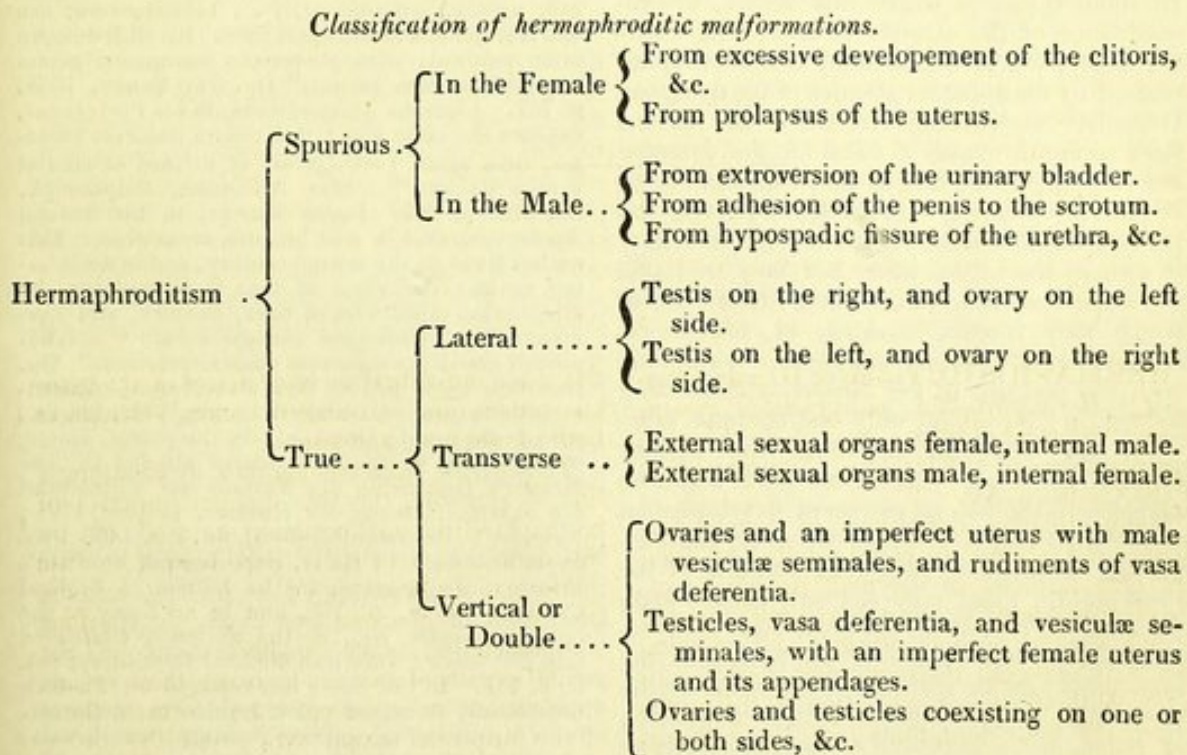
Spurious hermaphroditism may occur either in the male or female; that is, there may, from malformation of the external sexual organ, be an appearance of hermaphroditism in persons actually of the female sex, or from a similar cause there may be an appearance of hermaphroditism in persons actually of the male sex. The differences derived from the diversity of sex in which spurious hermaphroditism occurs, and the particular varieties of malformation in each sex which may give rise to it, will serve as

* From the well-known mythological fable of the union into one, of the bodies of Hermaphroditos (the son of *Ερμης*, *Mercury*, and *Αφροδιτη*, *Venus*,) and the nymph Salmacis. See Ovid's *Metamorphoses*, lib. iv. fab. 8.

bases on which we shall find some further subdivisions of this order.

True hermaphroditism, as above defined, comprehends also, as shall be afterwards more particularly shewn, several very distinct varieties of malformation. If we conceive for a moment all the reproductive organs to be placed on a vertical plane, (as we may suppose them to be, though not with strict correctness, in the human body when in the erect posture,) we shall find that the principal of these varieties may be all referred to three sets of cases:—1st, those in which, if we drew a vertical median line through this supposed plane, the two lateral halves will be seen to present organs differing in this respect, that they belong to opposite sexual types; 2d, others in which, if we bisect the same plane by a transverse horizontal line, there exist organs of a different sex in the upper from what are present in the lower segment; or, in other words, the internal genital organs belong to one sex, and the external to another. In the two preceding classes of cases there is not necessarily, as we shall afterwards more fully point out, any malformation by *duplicity* in the sexual apparatus of the

malformed individual; there is only one set of sexual organs present, but in some parts these organs are formed upon the male, and in others upon the female type. In the 3d and remaining set of cases, however, there is really present to a greater or less, though most generally only to a very partial extent, a double set of sexual organs, having opposite sexual characters, so that upon the same body, and usually upon the same side, or upon the same vertical line in our supposed plane, we find coexisting two or more of the analogous organs of the two sexes. In accordance with this view, we shall consider the cases of true hermaphroditic malformation under the three corresponding divisions of, 1st, *lateral*; 2d, *transverse*; and 3d, *vertical*, or, more properly, *double* or *complex hermaphroditism*; and each of these genera will admit of some further convenient subdivisions. But the mode in which we propose to classify and consider the subject will probably be at once more accurately gathered from the following table, than from any more lengthened remarks upon it in the present place.



In commenting upon and illustrating the different varieties of hermaphroditism in the particular order in which they are placed in the above table, we shall, we believe, by following that order, be able to take a graduated, and, at the same time, a correct and comprehensive view of the subject, beginning with the more simple, and ending with the more complex and complete species of hermaphroditic malformation, as seen in the primary sexual characters, or the structure of the genital parts themselves. We shall then consider at some length the curious and important physiological subject of hermaphroditism as manifested in the secondary sexual characters of the system. After having done so, we shall endeavour to show how far

the diversified forms of hermaphroditic malformation can be explained upon our present knowledge of the laws of development; point out the actual anatomical and physiological degree of sexual duplicity which is liable to occur, and the numerous fallacies with which the determination of this question in individual cases is surrounded; and lastly, in conclusion, we shall offer some general observations upon the causes, &c., of this class of abnormal formations.

I. SPURIOUS HERMAPHRODITISM.

A. *In the female*.—There are two circumstances in the conformation of the genital organs of the female, the existence of each of which has

occasionally given rise to doubts and errors with regard to the true sex of the individual on whom they were found—namely, 1st, a preternaturally large size of the clitoris; and 2d, a prolapsus of the uterus; the enlarged clitoris in the one case, and the protruded uterus in the other, having been repeatedly mistaken for the male penis.

1. *Abnormal development or magnitude of the clitoris.*—In the earlier months of intra-uterine life, the clitoris of the human female is nearly, if not altogether, equal in size to the penis of the male fœtus; and at birth it is still relatively of very considerable dimensions. From that period, however, it ceases to grow in an equal ratio with the other external genital parts, so that at puberty it is, as a general law, found not to exceed six or eight lines in length. But in some exceptional instances the clitoris is observed to retain up to adult age more or less of that greater proportionate degree of development which it presented in the embryo of the third and fourth month, thus exhibiting in a persistent form the transitory type of structure belonging to the earlier stages of fœtal life. In some instances where this occurs, the resemblance of the external female to the external male parts is occasionally considerably increased by the apparent absence of the nymphæ. Osiander* endeavoured to show that at the third or fourth month of fœtal life the nymphæ are very imperfect, and so very small as not to be easily observed. Meckel,† however, has pointed out that these organs are not in reality of a small size at that time, but they are liable to escape observation from the folds of skin of which they consist, making, at the period alluded to, a perfectly continuous membrane with the prepuce of the clitoris, and forming indeed, in their origin, only one common mass with this latter body. When the ulterior changes, therefore, which these parts ought to undergo in the natural course of development in the latter stages of fœtal existence, are suspended or arrested from about the end of the third month, there may not only coexist with the enlarged clitoris an apparent want of nymphæ, but the resemblance of the female to the male parts may be still further increased by the persistence of the original intimate connexion of the nymphæ with the prepuce and body of the clitoris, and by the consequently continuous coating of integuments, as well as the greater size and firmness of this organ.

Excessive size of the clitoris would seem to be much less common among the natives of cold and temperate than among those of warm countries. The frequency of it in the climate of Arabia may be surmised from the fact of directions having been left by Albucasis and other surgeons of that country for the amputation of the organ; an operation which Ætius and Paulus Eginetus describe as practised

among the Egyptians. According to the more modern observations of Niebuhr* and Soncini,† circumcision would seem to be still practised upon the females of that country.

This variety of conformation of the female parts appears to have been well known to the ancient Greeks, and several of their authors have mentioned the women so constituted under the names of *τριβαδες* and *εταριστριαι*, a class in which the celebrated poetess Sappho (*mascula Sappho*) is well known to have been included. Martial, Tertullian, and other Roman authors have noticed the same malformation, (*fricatrices, confricatrices*;) and alluded to the depravity to which it led.‡

* Beschreibung von Arabien, s. 77.

† Voyage dans la Haute et Basse Egypte, tom. ii. p. 37.

‡ Mart. Epigr. lib. i. ep. 91.; see also lib. viii. ep. 66. The frequency of this crime in the ancient gentile world may be inferred from the pointed manner in which the Apostle Paul alludes to it, Romans, chap. i. 26. In Greece it was in some places forbidden by law, and in others, as in Crete, tolerated by the state. Seneca, in his 95th ep., when speaking of the depravity of the women of his own age, remarks, "non mutata fœminarum natura, sed vita est. . . Libidine vero, nec maribus quidem cedunt pati natæ. Dii illas deæque male perdant, adeo perversum commentæ genus impudicitia viros ineunt." Op. Om. Pædag. 1665, p. 787. Clemens Alexandrinus, in his Pædagogus, exposes the same vice: "et contra naturam fœminæ, viros agunt (*ανδροζορραι*) et nubunt et etenim uxores ducunt." Also Athenæus, Deipnosoph. lib. xiii. p. 605. Justin Martyr, in his Second Apology, makes a still broader accusation. This author lived in the second century, and in declaiming against the vices of that licentious age, he alleges that multitudes of boys, females, and hermaphrodites (*androgyni ambigui sexus*) "nefandi piaculi gratiâ per nationem omnem prostant." Op. Om. Col. 1686, p. 70. See also Marcus Antoninus, De Seipso, ed. Gatakeri, Cambr. 1652, lib. iii., note at the end by Gataker. On the extent, among the ancients, of the vices above alluded to, see Meiner's Geschichte des Verfalls der Sitten und der Staatsverfassung der Roemer, Leipzig, 1791; Neander's Denkwürdigkeiten, Bd. i. s. 143; Professor Tholuck's, of Halle, Exposition of St. Paul's Epistle to the Romans, in the Edinburgh Biblical Cabinet, vol. v. p. 102, and in an Essay on the licentious vices, &c., of the ancients, translated into Robinson's American Biblical Repository, vol. ii. p. 441. In the essay last referred to, Tholuck incidentally mentions (p. 422,) that the deity Mitra (Mithras of the ancient Persians) was hermaphrodite. For our own part we are inclined to believe that many of the idols of the heathenish mythology of Asia could be traced to the deification of various monstrosities in man and quadrupeds. (See the figures of these idols *passim* in C. Coleman's Mythology of the Hindus, Lond. 1832; and E. Upham's History and Doctrine of Buddhism, Lond. 1829.) It perhaps is not unworthy of notice that the Jewish Talmudists, taking the Hebrew noun in the Pentateuch answering to man in its individual and not in its collective sense, considered, from Genesis, chap. i. v. 21, that our original progenitor was hermaphrodite. (See Jus Talmud. Cod. Erwin. c. 2; Heidegg. Hist. Patriarch, t. i. 128; C. Bauhin De Monstrorum Natura, &c., lib. i. c. 24; and Arnaud's Mémoire, p. 249.) It is further interesting to remark that Plato, in his Symposium, introduces Aristophanes as holding the same opinion. "The ancient nature," he observes, "of men was not as it now is, but very different; for then he was androgynous both in form and

* Abhandlungen über die Scheidenklappe, in Denkwürdigkeiten für die Heilkunde, Bd. ii. p. 4-6.

† Manuel d'Anat. Gén. tom. iii. p. 666.

The dimensions which the clitoris occasionally presents are such as to render it, in respect of size alone, not unlike the male penis. It is not unfrequently found of two or three inches in length, but sometimes it is seen five and six inches long. Dr. Clark frequently found the organ an inch long, and thick in proportion, among the Ibbo and Mandingo women.*

Haller † and Arnaud ‡ have collected numerous instances of preternatural size of the clitoris. The former author alludes, among others, to two cases in which the organ was stated to have been seven inches in length; and to another, mentioned by Chabart, in which it was alleged to have been twelve inches,—a size which we can only conceive to have been the result of disease.

When the female clitoris is increased greatly in size, it is not wonderful that it should be sometimes mistaken for the male penis,—the female organ in the Mammalia naturally differing from the male only in regard to its smaller dimensions, its not being perforated by the urethra, and its wanting the corpus spongiosum,—a peculiarity or defect of structure that exists as the natural type of formation in the penis of male reptiles. In the human subject the organs are composed internally of the same kind of erectile tissue, and when we descend in the animal scale, and examine their relations in the males and females of the same species, we find some still more striking analogical peculiarities of structure. Thus, in several of the Carnivora and Rodentia, as in the lioness, cat, racoon, bear, marmot, &c. the clitoris contains a small bone like that belonging to the penis of the males of the same species; and amongst the Monotremata and Marsupialia the clitoris of the female, like the penis of the male, is surmounted by a bifid glans. In a species of lemur (*Loris gracilis* or *Stenops tardigradus*), the clitoris is of a very large size; and the urethra, as first pointed out by Daubenton, †

name," (*ανδρογυνιον και ειδος και ονομα.*) Probably from the licentious purposes alluded to by Justin Martyr, or from the weak and imbecile character of hermaphrodite individuals, the word *ανδρογυνιος* came in latter times to signify effeminate and luxurious. The ancient lexicographer Hesychius gives it this meaning; and Theodoret, in his *Therap.*, speaks of Bacchus as being licentious, effeminate, and androgynous—(*γυνις αν, και θηλυδριας, και ανδρογυνιος.*)

* Home's *Comp. Anat.* vol. iii. p. 317. On the peculiarities of the external genital organs in various African tribes, see a learned paper by Prof. Müller in his *Archiv fuer Anatomie* for 1834. *Ht.* iv. s. 319., with ample references to the observations and opinions of Levaillant, Barrow, Peron, Lesner, Lichtenstein, Burchell, Somerville, &c. See also Otto, in his *Neue Seltene Beobachtungen zur Anatomie*, p. 135, shewing the very prominent external female parts of different African tribes to consist differently, 1, of enlarged nymphæ, 2, of enlarged labia, and 3, of the enlarged clitoris.

† *El. Phys.* tom. vii. part ii. p. 81. 82.

‡ *Dissertation sur les Hermaphrodites*, p. 372. See also Homberg, *De Excrescentia Clitoridis nimia*, Jena, 1671; Tronchin, *De Clitoride*, Lugd. 1736; and Ploucquet's *Literatura Medica*, art. *Clitoris Magna*, tom. i. p. 299.

§ Audibert, *Histoire Nat. des Singes*, tab. ii. fig. 8.

runs forward and opens at its anterior extremity between the branches of its glans, imitating, in this point of structure, the penis of the male among the Mammalia.

In the human subject the mere enlargement of the clitoris alone has seldom of itself given rise to errors with regard to the sex of the individual, except in young children; but it has frequently happened that along with it other minor malformations have coexisted, so as to render the sexual distinction much more ambiguous. In women possessing this peculiarity of structure we sometimes observe, for instance, the clitoris not only resembling the penis in size, but it has an indentation at the point of the glans, imitating the orifice of the urethra; and occasionally the glans is actually perforated to a certain extent backwards, or the body of the clitoris is drilled more or less imperfectly with a canal like that of the male urethra. In other instances the canal and orifice of the female vagina are, by an excess of development in the median line of the body, much contracted or nearly shut up, the vulva being closed by a strong membrane or hymen, and the labia cohering so as to give the parts a near resemblance to the united or closed perinæum and scrotum of the male. Further, in one or two very rare cases which have been put upon record, the ovaries and Fallopian tubes seem to have descended through the inguinal rings into the labia, thus giving an appearance of the presence of testicles; and a fallacy seems to have occurred in some cases from the presence of roundish masses of fat in this situation simulating more or less the same male organs.

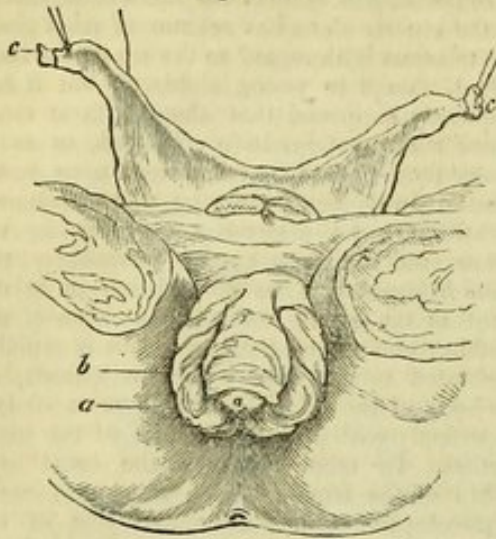
Besides, it often happens in those women who present more or fewer of these peculiarities of conformation in the external genital parts, that the general or secondary sexual characters of the female are wanting, or developed in a slighter degree than natural, owing probably to the malformations of the external organs being often combined with some coexisting anomalies in those more important internal reproductive organs, the healthy structure and action of which at the time of puberty appear to exercise so great an influence on the development of the peculiar general conformation and moral character of the female. Thus the features are sometimes hard, the figure and gait rather masculine, the mammæ slightly developed, the voice is deep-toned, and the chin and upper lip are occasionally covered with a quantity of hair. In fact, in some marked cases the whole external character approaches to that of the male, or, more properly speaking, occupies a kind of neutral ground between that of the two sexes. Some of the more striking examples of this first variety of spurious hermaphroditism in the female will sufficiently illustrate the above remarks.

Dr. Ramsbotham* has briefly described the genital parts of an infant, that was christened and looked upon as a boy, until dissection after

* *Medical Gazette*, xiii. p. 184.

death shewed that the sex was actually female. The uterus and other female organs (*fig. 287, ccc*) were present and apparently naturally

Fig. 287.



formed; but the clitoris (*b*) was fully as large, and in appearance closely resembled the penis of a male of the same age. At its anterior extremity there was a sulcus (*a*), which was not the entrance of the urethra, but terminated in a cul-de-sac.

Columbus* and De Graaf† give two similar examples of the same form of spurious hermaphroditism in young children, in which the true sex was only fully ascertained by dissection after death. In relation to the clitoris in the case described by Columbus, that author states that this organ was furnished with two muscles only, and not with four, as in the perfect male.

In a reputed hermaphrodite woman, Gallay‡ found after death the clitoris to be three and a half inches long, and three inches and four lines in circumference. The glans and prepuce were well developed. The urethra ran as in man through the body of the penis and its glans. The labia, nymphæ, vagina, &c. were natural, and the internal female organs, the ovaries, Fallopian tubes, and uterus, are described as scirrhus. This woman had been married but never had any children; her catamenia, however, had been very regular. She had a considerable quantity of hair upon her face, and her voice was harsh and masculine.

In a child of two years of age, Schneider,§ on dissection after death, could find neither the labia externa nor interna, nor any trace of the ordinary cleft between them. The clitoris was an inch and a half long, and externally resembled most perfectly a male penis furnished with a glans and prepuce; but it was imperforate, having only at its anterior extremity a small spot marking the situation of the opening of the urethra in the male. Some

lines below there was an opening by which the urine was evacuated. This opening formed the entrance to the vagina, which was found of the usual length, and with the characteristic rugæ. The canal of the urethra was found entering its roof, but in such a manner that the urine was always evacuated very slowly and by drops only from the external opening. All the internal female sexual organs were natural.

M. Beclard* has left us a very detailed and interesting description of an example of spurious hermaphroditism referable to the present variety, and exhibited at Paris in 1814. The subject of the case, Marie Madeline Lefort, was at that time sixteen years of age. The proportions of the trunk and members, and of the shoulders and pelvis, and the conformation and dimensions of this last part of the body, were all masculine; the volume of the larynx also, and the tone of the voice were those of an adolescent male; a beard was appearing on the upper lip, chin, and region of the parotids; some hairs were growing in the areola around the nipple; and the mammæ were of a moderate size. The inferior extremities were furnished with an abundance of long hard hairs. The symphysis pubis was elongated as in man; the mons veneris rounded, and the labia externa were covered with hair. The clitoris was $10\frac{1}{4}$ (?) inches (27 centimetres) in length when at rest, but somewhat more when erect; its glans was imperforate, and covered in three-fourths of its circumference with a mobile prepuce. The body of this enlarged clitoris was furnished inferiorly with an imperfect canal, which produced a depression in it, instead of that prominence of this part which exists in the male penis. This canal was pierced along its under surface and median line by five small holes capable of admitting a small stylet; and one or more similar apertures seemed to exist in it after it reached backwards within the vagina. The labia were narrow and short, and the vulva or sulcus between them was superficial, being blocked up by a dense membrane, which, under the pressure of the finger, felt as if stretched towards the anus over a cavity. At its anterior part, or below the clitoris, there was an opening capable of admitting a sound of moderate size, and this sound could be made to pass backwards behind the membrane closing the vulva, which, when felt between the point of the instrument and the finger, seemed about twice as thick as the skin. The urine was passed by this opening, and also, according to the report of the individual herself, through the cribriform holes in the canal extending along the inferior surface of the urethra. By the same opening the menstrual fluid escaped, as Beclard ascertained on one occasion by personal examination. She had menstruated regularly from the age of eight years, considered herself a female, and preferred the society of men.

In this interesting case we have present all the secondary sexual characters of the male,

* De Re Anatomica, lib. xv. p. 493.

† Op. Om. cap. iii. or, De mulierum organo gen. inserv. with a plate.

‡ Arnaud, l. c. p. 309.

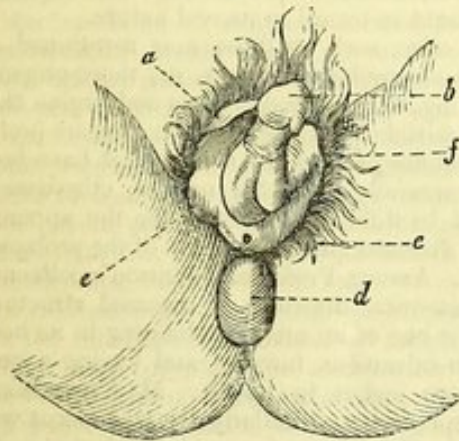
§ Jahrbücher der Staatsarzneikunde, (1809,) s. 193.

* Bulletins de la Faculté for 1815, p. 273.

with some of the female genital organs developed in so excessive a degree as to approach in several points the more perfect structure of them in man. The impossibility, however, as mentioned by Beclard, of finding any bodies like testicles in the labia or in the course of the inguinal canals, and more particularly the well-ascertained fact of the individual menstruating, can leave no doubt as to the nature of her sex. The perforation of the enlarged clitoris with the imperfect urethra is interesting, when compared with the peculiarities that we have formerly alluded to, of this part in the female Loris, as pointing out, what we have so often occasion to observe in human monstrosities, a type of structure assumed by a malformed organ similar to the normal type of structure of the same organ, in some of the inferior animals.

Arnaud* has represented and described at great length an interesting example of hermaphroditic malformation that seems referable to the head of spurious hermaphroditism in the female, although there are two circumstances in the history of the case which have led some authors to doubt the accuracy of this opinion; and the opportunity that was afforded of ascertaining the true structure of the parts after death was unfortunately lost through carelessness and neglect. The subject of the malformation, aged 35, passed in society for a female, and came to Arnaud complaining of a small tumour (*fig. 288, e*) in the right groin, which

Fig. 288.



had incommoded her much during her whole life. On examining this body, Arnaud was led to believe that it was a testicle, and he found a similar tumour (*f*) situated nearer the inguinal ring on the left side. The bags that contained them represented very exactly the labia externa. The clitoris (*a*) was two inches and nine lines in length, and placed between the labia at their upper angle. The glans (*b*) was well formed, and though imperforate at its extremity, it presented a small depression which ran backwards along the whole inferior border of the clitoris, indicating the situation of a collapsed urethral canal, that seemed pervious for some length at

its posterior part, as it became distended when the patient evacuated the bladder. The orifice (*c*), however, from which the urine actually flowed, occupied the situation in which it exists in the perfectly formed female. There was not any vaginal opening, and the individual menstruated per anum. At each menstrual period a tumour (*d*) always appeared in the perinæum, which gradually increased in size, becoming, in the course of three or four days, as large as a small hen's egg. When the perinæal tumour had reached this size, blood began to flow from the anus, although no hæmorrhoids or other disease of the bowel was present. At these periods the individual had often experienced very alarming symptoms, and in order to avert these, Arnaud was induced to make an opening into the soft yielding space at which the perinæal tumour above alluded to appeared; and at a considerable depth he found a cavity two inches in circumference, and about two and a half in breadth, having projecting into it at one point an eminence which was supposed from its situation to be possibly the os uteri. At the next period the menstrual fluid came entirely by the artificial perinæal opening, and the usual severe attendant symptoms did not supervene. From inattention, however, to the use of the tent, the opening was allowed to become completely shut, so that at the sixth return of the menses they flowed again by the anus, and were accompanied by the old train of severe symptoms. The individual lived for several years afterwards. Her conformation of body was remarkable. Her skin was rough, thick, and swarthy; she had a soft black beard on her face; her voice was coarse and masculine; her chest narrow; her mammæ were flat and small; her arms lean and muscular; her hands large, and her fingers of very considerable length and strength. The form, in fact, of the upper part of her body was masculine, but in the lower part the female conformation predominated. The pelvis was wide and large, the os pubis very elevated, the buttocks large, the thighs and legs round, and the feet small.

In this remarkable instance, if we do not go so far as to conceive the coexistence of some of the internal organs of both sexes, we must, from the well-ascertained fact of the menstrual evacuations, allow the person at least to have been a female. In that case we can only suppose the tumours in the labia to be the ovaries descended into that situation; and to the same excess of development which has produced this effect, we may attribute the closure of the vaginal orifice, and the formation of the imperfect urethral canal in the body of the clitoris.

Spurious hermaphroditism from preternatural enlargement of the clitoris has been recognised among some of the lower animals. Rudolphi* has noticed a mare of this kind that had a clitoris so large as almost to shut up the entrance into the vagina. Lecoq† has detailed

* Dissertation sur les Hermaphrodites, p. 265, pl. x.

* Rudolphi's Bemerkungen auf einer Reise, &c. Bd. i. s. 79. See a case also figured by Ruysch in his Thesaurus Anat. lib. viii. no. 53.

† Journ. Prat. de Méd. Vét. 1827, p. 103.

the case of a calf which Gurlt* believes to belong to the present head. Neither testicles nor scrotum were observed externally, and the penis or enlarged clitoris, which occupied its normal situation, was apparently perforated by the urethra, and crooked upwards so as to throw the urine in that direction. Mery† shewed by dissection the true sex of a monkey, the length of whose clitoris had deceived some observers with regard to the true sex of the animal. The enlarged clitoris was furrowed on its inferior surface. The clitoris of the female *Quadrumania* is, as shall be afterwards more particularly mentioned, relatively larger than in the human subject, and retains in a greater degree the size and type of structure of this organ in the embryo.

We may here further mention that, as pointed out by Blumenbach,‡ the clitoris and orifice of the urethra are placed at some distance from the vagina and in front of it, in the rat, mouse, hamster, &c. This normal structure has sometimes been mistaken for an hermaphroditic malformation.§

2. *From prolapsus of the uterus.*—It may at first appear strange that this occurrence should ever lead to any difficulty in ascertaining the sex of the individual, though not only non-professional observers but even the most intelligent medical men have occasionally been so far misled by the similarity of the protruded organ to the male penis, as to mistake a female for a male. Of this circumstance some curious illustrations are on record.

M. Veay, physician at Toulouse, has inserted in the *Philosophical Transactions of London*, vol. xvi. p. 282, a brief account of the case of Marguerite Malause or Malaure, who was entered as a female patient in the Toulouse Hospital in 1686. Her trunk, face, &c. presented the general configuration of a female, but in the situation of the vulva there was a body eight inches in length when on its fullest stretch, and resembling a perfectly formed male penis in all respects, except in not being provided with a prepuce. Through the canal perforating this body she was alleged to evacuate her urine, and from its orifice M. Veay had himself an opportunity of seeing the menstrual fluid flow. After being examined by several physicians she was pronounced to be more male than female, and ordered by the civil authorities to exchange the name of Marguerite for that of Arnaud, and to wear male attire. In 1693 she visited Paris in her male habiliments, and reputed herself endowed with the powers of both sexes. The Parisian physicians and surgeons who examined her seem all to have accorded in opinion with the faculty of Toulouse, until M. Saviard|| saw her and detected the supposed penis to be merely the prolapsed uterus. He reduced the protruded organ, and cured the patient. Upon the enigma

of her hermaphroditism being thus solved, she was permitted by the king, at her own request, to assume again her female name and dress.

Sir E. Home* detected a case of reputed hermaphroditism of the same description as the last, in a French woman of twenty-five years of age, who exhibited herself in London, and pretended to have the powers of a male. The cervix uteri was uncommonly narrow, and projected several inches beyond the external opening of the vagina. The everted mucous surface of the vagina had, from constant exposure, lost its natural appearance and resembled the external skin of the penis. The orifice of the os tinæ had been mistaken for the orifice of the urethra. The prolapsus had been observed at an early age, and had increased as the woman grew up.

Valentin† mentions another analogous instance of sexual ambiguity produced by a prolapsus of the uterus. In this case the husband mistook the displaced organ for the penis, and accused his wife of having "cum sexu virili necquicquam commune."

A case quoted at great length by Arnaud‡ from Duval, of reputed hermaphroditism in a person that was brought up as a woman, and married at twenty-one years of age as a male, but who was shortly afterwards divorced and imprisoned, and ordered again by the Court of Rouen to assume the dress of a woman, appears to us to belong very probably to the present division of our subject, the reputed penis being described as placed *within* the vagina. The recorded details of the case, however, are not so precise as to leave us without doubt in regard to its real nature.

In cases such as those now mentioned, in which the prolapsed uterus, or, more properly speaking, the prolapsed uterus and vagina have been mistaken for the penis, it appears probable that the neck of the uterus must have been preternaturally long and narrow, otherwise it would be difficult to account for the apparent small diameter and great length of the prolapsed organ. Among Professor Thomson's collection of anatomical drawings of diseased structures there is one of an uterus containing in its body a fibro-calcareous tumour, and having a neck of three inches in length. M. Cruveilhier§ has represented a similarly diseased uterus with a neck of between five and six inches. An organ shaped in this manner, whether from congenital malformation or acquired disease, would, when prolapsed for some time, represent, we conceive, a body resembling in form and size those observed in Saviard's and Home's cases. The prolapsus arising from a protrusion of an ordinary shaped uterus is generally of a greater diameter and roundness.

This second species of spurious female hermaphroditism is not observed among the lower animals.

B. *Spurious hermaphroditism in the male.*—

* *Lehrbuch der Pathol. Anat.* Bd. ii. s. 193.

† *Hist. de l'Acad.* (1686) tom. i. p. 345.

‡ *Comp. Anat.* p. 335.

§ Doebel, in *Nov. Liter. Maris Balthici* (1698), p. 238.

|| *Rccueil d'Observations Chirurgicales*, p. 150.

* *Comp. Anat.* vol. iii. p. 318.

† *Pandectæ Medico-Legales*, t. i. p. 38, Casus xii.

‡ *Mém. sur les Hermaphr.* p. 314-18.

§ *Anat. Pathol.* liv. xiii. Pl. iv.

Malformed males have been more often mistaken for females than the reverse. The varieties of malformation in persons actually male, that are liable to lead to mistakes with regard to their true sex, appear to be, 1st, extrophy or extroversion of the urinary bladder; 2d, adhesion of the inferior surface of the penis to the scrotum; and 3d, and principally, fissure of the inferior part of the urethra and of the scrotum and perinæum.

1. *Extroversion of the urinary bladder.*—For a full description of this malformation we must refer to the articles **BLADDER** and **MONSTROSITY**. This malformation is known to occur more frequently in the male than in the female, and when present in the former it has occasionally given rise to a supposition of hermaphroditism, the red fungous mass formed by the mucous membrane of the protruded posterior wall of the bladder, and situated above the pubis, having been mistaken for the female vulva,—an error which has probably been the more readily committed from the uterus and seminal ducts, and sometimes also, as in an instance described by A. Fraenkel,* a part of the intestinal canal opening upon the surface of the exposed portion of bladder. In some instances of this malformation occurring in man, the external male sexual organs are very imperfectly formed, or can scarcely be said to be at all present. In other cases the scrotum is of the natural form, with the two testicles in it; and the penis is of considerable size, though almost always fissured on its upper surface from the epispadic or open state of the urethra.

An example of supposed hermaphroditic malformation briefly described by Rueffe,† which seems referable to this variety will be sufficient to illustrate it. “In the year 1519 an hermaphrodite or androgynus,” he remarks, “was born at Zurich, perfectly formed from the umbilicus upwards, but having at this part a red mass of flesh, beneath which were the female genitals, and also under and in their normal situation those of the male.”

2. *Adhesion of the inferior surface of the penis to the scrotum by a band of integuments.*—This state of parts has occasionally given rise to the idea of hermaphroditism, the penis being so bound down as not to admit of erection, and the urine passing in a direction downwards, so as to imitate the flow of it from the female parts.

In a boy of seven years of age regarding whom Brand‡ was consulted, the penis was confined in this manner to the scrotum by abnormal adhesions. He had been baptized and reared as a girl, but by a slight incision the adherent organ was liberated, and the parents were convinced of the mistake that they had committed in regard to the sex of their child. The difficulty of determining the true

sex of the boy was increased by the testicles not having descended into the scrotum.

Wrisberg* mentions two similar instances in persons of the respective ages of nineteen and forty-six. He relieved the adherent penis in the first case by operation.

3. *Fissure of the inferior part of the urethra, perinæum, &c.*—This species of malformation, which has perhaps more frequently than any other given rise to the idea of the person affected with it being the subject of hermaphroditism, evidently consists in an arrest of the development of the external male sexual parts.

At an early stage of the development of the embryo, the various central sexual organs are, like all the other single organs situated on the median line of the body, found to be composed of two separate and similar halves, divided from each other by a vertical fissure, which, after the originally blind extremity of the intestinal canal has opened upon the perinæum, forms a common aperture or cloaca for the intestinal canal, and also for the urinary and genital apparatus, both of which are, in their primary origin, prolongations from the lower part of that canal. After a time, (about the second month in the human embryo,) the opposite sides of this cloaca gradually approximate, and throw out two corresponding folds, which by their union constitute a septum that separates the rectum from the canal or portion of the fissure, that still remains common to the urinary and generative organs; and, in the same way, by two similar and more anterior folds, the urethra of the female, and the pelvic portion of that of the male is subsequently produced. After this in the female the process of median reunion does not proceed further, and the primary perinæal fissure remains, forming the vulva and vagina. In the male, however, the development, when normal, goes on to a greater extent, and the sides of the opening become so far united as ultimately to leave only the comparatively contracted canal of the urethra to serve as a common passage for both the internal urinary and genital organs; and the situation of the line of junction of the opposite sides of the original perinæal cleft remains still marked out in the adult, by the raphé existing in the median line of the scrotum. The two lateral parts of the female clitoris unite together into one solid body, having on its under surface a slight groove or channel, indicative of the line of conjunction of its two component parts; and the urethra is left to open at the root of this imperforated organ. In the male, on the contrary, the two primitive halves of the penis, consolidated together at an early stage along the course of their upper surfaces, come, in the progress of development, to unite inferiorly in such a manner with one another as to form a tubular prolongation of the pelvic portion of the canal of the urethra, which is gradually extended forwards along the body of the penis and ultimately through its glans.

Many of the malformations to which the

* De Organorum Generationis Deform. Rarissimâ, Berlin, 1825, with a plate.

† De Conceptu et Generatione Hominis, p. 44.

‡ Case of a boy who had been mistaken for a girl. London, 1788.

* Comment. Med. &c. Arg. p. 534.

male genital organs are liable may be traced to stoppages in the above process of development, the character of the malformation depending upon the period of the development at which the arrest takes place, and varying consequently in degree from the existence of a cloaca or permanent primitive fissure common to the intestinal, urinary, and generative organs,* to that want of closure, to a greater or less extent in different instances, of the inferior surface of the canal of the urethra in the body of the penis, or in its glans, which is generally known under the name of *hypospadias*. When the development of the male organs is arrested, immediately after the two septa respectively separating the canals of the intestine and urethra from the original perinæal cleft are formed, and consequently when this perinæal fissure and that running along the inferior surface of the penis are still open, the external genital parts often come to present at birth, and during the continuance of life, a striking resemblance to the conformation of the external organs of the female, and the resemblance is frequently rendered greater by the coexistence of other malformations of the male organs. In these cases the imperfect and undeveloped penis is generally of small size, and, at the same time, from being imperforate, may readily be mistaken for the clitoris; the two halves of the divided scrotum have the appearance of the two labia externa; the two labia externa or nymphæ are sometimes represented by the lateral divisions of the penis forming two folds, which run backwards along the internal surfaces of the split scrotum; and the cleft in the perinæum corresponds in situation and direction, and occasionally also in size and form, with the canal of the vagina; this cleft is generally lined also by a red mucous membrane that is kept, like the natural female parts, constantly moistened by the secretions of the follicles with which it is provided; its mucous membrane occasionally presents irregular elevations imperfectly representing the carunculæ myrtiformes; and, further, the opening of the urethra at the root of the diminutive and imperforate penis serves still more to assimilate the malformed parts to the natural conformation of the female organs. In a number of cases, however, the apparent analogy to the female parts is rendered less striking by the perinæal cleft being small or altogether absent, the urethral orifice at the root of the penis often forming the only opening leading to the internal urinary and generative parts, and the halves of the scrotum in such instances being frequently more or less perfectly united. Generally the seminal ducts, and sometimes also the ducts of Cowper's glands, are seen opening on the surface of the urethra or supposed vaginal canal, at a short distance from its external orifice.

In males malformed in the manner described, the testicles are seldom found in the divided

scrotum at birth, but commonly they descend into it through the inguinal rings towards the period of puberty; and in several instances on record, in which the sex of the individual had been mistaken for that of a female, the tumours formed in the groin at that time by the organs in their descent have been erroneously regarded and treated as hernial protrusions. At the same time it occasionally happens that with the descent of the testicles, and the arrival of puberty, the diminutive penis enlarges in size, and the individual assumes more or less fully the habits and attributes of the male. In several instances on record this change has, under venereal excitation, appeared to occur suddenly, and persons formerly reputed female have thus unexpectedly found themselves provided with an erectile male penis. These various changes are occasionally postponed for a considerable period beyond the usual term of puberty.

In a few rare instances one testicle only descends through the inguinal ring, and occasionally they both remain throughout life within the abdomen, in or near the situation in which they are originally developed, imitating in this abnormal state the normal position of the same organs in many of the males among the lower animals. In a number of instances in which the testicles are thus retained within the cavity of the abdomen, they are found small and imperfectly developed, and from the want of their usual physiological influence upon the constitution, the whole physical and moral character of the malformed individual frequently presents a considerable approximation to that of the female, or, as we should perhaps more justly express it, never attains the perfection of the male, but preserves that kind of common or neutral state exhibited by the constitution of both sexes before the specific sexual characters of each are developed at the time of puberty.

Numerous curious examples of mistakes having been committed with regard to the sex of males affected with the above species of malformation have now been put on record, from the time at which Iphis, the daughter of Ligdus, king of Crete, was conceived to be changed into a man by the miraculous interference of Isis, down to the present day. Pliny, (lib. vii. chap. iv.) has noticed several cases; and in the treatise of Duval on hermaphrodites a number of additional instances are collected from Livy, Trallian, and others, some of them no doubt invested (as most of the details regarding hermaphrodites in the older authors are) in much misrepresentation and fable, but others bearing every mark of accuracy and authenticity. In more modern times the sexes of individuals have often been mistaken in consequence of this variety of malformation. Jean Chroker* relates, in apparently the most authentic manner, the case of Magdelain Mugnoz, a nun of the order of St. Dominique in the town of Ubeda, who was changed, as he supposes, into a male, seven years after having taken the vows.

* See on this malformation in the human subject (the normal form of structure in birds, &c.) Meckel on Kloakbildung in his *Path. Anat.* Bd. i. s. 693.

* *Fax. Histor. cent. i. and Arnaud, Dissertation sur les Hermaphrodites, p. 200.*

He was expelled the convent, assumed the male dress, and took the name of Francois. The sequel of the story, as told by Chroker, would seem to shew that his sexual desires became extremely strong, and he is said to have been ultimately condemned, whether justly or not, under an accusation of rape.

Portal* quotes from Tigeon the story of a person who was brought up as a female, and afterwards was considered to be suddenly changed by a surprising metamorphosis into a male, and in citing this case Dr. Hodgkin,† of London, mentions, on the authority of a friend, a recent instance of an equally sudden development of the male sex in a previously reputed female. Similar instances in which the proper sex of malformed males was unexpectedly discovered under the excitement of sexual passion at the period of puberty are mentioned by Parè, Tulpius, and others.

Schweikard‡ has recorded an instance of a person baptized and brought up as a female, and whose true sex was only at last disclosed by his requesting, at the age of forty-nine, permission to marry a young woman then pregnant by him. On examination it was discovered that the penis was slender and scarcely two inches long; the right testicle only had descended into the scrotum, and the urethra opened at the root of the penis, but its orifice was placed in such a manner that during micturition the urine was thrown along the groove or channel on the under surface of the penis, so as to appear to issue from its anterior extremity. The two halves of the scrotum were so far united that they left only a small oval opening between the anterior part of the raphé and the roots of the corpora cavernosa. In this opening the orifice of the urethra was situated.

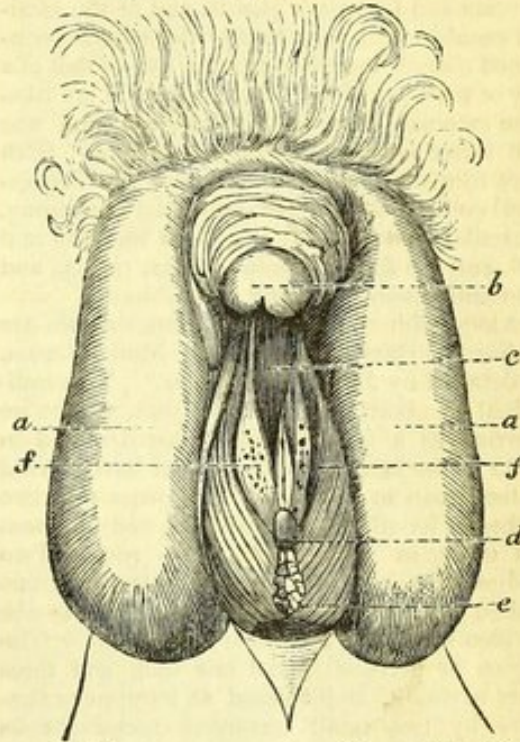
Dr. Baillie§ has mentioned a case which appears to belong in all probability to the present division. The subject of it was twenty-four years of age. She had always passed in society as a woman, and came for consultation to the Nottingham Hospital on account of her menses never having appeared; a circumstance, however, that had in no way affected her health. The spurious vagina consisted of a cul-de-sac two inches in depth. The penis was of the size of the female clitoris, but there were no nymphæ. The labia were more pendulous than usual, and contained each of them a body resembling a testicle of a moderate size, with its cord. The look of the individual was remarkably masculine, with plain features, but no beard. The mammæ resembled those of a woman. The person had no desire or partiality for either sex.

Adelaide Preville, who had been married as a female, died in the Hôtel Dieu of Paris. In examining the body of this individual after

death, Giraud* found that, except a perinæal cleft or false vagina consisting of a cul-de-sac placed between the bladder and rectum, nothing else resembling the female sexual apparatus could be detected, while all the organs belonging to the male sex were present

Otto† has described and represented (fig. 289)

Fig. 289.



a case of the present species of hermaphroditism in an individual whose history is remarkable. The person had lived ten years in the state of wedlock with three different men; but at the age of thirty-five an action of divorce was brought against her by her third husband, accusing her of being affected with some disease of the sexual parts that rendered the connubial act on his part extremely difficult and painful. After some difference of opinion between the two medical men to whose professional examination the wife was submitted, it was at last considered that she was in reality a male, and the case came at last under the investigation of the members of the Royal Medical College of Silesia, who confirmed this opinion. The imperforated penis (*b*) was one inch and a half in length; the perinæal fissure (*e*) forming the false vagina was, at the posterior part of its orifice, bounded by a distinct frænulum, but was of a size sufficient to receive the glans of the husband for an inch and a half in depth. This cavity, as well as the internal surfaces of the two lobes (*a a*) of the divided scrotum, were lined with a vascular mucous membrane. At the bottom of it the round orifice of the urethra (*d*) was seen to open; and at the same

* Hist. de l'Anat. tom. ii. p. 52.

† Catalogue of Guy's Hospital Museum, part ii. sect. xi.

‡ Hufeland's Journal der Prak. Heilkunde. Bd. xvii. No. 18.

Morbid Anatomy, p. 410, 2d edit.

* Recueil Period. de la Soc. de Méd. tom. ii. p. 315, or Moureau's Hist. Nat. de la Femme, t. i. p. 243, (with a figure of the parts.)

† Neue Seltene Beobachtungen zur Anatomie, &c. p. 123.

point a hard mass could be felt, probably consisting of the prostate gland; and more upwards and outwards, nearly in the natural situation of the bulb, was seen the split urethra (c) with a row of three considerably sized openings (f, f), which, under pressure and irritation of the genital parts, gave out several drops of a transparent mucous fluid. Otto considers these openings as the extremities of the ducts of the prostate and Cowper's glands, and of the seminal canals. The right half of the scrotum contained a small testicle about the size of that of a boy of ten years of age; the left testicle lay likewise external to the abdominal ring, and was still softer and smaller than the right. Both were furnished with spermatic cords. The general configuration of the individual was strong, muscular, and meagre; the beard was thin and soft, and the face, mammæ, thorax, pelvis, and extremities were evidently masculine.

Along with the preceding instances we are inclined to classify the case of Maria Nonzia, as detailed by Julien and Soules.* This individual was born in Corsica in 1695, was twice married as a female, and at last divorced in 1739 by her second husband, after having lived sixteen years in wedlock. The penis was two inches in length, but imperforate, and the meatus urinarius was placed at its root. Two bodies, like ordinary sized testicles, and furnished with spermatic cords, were felt in the divided scrotum; and there was a narrow false vagina or perinæal canal one inch and three lines in depth, and crossed at its upper extremity by two small traversing membraneous bridles. The character and appearance of the person were masculine; the visage was bearded; the mammæ were as fully developed as in the adult woman, but the nipples were each surrounded with hair.

So far as the preceding details go, they seem amply sufficient to justify us in considering Maria Nonzia as a malformed male; and we are still inclined to take this view of the case, notwithstanding the statement inserted in the report of Julien and Soules, that the menses were present as in other women. For not to insist upon the circumstance that the reporters do not shew that they made any minute or satisfactory inquiry into this alleged fact, and not improbably took it upon the mere word of the subject of the case, who was necessarily greatly interested in maintaining the reputed female character, it would be requisite, in any such paradoxical instance, to ascertain if the discharge actually agreed in character with the menstrual fluid, or was not pure blood, the result of an hæmorrhage from the genito-urinary passages, or from the rectum, where, as in other parts of the body, this form of disease frequently assumes a periodical type. We would be inclined to apply even still more strongly these remarks to the celebrated case of Hannah Wild, detailed by Dr. Sampson.† This person had

evidently the male genital organs malformed in the manner mentioned with regard to the other cases included under the present section, and possessed all the secondary sexual peculiarities of the male; so that we can only receive with great doubt and distrust the alleged existence of the menstrual discharge, and the more so, as this is evidently stated on the report of the subject of the case alone, who, deriving a precarious subsistence from the exhibition of his malformations, had a deep interest in amplifying every circumstance that could enhance the public curiosity with respect to the reality of his hermaphroditic character.

At the same time, however, it must be remarked that in some instances of spurious hermaphroditism, it is found extremely difficult or even impossible during life to determine with precision the true or predominant sex of the malformed individual; and in regard to several well-known cases on record, we find on this point the most discrepant opinions offered by different authors. Thus while Morand,* Arnaud,† and Delius‡ described Michel-Anne Drouart as a male; Guyot,§ Ferrein,|| and Caldani¶ maintained that this person was a female; and Mertrud** regarded the individual as an example of a real hermaphrodite.

A useful lesson of caution to us against our forming too decided and dogmatic an opinion in cases in which the sexual conformation appears in any marked degree doubtful, has lately been offered in the instance of Maria-Dorothee Duriée, or, as this individual was named in the latter years of his life, Charles Durge. While Metzger†† considered this person as a specimen of that kind of equivocal sexual formation to which the designation of hermaphroditism is truly applicable, Hufeland,‡‡ Mursinna,§§ Gall, Brookes,||| and others¶¶ declared the sex of Duriée to be in reality female; and Stark,*** Mertens,††† and the Members of the Faculty of Medicine at Paris‡‡‡ were equally positive in regarding the individual as merely a malformed male. The dissection of the body of Duriée by Professor Mayer has, as we shall afterwards state more in detail, shewn the sexual conformation of this individual to consist of a true mixture of both the male and female organs.

* Mém. de l'Acad. des Sc. 1750, p. 165.

† Dissert. sur les Hermaphr. p. 298.

‡ Frank, Sammlung. Th. viii. s. 398.

§ Mém. de l'Acad. des Sc. 1756, p. 71.

|| Ib. 1767, p. 205.

¶ Mem. della Societa Italiana, t. vii. p. 130.

** Arnaud, loc. cit. p. 293.

†† Gericht.-medic. Abhandlungen. Bd. i. s. 177.

‡‡ Journ. der Praktischen Heilkunde, Bd. xii. s. 170.

§§ Journ. für die Chirurgie, Arzneikunde, &c. Bd. i. s. 555.

||| Medical Gazette for October, 1836.

¶¶ Von dem Neuangekommen. Hermaphrod. Berl. 1801.

*** Neuen Archiv. für die Geburtshülfe. Bd. ii. s. 538.

††† Beschreibung der männlichen Geschlechtsteile von M. D. Durrier. Leipzig, 1802, with two plates.

‡‡‡ Med. Gaz. for October, 1836.

* Observ. sur l'Hist. Nat. sur la Physique et sur la Peinture, tom. i. p. 18, with a plate.

† Ephem. Nat. Curios. Dec. i. an. iii. p. 323.

In attempting to determine the true sex in such doubtful instances of sexual formation as those which we have been now considering, we are inclined to attribute very little weight to the nature of the sexual desires of the malformed individual, as we have already found Adelaide Preville, the dissection of whose body shewed him to be in reality a man, living for some years before death in the capacity of a wife, and the same remark might be further illustrated by a reference to Otto's and other cases.

A species of spurious hermaphroditism similar in character to that which we have just described in man, is occasionally met with in the males of our domestic quadrupeds, and has been amply illustrated, as it occurs in these animals, by Professor Gurlt in his work on Veterinary Medicine. In instances of this malformation among the animals to which we refer, the hypospadiac male penis has usually been found of a tortuous and winding form and of small size. In the cases in which the fissure of the parts extends through the scrotum, a false vagina is seldom formed, as in man, for the scrotum in most quadrupeds lies too remote from the perinæum, and consequently from the normal situation of the vagina, for this purpose; but in some examples this division appears to be carried upwards into the perinæum itself, leaving a vaginal-like opening, in which the urethra terminates. The testicles, as in man, are sometimes retained within the abdomen, and in other instances descend into the scrotum. They are frequently small in size. The mamma or udder seems to be often well developed.

This variety of hermaphroditic malformation has been met with in the horse by Penchenati,* in the he-goat by Haller;† and in the ram by the same author,‡ and by Wagner,§ Wepfer,|| Stark,¶ Gurlt,** Kauw Boerhaave,†† and A. Cooper.‡‡ We have seen an excellent specimen of this malformation in the last-mentioned animal in the museum of Dr. Handyside of Edinburgh. In this instance the internal male organs are all perfect; the large testicles are situated in the halves of the split scrotum; the penis is small and imperforate, and a furrow running along its inferior surface is continued backwards and upwards along the perinæum to within a short distance from the anus, where it leads into a canal, into which the urinary bladder and seminal ducts open. This canal is evidently formed of the dilated pelvic portion of the male urethra; its orifice is comparatively contracted, but corresponds in situation with the vulva of the female. We have seen a second similar case in

the ram in the possession of Professor Dick of the Veterinary School of Edinburgh.

There is another variety of malformation of the male parts occasionally found in quadrupeds, which is allied in its nature to the preceding. In this second species all the external male sexual organs are small; the short penis lies, when not in a state of erection, upon the posterior surface of the enlarged udder, and the imperfectly developed testicles are generally retained within the abdomen; or, if they have passed out of that cavity, they are found situated in the substance of the udder. The vasa deferentia, prostate, and Cowper's glands are usually of their normal size and appearance. This imperfect hermaphroditic formation appears to be not rare among horses, several instances of it in this animal having been now described by Arnaud,* Gohier,† Volmar,‡ Pallas,§ Virey,|| and Gurlt.¶ Anselmo** and Lecoq†† have met with this variety of malformation in the bull; and Sandford ‡‡ has described an instance in the calf which seems referable to the same head. Gurlt§§ also notices the preparation of an analogous case in the calf, as preserved in the museum at Berlin.

II. TRUE HERMAPHRODITISM.

True hermaphroditism exists as the normal type of sexual conformation in several classes of the vegetable and animal kingdom. Almost all phanerogamic plants, with the exception of those included under the class Diœcia, are furnished with both male and female reproductive organs, placed either upon the same flower, or, as in the Linnæan class Monœcia, upon different flowers in the same individual. In the class Polygamia various exceptional genera are included, that present indiscriminately upon the same individual, or upon different individuals of the same species, male, female, and hermaphrodite flowers, and which thus form a kind of connecting link between the general hermaphroditic form of phanerogamic vegetables, and the unisexual type of the monœcious flowers, and the diœcious plants.

From anomalies in development, these normal conditions of the sexual type in the different members of the vegetable kingdom are occasionally observed to be changed. Thus, among the Diœcia, individual plants are sometimes, in consequence of a true malformation, observed to assume an hermaphroditic type of structure; or, on the other hand, in hermaphroditic plants more or fewer flowers are occa-

* Mém. de l'Acad. de Turin. tom. v. p. 18.
 † Comment. Soc. Reg. Sc. Gotting. tom. i. p. 2, tab. i.
 ‡ Ibid. p. 5, tab. ii.
 § Ephem. Nat. Curios. Cent. i. ii. p. 235.
 || Miscell. Nat. Curios. Dec. i. An. iii. (1672), p. 255.
 ¶ Ibid. Dec. iii. Ann. v. vi., p. 669.
 ** Lehrbuch, p. 193.
 †† Nov. Comment. Acad. Petropolit. tom. i. (1750,) p. 315, tab. xi.
 ‡‡ Catalogue of Guy's Hospital Museum, No. 2546.

* Arnaud sur les Hermaphrodites, p. 282.
 † Mém. et Observ. sur la Chir. et la Méd. Vet. tom. i. p. 18.
 ‡ Archiv. für Thierheilkunde, Bd. iii. s. 292.
 § Beschäft. der Gesellschaft naturforsch. Freunde zu Berlin, Bd. iii. s. 296.
 || Journal Compl. des Sc. Méd. tom. xv. p. 140.
 ¶ Lehrbuch der Path. Anat. Bd. ii. p. 189; and tab. viii. fig. 6.
 ** Mém. de l'Acad. des Sc. de Turin, tom. ix. p. 103. fig. 1-3.
 †† Journ. Prat. de Méd. Vet. 1827, p. 102.
 ‡‡ Med. and Phys. Journal, vol. ii. p. 305, with two drawings.
 §§ Loc. cit. p. 191.

sionally found unisexual, in consequence of the arrested developement of one order of their sexual organs; and again, though still more rarely, from an excess of evolution, a double set of male parts, or a double set of stamens, is seen developed on some of the individual flowers.

In the animal kingdom we find instances of a perfect hermaphroditic structure as the normal form of the sexual type in the Trematodes and Cestoides among the Entozoa, in the abranchial Annelida, in the Planaria, and in many of the Mollusca, particularly in the Pteropoda, and in several families among the Gasteropoda. In some of these animals that are thus naturally hermaphroditic, the fecundation of the female organs of the bisexual individual is accomplished by its own male organs; but in others, although the anatomical structure is strictly hermaphroditic, yet the union of two, or, as sometimes happens, of more individuals is necessary to complete the sexual act; and during it the female organs of each are respectively impregnated by the male organs of the other.

In the Nematodes and Acanthocephali among the Entozoa, and in the Cephalopoda and Pectinibranchiate Gasteropoda among the Mollusca, as well as in all symmetrically formed animals, or, in other words, in those whose bodies are composed of an union of two similar halves, as in Insects, and the Arachnida, Crustacea, and Vertebrata, the male and female organs of reproduction are placed each upon a different individual of the species, constituting the basis of distinction between the two sexes. In such animals a mixture of more or fewer of the reproductive organs of the two sexes upon the same individual appears occasionally as a result of abnormal formation; but the male and female organs that coexist in these cases are seldom or never so anatomically perfect as to enable the malformed being to exercise the proper physiological function of either or of both of the two sexes. This form of true hermaphroditism or abnormal mixture upon the same individual of the organs of the two sexes in the higher animals, has been termed *unnatural* or *monstrous*, in opposition to the natural hermaphroditism which exists as the normal type of sexual structure in some of the lower orders of animals, and in phanerogamic plants. The malformation itself is observed to differ greatly, both in nature and degree, in different cases, varying from the presence or superaddition of a single organ only of the opposite or non-predominant sex, up to the development and co-existence of almost all the several parts of the two sexes upon the same individual. In describing the malformation, we shall classify its various and diversified forms under the three general orders pointed out in our table, including, 1st, *lateral*; 2dly, *transverse*; and 3dly, *double* or *vertical hermaphroditism*.

A. *Lateral hermaphroditism*.—According to the opinion of many physiologists of the present day, the two lateral symmetrical halves of the body, and even the two halves of all its single mesial organs, are originally developed in a great degree independently of one another. Granting this point in the doctrine of eccentric

developement, we can easily conceive how, in the same embryo, an ovary might be formed on one Wolffian body, and a testicle on the other; or, in other words, how female organs might be developed on one side, and male organs on the other. It is the existence of such an unsymmetrical type of sexual structure upon the two opposite sides of the body of the same individual, that constitutes the distinctive characteristic of lateral hermaphroditism.

Instances of this species of true hermaphroditic malformation have been observed in many different classes of animals, as well as in the human subject.

Individual examples are sometimes observed among insects, particularly among the Lepidoptera, in which all the different parts of the two sides or lateral halves of the body are formed after opposite sexual types. We shall afterwards have occasion to notice different examples of this form of lateral hermaphroditism as seen in the general conformation of the body, but may here state that in two or three instances such malformed insects have been carefully dissected, and found to present, in the anatomical structure of their sexual organs, a mixture of the organs of the male and female.

In a *Melitæa didymus* described by Klug,* the general external characters were those of the male, but the left eye, palpus, and antenna, and the left sexual fang, were smaller than in individuals belonging to this sex; and the left antenna was annulated with white and yellow at the apex, while the right was of one colour. On dissection, the various male sexual parts were present, and they had appended to them a free female ovary situated upon the left, and united to no other organ.

In a *Gastrophaga quercifolia* dissected by Schultz, and described by Rudolphi,† the left side appeared externally male, and the right female, with a distinct line of separation throughout the whole body. On dissection, Schultz discovered an ovarium upon the right side, and two testes upon the left. The oviduct of the ovary joined the canal of the vasa deferentia about two inches before its termination; and the spermatheca was connected with the common evacuating duct. The two testicles on the left side were placed one behind the other, and connected by a thin vessel. The spermatic duct belonging to one of the testicles immediately received, as in the Lepidoptera, the spiral vessel; further beyond, and on the opposite side, a second vessel, which appeared to consist of the rudimental spermatic duct of the other testicle, opened into it. The oviduct of the ovary joined the canal of the vasa deferentia about two inches before its termination in the penis, and a female spermatheca was connected with the common distended evacuating duct.‡

* Forriep's Notizen, vol. x. p. 183.

† Abhandlung. der Koenig. Akad. zu Berlin für 1825, s. 55.

‡ See also drawings of the body and genital organs of an hermaphrodite *Sphinx populi* in Fischer's Oryctographie du Gouvernement de Moscou (Moscow, 1830.)

A well-marked example of lateral hermaphroditism among the Crustacea has been recorded by Dr. Nicholls.* In a lobster (*Astacus marinus*) he found on the right side of the body a female sexual aperture in its normal situation at the root of the third leg, and connected with a regularly formed oviduct, full of ova. On the left side of the animal there was a male sexual aperture placed, as usual, at the root of the fifth leg, and connected internally with an equally perfect testicle and spermatic cord. The general external conformation of the animal corresponded with its internal sexual structure, the right lateral half of the body presenting all the secondary characters and peculiarities of the female, and the left all those of the male; so that if split from head to tail, (to use Dr. Nicholls' mode of expression,) the animal would have been perfectly female on the right side, and perfectly male on the left.

The investigations of Sir E. Home† led physiologists some years ago to believe that among Fishes lateral hermaphroditism constituted the natural type of sexual formation in the genera *Myxine* and *Petromyzon*; but the later and more accurate observations of Rathké‡ have shewn that these species are strictly bisexual, and that the opposite opinion had arisen from the kidneys of the female having been mistaken for the male testicles. Various instances, however, are on record of fishes, known to be normally bisexual, presenting from abnormal development a lateral hermaphroditic structure, or a roe on one side, and a milt on the other. Such an hermaphroditic malformation has been met with in the genera *Salmo*,§ *Gadus*,|| and *Cyprinus*,¶ and in the *Merlangus vulgaris*,** *Acipenser huso*,†† and *Esox lucius*.‡‡

Of lateral hermaphroditism in Birds, we have

* Phil. Trans. for 1730, no. 413, vol. xxxvi. p. 290, with drawings of the animal, and of its reproductive organs.

† Phil. Trans. for 1823. Art. xii.

‡ Bemerkungen ueber den Innern Bau der Pricke, s. 119. See also additional observations by the same author in Müller's Archiv für Anatomie, &c. for 1836. Heft. ii. s. 171. The older error of Cavolini, who supposed that he had detected two ovaries and two testicles in the *Perca marina* and *Labrus channa*, (Sulla Generazione dei Peschi et dei Granchi, Nap. 1787,) had been previously shewn by Rudolphi to depend upon his having mistaken undeveloped portions of the ovaries for testicles. (Schweigger's Skeletlose Thiere. s. 204; and Abhandlungen. König. Akad. der Wissenschaft zu Berlin, 1825. p. 48.)

§ Commercium Litter. Norim. 1734. Hebd. 39.

|| Pipping, Vetensk. Akad. nya Handl. (1800.) Bd. xxi. s. 33. tab. i. fig. 1. Leuwenhoeck, Experim. et Contempl. p. 150. Eph. Nat. Cur. Dec. i. Ann. i. obs. 125. Du Hamel, Traité des Poissons, Part ii. p. 130.

¶ Alischer, Breslau. Sammlung. 1720, p. 645; Morand, Mém. de l'Acad. des Sc. 1737. p. 72. Schwalbe, Commer. Lit. Norimb. 1734. p. 305.

** Marchant, Mém. de l'Acad. des Sc. 1737. p. 12. Baster, Opusc. Subcesiva, tom. i. p. 138.

†† Pallas, Reise durch Russe, &c. Theil. ii. s. 341.

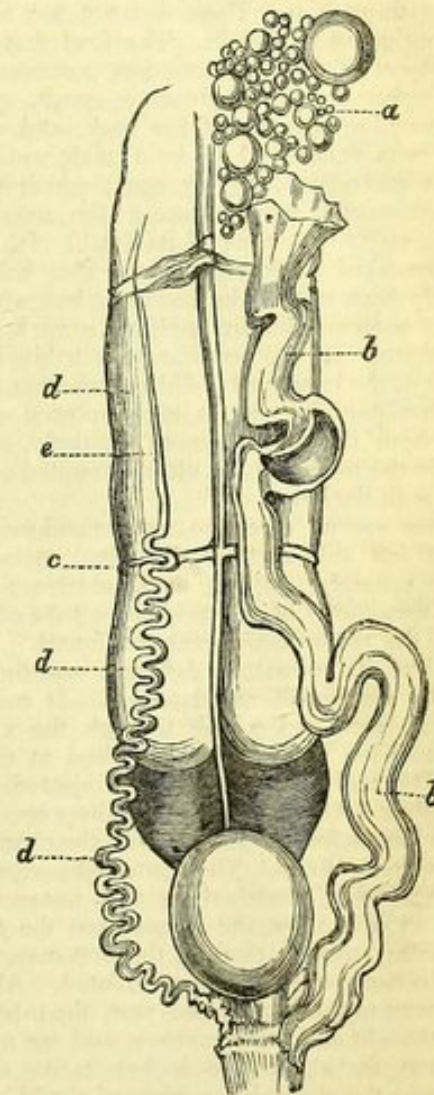
‡‡ Reaumur, Mém. de l'Acad. 1737. p. 51. Starke, Eph. Nat. Cur. Dec. iii. ann. vii. and viii. obs. 109.

one instance recorded by Bechstein,* in a chicken that had a testicle on the right side of the body, and an imperfect reniform ovary on the left. The external appearance of the bird presented a mixture of the characters of the two sexes.

Rudolphi has referred to a second and more ancient example of lateral hermaphroditism in the hen, mentioned by Heide.† The case, entitled by the author "galli qui putabatur hermaphroditus anatome rudis," is so imperfectly detailed as not to be entitled to much attention.

We have ourselves been fortunate enough to meet with two domestic fowls that presented in their sexual organization examples of lateral hermaphroditism. In the first of these cases (fig. 290) the female sexual organs were placed on the

Fig. 290.



left side of the body, and the ovary (*a*) and oviduct (*b*) were in all respects apparently naturally formed. On the right side, a male vas deferens (*d*), of about half the normal length,

* Naturgeschichte der Voegel, &c. Bd. ii, s. 1219, (1807).

† Anatomie Mytuli: subjecta est Centuria Obser. Amster. 1684, p. 193, obs. 95.

ran up from the cloaca to opposite the origin of the iliac vessels (*c*), and during this part of its course was bent into those short transverse zig-zag folds which characterise the structure of this part in the common cock. (See article AVES, vol. i. p. 354.) When it reached the middle third of the kidney (*d d*), it lost this particular form, became membranous (*e*), and after proceeding upwards for about an inch, in the common course of the canal, at last disappeared. The convoluted or contorted portion ran over a space of about two and a half inches, and if unrolled would have extended three or four times that length. Its canal was about the usual size of the same part in the perfect cock, and perhaps at some parts even more dilated. Its cavity was filled with a whitish seminal-looking albuminous fluid, which at first prevented a mercurial injection from readily passing through it. There was not any apparent vestige of a testicle. The fowl that was the subject of this malformation possessed in an imperfect degree the plumage, comb, spurs, and general appearance of the cock, and when young was considered to be a male until the time it commenced to lay eggs, which it did very constantly, except during the moulting season, up to the time of its death. Its eggs were remarked to be very large. They had repeatedly been tried to be hatched, but always without success. The bird itself was never known to incubate. It was peculiar in its habits in so far that in the barn-yard it did not associate with the other poultry, and at night roosted separately from them. It crowed regularly, especially in the morning, and often attempted copulation with the hens.

In the second case, the ovaries and oviduct on the left side of the body were, as in the former example, natural in themselves; but in the mesometry of the oviduct, a tube of the size of the male vas deferens was found. This tube, like the normal vas deferens, was thrown into the distinctive angular folds. It ran for about an inch and a half through the upper portion of the mesometry, was blind at either extremity, and admitted of being injected with quicksilver. On the right side, there was also a male vas deferens, marked with the characteristic angular folds. The contorted portion of this canal only stretched in this instance to about an inch above the cloaca; but the folds were even stronger than in the first case, and the tube itself was rather more dilated. Above or anterior to this convoluted part, the tube became straight and membranous, and ran up in this form for about two inches in its usual track over the abdominal surface of the kidney; but there was not at its upper extremity any trace of a testicle. This bird presented during life, in a very slight degree only, the appearance of a cock, its comb and spurs being even less developed than in the previous case. It shewed the same solitary habits in the poultry-yard. It layed eggs regularly. On three different occasions I had a number of them submitted to incubation, but in none of them was a chick produced.

In the Quadruped, Schlump* has mentioned an instance of lateral hermaphroditic malformation. In a young calf he found on the left side, under the kidney, a small testicle having attached to it a vas deferens, which was connected with the peritonæum towards the abdominal ring of the same side, and there became lost in the cellular texture of the part. An ovary and Fallopian tube, with an uterus consisting of a single horn only, were connected to the right side of the loins by a ligament. The neck of the uterus lost itself in the cellular substance beneath the rectum, and there was no vagina. The external organs were male, but imperfectly formed. The udder occupied the place of the scrotum.

In the human subject several different instances of sexual malformation have now been met with referable to the head of lateral hermaphroditism. In these cases, along with a testicle on one side, and an ovary on the other, there has generally co-existed a more or less perfectly formed uterus. The external parts have differed in their sexual characters, in some instances being female, in others male, and in others again of a neutral or indeterminate type.

In man, and in the higher quadrupeds, we have not unfrequently exhibited to us a slight tendency to this unsymmetrical type of sexual structure constituting true lateral hermaphroditism in the testicle of one side only descending, whilst the other, in consequence of imperfect development, remains within the inguinal ring. In the single unsymmetrical ovary of most female birds and some fishes,† we see a still nearer approach to the state; and it is worthy of remark, that among birds at least, the single ovary is always placed upon the left side. In lateral hermaphrodites in the human subject, the left side also appears to be that on which we most frequently meet with the female type of the sexual organs. We shall divide the following cases according to the particular sides which were respectively male and female in them.

1. *Ovary on left side, and testes on the right.*—*a. M. Sue* met, in 1746, with an instance of lateral hermaphroditism in the human subject, in a young person of thirteen or fourteen years of age, whose case was the subject of a Thesis sustained by *M. Morand*.‡ Of the internal

* *Archiv. fuer die Thierheilkunde*, Bd. ii. Hft. ii. s. 204.

† In the early embryo of birds, the ovaries are originally double, as pointed out by *Emmert*, (see *Reil's Archiv* for 1811;) and as was previously known to *Wolff* and *Hochstetter*, (*Anat. Phil. tom. i. p. 349.*)

‡ *De Hermaphroditis*, Paris, 1749. This, according to *Arnaud*, (p. 323,) is the same case of lateral hermaphroditism with that described by *Lecat*. If so, the latter author, (probably from drawing his description from memory, and not, as *Morand* seems to have done, from the parts placed before him,) has stated that along with the testicle and vas deferens on the one side, there existed a vesicula seminalis, and that both sides were provided with round ligaments, the one on the male side forming probably one of the two tubes described by *Morand* as arising from the testicle.

genital organs, there existed on the *left* side a very distinct ovary, a round ligament which ran outwards to the groin of the same side, and a well-formed Fallopian tube with its usual fimbriated extremity. The other extremity of the Fallopian tube terminated in the fundus of the uterus, which occupied its usual situation between the bladder and rectum. On the *right* side, again, there was a slender elongated testicle, which had moved forwards to the corresponding inguinal canal, but had not proceeded so far as to pass out of the abdominal cavity. On the superior part of the testicle was a body resembling the epididymis, and the testicle itself sent off two tubes, which afterwards united into one immediately before their insertion into the uterus. The *external* genital organs were those of a hypospadiac male, and during life the person had been always looked upon as belonging to the male sex. The perineal canal or vagina terminated, between the scrotum and root of the imperforate penis, in a very small opening, which was common to it and to the meatus urinarius.

b. In 1754,* a young person of about eighteen years of age died in the Hôtel Dieu of Paris; and in dissecting his body, the anatomist, Varole, found the reproductive organs malformed in the following manner. On the *right* side the scrotum contained a testicle, and the vas deferens arising from it opened, not as usual into the neck, but into the middle of the external border of the corresponding vesicula seminalis. On the *left* side the scrotum was empty; and internally on this side there were found an ovary, a Fallopian tube with its fimbriated extremity, a small oval uterus without a neck and somewhat flattened, and a broad and round ligament, the last of which ran outwards, and was lost in the cellular tissue of the left half of the scrotum. The vesicula seminalis on the right, and the imperfect uterus on the left side, communicated by a canal of an inch and a half in length. The external organs were male; but the penis was very small, had no corpus spongiosum, and was imperforate for half an inch at its anterior extremity. The mammæ were as large as in women of the same age. The individual had been regarded during life as a male.

c. In 1825 the late Professor Rudolphi† detailed to the Academy of Sciences at Berlin the case of an infant who was reported to have died seven days after birth, and whose sexual organs exhibited the following interesting instance of lateral hermaphroditic conformation.

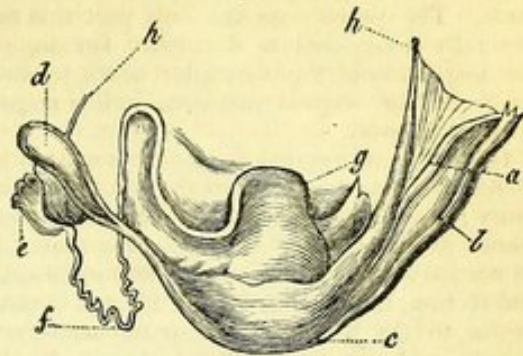
Meckel (Reil's Archiv. Bd. xi. s. 322,) considers Morand's and Lecat's as two different cases, and points out that what is described as the male side in the one, was the female in the other, and *vice versa*. It is, perhaps, not unworthy of remark, that in the coloured plate accompanying the translation of Morand's case by Gautier, the male and female sides have been reversed from an error in the engraving; and this circumstance may have contributed to mislead Lecat in his description, provided he happened to look to this notice of the case.

* Mém. de la Soc. Méd. de Paris, tom. iv. p. 342.

† Abhandlung. Konig. Akad. der Wissenschaft. zu Berlin für 1825, s. 60.

On the left side were discovered an ovary (fig. 291, *a*), without a distinct broad ligament,

Fig. 291.



Uterus (*c*) turned downwards and forwards to show its posterior surface and connections, &c.

and a Fallopian tube (*b*), which communicated with the superior and left portion of an uterus (*c*). The left side

of the scrotum (fig. 292, *a*), was empty; the right (*b*) contained a testicle (fig. 291, *d*) furnished with an epididymis (*e*) and tortuous vas deferens (*f*).

Below the uterus there was a hard flattened ovoid body (fig. 291, *g*, and fig. 293, *b*), which, when divided was found to consist of a cavity with thick parietes, and was considered by Rudolphi as the prostate gland in a rudimentary state.

The mouth of the uterus (fig. 293, *a*) terminated below in the parietes of this ovoid body, and on the right the vas deferens (*d*) penetrated into its substance, but without opening into its cavity. At the inferior part of the uterus there was a true vagina (fig. 293, *c*), which terminated in a cul-de-sac. The anus, rectum, and other organs were natural. The external sexual parts were male, but the penis was divided inferiorly (fig. 292, *c*). The testicle and ovary were supplied with the two usual spermatic arteries (fig. 291, *h h*).

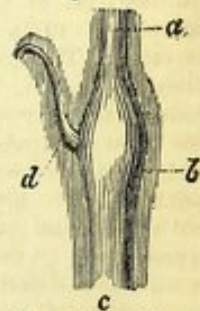
d. Under the present section of lateral hermaphroditism, we may also, according to Mayer's report, include the celebrated case of Marie Derrier, or Charles Doerge.* This person was baptised and brought up as a female, but at forty years of age was persuaded to change his name and dress to those of a man. We have already alluded to the great diversity of opinion which was entertained by the medical men of



External organs.

rudimentary state.

Fig. 293.



Os uteri, vagina, prostate, and vas deferens.

* Gazette Méd. de Paris (1836), no. 39. Lancet, v. i. for 1836-7, p. 140; or London Medical Gazette for October 29, 1836.

Europe in regard to the true sex of this individual. Even the different parts of his body were at one time referred to the male type, and at another time, and by other persons, to the female. The pelvis was the only part that was generally considered as decidedly female, yet the inspection of the body after death by Professor Mayer shewed that even in this respect all were in error.

Of the female sexual organs there existed an uterus, vagina, two Fallopian tubes, and an ovary; and of the male, a testicle, and prostate gland and penis. The uterus was placed in its normal situation between the urinary bladder and rectum, but with its fundus directed in some degree to the left. The organ was extremely narrow, and two and a half inches in length. The cavity of its cervix presented on its inner surface some slight folds, but would scarcely admit a quill; the cavity of its fundus was nearly half an inch across. The small canals of two Fallopian tubes opened into the fundus uteri. Their abdominal extremities were shut, but the corpora fimbriata were present. Near the extremity of the right Fallopian tube, which was four inches and four lines in length, a small flattened almond-shaped body was placed, which on examination proved to be distinctly a testicle. It was completely enveloped in peritonæum, and received a cord composed of muscular fibres, and of a spermatic vein and artery. Its internal structure was yellow and filamentous, like that of the testicle, and its seminiferous tubes could be easily separated. The left Fallopian tube was an inch shorter than the right; and a little outside and behind its abdominal extremity another small flattened body was found inclosed in the peritonæum. It resembled an ovary rather than a testicle. Its tissue was composed of small granules conglomerated together. The penis was two inches and nine lines in length, and was for the greater part concealed underneath the mons veneris. During life it was capable of erection, and was then elongated to more than three inches. The prepuce covered only half the glans. There was not any corpus spongiosum. A fossa or groove, representing an urethral canal divided inferiorly, ran along the under surface of the penis. The two folds of skin forming the sides of the groove separated from each other posteriorly, and might be compared to nymphæ. Towards the root of the penis, by uniting inferiorly with a puckering of the skin of the labia majora or divided halves of the scrotum, they formed a circular orifice not larger than a quill, having some bodies, supposed to be vestiges of the *carunculæ myrtiformes*, at its lower edge, and leading to a short vestibule, or common canal, into which the urethra, surrounded by a firm but small prostate, entered from above, and the vagina, encircled at its entrance by a vascular ring of varicose veins, opened from below. The vagina was two inches and eight lines in length, and only ten lines at its greatest breadth. Its inner surface was somewhat wrinkled anteriorly, but smooth behind. It terminated above in a kind of spongy isthmus representing the blind orifice of the uterus, and from four to

six lines in length. The diameters and form of the pelvis were, on dissection, found to be most evidently masculine.

The general character of Doerge was a mixture of the male and female type. When between twenty and thirty, he had been examined by different medical men in Germany, France, and England, and, as we have already mentioned, the most contradictory opinions were offered upon his real sex. The breasts were not much developed, and there was no distinct mammary glandular structure. His stature was small (five feet). As he had advanced in age, his voice had become more firm and grave, and a slight trace of beard had appeared; but his head and face presented the aspect of that of an old woman. His neck was short, and the thyroid cartilage did not project much: his chest was fat and full. During the last few years of his life he was subject to epistaxis and hæmorrhoids, but did not present any trace of sanguineous discharge from the genital organs,—a phenomenon which was alleged to have manifested itself three times during his twentieth year.

The right hemispheres of the cerebrum and cerebellum, particularly that of the latter, were smaller and less developed than the left, and the left side of the occiput was externally more prominent than the right. He is stated by Professor Mayer to have shewn a certain predilection for females, without, however, feeling any sexual desire.

2. *Testicle on the left, and ovary on the right side.*—An instance of malformation of the reproductive organs minutely described by Maret,* and which is in all its more essential anatomical points an example of lateral hermaphroditism, may be included under this head.

a. The subject of the case (Hubert Jean Pierre) died in the hospital at Dijon in 1767, at the age of seventeen. On the left side a perfect testicle was discovered with its usual spermatic vessels, vas deferens, and vesicula seminalis, all occupying the natural situation in which they are placed in the male adult. The vesicula seminalis contained a fluid of the colour and consistence of semen. On the right side an oblong cystic tumour was found lying in the iliac fossa, and stretching outwards into the inguinal region. On opening it a quantity of reddish limpid fluid escaped, and then the solid contents of the tumour were seen to consist of a somewhat flattened body, that gave off from the upper part from its right side a short Fallopian tube; and at the fimbriated extremity of this tube an ovary of the natural size, consistence, and figure, was situated. The roundish shaped body to which the tube was attached was about an inch and a half in its greatest, and an inch in its smallest diameter. It contained in its centre a small cavity continuous with that of the tube,—a circumstance, which, along with the structure of its walls, left little doubt that the body itself was an imperfectly formed uterus. No other opening except that of the tube could be traced into its cavity. Its external surface

* Mém. de l' Acad. de Dijon, t. ii. p. 157.

was attached to the ovary by a kind of ligament. On this same side of the body (the right) there existed also a vesicula seminalis, but smaller and more shrivelled than that on the left. It gave off a vas deferens, which became gradually smaller as it was traced backwards, and at last disappeared altogether without being connected with any structure resembling a testicle. In regard to the external organs of generation, the penis was four inches long and imperforate, but in all other respects perfectly formed. It possessed a corpus spongiosum, which does not exist in the female clitoris. On raising the penis, it was observed to cover a large fissure, the sides of which resembled the labia of a female. In the left labium or left half of the scrotum the testicle already alluded to was placed, but there was none in the right. When the labia were separated, two red spongy bodies were seen, resembling the nymphæ in appearance, and seemingly consisting of the sides of the split urethra. Between these bodies and at their upper part, the urethra opened as in the female; while below there was a very narrow aperture covered by a semilunar membrane, and presenting on one side of its entrance a small excrescence somewhat resembling in figure a caruncula myrtiformis. This orifice led into a membranous canal or cul-de-sac an inch in depth, and half an inch in diameter. On the lower part of this canal the verumontanum and orifices of the seminal ducts of both sides were discovered.

During life Pierre had been considered a male, but was not known to have shown any partiality for the female sex. His countenance was more delicate than what we ordinarily see in the male sex. There was no beard on the face; the larynx was not enlarged as in man; and the mammæ, each of which was furnished with a very large areola, were of a moderate size and roundish form. The configuration of the lower part of the body was more decidedly masculine, and there was none of that enlargement of the buttocks and projection of the thighs, from the increased width of the pelvis, which is observable in young females.

In this case we have on the *left* side of the body male sexual organs, consisting of a perfect testicle, vas deferens, and vesicula seminalis. On the *right* side, again, we have a female ovary and Fallopian tube with a rudimentary uterus, together with an imperfect male vesicula seminalis and vas deferens.

Arnaud mentions a very imperfect form of lateral hermaphroditism as having been recognised by M. Boudou, surgeon to the Hôtel-Dieu of Paris, on the person of a monk who died in that hospital in 1726. The external genital parts were those of a hypospadiac male. In one of the halves of the scrotum a testicle was found; the other was empty. The seminal canals and vesiculæ seminales on the side on which the perfect testicle existed were natural in their course and situation. Those of the opposite side lost themselves between the

bladder and rectum in a small body, which, in M. Boudou's opinion, was a shrunk uterus.*

Among the preceding cases of lateral hermaphroditism in the human subject, there are four in which the left side, and one only in which the right was the female. In the last instance quoted from Boudou the respective sides on which the male and female organs were placed are not stated by Arnaud.

B. *Transverse hermaphroditism*.—In the variety of hermaphroditic malformation which we have last considered, we have found upon the same individual the reproductive organs of one side disagreeing in their sexual type from those of the other. In the present division we have a similar sexual antagonism following a different direction; for supposing the internal sexual apparatus to be divided from the external by a transverse line, we have, in transverse hermaphroditism, on each side of this partition, organs of an opposite sexual type: in other words, the organs of reproduction (in the more correct sense of the word) or the internal sexual organs do not, in the present species of hermaphroditism, correspond in type with the organs of copulation, or the external sexual parts,—a circumstance the occasional occurrence of which tends to shew that these two portions of the generative apparatus are in some degree independent of one another in their normal development and existence, and consequently also in their abnormal formations.

Transverse hermaphroditism varies in its character according to the relative positions occupied by the co-existing male and female organs; the external organs, or all those exterior to the supposed transverse line, being sometimes female, and the internal male, and *vice versa*.

1. *Transverse hermaphroditism with the external sexual organs of the female type*.—In the cases included under this division, the external genital organs consist of a clitoris, vagina, and uterus; the uterus is often rudimentary, and sometimes altogether absent and replaced by the male vesiculæ seminales. The male internal organs are the testicles, generally small and imperfectly developed, and placed either within or without the abdomen, with vasa deferentia terminating in the uterus and vagina.

This variety of sexual malformation has been repeatedly observed among our domestic quadrupeds, particularly among black cattle. Mr. John Hunter, in an essay read before the Royal Society in 1779, and published in their Transactions,† and in his Observations on the Animal Economy, shewed that, (as had been long known among agriculturists,) when among black cattle the cow brings forth twin calves, one of them a male, and the other apparently a female, the male is a perfect bull calf, but the female, while it has all the external marks of a cow-calf, as the teats and udder, is still, with a few exceptions, imperfectly formed in its

* Arnaud, loc. cit. p. 283.

† Vol. lxi.

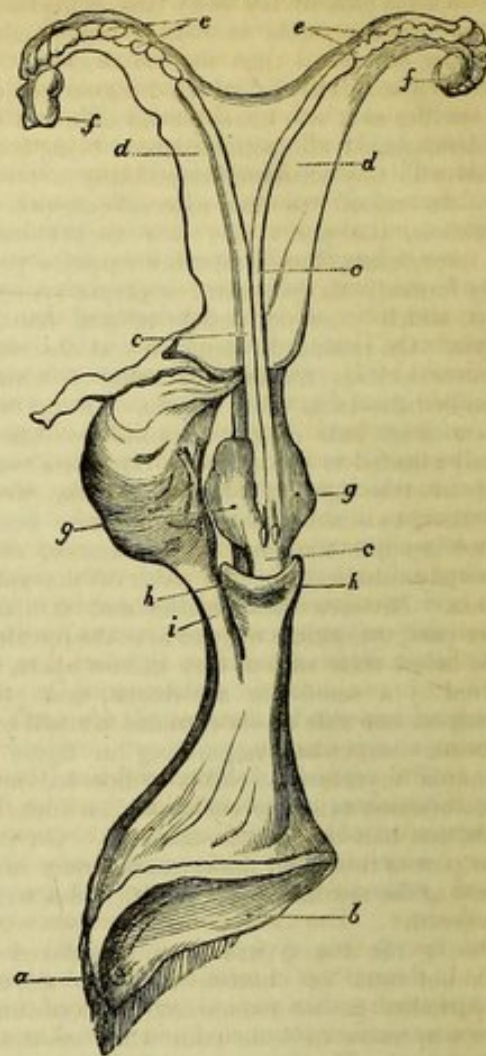
internal sexual organs, and very generally presents a mixture of the organs of the two sexes in various degrees. Such hermaphroditic twin cattle have long been distinguished in this country under the name of *free-martins*. In some exceptional cases only have they been observed capable of breeding; and generally they shew no sexual desire for the bull, or the bull for them. In appearance they resemble the ox or spayed heifer, and have a similar, or still greater disposition to become fat under the use of good food.

In the paper to which we have referred, Mr. Hunter has described the dissection of three free-martins: and one of these seems to belong to our present division of female transverse hermaphroditism. The clitoris and external parts appear to have been strictly of the female type, and there was a small udder with four teats. The vagina terminated in a blind end a little beyond the opening of the urethra, and from this point the vagina and uterus were impervious. The uterus at its superior part divided into two horns, and at the terminations of these horns, not ovaria, but bodies resembling the male testicles were found. These bodies had not a perfect internal structure like that of testicles, but resembled these organs in so far that, 1st, they were nearly as large as the male testes, and much larger than the female ovaries; 2nd, they were supplied with tortuous spermatic arteries like those of the bull or rigdil; and 3d, cremaster muscles passed up to them, as in rigdils, from the abdominal rings. There were two small vesiculæ seminales placed behind between the bladder and uterus, with their ducts opening into the vagina. Nothing, according to Mr. Hunter, similar to the vasa deferentia was present; but Gurlt is inclined to believe that the parts which Mr. Hunter has described as the horns of the uterus were really the deferent vessels.

Professor Gurlt* has himself given, from a preparation in the Museum of the Berlin Veterinary School, the accompanying sketch of the malformed sexual organs of a five-year old free-martin, (*fig. 294*), which presents to us an illustration of Mr. Hunter's supposed mistake, at the same time that it affords a well-marked example of transverse hermaphroditism. The detail of the anatomical peculiarities of the case has been unfortunately omitted by the author, but from the short explanations appended to the drawing, it appears that the clitoris (*a*) and external pudenda (*b*) were perfectly feminine, and that the vagina, short and funnel-shaped, terminated at its superior contracted extremity in two vasa deferentia (*c c c*), which were carried upwards in a duplicature of peritonæum (*d d*) resembling the broad ligament, until they joined the unrolled and lengthened epididymes (*e e*) of two small testicles (*f f*) placed in the position of the ovaries. Near the junction of the vagina and vasa deferentia bodies resembling the male vesiculæ seminales

* Lehrbuch der Pathol. Anat. d. Saug. Th. Bd. ii. S. 186.

Fig. 294.



(*g g*) and Cowper's glands (*h h*) were situated, and the urethral canal (*i*) opened into the vagina and was shorter than it usually is in the cow.

We have found upon a free-martin cow a state of the sexual apparatus very much resembling that figured in the above case by Professor Gurlt. The two vasa deferentia, as they ran in the duplicature of the peritonæum, had very much the appearance and shape of an imperfectly developed uterus. The vesiculæ seminales were large; the vasa deferentia were quite impervious throughout their whole course; and the bodies placed at their abdominal extremities were large, but of so indeterminate a structure as not to enable us to pronounce them to be either true testicles or ovaries.

M. Geoffroy St. Hilaire published in 1834 a very distinct case of an hermaphroditic goat which had two male testicles and epididymes with a two-horned uterus and female external parts.* M. Isidore St. Hilaire† mentions a nearly analogous case in the same animal, and quotes a third from Bomare which was observed upon a deer.‡

* Nouv. Ann. du Museum d'Hist. Nat. t. ii. p. 141.

† Histoire des Anomalies, t. ii. p. 128.

‡ Journ. de Phys. t. vi. p. 501.

To the present division of transverse hermaphroditic malformation with external female and internal male organs, we may probably also refer the case of the hermaphrodite dog detailed by Sir E. Home,* and three instances in the sheep described by Ruysch,† Herholdt,‡ and Gurlt.§ In all these instances imperfectly developed testicles were situated either within the abdomen or without it upon the udder, at the same time that the external parts exhibited in a more or less marked degree the peculiarities of the female sex; the vagina was, however, narrower, and the clitoris more developed than in the perfectly formed female; and in the dog mentioned by Home, this latter organ was very large, being three quarters of an inch long, and half an inch broad, but still it could not properly be considered as an imperfect penis, since the bone, which forms the distinguishing mark of that organ in the dog, was wanting.

Few well-marked instances of transverse hermaphroditism with external female organs have been hitherto described as observed in the human subject, unless we regard as an approach to it the numerous cases, already referred to, of spurious hermaphroditic malformation in the male from hypospadiac division of the urethra, scrotum, and perinæum.

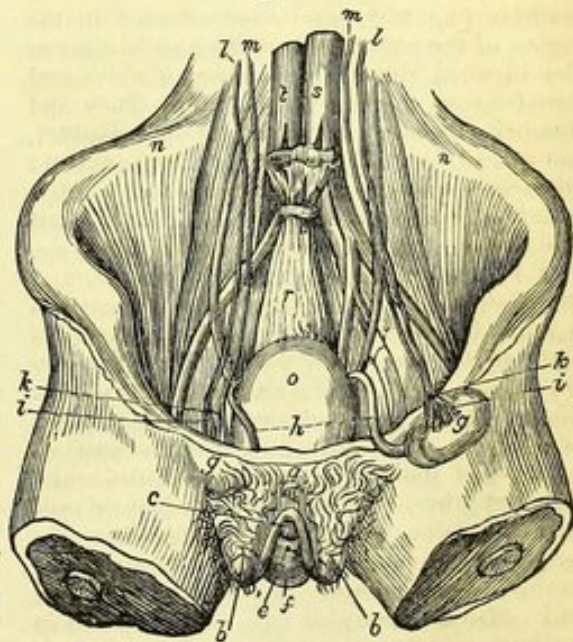
a. In his essay on hermaphroditism, however, Steglehner|| has detailed at great length the particulars of a case belonging to the present variety, which he met with on the body of a woman who died of phthisis at the age of twenty-three. The external sexual organs were all of the female type and in general well formed, though the clitoris and nymphæ were perhaps smaller than natural, and the orificium vaginae was rather contracted and half shut up by a hymen. The fossa navicularis was very distinct, and the vagina normally situated, but extremely short and narrow. Its internal surface presented an appearance of transverse and longitudinal rugæ, but its upper extremity formed a blind sac, and no traces could be found beyond it of the uterus, nor indeed any vestiges whatever of the other internal female organs, the ovaries and Fallopian tubes. On more minute examination a testicle with its spermatic cord was found in each inguinal region, placed outside the external ring, and surrounded with their cremaster muscles and vaginal coats. The testicles were flaccid and small, but their internal structure and that of their epididymes was natural; and the slender pervious vasa deferentia arising from them entered the abdomen, descended into the pelvis, and were joined behind the urinary bladder by two vesiculæ seminales of considerable size. Their common ejaculatory ducts opened into the vagina. The form of the thorax and pelvis, and of the body in general, was feminine; and

the mammæ and nipples were well developed, but the larynx was rather more protuberant than in females, and the voice approached in tone to that of a man. There had never been any menstrual discharge, but the periodical molimina indicative of its appearance were said to have been observed regularly. There were some hæmorrhoidal tumours situated around the anus.

b. If possible a still more perfect example of the present variety of transverse hermaphroditism in the human subject has lately been observed at Naples. The malformation occurred in the person of an individual Maria E. Arsano, who died at the age of eighty in one of the pauper charities at Naples, and who had passed through life as a female and been married as such. No suspicion of the malformation existed during life, and it was only at first accidentally discovered in preparing the dead body for demonstration in the anatomical theatre of Professor Ricco, who afterwards carefully dissected the malformed parts in company with Professors Sorrentino and Grosetti. We have taken the following account and sketches from Ricco's published description of the case.*

The external organs of generation were those of the female in their natural or normal state, consisting of the mons veneris with a scanty quantity of hair (*fig. 295, a*); of the labia ex-

Fig. 295.



terna (*fig. 295 & 296, bb*) naturally formed, and the nymphæ (*fig. 295 & 296, dd*); of the clitoris (*fig. 295 & 296, c*), which was perfectly imperforate, and of the ordinary size of the same organ in the adult female; of the orifice of the urethra (*fig. 295 & 296, e*) situated below the clitoris; and of the os vaginae (*fig. 295 & 296, f*), which was of the usual size and diameter. Altogether the aperture of the vulva was natural. The canal of the urethra was of the usual length, as seen at *u* in the section

* Phil. Trans. for 1795, p. 157. Comp. Anat. iii. 323.

† Thesaur. Anat. viii. n. c. iii. tab. 115.

‡ Viborg's Sammlungs fuer Thierartze (1797.) s. 25.

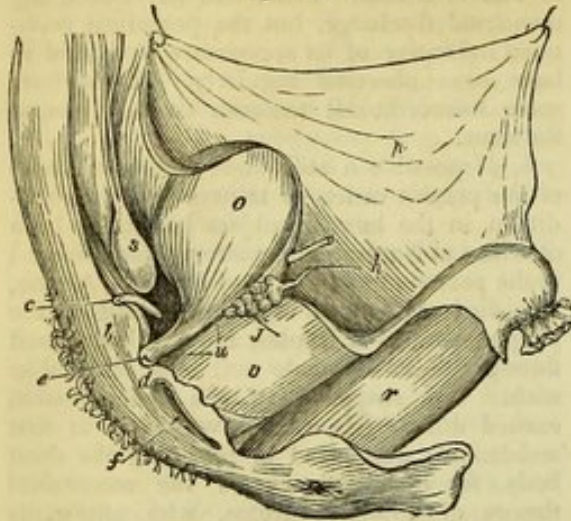
§ Lehrbuch, &c. Bd. ii. s. 186. tab. ix. 2. and xxii. s. 2.

|| Tract. de Hermaphr. naturâ, p. 120.

* Cenno Storico su di un Neutro-Uomo, p. 5, 7.

of the pelvis represented in *fig. 296*, in which *s* marks the divided symphysis pubis, and *p* the

Fig. 296.



peritonæum. The os vaginae shewed no vestiges of the membrane of the hymen, or, in other words, was without carunculæ myrtiformes. The canal of the vagina (*fig. 296, v*) was about two inches long, but without rugæ, and it terminated internally in a completely blind extremity or cul-de-sac. The uterus was entirely wanting, as were also the Fallopian tubes and uterine ligaments.

The internal organs of reproduction were, on the other hand, completely male. The two testicles (*fig. 295, g g*) were situated in the region of the pubis, and were scarcely clear of the inguinal rings. They were of the usual ovoid figure, and natural in size. They had internally the structure of the tubuli seminiferi, but it was not well developed. The spermatic cords were quite normal both in regard to their composition and the origin and course of their bloodvessels. The right spermatic artery (*fig. 295, l*) arose, as usual, from the renal, and the corresponding vein (*m*), after forming the pampiniform plexus (*k*), opened into the vena cava inferior; while on the left side the artery (*l*) arose from the aorta, and the vein (*m*) terminated in the left emulgent. The epididymes of the testes were also of the usual vermiform figure, and the corresponding vasa deferentia (*fig. 295 & 296 h h*) coursed towards their vesiculæ seminales (*fig. 296, j*), and terminated in an attenuated membranous expansion without any external aperture or ducti ejaculatorii. The vesiculæ seminales (see the left one *j* in *fig. 296*) were placed between the urinary bladder (*o*) and rectum (*r*); they were smaller and more shrunk than those of the adult male, though certainly they preserved their naturally oblong form. Their internal hollow or tubular structure was indistinct. The prostate gland was not present. The urinary bladder (*o*) and ureters (*n n*), the rectum (*r*), and the other intestinal viscera, with the abdominal bloodvessels (*s*, the aorta, *t*, the vena cava, *fig. 295*) seem to have been all quite natural.

The head of the above individual was of the usual size, the neck long, and the stature ordinary. The periphery of the thorax was so

expanded as almost to equal that of the male, notwithstanding the presence of well pronounced mammæ. The face, although entirely free from hair, had yet neither the expression of that of a female nor of a male, but shewed more of that mixed character which is seen in the eunuch. The pelvis was altogether that of a male in its form and dimensions, and the limbs were perfectly masculine. According to information collected after death, the voice was deep, and the temperament strong and firm. Though there was never any menstruation, yet, from being constantly employed in domestic occupation, the mental character was feminine, and the married state had been willingly entered into.

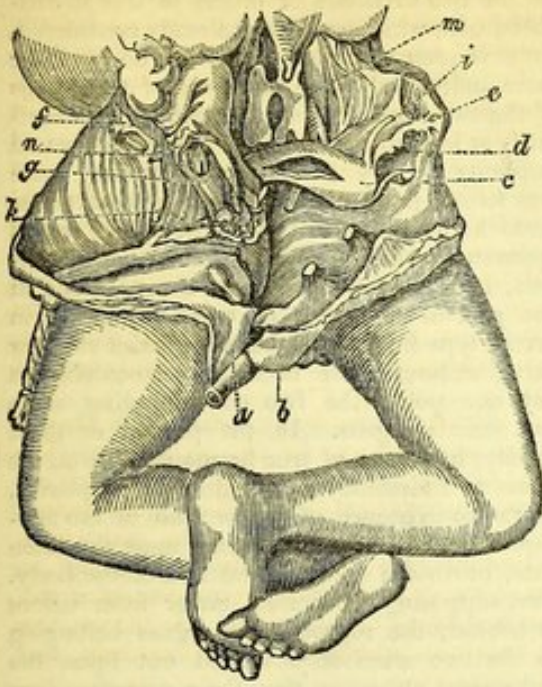
2. *Transverse hermaphroditism with the external sexual organs of the male type.*—The male organs that are present consist of the penis, which is provided with a regular formed prepuce, glans, corpora cavernosa, and corpus spongiosum, with the urethra perforating it, and of the prostate gland, verumontanum, &c. The co-existing female organs are the ovaries, the Fallopian tubes with their infundibula, and the uterus.

We are not aware of any recorded instances of this variety of hermaphroditic malformation among the lower animals. We have already, under the head of spurious hermaphroditism in the female from enlargement of the clitoris, &c., mentioned several cases, in which, from excessive development, the external organs in women had assumed some of the characters of the corresponding parts in man; but the two following cases described by Professors Eschricht of Copenhagen, and Bouillaud of Paris, present instances of malformation in which the more exterior sexual organs were all formed upon the male, and the internal upon the female type.

a. The subject of the case described by Eschricht* was a twin child that died very shortly after birth, and in whom the external sexual organs were of the male type, and the internal female. The penis (*fig. 297, a*) and scrotum (*b*) were well developed, but the usual raphé seen upon the latter was absent. The urethral canal of the glans and body of the penis was pervious throughout, and admitted of a sound being easily passed into the bladder. The glans was remarkably thin and slender. The prepuce could be easily pushed back. No testicles could be felt in the scrotum, and internally there was an uterus with Fallopian tubes and ovaries. The uterus (*c*) was about an inch in length, and had the general form presented by this organ in female infants. It contained a cavity marked with rugæ, but had no orifice inferiorly, nor any vagina attached to it. Its blind or imperforate neck was firmly attached to the posterior walls of the urinary bladder (*g*), while its fundus was directed very obliquely downwards and over to the left side. From the left side of the fundus of the uterus a twisted Fallopian tube (*d*) proceeded, having

* Müller's Archiv fuer Anatomie, &c. 1836, Heft ii.

Fig. 297.



well developed fimbriæ (e) at its abdominal extremity, and the broad ligament or fold of peritonæum along which it ran contained an oblong soft body (i), (which Eschricht considered as distinctly an ovary,) and a round ligament that took its course through the inguinal canal of the same side. On the right side an ovary (k) and Fallopian tube (f) were likewise discovered, but they were displaced and separated from the body of the uterus. The ovary lay in the iliac region, and above it and towards its outer side was placed the fimbriated extremity of the corresponding Fallopian tube. The tube presented towards this extremity a vesicular swelling of the size of a small pea, which admitted of being inflated and filled with quicksilver through a small opening between the fimbriæ. Below this it was impervious, and apparently diverged off into two prolongations, one of which (the round ligament) passed down into the inguinal canal, and the other crossed over with a fold of peritonæum to where the rectum and urinary bladder were preternaturally connected together. Professor Jacobson suggested that this latter part was a rudiment of the right half or horn of the uterus. It may perhaps, however, be more properly regarded as the commencement of the right Fallopian tube, and in this case it would, if continued onwards, have been joined to the neck of the uterus,—an arrangement which would be quite in accordance with the usual deep and displaced origin of one of the tubes in instances of congenital obliquity of the uterus.

The child was malformed in other respects also. The anus was imperforate, and the rectum (n) opened into the urinary bladder, which was very contracted. The kidneys (m) were irregularly formed, and lay near the promontory of the sacrum. There was an accessory spleen, and the formation of the heart and

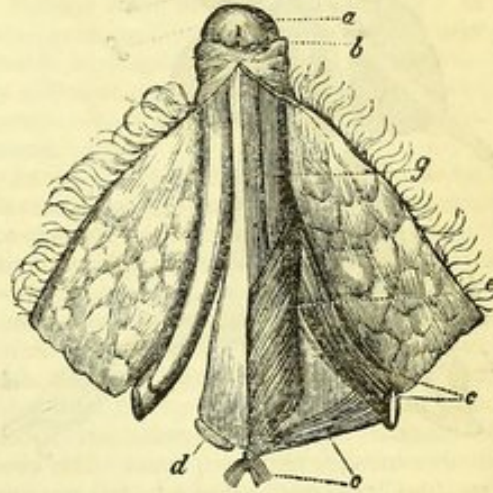
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large vessels was abnormal. The other twin child was well formed and lived.

b. The case of transverse hermaphroditism observed by Bouillaud* was even still better marked than that of Eschricht. Valmont, the individual who was the subject of it, died in one of the hospitals of Paris of the epidemic cholera. He was a hatter by trade, and had been married as a male. No further particulars of his history or habits could be obtained. The following was found by MM. Manec and Bouillaud to be the state of the external and internal sexual organs.

Externally there was a penis (fig. 298) of a

Fig. 298.



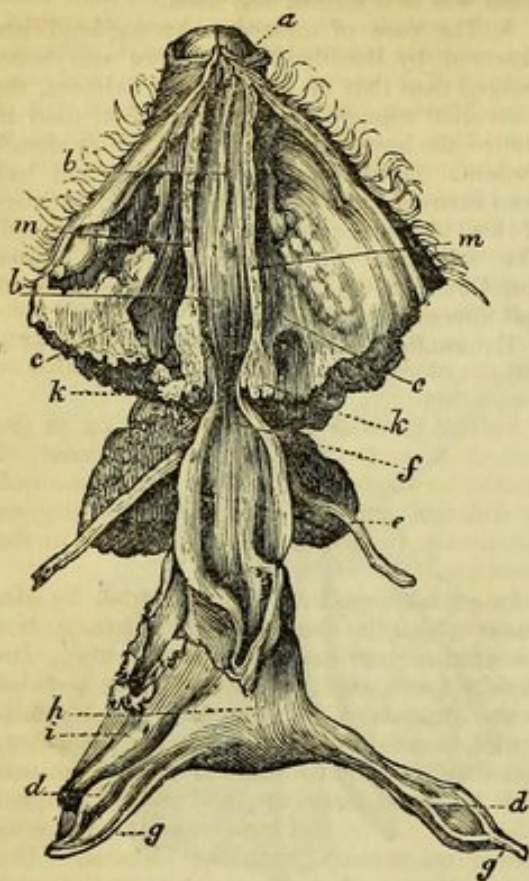
medium size, terminating in a regularly formed glans (a), and furnished with a prepuce (b).

The urethra (fig. 299, bb) opened on the inferior side of the glans (fig. 298 & 299, a). In its course from this point backwards to the bladder, it perfectly resembled the urethra of the male, and was surrounded at its origin by a well-formed prostate gland (fig. 299, k k). Cowper's glands were also present (fig. 298, d). The verumontanum or caput gallinaginis was distinct, as well as the orifices of the prostatic follicles; but the usual openings of the seminal canals could not be found. The corpus spongiosum urethræ (fig. 298, g) and the corpora cavernosa (fig. 299, m m) were as well developed as in the perfect male subject. The scrotum was small, and did not contain any testicles; it presented on its middle a line or raphé extending from the prepuce to the anus, and which was harder and better marked than it usually is upon male subjects. The various muscles of the male perinæum (fig. 298, c c) were present, and very perfectly formed. The constrictores urinæ muscles (e) were particularly long and thick.

In the cavity of the pelvis two ovaries (fig. 299, d d), similar in form and structure, according to M. Manec, to those of a girl of fifteen or sixteen years of age, or (to adopt

* Journ. Hebdom. de Méd., tom. x. p. 466. "Exposition Raisonnée d'un cas de nouvelle et singulière variété d'hermaphroditisme observée chez l'homme."

Fig. 299.



M. Bouillaud's statement) two bodies in some sort fibrous, and perhaps intermediate in their structure between ovaries and testicles, were found along with two Fallopian tubes (fig. 299, *g g*), having each a fimbriated extremity at one end, and opening by the other into the cavity of an uterus (*h*) which occupied the usual situation of that organ in the female, and opened inferiorly into a kind of vagina (*e*). The internal surface of the uterus showed the usual arborescent wrinkles of this organ in the unimpregnated state; the os tincæ was regularly formed; the vagina was about two inches long, and of a middle size, and presented internally numerous ridges, such as are met with in virgins. This canal, when opposite the neck of the bladder at *f*, became much contracted, and was continued downwards in the form of a small tube to the membranous portion of the urethra, into which it entered by a narrow orifice. The broad ligaments of the uterus were normally formed; the round ligaments passed through the inguinal canal accompanied each by an artery larger than that of the corresponding one in the female sex.

The external appearance and form of Valmont are described by M. Bouillaud as having been intermediate between those of the male and female sex. The stature was short; the mammary glands and nipples were well developed; the face was bearded; but the general physiognomy was still delicate. The body was fat; the hands and feet were small; the pelvis was shallow; and the haunches were wider than in a well-formed man.

C. Double or vertical hermaphroditism.—

In the two divisions or orders of true hermaphroditism which have been already considered, we have seen re-united upon the body of the same individual more or fewer of the organs of the two sexes, but so arranged as not necessarily at least to present the occurrence of actual duplicity in any of the corresponding male and female parts. In both lateral and transverse hermaphroditism the type of the sexual apparatus is in fact *single* in so far that it consists, in almost all cases, in the presence at one part of an organ or organs differing in sexual type from those that are present at other parts, without there necessarily co-existing at any one point the two corresponding male and female organs. In the present or third variety, however, of true hermaphroditism, we come to a tendency to actual sexual duplicity, in the co-existence of two or more of the analogous organs of the two sexes upon the same side, or in the same vertical line of the body. For, supposing we viewed, either from before or behind, the reproductive organs belonging to the two sexes all stretched out upon the same erect plane, so that their corresponding organs should be exactly superimposed upon one another,—as the two female ovaries upon the two male testicles, the Fallopian tubes upon the vasa deferentia, the uterus upon the vesiculæ seminales and prostate gland, &c.,—we should find in vertical or double hermaphroditism more or fewer of those analogous organs of the two sexes that were thus placed upon one another, and that consequently lay in the same vertical line, or upon the same side of the body, co-existing together at the same time upon the same individual.

Double, vertical, or complex hermaphroditism differs much in variety and degree in different cases, from the imperfect repetition of two only of the corresponding organs of the male and female upon the same body, to the reunion or co-existence of almost all the genital organs of both sexes upon one individual.

For the purpose of contrasting and collecting together as much as possible the more analogous cases, we shall arrange the instances of double hermaphroditism under three genera or divisions; the *first* including cases in which there co-existed a female uterus and male vesiculæ seminales, with a general female type; the *second*, those in which a female uterus, occasionally provided with Fallopian tubes, was added to an organization that was in other respects essentially male; and the *third* comprehending all examples in which ovaries and testicles are alleged to have been repeated together upon one or both sides of the body. Other divisions of double hermaphroditism may become necessary under the accumulation of new varieties of cases, but we believe it will be possible to arrange all the instances hitherto recorded under one or other of the above divisions. In classifying and describing these instances we shall in the meanwhile offer no observations on the probable anatomical mistakes that have been committed in the exami-

nation of individual cases. We reserve this important subject for special consideration under a separate head, where we shall endeavour to shew the numerous sources of error with which the observation of individual examples and varieties of complex hermaphroditism is beset.

1. *Male vesiculæ seminales, &c. superadded to organs of a female sexual type.*—In this first genus of double hermaphroditism we find two female ovaries, or bodies resembling ovaries, and an imperfect uterus co-existing with two male vesiculæ seminales, which are occasionally accompanied also with rudiments of the vasa deferentia. One of the free-martins described by Mr. Hunter* is referable to this variety of double hermaphroditism. The external genital organs and mammæ resembled those of the cow, but were smaller in size. The vagina, beyond the opening of the urethra into it, was, with the uterus itself, impervious. The imperfect uterus divided into two horns, at the end of which were the ovaria. On each side of the uterus there was an interrupted vas deferens broken off in several places; and between the bladder and vagina these vasa deferentia terminated in two vesiculæ seminales. The ducts from the vesiculæ and the vasa deferentia opened into the vagina. In this instance we have all the female organs present, but imperfect in their development; and at the same time there is superadded to them a tubular structure, formed, according to Mr. Hunter's opinion, of the male vesiculæ seminales and vasa deferentia.

We have met with a free-martin cow, in which upon dissection we found an arrangement of sexual parts very similar to that described in the preceding case. The uterus, however, though small, was pervious for a distance of some inches above the vagina; and at the abdominal end of each blind Fallopian tube there was a dilated sac of considerable size lined by peritonæum, and opening into the abdominal cavity by a small orifice. These sacs we considered as abortive attempts at the formation of the fimbriated extremities. The imperfect bodies which we considered as testicles were placed near the cavities which we mention, in the situation of the ovaries. They were small in size, and of an oblong shape. On a section being made of them, they shewed internally a kind of dense homogeneous yellow tissue, dotted or crossed with strongly marked white lines. The vasa deferentia could be traced along each side of the uterus in the form of broken dense cords. The vesiculæ seminales were large and partially hollow, and near them on each side there was an oblong body of considerable size, having the appearance of Cowper's glands. The tubes from them, and from the vesiculæ seminales, opened near the os tinæ into a vagina of nearly the usual size.

2. *An imperfect female uterus, &c. superadded to a sexual organization essentially male.*

* See An. Econ. p. 64. Mr. Well's free-martin.

—In the cases included under this second division of double hermaphroditism there exist a male testicle, or testicles, vasa deferentia, and vesiculæ seminales, along with a female uterus. The uterus occupies its normal situation between the bladder and rectum. It is sometimes defectively developed, and of a membranous structure; and occasionally it is not provided with Fallopian tubes, or, in the quadruped, with cornua. The cavity of the uterus communicates with a vagina that either opens in its usual situation externally, or, as happens more frequently, joins the male urethra. In some cases the vagina is wanting, and the uterus opens directly into the canal of the urethra.

Several cases of sexual malformation in the ram, goat, and dog referable to this variety of double hermaphroditism have been described by different authors; and various analogous instances have now also been observed in the human subject.

In a lamb described and delineated by Mr. Thomas,* all the external parts were male, but the scrotum was divided or hypospadiac. Internally there were two perfect male testicles in the situation of the ovaries, with their epididymes, vasa deferentia, and vesiculæ seminales; and a well-formed two-horned uterus furnished with its usual ligaments, and with Fallopian tubes that ran up and terminated in a tortuous convoluted manner upon the testicles. The body of the uterus possessed the common rugose structure, but the horns were lined by a smooth membrane without their usual glandular bodies internally. At the anterior extremity of the fundus uteri, a thick semilunar valve, which seemed to correspond to the os tinæ, passed across and hardly allowed a fine probe to be entered over its upper edge. The vagina scarcely existed, and formed only a short smooth pouch terminating below in a cul-de-sac. The male vesiculæ seminales and vasa deferentia entered the male urethra in their normal situation at the caput gallinaginis.

Gurlt† has described and delineated the sexual parts of a goat in which all the internal male genital organs, with the exception of Cowper's glands, were found (*fig. 300*). There was also present an uterus (*c*) provided with long but narrow and curved cornua (*ff*), that accompanied the vasa deferentia and testicles through the abdominal rings, and ended blind at the epididymes. The testicles lay externally upon the udder, which was of considerable size. The scrotum was absent; the penis (*g*) was short, tortuous, and imperforate; and there was a fissure in the perinæum into which the urethra (*h*) opened.

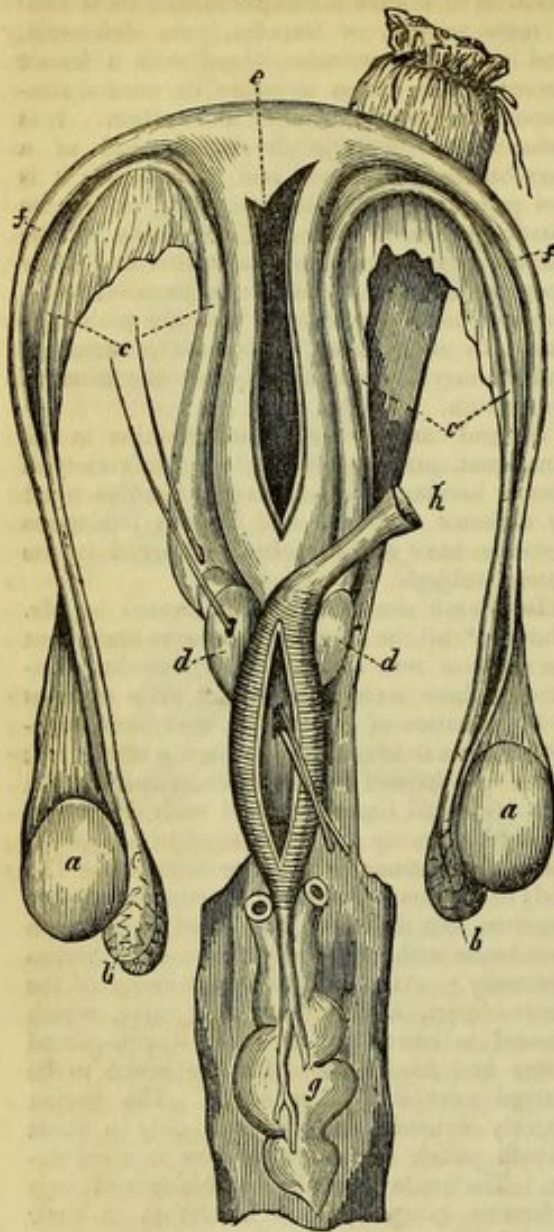
Stellati‡ has recorded an analogous case in the same animal. The male sexual organs

* London Med. and Phys. Journ. vol. ii. (1799), p. 1, with a good drawing of the malformed organs of generation.

† Lehrbuch der Pathol. Anat. Bd. ii. s. 195. pl. ix. fig. 1 & 2, and pl. xxii. fig. 3 & 4.

‡ Atti del Real Instit. d'Incoragg. alle Sc. Nat. Naples, tom. iii. p. 380.

Fig. 300.



a a, the testicles; *b b*, epididymes; *c c*, vasa deferentia; *d d*, vesiculæ seminales.

were not entirely complete, and there were superadded to them a female vagina and an imperfectly developed uterus, the Fallopian tubes of which ran towards the inguinal rings, and terminated with them upon the epididymes of the testicles.

Another instance of hermaphroditic malformation in the goat, detailed at great length by Meckel,* seems also in its principal points justly referable to the present division of cases, although there was at the same time a tendency, in the unequal size of the two cornua uteri, &c., to a degree of lateral hermaphroditism.

Professor Mayer, of Bonn,† has detailed at length the dissection of three hermaphroditic

goats, in all of which the conformation of the sexual parts resembled in its more essential parts the preceding cases of Thomas and Gurlt. In all the three instances there were found two male testicles with their epididymes, vasa deferentia, and vesiculæ seminales; and at the same time there was present a well-marked female two-horned uterus, with a vagina opening into the urethra. In the first case the large hollow cornua uteri terminated in blind extremities, and there were only very short impervious rudiments of the Fallopian tubes. In the second case, at the extremity of the right horn of the uterus, a blind appendicula was situated, formed by a vestige (according to Mayer) of the Fallopian tube; and from this a ligament was sent off to the corresponding testicle; a similar ligament, but no appendicula, existed on the left side. In the third case both Fallopian tubes were present, and each ended in a bursa formed by the lamina of the peritonæum, and partly surrounding the testicle and epididymes. In two of the instances the ejaculatory ducts seem to have opened into the urethra near the point at which the vagina terminated in it; and in one of the cases they opened into the canal of the vagina itself before it joined that of the urethra. All the external organs were male, but malformed in so far that the penis was short, and in two of the cases somewhat twisted; and the scrotum was either small or wanting.

The same author* has described the dissection of a dog, the sexual organs of which exhibited a similar variety of hermaphroditic malformation. The Fallopian tubes were pervious throughout in this instance, and at their further extremities opened upon the neighbouring cellular tissue. The body of the two-horned uterus was very small. On compressing the epididymes and vasa deferentia, a fluid resembling semen issued from the openings of the latter into the urethra. The external sexual parts were those of a hypospadiac male.

Several cases of hermaphroditic malformation in the human subject, similar in their anatomical characters to the preceding, have been described by Columbus, Harvey, Petit, Ackermann, and Mayer.

a. In a person with external hypospadiac male organs, Columbus† found two bodies like testicles in the situation of the ovaries, and larger in size than the latter female organs naturally are. From each of these testiform bodies two sets of tubes arose, one of which, like the male vasa deferentia, passed on to the root of the penis and opened into the urethra; while the other, like the female Fallopian tubes, were inserted into an uterus. The prostate gland was absent.

b. Harvey‡ has mentioned a very small hermaphroditic embryo, on which he found a two-horned uterus with two testicles of a very

* Reil's Archiv fuer die Physiologie, Bd. xi. s. 334-8.

† Icones Select. Præparat. Mus. Anat. Bonn. p. 17-20. tab. iv. fig. 5, and tab. v. figs. 1, 2, & 3.

* Ib. p. 16. tab. iv. fig. 3, external parts of generation; fig. 4, internal.

† De Re Anat. lib. xv.

‡ De Gen. Anim. Exerc. lxi. p. 304.

small size, and, near the diminutive penis, some traces of a prostate gland.

c. The observation of M. Petit,* of Namur, is still more complete. On the body of a soldier, aged twenty-two, who died of his wounds, and whose external organs appear to have presented no deviation from the male type except in the absence of the testicles from the scrotum, these bodies, with male vasa deferentia, vesiculæ seminales, and a prostate, were found to co-exist with female Fallopian tubes, and an uterus that was attached to the neck of the urinary bladder, and opened into the urethra between this neck and the prostate. The form of this imperfect uterus, M. Petit remarks, merited for it rather the name of a vagina than of an uterus, and it resembled more this organ in the female quadruped than in women. From the body of the uterus, at three inches from its entrance into the urethra, two Fallopian tubes arose. These tubes were perforated, and were three inches and a half long; their abdominal extremities were not loose and provided with fimbriæ, but were attached to a small soft body on each side, occupying nearly the natural situation of the ovaries, but having the substance or structure of the testicles, and provided with an epididymis and vas deferens. The vasa deferentia were each seven inches and a half long, and were attached to two long and rather slender vesiculæ seminales placed alongside of the uterus. The vesiculæ opened into the urethra by two ducts.

In a note appended to this case, M. Petit states that he had been consulted by a man who rendered blood by the penis regularly every month, without pain or any troublesome symptom. Perhaps, adds M. Petit, this man had also a concealed uterus. We have been informed, on credible authority, of two similar cases, the one in a young unmarried man of seventeen years of age, and the other in a person who had been married for several years without his wife having had any children. In both of these cases the discharge was in very considerable quantity, and perfectly regular in its monthly occurrence. Did it consist in a periodical hæmorrhage from the urinary bladder or passages only? or was it, as M. Petit seems to suppose in his instance, of a true menstrual character, and produced by the reproductive organs of the female existing internally, and communicating with the bladder or urethra?

d. Professor Ackermann,† of Jena, published in 1805 the following interesting case of the present variety of hermaphroditic malformation. It occurred in an infant that lived about six weeks after birth. On dissection, two testicles were found; one of them had descended into the scrotum or labium; the other had advanced no further than the groin. Both were perfectly formed, and had their usual appendages complete. In the natural situa-

tion of the female uterus, there was found a hollow pyriform organ, which, from its locality and connections, was supposed to be an uterus, though its coats were finer and thinner, and its cavity greater than naturally belongs to that viscus. Duplicatures of peritonæum, resembling the ligamenta lata, connected this imperfect uterus with the sides of the pelvis, and its cavity opened into a kind of short vagina, which soon united with the urethra, and formed one common canal with it (*vagina urethralis*). The vasa deferentia ran from the testicles towards the superior angles of the uterus, and penetrated into its substance at the points where the Fallopian tubes are usually placed. Without opening here, however, they passed onwards under the internal mucous-like membrane of the uterus and vagina, and at length terminated, by very small orifices, in the vagina urethralis. Immediately previous to entering the ligamenta lata, each vas deferens formed a number of convolutions, conglomerated into a mass resembling a vesicula seminalis.

e. Steghlener* has described at great length the case of an infant that survived only for half an hour after birth, and upon whose body he found perfect external male organs (*fig. 301, a b*), and internally two small elongated testicles (*c c*), with their epididymes (*g g*), the convolutions of their vasa deferentia (*b b*)

Fig. 301.



* Hist. de l'Acad. Roy. des Sc. for 1720, p. 38.

† *Infantis androgyni historia et iconographia*, Edinb. Med. and Surg. Journ. vol. iii. p. 202.

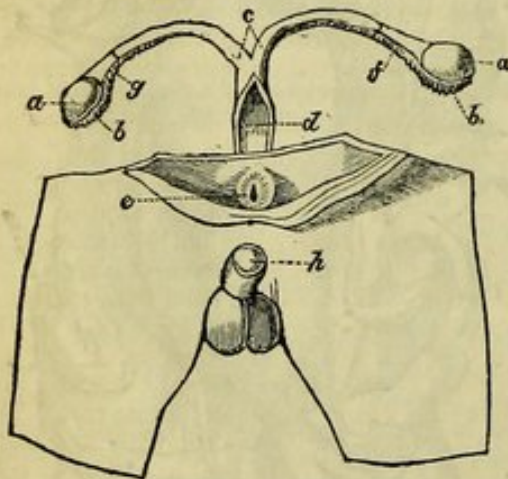
* De Hermaphr. Nat. p. 104.

distinctly marked. Between the rectum and bladder there was placed a very large pear-shaped bag or pouch (*f*), with firm, coriaceous, but not thick walls, and distended with fluid. This bag or imperfect cystoid uterus terminated inferiorly by a narrow neck, in a vagina that opened into the urethra, in the situation of the verumontanum, and was there dilated into a large bag or ampulla, occupying exactly the site of the prostate gland, and resembling this organ also in its form and position. The internal membrane of the uterus was collected at its neck into numerous valvular-like folds, and that of the vagina had also a rugous or plicated arrangement. From the fundus of the large sac of the uterus, and not from its angles, but from near its middle, two impervious solid ducts (Fallopian tubes, or rather vasa deferentia,) arose, and after a somewhat flexuous course reached the testicle (*c c*) lying in the superior part of the iliac fossæ. These ducts had attached to them at one or two points a number of small reddish nodules (*b b*), consisting, according to Steghlener, of glandular granules, and described by Ackermann in his case as vesiculæ seminales. The canal of the urethra was obliterated for a short distance towards the fossa navicularis, and the urinary bladder (*j*) and uterus (*i i*) were extremely distended, and the left kidney (*m*) was vesicular.

Mayer, in the work already referred to,* has described and delineated the following five cases of the present species of hermaphroditic malformation in the human subject, all of which he had himself met with and dissected.

f. In a fœtus of the fourth month, and affected with omphalocele and extroversion of the urinary bladder, he found male testicles (*fig. 302*,

Fig. 302.



a a) with their epididymes (*b b*), and a two-horned uterus (*c*) terminating in a vagina (*d*), that opened into the posterior part of the urinary bladder (*e*). From the left testicle a contorted vas deferens (*f*) arose, and ran down to the vagina; the right vas deferens (*g*) was shorter,

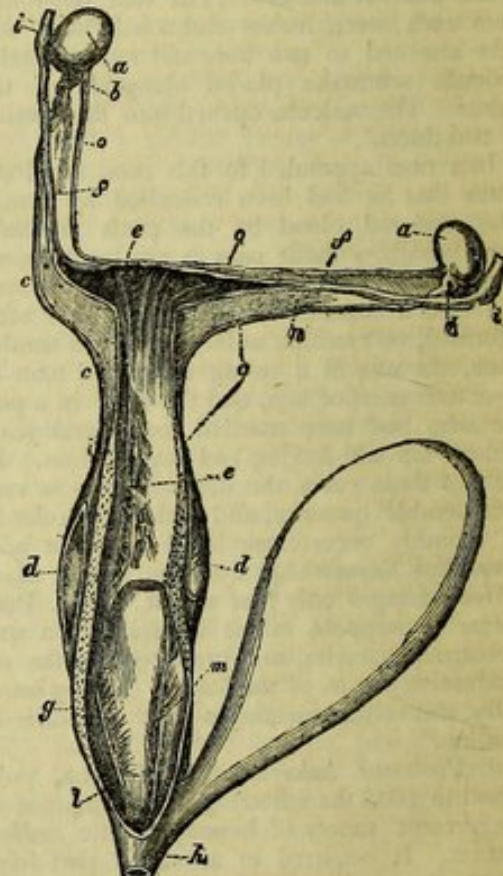
* *Icones Select.* &c. p. 8-16. See also Walther and Graefe's *Journal der Chirurgie und Augenheilkunde*, Bd. vii. Hft. 3, and Bd. viii. Hft. 2.

and became thread-like, and disappeared near the corresponding cornu of the uterus. A rudiment only of the left male vesicula seminalis was observable. The external organs were male; the glans penis (*h*) was imperforate.

g. In another fœtus of the sixth month,* there existed a perfect set of internal and external male sexual organs, viz., testicles, epididymes, vasa deferentia, and vesiculæ seminales, with a prostate gland and a normally formed penis and scrotum. But besides these, there was also present an imperfect female uterus, the body of which divided into two cornua, the right longer and incurvated, the left shorter and sacciform. The neck of the uterus was marked internally by its usual arborescent appearance; and it opened into a vagina that terminated in the urethra near the exit of the latter from the urinary bladder.

h. In a third case† of hermaphroditic malformation in an infant who died of convulsions when six months old, Mayer found the following blending of the organs of the two sexes. Of the internal male genital organs there were present two bodies at the inguinal rings that were evidently testicles, (*fig. 303, a, a*) as was proved

Fig. 303.



not only by their position, but by their form, coverings, connections, and internal structure, ("their substance," says Mayer, "being evidently composed of yellow canals"); their epididymes (*b b*) were also distinctly developed, and each of them sent off a vas deferens (*c c*), which

* *Icones*, p. 8, tab. ii. fig. 5.

† *Icones*, p. 9, tab. iii. fig. 1 and 2.

was furnished with a corresponding multilocular vesicula seminalis (*dd*). Of the internal female sexual organs there were found a perfectly developed uterus (*ee*), with its broad (*nn*) and round (*oo*) ligaments naturally formed and placed, and provided with two Fallopian tubes (*ff*) that followed the course of the testicles through the inguinal canals, and a vagina (*g*) which opened into the urethra (*h*) near its external orifice. The ejaculatory ducts of the male vesiculæ seminales opened into this vagina at *l* and *m*. The internal surface of the vagina was already beginning to present the appearance of its usual rugæ. The cavity of the uterus was triangular, and exhibited on the internal part of the cervix its characteristic plicated or arborescent structure. The Fallopian tubes were, at their uterine orifices, of a large caliber; their cavity afterwards became suddenly contracted, and then again dilated, and terminated at their ulterior extremities, where they lay in contact with the testicles at the external inguinal rings, in blind sacs (*ii*), without any very distinct appearance of fimbriæ. The external genital parts in this very interesting case were of a doubtful nature, being referable either to those of a hypospadiac male, or of a female with a large clitoris, but without nymphæ, the meatus urinarius being in its normal situation, but leading behind to the cavities of both the urinary bladder and uterus. The circle of the pelvic bones was large.

i. The two other instances described by Mayer occurred in adult subjects, and the malformation in both of them differed from that found in the cases just now cited in this, that there was only one testicle present along with the imperfect uterus.

The subject of one of these cases* was a person who died at the age of eighteen, and whose external sexual organs were those of a hypospadiac male, with a narrow perinæal canal or fissure. On dissection this perinæal canal was found to communicate anteriorly with the urethra, and posteriorly with a vagina of two inches and nine lines in length, and five or six lines in caliber. The anterior and posterior column of rugæ belonging to the vagina was only slightly marked. Its canal led to a large dilated uterus, the superior part of which was unfortunately cut away with some diseased viscera before the genital organs were examined; but, from the portion left, this organ seemed to resemble the uterus of quadrupeds in its oblong form, and in the thinness of its walls, which were composed of a cavernous fibro-vascular texture, and full of lacunæ. The usual arborescent appearance of the internal surface of the os uteri was very perfectly marked. Besides these female organs, there was a well-formed male prostate gland at the neck of the bladder; and behind the abdominal ring of the right side, a small roundish body, similar in form and texture to the testicle, and having the cremaster muscle adhering to its membranous involucre. There were no traces of any similar organ on the left side.

On both sides some portions of a canal were seen, but whether they were the remains of the vasa deferentia or Fallopian tubes was not ascertained on account of the previous mutilation of the uterus. On each side of the neck of the uterus there was placed a vesicula seminalis, provided with an ejaculatory duct that opened into the orifice of the vagina. The dimensions of the pelvis approached much nearer to those of the female than those of the male. In the secondary sexual characters of the individual, the female type was further recognised in the want of prominence in the larynx, in the slender form of the neck, and (according to Professor Mayer) in the rounded shape also of the heart, the smallness of the lungs, the oblong shape of the stomach, the large size of the liver, the narrowness of the forehead, and the conformation of the brain; while the individual approximated, on the other hand, to the male in the length and position of the inferior extremities, in the breadth of the thorax, the undeveloped state of the mammæ and the hairy condition of their papillæ, and in the existence of a slender beard upon the chin and cheeks.

j. In the second adult subject (a person of eighty years of age) Mayer* found, on the left side of the cavity of the abdomen, and near the inguinal ring, a small oval body exhibiting imperfectly in its internal structure the tubular texture of the male testicle, and having an appendix resembling the epididymis attached to it. From this testicle arose a vas deferens, which was joined in its course by a vesicula seminalis, and ended in an ejaculatory duct. On the opposite or right side a vesicula seminalis, having no continuous cavity, was present; but no vestige of a corresponding testicle, vas deferens, or ejaculatory duct could be discovered. The prostate gland was present, and regularly formed. In the cavity of the pelvis an uterus was found with parietes of moderate thickness, and of the usual cavernous texture; its cervix was marked internally with the appearance of the natural arborescent rugæ. Inferiorly it opened into a narrow membranous vagina, that received the right ejaculatory duct, then passed through the body of the prostate, and latterly joined the canal of the urethra. The fundus of the uterus could not be examined, as it had been removed in a previous stage of the dissection. The external parts were male and naturally formed, with the exception of the penis, which was shorter than usual, and had the canal of the urethra fissured inferiorly, and the meatus urinarius situated at its root. The individual was during life regarded as a male, but had all along remained in a state of celibacy. The general appearance of the face and body was that of an imperfectly marked male, but the pelvis was broad like that of a female.

3. *Co-existence of female ovaries and male testicles.*—This third division of complex or double hermaphroditism includes all those cases in which a male testicle and female ovary exist together either upon one side only, or upon

* Icones, p. 11. tab. iii. fig. 3 and 4.

* Icones, p. 15, tab. iv. fig. 1 and 2.

both sides of the body. With this arrangement, other malformations by duplicity of the sexual organs are generally combined; but these are so various in their character as not easily to admit of any useful generalization. In considering this third division of complex hermaphroditism, we shall mention, *first*, the cases in which *two* testicles and *one* ovary are stated to have co-existed; and *secondly*, those in which there have been supposed to be present *two* testicles and *two* ovaries.

Two testicles and one ovary.—The two dissections that we have previously detailed of lateral hermaphroditic insects, (see *Lateral Hermaphroditism*, p. 696,) shew that in these two cases this variety of sexual duplicity existed. It appears to have been observed also in two instances of hermaphroditic malformation in the quadruped, the histories of which have been described by Mascagni and Mayer.

In a bull, nine years of age, and which was provided with the usual external organs of the male, Mascagni found internally, on dissection, a prostrate gland and two perfect vesiculæ seminales, vasa deferentia, epididymes, and testicles. The testicles and epididymes were injected with mercury through the vasa deferentia. In addition there was discovered near the left testicle, and connected to it by peritonæum and bloodvessels, a body having the structure of the female ovary; and, in its normal situation, there existed a distended double uterus, containing from fifteen to sixteen pounds of a clear fluid. This uterus was furnished with two Fallopian tubes at its upper part, and terminated inferiorly in a vagina, which opened by a small orifice into the male urethra.*

In a goat dissected by Mayer,† he found two testes with their epididymes fully developed, and vasa deferentia and vesiculæ seminales. One of the testes was placed without and the other still remained within the abdominal cavity. At the same time there were present a large female vagina communicating with the urethra, and a double-horned uterus provided with two Fallopian tubes. One of these tubes terminated in a blind canal, but the other had placed at its abdominal extremity several vesicles, resembling, according to Mayer, Graafian vesicles, or an imperfect ovary. The vesiculæ seminales and (through regurgitation by the urethra and ejaculatory ducts) the cavities of the vagina and uterus, were filled with about four ounces of a whitish fluid, having the colour and odour of male semen. This fluid could not be found by the microscope to contain any seminal animalcules, but only simple and double Monades (*Monades termones et guttulas*). Bergmann, however, is alleged to have found it, on analysis, to contain the same chemical principle that characterizes human male semen.

Two testicles and two ovaries.—Various instances have now been published in which this sexual duplicity has been supposed to exist

among cattle and other domestic quadrupeds, as well as in the human subject.

One of the free-martins* described by Mr. Hunter comes under this variety. In the case referred to, in the situation of the ovaries “were placed,” to use Mr. Hunter’s words, “both the ovaria and testicles,”—or, as Sir Everard Home, in alluding to this case, more justly expresses it, “an appearance like both testicles and ovaria was met with close together.”† The two contiguous bodies were nearly of the same size, being each about as large as a small nutmeg. There were no Fallopian tubes running to the ovaries, but a horn of an imperfect uterus passed on to them on each side along the broad ligament. Pervious vasa deferentia were found; they did not, however, reach up completely to the testicle on either side, or form epididymes. The vesiculæ seminales were present, and much smaller than in the perfect bull. The external parts appear to have been those of the cow, but smaller than natural. The vagina passed on, as in the cow, to the opening of the urethra, and, after having received it and the orifices of the seminal ducts, it began to contract into a small canal, which ran upwards through the uterus to the place of division of that organ into its two horns.

Velpeau,‡ in his work on Midwifery, mentions that in an embryo calf, he had “found reunited the testicles and ovaries, the vasa deferentia, and uterus.”

In a hermaphroditic foal-ass, Mr. Hunter§ found both what he considered to be two ovaries placed in the natural situation of these bodies, and two testicles lying in the inguinal rings in a process or theca of peritonæum similar to the tunica vaginalis communis in the male ass. No vasa deferentia or Fallopian tubes could be detected; but there was a double-horned uterus present, and from its broad ligaments, (to the edges of which the cornua uteri and ovaries were attached,) there passed down on either side into the inguinal rings a part similar to the round ligament in the female. The horns and fundus of the uterus were pervious; but its body and cervix, and the canal of the vagina from above the opening of the urethra into it, were imperforate. The external parts were similar to those of the female ass; but the clitoris, which was placed within the entrance of the vagina, was much larger than that of a perfectly formed female; it measured about five inches. The animal had two nipples.

Scriba has given an account|| of an hermaphroditic sheep, in which two large testicles are stated to have been found in the scrotum, at the same time that there existed, in their normal situation, two moderately sized ovaries, and a small uterus furnished with two apparently closed Fallopian tubes. The external sexual parts appear to have been those of a

* An. Econ. p. 63-64, pl. ix.

† Comp. Anat. vol. iii. p. 322.

‡ Traité de l'Art des Accouchemens, t. i. p. 114.

§ An. Econ. p. 58.

|| Schriften der Gesellschaft Naturforschender Freude zu Berlin, Bd. x. s. 367.

* Atti dell' Acad. delle Scienze di Siena, t. viii. p. 201.

† Icones, p. 20.

malformed male, the penis being short and impervious, the scrotum divided, and the urethra opening into a contracted perinæal fissure resembling the female vulva. This animal had often attempted connection with the female sheep.

Borkhausen* has described a very similar case in the same species of animal. Each half of the divided scrotum contained a testicle which was regularly formed, but greater in size than usual, and furnished with a large spermatic artery. The pelvis contained a normal uterus, which was smaller, however, than natural; it was provided with its usual ligaments. The Fallopian tubes were present but imperforate, and the two ovaries were full of vesicles and inclosed in a strong membrane. The vagina was natural and opened as in the female. Behind the divided scrotum the rudiment of an udder with four teats (instead of two) was situated. The male penis was also present, but diminutive and short; its erectors muscles were small, and the prostate gland indistinct. The urethra was single as it left the bladder, but it afterwards divided into two canals, the wider of which opened into the female vagina and vulva, and the narrower ran through the male penis. The urine passed in a full stream through the former canal, and only by drops through the latter. The animal is alleged to have attempted coition in both ways.

In 1829, an account of an hermaphroditic goat was published at Naples, which is said to have been provided with both female ovaries and male testicles.† The two ovaries occupied their usual situation; no Fallopian tubes were found; but there were present a double-horned uterus with blind cornua, and a vagina which opened externally, as in the female. In the neighbourhood of the ovaries, and more external than them, two small testicles were discovered, having two vasa deferentia arising from them. The vasa deferentia ran downwards to two corresponding vesiculæ seminales, that were placed alongside of the uterus. In the lower angle of the external pudenda, a body, resembling in length the male penis more than the female clitoris, was situated: it was, as we have already had frequently occasion to mention in regard to the penis in malformed male quadrupeds, of a very tortuous or convoluted form.

We have had an opportunity of examining an excellent preserved specimen of double hermaphroditism in the sow, referable to the present section, which was met with some years ago by Dr. Knox, and we have his permission to state here the following particulars of the case.

Among the internal female organs there is present a natural well-formed double uterus, provided with broad ligaments and two hollow cornua, each about six or seven inches in length. The fimbriated extremities are not distinctly marked, the female tubes appearing to end

blind at their upper terminations, as they have often been observed to do in similar cases. The os uteri opens inferiorly into a vagina, which seems normal in its structure. At a short distance from the upper extremity of each horn of the uterus, two bodies of considerable magnitude are seen lying in close juxtaposition. The smaller of these two bodies is on either side about the size and shape of a large almond; and though internally of an indeterminate amorphous structure, they are considered by Dr. Knox as answering to the two ovaries. The two larger bodies, which are placed *between* the supposed ovaries and the upper extremities of the cornua uteri, are most distinctly testicles, as shewn by their numerous tortuous seminiferous tubes, which have been successfully filled with a mercurial injection. They are of the full size of the organ in the adult male. The seminiferous tubes of each testicle terminate in a vas deferens, which was injected from them; and the two vasa deferentia run downwards through the ligamenta lata of the uterus, and terminate inferiorly in the upper part of the vagina, thus following the course of those natural canals in the female sow that we shall afterwards have occasion to allude to at greater length under the name of Gaertner's ducts, and which Dr. Knox, from the evidence of the present case, believes to be in reality typical of the male vasa deferentia. There is no trace of vesiculæ seminales. Externally the vagina opened along with the urethra upon the perinæum, at a point lower than natural in the well-formed female. The clitoris in situation and size was nearly normal.

The animal at the time of death was fourteen months old; it was ferocious in its habits; and it had been in vain tried to be fattened. It had repeatedly shewn strong male propensities, and at the season of heat its vagina is said to have presented the usual injected appearance observed in the female sow.

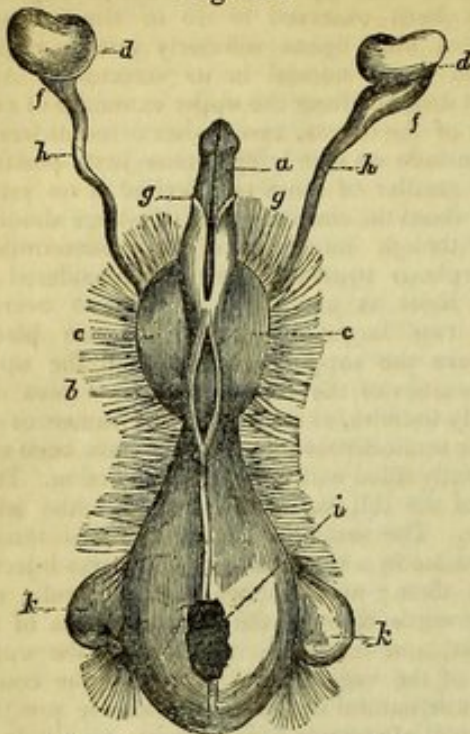
Dr. Harlan of Philadelphia* has lately described a still more perfect instance of double hermaphroditism than any of the preceding, which he met with in the body of a gibbon or orang outang, from the Island of Borneo (*Simia concolor*). This animal died of tubercular disease in Philadelphia in 1826, when it was considered to be under two years of age. Dr. Harlan gives the following account of its sexual formation. The penis (*fig. 304, a*) was about one inch in length, and subject to erections; it terminated in an imperforate glans; and a deep groove on its inferior surface served as a rudimentary urethra. This groove extended about two-thirds of the length of the penis, the remaining portion being covered with a thin articular diaphanous membrane, which extended also across the vulva (*b*), and closed the external orifice of the vagina. The vagina was rather large, and displayed transverse striæ. Traces of the nymphæ and labia externa were visible. The meatus urinarius opened beneath the pubis into the vagina, but the urine must have been directed along the groove of the penis by the

* Rheinisches Mag. zur Erweiterung der Naturkunde. Giessen 1793. Bd. i. s. 608.

† Brevi cenne su di un Neutro Capro; or, Gurlt's Pathologischen Anatomie, Bd. ii. s. 198.

* Med. and Phys. Researches, p. 19.

Fig. 304.

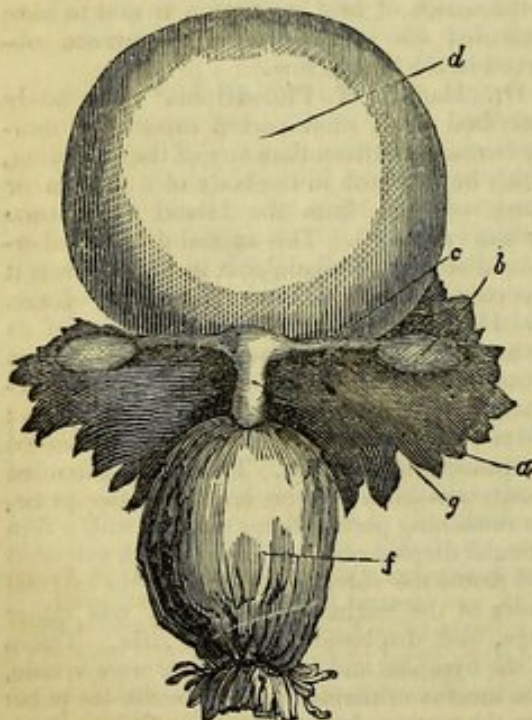


External sexual organs and testicles.

gg, the prepuce; hh, the vasa deferentia; i, the anus; kk, ischiatic protuberances.

membrane obstructing the orifice of the vulva. The os tincae was surrounded by small globular glands. The orifice and neck of the uterus admitted a large probe into the cavity of that organ, which appeared perfect with all its appendages. The round and broad ligaments, together with well-developed ovaries (fig. 305, b b), were all found in situ. The scrotum

Fig. 305.



Internal sexual organs seen from behind.

d, the urinary bladder; ff, rectum; gg, broad ligaments; cc, Fallopian tubes.

(fig. 304, c) was divided, and consisted of a sac on each side of the labia externa, at the base of the penis, covered with hair. The testicles (fig. 304, d d) lay beneath the skin of the groin about two inches from the symphysis pubis, obliquely outwards and upwards: they appeared to be perfectly formed with the epididymis (f, f), &c. The most accurate examination could not discover vesiculæ seminales; but an opening into the vagina, above the meatus urinarius, appeared to be the orifice of the vas deferens. In all other respects the male and female organs of generation were in this animal as completely perfected as could have been anticipated in so young an individual, and resembled those of other individuals of a similar age.

Two imperfect instances are on record of the co-existence of male testicles and female ovaries in the human subject.

a. The first of these cases is detailed by Schrell.* It occurred in an infant who died when nine months old. All the internal and external male organs were present and perfectly formed, with the exception of the prepuce of the penis, which seemed divided in front and rolled up. At the root of the large penis, was a small vulva or aperture capable of admitting a pea, and provided with bodies having an appearance of labia and nymphæ. This vulva led into a vagina that penetrated through the symphysis pubis, and terminated in a nipple-like body or imperfect uterus, to which, structures having a resemblance to the Fallopian tubes and ovaries were attached.

b. The other and still more doubtful case of the alleged existence of both testicles and ovaries in the human subject, was first published by Beclard.† The case was met with by M. Laumonier of Rouen, who injected and dissected the sexual parts, and deposited them in a dried state, along with a wax model representing them in their more recent condition, in the Museum of the School of Medicine at Paris. In the wax model two female ovaries with an uterus, vagina, external vulva, and large imperforate clitoris, are seen combined with two male testicles, the vasa deferentia of which terminate in the uterus at the place at which the round ligaments are normally situated; these ligaments themselves are wanting. The preparation of the dried sexual parts is far from being equally satisfactory, and, in its present imperfect condition at least, does not bear out by any means the complete double hermaphroditic structure delineated in the model.

III. HERMAPHRODITISM AS MANIFESTED IN THE GENERAL CONFORMATION OF THE BODY, AND IN THE SECONDARY SEXUAL CHARACTERS.

In the preceding observations we have principally confined ourselves to the description of hermaphroditic malformations as seen in the resemblance in appearance and structure of the

* Schenk's Medic. Chirurg. Archiv. Bd. i. s.

† Bullet. de la. Fac. de Méd. 1815, p. 284; or, Diet. des Sc. Méd. xxi. p. 111.

external genital parts of one sex to those of the other, and in the different degrees and varieties of reunion or co existence of the reproductive organs of the two sexes upon the body of the same individual. Hermaphroditism, however, may appear not only in what are termed the *primary* sexual parts or characters, or, in other words, in the organs more immediately subservient to copulation and reproduction, but it may present itself also in the *secondary* sexual characters, or in those distinctive peculiarities of the sexes that are found in other individual parts and functions of the economy, as well as in the system at large. We have occasionally an opportunity of observing some tendency to an hermaphroditic type in the general system, without there being any very marked corresponding anomaly in the sexual organs themselves, but it rarely happens that there exists any hermaphroditic malformation of the primary organs of generation, without there being connected with it more or less of an hermaphroditic type in the secondary sexual characters; and this circumstance often offers us, in individual doubtful cases, a new and perplexing source of fallacy in our attempts to determine the true or predominating sex of the malformed individual. Before, however, describing that variety of hermaphroditism which manifests itself in the general system and in the secondary sexual peculiarities, it will be necessary, in order to understand its nature and origin, to premise a few remarks on the dependence and relation of these secondary characters upon the normal and abnormal conditions of the primary sexual organs.

That the various secondary sexual peculiarities which become developed at the term of puberty are intimately dependent upon the changes that take place at the same period in the organism of the female ovaries and male testicles, seems proved by various considerations, particularly by the effect produced by original defective development and acquired disease in these parts, and by the total removal of them from the body by operation. In considering this point we shall speak first of the effects of the states of the ovaries upon the female constitution, and shall then consider those of the testicles upon the male.

When the usual development of the ovaries at the term of puberty does not take place, the secondary sexual characters which are naturally evolved in the female at that period do not present themselves; and this deficiency sometimes occasions an approach in various points to the male formation. Thus in a case recorded by Dr. Pears,* of a female who died of a pectoral affection at the age of twenty-nine, the ovaries on dissection were found rudimentary and indistinct, and the uterus and Fallopian tubes were present, but as little developed as before puberty. This individual had never menstruated nor shewed any signs, either mental or corporeal, of puberty. The mammæ and nipples were as little developed as those of the male subject. She had ceased to grow at ten

years of age, and attained only the height of four feet six inches.

In another analogous instance observed by Renaudin,* scarcely any rudiments of the ovaries existed, and the body of the uterus was absent, but the external genital female organs were well formed. The individual who was the subject of this defective sexual development had never menstruated; the mammæ were not evolved; in stature she did not exceed three and a half French feet; and her intellect was imperfectly developed.

In reference to these and other similar instances that might be quoted,† it may be argued that they do not afford any direct evidence of the evolution of the sexual characters of the female depending upon that of the ovaries, as the arrestment in the development of both may be owing to some common cause which gives rise at the same time to the deficiency in the development of the genital organs, and to the stoppage of the evolution of the body in general. That the imperfection, however, in the organism of the ovaries may have acted in such cases as the more immediate cause or precedent of the imperfection or non-appearance of the secondary characters of the sex, seems to be rendered not improbable, in regard to some, if not to all the instances alluded to, by the fact that the removal of these organs before the period of puberty, as is seen in spayed female animals, entails, upon the individuals so treated, the same neutral state of the general organization as was observed in the above instances; or, in other words, we have direct evidence that the alleged effect is capable of being produced by the alleged cause; and further, when in cases of operation or disease after the period of puberty, both ovaries have happened to be destroyed, and their influence upon the system consequently lost, the distinctive secondary characteristics of the female have been observed also to disappear in a greater or less degree.

Thus in the well-known case recorded by Mr. Pott,‡ the catamenia became suppressed, the mammæ disappeared, and the body became thinner and more masculine, in a healthy and stout young woman of twenty-three years of age, whose two ovaries formed hernial tumours at the inguinal rings, and were, in consequence of their incapacitating the patient from work, both removed by operation.

Many facts seem to show that the act of menstruation most probably depends upon some periodical changes in the ovaries, if not, as Dr. Lee§ supposes, in the Graafian vesicles of these organs; and when the function becomes suddenly and permanently stopped in a

* Seances de l'Acad. Roy. de Méd. 28 Fevrier 1826, and Medical Repository for 1826, p. 78.

† Davis, in his Principles and Practice of Obstetric Medicine, p. 513, refers to several instances in point. We may mention that Dr. Haighton found that after the Fallopian tubes were divided in rabbits, the ovaries became gradually atrophied, and the sexual feelings were lost. Phil. Trans. for 1797, p. 173.

‡ Surgical Works, vol. iii. p. 329.

§ Article OVARY in Cyclo. of Pract. Med.

* Phil. Trans. for 1805, p. 225.

woman at the middle period of life, without any indications of the catamenial fluid being merely mechanically retained, we may perhaps suspect with reasonable probability the existence of a diseased state which has destroyed either successively or simultaneously the functions of both ovaries. In such a case the distinctive secondary peculiarities of the female sex come to give place to those of the male. Thus Vaulevier mentions an instance in which menstruation suddenly ceased in a young and apparently healthy woman; no general or local disease followed; but soon afterwards a perfect beard began to grow upon her face.* Again, in women who have passed the period of their menstrual and child-bearing life, and in whom consequently the functions and often the healthy structure of the ovaries are lost or destroyed, we have frequently an opportunity of observing a similar tendency towards an assumption of some of the peculiarities of the male; an increase of hair often appears upon the face, the mammæ diminish in size, the voice becomes stronger and deeper toned, the elegance of the female form and contour of body is lost, and frequently the mind exhibits a more determined and masculine cast. Women, both young and aged, with this tendency to the male character, are repeatedly alluded to by the Roman authors under the name of *viragines*; and Hippocrates† has left us the description of two well-marked instances.

Among the females of the lower animals a similar approach to the male character in the general system not unfrequently shows itself as an effect both of disease and malformation of the sexual organs, and also in consequence of the cessation of the powers of reproduction in the course of advanced age. Female deer are sometimes observed to become provided at puberty with the horns of the stag,‡ and such

animals are generally observed to be barren,* probably in consequence either of a congenital or acquired morbid condition of their ovaries or other reproductive organs. In old age, also, after the term of their reproductive life has ceased, female deer sometimes acquire the horns of the male in a more or less perfect degree;† and Burdach alleges that roes sometimes become provided with short horns when they are kept from the male during the rutting season, and at the same time furnished with abundant nourishment.‡ Mehli§ alludes to two cases in which a virile type was shewn principally in the hair of the female deer. In one of these instances the hair of the head, neck, and abdomen, the shape of the ears and extremities, and the odour of the animal, gave it the closest resemblance to the male, and it followed the other females as if urged by sexual desire.

This kind of acquired hermaphroditism in aged females has, however, been more frequently and carefully attended to as it occurs in Birds than as met with among the Mammalia, the change to virile type in the former being more marked and striking than in the latter, owing to the great difference which generally exists between the plumage of the male and female.|| When old female birds live for any considerable period after their ovaries have ceased to produce eggs, they are usually observed to assume gradually more or less of the plumage and voice, and sometimes the habits also of the male of their own species. This curious fact, first pointed out by Aristotle¶ in relation to the domestic fowl, has now been seen to occur in a number of other species of birds, but particularly among the Gallinæ. It has been in modern times remarked in the common fowl (*Phasianus gallus*) by Tucker, Butler, and Jameson; in the common pheasant (*P. colchicus*) by Hunter and Isidore St. Hilaire; in the golden pheasant (*P. pictus*) by Blumenbach and St. Hilaire; in the silver pheasant (*P. nychemerus*) by Bechstein and St. Hilaire; in the turkey (*Meleagris*) by Bechstein; in the pea-hen (*Pavo*) by Hunter and Jameson; and in the partridge (*Tetrao perdix*) by Montagu and Yarrell. Among the Cursores it is mentioned as having occurred in the bustard (*Otis*) by Tiedemann, and in the American pelican (*Platalea aiaia*) by Catesby. In the order Palmipedæ it has been observed by Tiedemann and Rumball in the

* Journ. de Méd. tom. lxxix. and Meckel in Reil's Arch. Bd. xi. s. 275. Meckel quotes other similar cases from Seger in Ephem. Nat. Cur. Dec. i. Ann. ix. and x. obs. 95; Vicat, sur la Plique Polonoise, in Murray's Pr. Bibl. Bd. i. s. 578; and Schurig's Parthenologia, p. 184. Burlin published an express treatise on the subject, De barba mulierum ex menstruorum suppressione, Altorf. 1664. See also Haller's Elem. Phys. tom. v. p. 32; Reuss, Repert. Comment. tom. x. p. 205; Eble, Die Lehre von den Haaren in der organischen Natur. Bd. ii. s. 222. Vien. 1831; and Mehli, Ueber Virilescenz und Rejuvenescenz thierischer Körper. Leipz. 1838, who quotes several cases additional to those of Meckel.

† De Morb. Vulg. lib. vi. ss. 55, 56. "Abderus Phaetusa, Pythæi conjunx, antea per juventam fecunda erat; viro autem ejus exortante, diu articulos exorti sunt. Quæ ubi contigerunt, tum corpus virile, tum in universum hirsutum est redditum, barbaque est enata, et vox aspera reddita. Sed cum omnia quæ ad menses deducendos facerent tentassemus, non proflexerunt, verum haud ita multo post vita functa est. Idem quoque in Thaso Namysia, Gorgippi conjugi, contigit." Hippocr. Op. ed. Fœsii, p. 1201.

‡ Camden's Angl. Norm. (1603) p. 821. Langelot Eph. Nat. Cur. Dec. i. ann. ix and x. obs. 88. Ridinger's Abbild. Seltener Thiere Taf. 79, or Meckel in Reil's Archiv. für die Physiol. Bd. xi. p. 273.

* Wildungen, Taschenbuch für Forst- und Jagdfreunde, s. 17.

† Otto's Path. Anat. by South, p. 166, s. 123, n. 18, for list of cases.

‡ Phys. vol. i. § 183, p. 318.

§ Ueber Virilescenz Thierisch. Koerper; or British and Foreign Med. Review, vol. vi. p. 77.

|| It occurs also more frequently among birds than among mammalia, from the former possessing only a single ovary.

¶ "Gallini, cum vicerint gallos, concurrent marresque imitandi subagitare conantur. Attollitur etiam crista ipsis, simul et clunes (uropygium); adeo ut jam non facile diagnoscantur an fœminæ sint. Quibusdam etiam calcaria parva surriguntur." Hist. Animal. lib. ix. cap. 36.

domestic and wild duck (*Anas boscha*). Among the Scansores it has been seen in the cuckoo (*Cuculus canorus*) by Payraudeau; and among the Passeres in the cotinga (*Ampelis*) by Dufresne; in the chaffinch (*Fringilla*) and *rougequeue* (*Motacilla*) by Prevost; and in the bunting (*Emberiza paradisæa* and *longicauda*) by Blumenbach.

This change of plumage in old female birds commences, according to M. Isidore St. Hilaire,* much sooner in some instances than in others; it may only begin to show itself several years after the bird has ceased to lay, though depending more or less directly upon this phenomenon, and sometimes it commences immediately after it. The change may be effected in a single season, though in general it is not complete for some years. When it is perfected, the female may display not only the variety of colours, but also the brilliancy of the male plumage, which it sometimes resembles even in its ornamental appendages, as in the acquisition of spurs, and in the domestic fowls, of the comb and wattles of the cock. The voice of the bird is also very generally changed. Its female habits and instinct are likewise often lost; and, in some instances, it has been seen to assume in a great degree those of the male, and has even been observed to attempt coition with other females of its own species † In most of the female birds that have undergone this change, the ovary has been found entirely or partially degenerated, though in a few cases the morbid alteration is not very marked, eggs having even been present in the organ in one or two instances. In general, however, it is greatly diminished in size, or has become altogether atrophied; but the perfection of the change in the plumage does not seem to bear any direct ratio with the degree of morbid alteration and atrophy in the ovary.

That the changes towards the male type, described as occasionally occurring in old female birds, is directly dependent, not upon their age, but upon the state of the ovaries in them, seems still further proved by similar changes being sometimes observed in these females long previous to the natural cessation of the powers of reproduction, in consequence of their ovaries having become wasted or destroyed by disease. Greve, ‡ in his *Fragments of Comparative Anatomy and Physiology*, states that hens whose ovaries are scirrhous grow sometimes like cocks, acquire tail-feathers resembling

those of the male, and become furnished with large spurs. The same author mentions also the case of a duck, which, from being previously healthy, suddenly acquired the voice of the male, and on dissection its ovary was found hard, cartilaginous, and in part ossified.

Mr. Yarrell, in a paper read before the Royal Society in 1827,* has stated that in a number of instances he had observed young female pheasants with plumage more or less resembling the male, and in all of them he found on dissection the ovaries in a very morbid state, and the oviduct diseased throughout its whole length, with its canal obliterated at its upper part. He also shews that a similar effect upon the secondary sexual characters of the female bird is produced by the artificial division and removal of a small portion of their oviduct in the operation of making capons of female poultry; and he states that his investigations have led him to believe that in all animals bearing external characters indicative of the sex, these characters will undergo a change and exhibit an appearance intermediate between the perfect male and female, wherever the system is deprived of the influence of the true sexual organs, whether from original malformation, acquired disease, or artificial obliteration. †

From the frequency with which castration is performed, the effects of the testicles in evolving the general sexual peculiarities of the male have been more accurately ascertained than those of the ovaries upon the female constitution. These effects vary according to the age at which the removal of the testicles takes place. When an animal is castrated some time before it has reached the term of puberty, the distinctive characters of the male are in general never developed; and the total absence of these characters, together with the softness and relaxation of their tissues, the contour of their form, the tone of their voice, and their want of masculine energy and vigour, assimilate them more in appearance and habits to the female than to the male type. If the testicles are removed nearer the period of puberty, or at any time after that term has occurred, and

* Phil. Trans. for 1827, part ii. p. 268.

† On old or diseased female birds assuming the plumage, &c. of the male, see J. Hunter, *Observ. on the An. Econ.* p. 75; E. Home, *Lect. on Comp. Anat.* vol. iii. p. 329; Mauduit, in *Encycl. Method. Art. Faisan*, tom. ii. p. 3; Butter, in *Wernerian Soc. Mem.* vol. iii. p. 183; Schneider's Notes, in his edition of the *Emperor Frederick the Second's Treatise "De Arte Venandi cum Avibus;" Tucker's Ornithologia Damnoniensis; Catesby's Natural History of Carolina, &c.* i. t. 1.; Bechstein, *Naturgeschichte d. Deutschlands*, bd. ii. § 116; Blumenbach, *De anomalis et vitiosis quibusdam nisus formativi aberrationibus*, p. 8; and *Instit. of Physiology*, p. 369; Payraudeau, *Bull. des Sc. Nat.* t. xiii. p. 243; Tiedemann, *Zoologie*, vol. iii. p. 306; Geoff. St. Hilaire, *Phil. Anat.* tom. ii. p. 360; Isid. St. Hilaire, *Mém. du Mus. d'Hist. Nat.* tom. xii. p. 220; *Annal. des Sc. Nat.* t. vii. p. 336, or *Edinburgh New Philosophical Journal* for 1826, p. 302, with additional cases by Professor Jameson, p. 309; Kob, *De mutatione sexus*, p. 11. Berlin, 1823; Yarrell, *Phil. Trans. for 1827*, p. 268, with a drawing of the diseased ovaries, &c.

* *Edinburgh Journ. of Philos. Science*, (1826) p. 308.

† Rumball, in *Home's Comparative Anatomy*, vol. iii. p. 330, states having observed an old duck which had assumed the male plumage, attempt sexual connection with another female. This may perhaps enable us to understand the reputed cases of hermaphroditism in women, who, as related by Mollerus (*Tract. de Hermaphr. cap. ii.*) and Blancard, (*Collect. Medico-Phys. cent. iii. obs. 80.*) after having themselves borne children became addicted to intercourse with other females. Of course we cannot give our credence to the alleged successful issue of such intercourse.

‡ *Bruchstuecke sur vergleich. Anat. und Physiol.* s. 45.

when the various male sexual peculiarities have been already developed, the effect is seldom so striking; the sexual instincts of the animal, and the energy of character which these instincts impart, are certainly more or less completely destroyed, and the tone of the voice is sometimes changed to that of puberty; but the general male characteristics of form, such as the beard in man, and the horns in the Ruminantia, most commonly continue to grow. In animals, such as the stag, which possess deciduous horns, the removal of the testicles during the rutting season causes the existing horns to be permanent; and if the operation is performed in an adult animal when out of heat, no new horns in general appear.* In the ox, the effect of castration upon the growth of the horns, even when performed before the time of puberty, is quite remarkable; for instead of having their development altogether stopped, or their size at least diminished by the operation, as occurs in the ram and stag, the volume of these appendages is even increased by the operation, the horns of the ox being generally larger but less strong than those of the entire bull. Castration in the boar causes, according to Greve,† the tusks to remain small, and prevents altogether the replacement of the teeth. This author also states that the same operation on the horse prevents the full development of the neck, renders the teeth smaller and slower in their growth, increases the growth of the hair, and the size of the horny protuberances on the inside of the legs. The prostate gland, he further alleges, as well as the vesiculæ seminales, become augmented as much as a third in their volume in consequence of the operation.‡

The removal of the testicles both before and after the period of puberty commonly gives rise to another singular effect,—to an increased deposition of fat over the body, as has already been mentioned in the article ADIPOSE TISSUE, and from this circumstance the general form of the body, and in man that of the mammæ, is sometimes modified in a degree that increases the resemblance to the opposite sex. In the sterile of both sexes in the human subject an unusual corpulency is not uncommon, and the same state is often met with in old persons, and particularly in females, after the period of their child-bearing life is past.

The nature of the effects produced by the existence and functional activity of the testicles and ovaries upon the development of the secondary sexual characters of the male and female, may be further illustrated by what occurs in the season of heat to animals such as the deer, sheep, birds, &c. that have periodical returns of the sexual propensity. At these periods all the distinctive general characters of the sexes become much more prominently developed, in conjunction with, and apparently in consequence of, the changes which have

been ascertained by observation to occur at that time in the relative size and activity of the internal organs of generation. Thus with the return of the season of sexual instinct the dorsal crests and cutaneous ear-lobes of tritons enlarge; in Batrachian Reptiles the spongy inflations of the thumbs become increased in size; the various species of singing birds re-acquire their vocal powers; and some, as the cuckoo and quail, appear capable of exercising their voice only at this period of the year. At the pairing season also the plumage of birds becomes brighter in tint, and in some instances is in other respects considerably changed, as in the male ruff (*Tringa pugnax*), who then reassumes the tuft of feathers upon his head and neck, and the red tubercles upon his face that had fallen off during the moulting, and thus left him more nearly allied in appearance to the female during the winter. In reference to this subject, it appears to us interesting to remark, that in certain birds, as in the different species of the genus *Fringilla*, the male presents in winter a plumage very similar to that of the female,* and in the present inquiry it is important to connect this fact with the very diminutive size and inactive condition of the testicles of these birds at that season. (See AVES.)

From the remarks that we have now made upon the influence of the ovaries and testicles in developing the general sexual peculiarities of the female and male, it will be easy to conceive that when, in cases of malformation of the external genital organs giving rise to the idea of hermaphroditism, there is at the same time, as sometimes happens, a simultaneous want of development in the internal organs of reproduction, particularly in the ovaries and testicles, the general physical and moral peculiarities distinctive of the sex of the individual may be equally deficient, or have a tendency even to approach in more or fewer of their points to those of the opposite sexual type. In this way we may, it is obvious, have *general* or constitutional hermaphroditic characters, if they may be so termed, added to those already existing in the *special* organs of generation, and rendering more difficult and complicated the determination of the true sex of the malformed individual. Some cases of spurious hermaphroditism in the male published by Sir E. Home† may serve to illustrate this remark.

A marine soldier, aged twenty-three, was admitted a patient into the Royal Naval Hospital at Plymouth. He had been there only a few days, when a suspicion arose of his being a woman, which induced Sir Everard to examine into the circumstances. He proved to have no beard; his breasts were fully as large as those of a woman at that age; he was inclined to be corpulent; his skin was uncommonly soft for a man; his hands were fat and short, and his thighs and legs very much like those of a woman: the quantity of fat upon

* Buffon, Hist. Nat. tom. vi. p. 80.

† Bruchstuecke zur Vergl. Anat. und Physiol. p. 41.

‡ Loc. cit. p. 45.

* Stark's Elements of Nat. Hist. vol. i. p. 243.

† Comp. Anat. vol. iii. p. 320.

the os pubis resembled the mons veneris; and in addition he was weak in his intellect, and deficient in bodily strength. The external genital organs shewed him to be a male, but the penis was unusually small, as well as short, and not liable to erections; the testicles were not larger in size than they commonly are in the fœtal state; and he had never felt any passion for the opposite sex.

The following cases by the same author strongly illustrate this subject.* In a family of three children residing near Modbury in Devonshire, the second, a daughter, was a well-formed female, the eldest and youngest were both malformed males. The eldest was thirteen years of age. His mons veneris was loaded with fat; no penis could be said to be present, but there was a præputium a sixth of an inch long, and under it the meatus urinaris, but no vagina. There was an imperfect scrotum with a smooth surface, there being no raphé in the middle, but, in its place, an indented line; it contained two testicles, of the size that they are met with in the fœtus. His breasts were as large as those of a fat woman. He was four feet high, and of an uncommon bulk, his body round the waist being equal to that of a fat man, and his thighs and legs in proportion. He was very dull and heavy, and almost an idiot, but could walk and talk; he began to walk when a year and a half old. The younger brother was six years old, and uncommonly fat and large for his age. He was more an idiot than the other, not having sense enough to learn to walk although his limbs were not defective.

A case in a similar manner confirmatory of the preceding remarks is mentioned by Itard de Riez.† A young man, aged twenty-three, had no testes in the scrotum, a very small penis, not capable of erection, and a divided scrotum. He was in stature below the middle size. His skin was soft, smooth, and entirely free from hair, the place of the beard being supplied by a slight down. The voice was hoarse; the muscles were not well marked; the form of the chest resembled that of the female, and the pelvis was extremely broad and large. The intellectual faculties were very dull, and the sexual appetite was entirely wanting.

Renauldin, also, in the same work,‡ has recorded another case in point. In a soldier of twenty-four years of age, whose genital organs were extremely undeveloped, his penis being only of the size of a small tubercle, and his testicles not larger than small nuts, the pelvis was broad; the chest narrow; the face and body in general were not covered with hair, with the exception of a small quantity upon the pubis; the voice was feminine, and the mammary glands were as perfectly developed as in the adult female. The body of this individual was rather lean than otherwise. The

mammæ had begun to enlarge when his body attained to its full stature at sixteen years of age. He had all the habits and sexual desires of the male sex.

In quadrupeds as in man, when the testicles or ovaries are imperfectly formed, the secondary sexual peculiarities are frequently so defectively evolved as to offer a kind of hermaphroditic or neutral type in the general configuration and characters of the animal. Thus, the free-martin does not present an exact analogy in form either with the bull or cow, but exhibits a set of characters intermediate between both, and more nearly resembling those of the ox and of the spayed heifer. In size it resembles the castrated male and spayed female, being considerably larger than either the bull or the cow, and having horns very similar to those of the ox. Its bellow is similar to that of the ox, being more analogous to that of the cow than of the bull. Its flesh, like that of the ox and spayed heifer, is generally much finer in its fibre than the flesh of either the bull or cow, and is supposed to exceed even that of the ox and heifer in delicacy of flavour.*

The consideration of the various facts that we have now stated inclines us to believe that the natural history characters of any species of animal are certainly not to be sought for solely either in the system of the male or in that of the female; but, as Mr. Hunter pointed out, they are to be found in those properties that are common to both sexes, and which we have occasionally seen combined together by nature upon the bodies of an unnatural hermaphrodite; or evolved from the interference of art, upon a castrated male or spayed female. In assuming at the age of puberty the distinctive secondary peculiarities of his sex, the male, as far as regards these secondary peculiarities, evidently passes into a higher degree of development than the female, and leaves her more in possession of those characters that are common to the young of both sexes, and which he himself never loses, when his testicles are early removed. These and other facts connected with the evolution of both the primary and secondary peculiarities of the sexes further appear to us to shew that, physiologically at least, we ought to consider the male type of organization to be the more perfect as respects the individual, and the female the more perfect as respects the species. Hence we find that, when females are malformed in the sexual parts so as to resemble the male, the malformation is almost always one of excessive development, as enlargement of the clitoris, union of the labia, &c.; and, on the other hand, when the male organs are malformed in such a manner as to simulate the female, the abnormal appearance is generally capable of being traced to a defect of development, such as the want of closure of the perinæal fissure, and of the inferior part of the urethra, diminutive size of the penis, retention

* *Ib.* p. 320-21.

† *Mémoires de la Société Méd. d'Emulation*, tom. iii. p. 293-5.

‡ *Tom.* i. p. 241.

* *Hunter's Obs. on the An. Econ.* p. 60.

of the testicles in the abdomen, &c. In the same way, when the female assumes the secondary characters of the male, it is either, first, when by original malformation its own ovaries and sexual organs are so defective in structure as not to be capable of taking a part in the function of reproduction, and of exercising that influence over the general organization which this faculty imparts to them; or, secondly, when in the course of age the ovaries have ceased to be capable of performing the action allotted to them in the reproductive process. In both of these cases we observe the powers of the female organization, now that its capabilities of performing its particular office in the continuation of the species are wanting or lost, expend themselves in perfecting its own individual system, and hence the animal gradually assumes more or fewer of those secondary sexual characters that belong to the male.

We do not consider it subversive of the preceding view to qualify it with the two following admissions,—1st, that, owing to the energies of the female system being so strongly and constantly directed towards the reproductive organs, and the accomplishment of those important functions which these organs have to perform in the economy of the species, the general characters of the species may be developed in her body in a degree *less* than they otherwise would be, or than actually constitutes the proper standard of the species; and, 2dly, in consequence of the peculiarities of the sexual functions of the female, some of the individual organs of her system, as the mammæ, are evolved in a degree *greater* than is consonant with the standard characters of the species. At the same time we would here remark that the occasional enlarged condition of the mammæ in hermaphrodites in whom the male sexual type of structure predominates, (as in the examples of spurious male hermaphrodites that have been quoted from Sir E. Home, and in other instances mentioned by Renaudin, Julien, Petit, Rullier, and others in the human subject, as well as in numerous cases among hermaphrodite quadrupeds,) would almost seem to shew that the full development of the mammary glands is a character proper to the species in general, rather than one peculiar to the female system alone. In males, also, who are perfect in their reproductive organs and functions, the mammæ are sometimes observed to be developed in so complete a manner as to be capable of secreting milk, forming what may be regarded as one of the slightest approaches towards hermaphroditic malformation in the male organization;* and

* The secretion of milk in the mammary glands of the male is occasionally observed amongst our domestic quadrupeds. See Gurlt's *Pathologischen Anatomie der Haus-Saugthiere*, Bd. ii. s. 188; Blumenbach in the *Hanoversich Magazin* for 1787; and Home in *Comp. Anat.* iii. p. 328. Among the recorded instances and observations upon it in man we may refer to Paullini, *Cynographia*, p. 52; Schacher, *De Lacte Virorum et Virginum*, Leipz.

the mammæ of the infants of both sexes not unfrequently contain a lactiform fluid at birth.

In some instances of hermaphroditic malformation the total form and configuration of the body have been alleged to present not only a general tendency towards the physical secondary characters of the opposite sex, or to exhibit in a permanent state the neutral condition existing before puberty, but different individual parts of it have been occasionally conceived to be developed after a different sexual type. Thus, for instance, we have already mentioned in regard to Hubert Jean Pierre, that the upper half of the body of this individual seemed formed after the female, and the lower half after the male type, the larynx and mammæ being quite feminine, the face shewing no appearance of beard, and the arms being delicate and finely rounded, while the pelvis was narrow, and the thighs were marked and angled as in man. In a case described by Schneider,* the reverse held true, the bust being male with a strong beard and large thorax, and the pelvis being large and distinctly female. A more mixed combination of the secondary sexual characters has been already described as existing in the cases detailed by Ricco, Mayer, Arnaud, Bouillaud, &c.

One side of the body has been sometimes observed to be apparently formed in one or more of its parts on a sexual type different from that of the same parts on the opposite side. Girald, in his *Topography of Ireland*,† mentions a reputed female, who had the right side of the face bearded like that of a man, and the left smooth like that of a woman. Mr. King‡ has described an interesting instance of hermaphroditic malformation in an individual whose general character was masculine, but with the pelvis large and wide; the left testicle only had descended into the groin, and the mamma of this side was small comparatively to that of the opposite or right side.

In a hind mentioned by Mr. Hay,§ and which, he believed, had never produced any young, one of the ovaries on dissection after death was found to be scirrhous. The animal had one horn resembling that of a three years-old stag on the same side with the diseased ovary; there was no horn on the opposite side. Bomare|| has given a similar case in the same

1742; Sinnibaldus, *Geneanthrop.* tom. iv. p. 456; Alex. Benedictus, *Anatom. Corp. Hum.* lib. iii. p. 595; Winslow, *Anatomy*, vol. ii. p. 214; Deusing, *De Lacte*, p. 327; Kyper, *Anthropologia*, lib. i. p. 490; Buffon, *Hist. Nat.* tom. ii. p. 543; Bishop of Cork, *Phil. Trans.* vol. xli. p. 813; Humboldt, *Personal Narrative*, vol. iii. p. 57; Franklin, *First Expedition to the Polar Seas*, (London, 1823,) p. 157.

* Kopp's *Jahrbuch der Staatsarzneikunde*, Bd. x. s. 134.

† *Topog. Hiberniæ*, in *Camden's Angl. &c.* (1603), part ii. p. 724.

‡ *London Med. Repository* for 1820, vol. xiii. p. 87.

§ *Linnæan Transactions*, vol. iii. p. 356.

|| *Journ. de Phys.* tom. vi. p. 506.

animal, where a single horn was present, situated also on the same side with the diseased and degenerated ovary; and Russell* states, as the result of his experiments on castration in the deer, that when he removed one testicle only from the animal, the horn on the opposite side was the more completely developed of the two. Azara † observed in two birds the right side of the tail to possess the characters of the male, and the left those of the female.

In the hermaphroditic lobster previously alluded to as described by Nicholls, the general external configuration of the body was, like that of the sexual organs, perfectly female on one side, and perfectly male on the other.

It is principally, however, among hermaphroditic insects that a difference of sexual type in the general conformation of the opposite sides of the body, and of its individual parts, has been observed; and this malformation is the more striking and easy of observation in this class of animals, on account of the great differences in colour, size, and form respectively presented by the antennæ, wings, and other parts of the body of the males and females of the same species.

Lateral hermaphroditism of the body in Insects has been most frequently observed by Entomologists amongst the class Lepidoptera. It has now been remarked in the following species:— in the *Argynnis paphia*, *Lycæna alexis*, *Saturnia pyri*, *Endromis versicolor*, and *Harpya vinula* (Ochsenheimer); in the *Gastrophaga medicaginis* and *Lycæna adonis* (Rudolphi); in the *Liparis dispar* (Schæfer, Ochsenheimer, and Rudolphi); in the *Saturnia Carpini* (Capioux, Ochsenheimer, and Rudolphi); in the *Gastrophaga quercifolia* (Hettlinger and Rudolphi); in the *Gastrophaga pini* (Scopoli); in the *Gastrophaga cratagi* (Esper); in the *Sphinx convolvuli* (Ernst); *Sphinx populi* (Fischer and Westwood); *Papilio polycaon* (Macleay); *Polyommatus alexis* (Entomolog. Mag. vol. iii. p. 304); *Bombyx castrensis* (Duval); in the *Argynnis paphia* (Allis); in the *Vanessa atalanta* (Schrank and Germar); and in the *Vanessa antiopa* and *Deilephila euphorbiæ* (Germar). Klug and Germar have recorded two instances of it among the Coleoptera, the former in the *Lucanus cervus*, and the latter in the *Melolontha vulgaris*; and Mr. Westwood mentions a third case in the large water-beetle (*Dyticus marginalis*), as contained in Mr. Hope's collection, and has seen a fourth in the stag-beetle (*Lucanus cervus*).

Out of twenty-nine recorded cases of lateral hermaphroditism in Insects, in which the sexual characters of each side are distinctly specified, we find that in seventeen instances the right side was male, and in twelve female. Burmeister alleges that in by far the majority of cases the right side is male, and the left female,—a statement in which Meckel coincides, while Westwood maintains the reverse. The cases we have ourselves collected are certainly numerically in favour of the former

opinion, but the data are as yet so few, and the difference so trifling, as not to warrant us to come to any decided conclusion on this point.

In some instances we find among insects an imperfect lateral hermaphroditism consisting of some parts of one side, as of one or more of the wings, palpi, or antennæ being formed according to a different sexual type from the same parts of the opposite side, and from the general body of the animal. Thus in the *Melitæa* described and dissected by Klug (see *Lateral Hermaphroditism*) the general form of the insect was male, but the left eye, palpus, antenna, and left sexual fang were smaller than in individuals belonging to this sex; the left antenna was annulated with white and yellow at the apex, while the right was of one colour; the general form of the abdomen was male but somewhat thick, and the wings were all equal and male.

In a *Pontia duplidice* mentioned by Rudolphi, and which in its general external characters was female, the right anterior wing was formed after the male type, and the sexual organs also resembled those of the male.

Ochsenheimer mentions one *Gastrophaga quercus* with the body, and the antennæ and wings on the left side female, and the right wings male; and a second with the body and the right side female, and the left side and two antennæ male, the latter being brown and pectinated.

In this imperfect variety of lateral hermaphroditism, the malformed wing, antenna, or palpus is sometimes formed after one sexual type and coloured after another. In a male *Melitæa phæbe* noticed by Germar, the right wings and antenna were female in regard to size, but male in respect to colouring and markings. In a female *Deilephila galii*, he found the left antenna and palpus of the small size of the male, but agreeing in colouring and markings with the corresponding female parts on the right side. In a *Pontia cardamines*, which was male in all its other characters, Ochsenheimer observed the right superior wing marked as in the female, and he mentions another individual of the same species which had a female form with some male colours.

In another variety of insect hermaphroditism the sexual difference is sometimes, as we have already noticed in regard to the human subject, expressed not by a lateral, but by a longitudinal sexual antagonism, or, in other words, the anterior and posterior parts of the body are formed after the two opposite sexual types. Thus in a *Saturnia carpini* described by Ochsenheimer, the antennæ were male, the superior wings male in form, but coloured as in the female, and the posterior wings, with the exception of a reddish brown spot upon the left, were, with the body and other parts, female.

Lastly, in a third variety of external hermaphroditic conformation in Insects, we find the characters of the two sexes mixed up and crossed in different irregular combinations upon the body of the same individual. In a *Gastrophaga castrensis* described by Rudolphi, and where the male type predominated, with a tendency,

* Economy of Nature in Glandular Diseases.

† Kob's Dissert. de Mutatione Sexus, p. 19.

however, in all parts to the female form, the right antenna and the wings on the opposite or left side were distinctly female, while the left antenna and right wings were entirely male, the latter being only somewhat larger than in male insects, and the colours brighter than in the female. In a *Bombyx castrensis* alluded to by Westwood, the wings on the right side, and the antennæ and abdomen of the left, were those of a male, while the left wing, right antennæ, and right side of the abdomen were those of a female.

GENERAL SUMMARY WITH REGARD TO THE NATURE OF HERMAPHRODITIC MALFORMATIONS.

1. *Of the varieties of spurious hermaphroditism.*—On some of these varieties it is unnecessary for us to dwell here. The first species of spurious male hermaphroditism, or that arising from extroversion of the urinary bladder, is elaborately discussed elsewhere (see BLADDER); and two others, namely, the second female species consisting of prolapsus of the uterus, and the second male consisting of an adhesion of the penis to the scrotum, seem both referable to the head rather of disease than of original malformation. This latter indeed appears in all probability only an effect or result of adhesive inflammatory action in the affected parts during embryonic or fetal life. Both of the two remaining forms of spurious hermaphroditism,—viz. those consisting of hypospadiac fissure of the urethra, scrotum, and perinæum in the male, and of abnormal magnitude of the clitoris in the female,—seem readily explicable upon the doctrine of arrestment and anomaly in the development of the malformed parts.

We have already described at sufficient length the process of development of the different copulative organs, and have shewn that those various degrees of hypospadiac malformation which constitute the common form of spurious hermaphroditism in the male, may be traced to arrestment of this process at various periods or stages of its progress. And we may here remark that the earlier this arrestment occurs, the distinction of the true sexual type of the malformed organs will always be the less marked, because the younger the embryo, and, on a similar principle, the lower we descend in the scale of animal existence, we find the differences between the organs of the two sexes proportionally the less pronounced, until at last we arrive at that primitive type in which these organs present altogether a common, neutral, or indeterminate character.

We have also already shewn that at a certain early stage of the development of the female organs, the female clitoris holds the same, or nearly the same relatively larger size to the whole embryo as the penis of the male, and that so far we may consider the occasional occurrence of spurious hermaphroditism from magnitude of the clitoris, and its resemblance in this respect to the male organ, as a permanent condition of a type of embryonic structure that is normally of a temporary or transitory existence only. But besides this permanence

of the embryonic type of the clitoris, we must farther, in all the more complete instances of spurious female hermaphroditism, admit an excess of development in the malformed external sexual parts, and more particularly in the line of the median reunion of the two primitive lateral halves or divisions of these parts. In this way the vagina (a remnant in the female of the primitive perinæal cleft or fissure) is often in such cases more or less contracted and closed, so much so indeed in some instances as to leave only, as in the male, a small canal common to the genital and urinary passages. If the median junction is extended still farther, this canal comes also to imitate the male urethra in this respect, that it is united or shut up below in such a way as to be carried onward to a greater or less length, and in a more or less perfect condition along the under surface of the enlarged clitoris; and occasionally the male type of structure is still more completely repeated in the female organization by the median reunion of the two labia, giving the appearance of the united scrotum and closed perinæum of the opposite sex.

If we divide the whole sexual apparatus of the male and female into three corresponding transverse spheres or segments,—the first or deep parts including the testicles and ovaries, the second or median comprehending the male seminal canals and prostate gland, and the female oviducts and uterus, and the third or external embracing the copulating organs of the two sexes,—we shall find that, relatively speaking, the deep and the external spheres are naturally most developed in the male economy, while the median, comprising the uterus, (the principal and most active organ in the female reproductive system,) is developed in the greatest degree in that sex. In malformed females presenting a spurious hermaphroditic character, this important portion of the female sexual organization is, in general, either itself in some respects malformed, or, from the structure of the other parts of the sexual apparatus being imperfect, its specific importance in the economy is cancelled, and therefore the energy of development takes the same direction as in the male, being expended upon the more complete evolution of the organs of the external and deep spheres. Hence the greater size of the clitoris, and the greater development which we have just now pointed out, in the median line of reunion of the external sexual parts; and hence also the occasional though rare occurrence, in the same cases, of the descent of the ovaries through the inguinal rings into the labia,—an anomaly that certainly consists in a true excess of development, and which we cannot but regard as interesting, both in this respect, and as affording a new point of analogy between these organs themselves and the male testicles.

There is another and equally interesting point of view in which we may look upon this subject. Not only are the forms of spurious hermaphroditism which we have been considering, capable of being traced backward to certain transitory types of sexual structure in the embryos

of those animal species in which the malformations in question occur, but they may be shewn also to present in their abnormal states repetitions of some of the normal and permanent conditions of the sexual organs in various species of animal beings placed lower in the scale of life. Thus the occasionally imperforate penis of the male hermaphrodite has been supposed to have an analogue in the naturally solid penis of some of the species of the genera *Doridium* and *Hyalæa*.* Its more or less grooved or hypospadiac condition is similar to the natural type of the same part in some hermaphrodite Mollusca, as in the *Planorbis* and *Murex* † in its occasional diminutive size it approaches the general smallness of the partially fissured penis of most birds and reptiles; and we find it in the Rodentia and Marsupialia tied down by a short prepuce in a way analogous to what is seen in some cases of severe hypospadias. In the sloth (*Bradypus tridactylus*) the penis is small and grooved in its lower surface, and has the urethra opening at its base; ‡ and in several of the male Rodentia the scrotum is also cleft, and has its two opposed surfaces smooth, humid, and free of hair, as in most cases of hypospadiac hermaphroditism in man. In Ophidian and in most Saurian Reptiles, the male seminal ducts open at once externally, as in some male hermaphrodites, at the root of the fissured penis.

The fact of the testicle some time remaining, in cases of hermaphrodite formation in the human subject, within the cavity of the abdomen, presents to us in a permanent state their original but changeable position in the early fœtus, and at the same time affords a repetition of their normal situation, in almost all the lower tribes of animals, and in the Cetacea, Amphibia, Edentata, and some Pachydermata, as the Cape Marmot (*Hyrax*) and Elephant, among the Mammalia.

The malformed clitoris in instances of spurious hermaphroditism assumes also, in its abnormal state, types of structure that we find as the normal condition of the organ in various inferior animals. Thus in female Cetacea and Rodentia, and in the animals included in Cuvier's order of Carnassiers, but more particularly among the Quadrupeds, the clitoris retains as its permanent normal type that relatively larger size which we observe in the early fœtus, and in female hermaphrodites in the human subject: and further, as is sometimes seen in such malformed individuals, the clitoris becomes partially traversed by the urethra, as in the Ostrich, Emu, § and Ant-eater; || and in the Loris (as we have noticed in a preceding page) and Maki, it is completely enclosed, like that of the male, in the body of

the organ, forming a continuous and perfect canal through it.

We may here further observe, (though the illustrations should more properly belong to the next section,) that in cases of true hermaphroditism also in man and quadrupeds, as well as in the above spurious varieties, there may be often traced in some portions of the abnormal structures a sexual type bearing a greater or less analogy to the corresponding parts of those inferior animals that are naturally androgynous. Thus, in instances of true hermaphroditism, the orifices of the sexual ducts or passages occasionally open into a common cavity, as is normally the case in some species of *Doridium*, *Helix*, and other Mollusca; or the female oviducts or Fallopian tubes, and the male vasa deferentia, run closely alongside of each other without any communication between their canals, as in the *Alypsia* and most Gastropoda. Indeed the occasional co-existence even of both testicles and ovaries in individuals among the higher animals would be only a repetition of, or retrogression to, the normal sexual type of those genera of animals that we have just named, and of the Planaria, Cestodea, and other natural hermaphrodites.

In this way we see, that, (as in many other monstrosities,) the several varieties of malformation in the sexual organs occurring in spurious human hermaphroditism do not consist of the substitution of an entirely new and anomalous type of structure, but are only repetitions of certain types of the same organs that are to be met with both in the human fœtus and in the inferior orders of animal beings. The investigation of the whole subject shews us in reference to the sexual organs, what is equally true in regard to all the other organs of the body,—that their different stages of development in the embryos of man and of the higher orders of animals correspond to different stages of their development in the series of animal beings taken as a whole; so that here, as elsewhere, the facts of Comparative Anatomy are reproduced in those of Embryology, and both are repeated to us by nature on a magnified scale in the anatomy of the malformations of the part,—a circumstance amply testifying to the intimate relations which subsist between Comparative Anatomy, the anatomy of Embryonic Development, and that of Monstrosities. Indeed proportionally as our knowledge of malformations has increased, it has shewn us only the more strongly that the laws of formation and malformation,—of normal and abnormal development, are the same, or at least that they differ much more in degree than in essence, and that the study of each is calculated reciprocally to illustrate and to be illustrated by the study of the other.

2. *Nature of true hermaphroditic malformations.*—Of the nature of local malformations by duplicity, we at present possess much less precise knowledge than of those of simple defect or simple excess of development; but there are certain facts ascertained with regard

* Burdach's Physiologie, Bd. i. § 132, p. 231.

† Tiedemann's Zeitschrift fuer Physiologie, Bd. i. s. 15, or Cuvier, Anat. Comp. tom. v. p. 182.

‡ Meckel, Beiträge zur vergleichenden Anatomie, Bd. ii. cap. i. p. 125.

§ Cuvier, Anat. Comp. t. v. p. 129.

|| Meckel, Archiv. fuer die Physiologie, Bd. v. s. 66.

to the formation of the sexual organs, which may enable us to make an approach at least to accurate ideas of the character and origin of those anomalies that constitute the several varieties of true hermaphroditism. These facts relate to the interesting subject of the unity of structure which is manifested in the corresponding male and female reproductive organs of the human subject, and of other species of bisexual animals.

By several of the Greek, Roman, and Arabian physiologists,* the respective organizations of the two sexes were considered as in some degree typical of one another, the female being regarded as an inverted male, with the testicles and penis turned inwards to form the ovaries and uterus. This doctrine of analogy between the male and female sexual organs has, with various modifications, been very generally admitted by modern physiologists, and in some of its bearings it has been made, more particularly of late years, the subject of considerable discussion. The testicles are still regarded as organs which correspond with the ovaries in their original situation, in their vascular and nervous connections, and in their relative sexual functions. The recent progress of the anatomy of the development of the embryo has also shewn that the two organs correspond in their primitive origin. It is now well ascertained that the large masses occupying each side of the abdomen of the embryo at an early stage of development, and which Rathke has named the Wolfian bodies after their illustrious discoverer, form, in Birds and Mammalia at least, the primordial matrices upon which the urinary and genital organs are developed. On the inner side of each of these matrices a small body is early developed, which seems to become afterwards either a testicle or an ovary, according to the particular ulterior sexual type which the embryo assumes.

In further following up the analogy of structure between the organs of the two sexes, the vasa deferentia of the male are generally compared to the Fallopian tubes of the female, the scrotum to the external labia, the body of the penis to the clitoris, and its corpus spongiosum, or, according to others, its prepuce, is regarded as corresponding in type with the female nymphæ. A considerable difference of opinion, however, still prevails as to the prototype of the female uterus in the male system. Some anatomists, as Burdach, Steghlener, and Blainville, regard the uterus and male vesiculæ seminales as corresponding parts; while others, as Meckel, Carus, Schmidt, Ackermann, and Serres, compare the uterus to the male prostate. A sufficient number of facts seems still wanting to determine the accuracy and justness of either of these analogies. There are instances of malformation on record which appear to favour both opinions, and there are other cases which almost incline us to be-

* Aristotle, *Hist. An.* lib. i. 17. Galen, *De Semine*, lib. ii. & *De Usu Partium*, c. i. Rhases, *De Re Medica*, lib. i. cap. 26. Avicenna, *De Membris Generat.* lib. iii. 21, &c.

lieve that the vesiculæ seminales correspond to the fundus or body of the uterus in the human subject, and to the cornua uteri in quadrupeds; while the prostate represents in the male structure the lower portion or cervix of the same organ. The phenomena of the development of the reproductive organs in the embryo will, when more fully investigated, probably serve to clear up this question.

M. Geoffroy St. Hilaire has propounded views of the analogy of the male and female organs in some respects different from the above. He divides the uterus of the human subject into the body and the upper part or fundus, the latter corresponding to what constitutes the cornua uteri in the human embryo, and in adult quadrupeds. Further, believing that in the determination of all analogies in type and structure between different organs, the origin and course of the bloodvessels supplying the part ought to be our principal criterion, he has been led, by the study of the distribution of the branches of the hypogastric arteries, to consider the body of the uterus and the vesiculæ seminales as repetitions of each other in the two sexes; and, contrary to the opinion of most anatomists, he conceives that the male vasa deferentia strictly correspond with the fundus or cornua uteri, and that the epididymis represents a coiled-up Fallopian tube, or in other words that the Fallopian tube is an unrolled epididymis. M. St. Hilaire has offered the following table to shew what he conceives to be analogous organs in the two sexes:—*

<i>In the male.</i>		<i>In the female.</i>
Testicle	=	Ovary
Epididymis	=	Fallopian tube
Vas deferens.	=	Cornu of the uterus
Vesicula seminalis	=	Body of the uterus.
Sheath of the penis	=	Vagina
Penis	=	Clitoris

In tracing out the analogies between the male and female parts, the mode in which we ought to consider the female vagina has given rise to some diversity of opinion. From the above table it appears that M. St. Hilaire considers it to be represented in the male organization by the sheath of the penis, but we are certainly inclined to view it in a different light, and to regard it as a part in so far peculiar to the female, that it consists of a permanent condition of that urino-genital perinæal fissure that we have already described as existing at a certain period in the embryos of both sexes, and which is latterly shut up in the male, or, speaking more accurately, it is contracted into what forms the pelvic portion of the male urethra.

If this were a fit opportunity for following out the consideration of the unity of type between the male and female reproductive organs, it would be easy to shew the justness of those greater analogies that we have mentioned, by pointing out other numerous minor, but still strong points of correspondence manifested in

* *Phil. Anat.* tom. i. (1822,) p. 471.

the abnormal conditions and localities of the ovaries and testicles in the higher animals, and in their conformity of structure in some of the lower. Thus among Insects, in the genus *Libellula* the long cylindrical testes of the males correspond with the long-shaped ovaries of the females; in the *Locusta* and *Gryllotalpa*, there are ramose bunched testicles with analogous fasciculated ovaries; in the *Lamellicornia* we find compound radiating and united testes, with similar radiating and united ovaries; and sometimes, as in the genera *Melolontha* and *Trichius*, the number of the single bodies in the testicles corresponds with the number of the oviducts.*

We have already, when considering spurious hermaphroditism in the female, mentioned several facts illustrative of the analogical peculiarities in structure between the male penis and female clitoris in some species of animals; and Burmeister,† who regards the ovipositors and stings of female insects as corresponding to the clitoris in the female Vertebrata, has pointed out a remarkable conformity of structural type between its valves and those of the penis of the male of the same species.

Some organs that are, as far as regards their functions, peculiar and essential to one sex only, are nevertheless found to be repeated in the opposite sex in the form of an analogous rudimentary type of structure. Thus, in the male we may observe the unity of sexual structure maintained in the presence of the rudiments of the mammary gland, which is *functionally* an organ of the female system only. In the human subject, and in animals whose females have pectoral mammæ, these organs occupy the same position in the male; while in those species of quadrupeds in which they are placed in the inguinal region, we find them in the corresponding males forming the scrotum or bags for containing the testicles. Hence, as we have already seen, the testicles, in cases of malformation in these animals, are often laid upon or imbedded in the udder. In the same way in the Marsupialia, the bone which the female has for supporting the marsupium is repeated in the organization of the male, although in the latter we cannot conceive it to serve any possible use.‡

In the female also we observe in some points a similar disposition to the rudimentary repetition of parts that are essential or peculiar only to the male organization, as in the repetition in the clitoris of some female Rodentia, of the penis-bone of the male, and in the formation of rudimentary forms of those processes of peritonæum which constitute the tuniçæ vaginales. We are ourselves inclined also to regard the common crescentic form of the hymen of the human female in the same light,§

* Burmeister's Entomology, § 154. p. 222.

† Loc. cit.

‡ Home's Lect. on Comp. Anat. vol. ii. pl. v.

§ Burdach (Phys. § 137,) considers the small cutaneous fold situated at the orifices of the vasa deferentia, and Stiebel the membrane placed at the extremity of the urethra (Meckel's Archiv. für Physiol. Bd. viii. s. 207,) as the analogue in the male for the female hymen.

and to consider it merely as an abortive attempt at that closure of the perinæal fissure which we have already described as effected at an early period in the male embryo—an opinion in which we conceive we are borne out both by the history of the development and the study of the malformations of the external sexual parts in the female.

M. Isidore St. Hilaire read, in 1833, to the French Academy a memoir,* in which, following up the doctrine of his father with regard to the determination and distinction of the type of parts by the particular vessels distributed to them, he endeavoured to shew some new points of analogy between the male and female organs, and to develop new views with regard to the origin and particular varieties of hermaphroditic malformations. With Burdach, he divides the whole reproductive apparatus of either sex into three transverse spheres and into six portions or segments in all, or three on each side, viz., 1 and 2, the deep organs, including the male testicles and female ovaries; 2 and 3, the middle organs, or male prostate and vesiculæ seminales, and female uterus; 3 and 4, the external organs, comprehending the penis and scrotum of the male, and the clitoris and vulva of the female. Each of these portions or segments is, M. St. Hilaire points out, supplied by an arterial trunk peculiar to itself, and the corresponding organs of the male and female by corresponding arterial branches, as the deep organs of both sexes by the two spermatics, the middle by branches of the two hypogastrics, and the external by some other hypogastric branches, and by the external pudics. This circumstance, he conceives, renders all the segments in a certain degree independent of the others, both as regards their development and existence, and allows of the occasional evolution of any one or more of them on a type of sexual structure, different from that upon which the others are formed in the same individual.

Though assuredly we cannot subscribe to the speculations of the elder St. Hilaire, that the development in the embryo of male testicles or female ovaries, and consequently the whole determination of the sex, is originally regulated by the mere relative angle at which the first two branches of the spermatic arteries come off, and the kind of course which they follow,† (more particularly as it is admitted by most physiologists that the bloodvessels grow, not from their larger trunks or branches towards their smaller, but from their capillary extremities towards their larger branches,) yet we believe that the doctrine of the comparative independence of the different segments of the

* Arch. Gén. de Méd. (1833) tom. i. p. 305.

† Anat. Phil. tom. i. p. 359. . . "L'ordre de variations des sexes tient à la position d'un artère. . . Le plus ou le moins d'écartement des deux branches spermaticques motive effectivement cette préférence. Que les deux branches de l'artère spermaticque descendent parallèlement et de compagnie, cette circonstance, je le repete, cette circonstance donne le sexe male; qu'elles s'écartent à leur point de partage, nous avons le sexe femelle."

reproductive organs pointed out by the son is in its general principles correct. At the same time we would here remark that we conceive the doctrine would have been founded more on truth if the influence of the nervous branches supplying the different reproductive organs had been taken into account along with that of their arterial vessels, because, as we shall point out when speaking of the causes of hermaphroditism, there appears to be some connection between the state of the nervous system and the degree or condition of sexual development.

The consideration of the preceding analogies in structure between the male and female organs is interesting in itself, and, as far as relates to our present subject, important in this respect, that it enables us in some degree to understand how it happens that, without any actual monstrous *duplicity*, we should sometimes find, in an organization essentially male, one or more of the genital organs absent and replaced by an imperfect or neutral organ, or by the corresponding organ of the opposite sex, and *vice versa*; inasmuch as it shews us that the moulds in which the analogous organs of the two sexes are formed are originally the same. Hence there is no difficulty in conceiving that, in the body of the same individual, the primitive structural elements of these parts should occasionally, in one or more points or segments, take on, in the process of development, a different sexual type from that which they assume at other points. Indeed some physiologists, as we shall immediately see, deny that the most complete hermaphroditic malformations ever consist of anything except such a want of conformity between the sexual type of different portions of the reproductive apparatus.

If each of the six segments (and we believe that their number might be shewn to be really greater than this,) is thus an independent centre of development in the formation of the sexual apparatus, and is consequently liable also in abnormal cases to have its own particular malformations, and to assume, either alone or along with some of the other segments, a sexual type different from the remainder, it is evident that we may have as many varieties of true hermaphroditism, without any real duplicity, as it is possible to conceive differences of arrangements among these six segments. Again, however, one or more of these segments may preserve from a development its original indeterminate or neutral sexual type, while the others are variously formed either upon one or upon both sexual types; or one or more of the segments may, by a true malformation by duplicity, have evolved within them the corresponding organs of the two sexes; and if we consider the different arrangements of double and single sexual parts that might thus occur in the six separate segments, we may gain some idea of the great diversities of structure in the sexual parts that are liable to be met with in instances of true hermaphroditism.

The above forms, as it appears to us, the

most sound and rational solution of the nature and origin of many forms of true hermaphroditism which physiological science is capable of affording, upon our present limited knowledge of the laws of development; and its application to the explanation of the different varieties of lateral, transverse, and vertical hermaphroditism is so obvious as only to be required to be alluded to. It offers to us, however, no insight into the probable origin of those varieties of double hermaphroditism in which there is an actual co-existence upon one or upon both sides of the body, or, in other words, in the same segment of the sexual apparatus, of both the corresponding male and female organs. We can only refer all such instances to the laws which regulate the occasional production of *local* duplicities in different other organs of single bodies, and at the same time confess our present ignorance of what these laws are. We know that various individual muscles, nerves, &c. are not unfrequently found double, and that in the internal organs of the body examples of duplicity in individual viscera are occasionally, though rarely, observed in the heart, tongue, trachea, œsophagus, intestinal canal, &c. In the several organs composing the reproductive apparatus, instances of similar duplicity would seem to be even more common than among any other of the viscera. Examples of *three* mammae upon the same person are mentioned by Bartholin,* Borelli,† Lanzoni,‡ Drejer,§ Robert,|| Petrequin,¶ and others;** and cases in which the number of these organs was increased to *four* have been recorded by Faber,†† Gardeux,‡‡ Cabroli,§§ Lamy,||| Tiedemann,¶¶ Champion,*** Sinclair,††† R. Lee,††† and Moore.§§§ An instance in which *five* mammae even existed upon the same woman is reported to have been seen by Gorré,|||| Valentin,¶¶¶ and Gunther**** have recorded supposed cases of duplicity in the male penis; and Arnaud†††† has related an example of an analogous malformation in the female clitoris. Weber†††† met with a double vesicula seminalis

* Acta Med. Hafn. tom. iii. obs. 93.

† Observ. Rar. cent. i. p. 55.

‡ Eph. Nat. Cur. Dec. ii. Ann. v. obs. 55.

§ Arch. Gén. de Méd. tom. xvii. p. 88.

|| Journ. Gén. de Méd. tom. c. p. 57.

¶ Gazette Medicale for April, 1837. Three distinct mammae in a father, and in his three sons and two daughters.

** Dict. des Sc. Méd. tom. xxxiv. p. 529.

†† Eph. Nat. Cur. Dec. i. Ann. ii. p. 346.

‡‡ Journ. de Méd. de Corvisart, tom. ix. p. 378.

§§ Obs. Anat. vii.

||| Fantoni Anat. p. 267.

¶¶ Zeitschrift für Physiologie, Bd. v. s. 110. One case with three, and three with four nipples. In one case the malformation was hereditary.

*** Dict. des Sc. Medic. t. xxx. p. 377. See also p. 378.

††† Statistical Account of Scotland, xix. p. 288.

††† London Med.-Chirurg. Trans. vol. xxi. p. 266.

§§§ Lancet for February 24, 1838.

|||| Dict. des Sc. Méd. tom. xxxiv. p. 529.

¶¶ Eph. Nat. Cur. Dec. iii. Ann. iii. obs. 77.

**** Cohen vom Stein, Halle, 1774, p. 107.

†††† Mém. de Chir. tom. i. p. 374.

†††† Salzburg Medicinische Zeitung, 1811, s. 188.

on each side; and Hunter* alludes to the occasional occurrence of an imperfect supernumerary vas deferens. In 1833 a case of a double human uterus, furnished with four Fallopian tubes and four ovaries, was shewn by Professor Moureau to the Academie de Médecine.† Blasius‡ dissected the body of a man on whom he detected the co-existence of three testicles; the additional testicle was of the natural form and size, and was furnished with a spermatic artery and vein that joined in the usual manner the aorta and vena cava; it lay in the right side of the scrotum. Arnaud found, on dissection, three testicles in a dog; the third was placed in the abdomen, and of the natural consistence, figure, and size; it was furnished with a vas deferens.§ Other instances of triple and quadruple testicles of a more doubtful character, inasmuch as the observations made during life were not confirmed by dissection after death, are related by Voigtel,|| Sibbern,¶ Brown,** Rennes,†† and others.‡‡ Scharff§§ even gives an alleged case of a man with five testicles, three of which are stated to have been well formed, while the other two were much smaller than natural. And, lastly, Loder||| is said to have exhibited to the Göttingen Academy drawings taken from the body of a male infant, on whom *all* the sexual apparatus existed double, there being two penes, a double scrotum, and urinary bladder, and, as it was supposed, four testicles.

In all the preceding instances the local duplicity of the particular reproductive and other organs adverted to existed independently of any duplicity in the body in general, or in any other individual parts of it. And if we once admit, (what the preceding instances will scarcely allow us to deny,) that there may occur a duplicity of some of the male sexual organs in a male, or of some of the female sexual organs in a female, it is certainly easy to go one step farther, and admit that the double organ or organs may, however rarely, be formed in other instances upon an opposite sexual type. Indeed all our knowledge of the unity of structure and development between the various analogous male and female reproductive organs, as well as the fact of the occasional replacement of an organ of the one sex by that of the other in cases in which the sexual type is entirely single (as seen in instances of lateral hermaphroditism), would lead us *a priori* to suppose that, if a local duplicity in any of the sexual organs was liable to occur, this duplicity would sometimes shew itself in the double organs assuming opposite

sexual characters, and thus constituting some of those varieties of double or vertical hermaphroditism that we have already had occasion to describe.

In the preceding observations we have proceeded upon the opinion commonly received by physiologists, of the fundamental unity of sex among all individuals belonging to the higher orders of animals; or, to express it otherwise, we have assumed that each individual is, when normally formed, originally furnished with elemental parts capable of forming one set of sexual organs only. We do not here stop to inquire whether this single sexual type is, in all embryos, originally female, as maintained by Rosenmüller, Meckel, Blainville, Grant, and others; or, of a neutral or intermediate character, as supposed by the St. Hilaires, Serres, Ackermann, Home, &c., and as we are certainly ourselves inclined to believe it.* On this subject, however, a physiological doctrine of a different kind has been brought forward by Dr. Knox, and this doctrine is so intimately connected with the question of the nature and origin of true hermaphrodites, that we must here briefly consider it.

Dr. Knox,† in conformity with some more general views which he entertains on transcendental anatomy, is inclined to regard the type of the genital organs in man and the higher animals, as in the embryo, originally hermaphroditic, or as comprising elementary yet distinct parts, out of which both sets of sexual organs could be formed; and he believes that, owing to particular but unknown circumstances, either the one or the other only of these sets of elements comes to be evolved in the normal course of development. In those abnormal cases, again, in which, as in instances of double hermaphroditism, more or fewer of both sets of genital organs are present upon the same individual, he maintains that this is not to be considered as a malformation by duplicity, but is only a permanent condition of the original double sexual type, and is attributable to the simultaneous development to a

* Meckel (De Duplicitate Monstrosa, p. 14), and Andral (Anat. Path. tom. i. p. 101) assume it, after Haller, as a fact, that a much larger proportion of monsters belong to the female than to the male sex; and while they attribute this circumstance to the genital organs in these beings retaining, from the general defect of development, their *original female* sexual character, they at the same time consider this circumstance to be strongly corroborative of this particular doctrine. Isid. St. Hilaire has shewn (Hist. des Anomal. t. iii. p. 387) that the supposed fact itself does not hold true in respect to some genera of monsters, and is even reversed in others; and he doubts if it be of such a degree of generality in respect to monsters in general as to merit to be raised into a teratological law. If the views of Meckel were correct, we should certainly expect at least that spurious hermaphroditism, where the development of the sexual parts is commonly abnormal from defect, should be much more frequent in the female than in the male. The list, however, of recorded cases of it in the latter is, we believe, more than double the number of it in the former.

† Brewster's Edinburgh Journal of Science, vol. ii. p. 322.

* Bell's Anatomy, vol. iii. p. 428.

† Journ. Hebdom. tom. x. p. 168.

‡ Obs. Med. pars iv. obs. 20.

§ Mém. de Chirurg. s. i. p. 131.

|| Handbuch der Path. Anat. Bd. iii. s. 393.

¶ Acta Hafn. tom. i. p. 320.

** New York Medical Repository, vol. iv. p. 801.

†† Arch. Gén. de Méd. t. xxiii. p. 17.

‡‡ See Haller's El. Phys. tom. v. p. 411, 12.—and Arnaud's Chem. de Chirurg. t. i. p. 128, &c.

§§ Eph. Nat. Cur. Dec. iii. Ann. v. vi. obs. 89.

||| Göttingen Anz. 1802, p. 466.

greater or less extent both of the male and female sets of sexual elements.

This doctrine of the original but temporary double sexed character of all embryos derives, perhaps, its principal support from a source to which Dr. Knox does not advert,—we mean the existence of this as the normal and permanent sexual type in most plants and in many of the lower orders of animals. But this argument by analogy certainly cannot by any means be considered as a sufficient basis for the establishment of so broad and important a generalization in philosophical anatomy. Dr. Knox himself seems to have been induced to adopt the idea principally because it afforded (when once assumed as a fact) a simple and elegant solution, upon the laws of development, of the occasional occurrence of cases of true hermaphroditism; and in doing so, he appears to have proceeded upon the mode in which most such physiological hypotheses have been made, viz. by drawing his premises from his deductions instead of his deductions from his premises. In the present state, however, of anatomical and physiological knowledge, Dr. Knox's hypothesis, however ingenious in itself, is one which we cannot subscribe to; for first, it is totally opposed to all the facts which have been ascertained, and all the direct observations which have been made by Rathke, Meckel, Müller, Valentin, and other modern anatomists upon the sexual structure of the embryos of the higher animals in their earliest state; and, secondly, if we were to admit it merely as a probable hypothesis, it is still even in this respect equally as incapable as the old doctrine of sexual unity, of explaining all the cases of malformation by duplicity of the genital organs; for, as we have already shewn, there are some apparently well-authenticated instances of the existence of three or four testicles upon the same man, or three or four ovaries upon the same woman; and in reference to all such cases we would, if we proceeded upon the same data and the same line of argument as those adopted by Dr. Knox, be obliged to suppose that the original sexual type is not, as he imagines, double only as respects the two sexes, but double even as respects each sex, and that all embryos had originally not simply the elements of two, but those of three or four testicles and ovaries. In explaining such cases as those to which we allude, Dr. Knox, on his own doctrine, must of necessity admit the existence of a malformation by duplicity of the sexual organs in question; and if we grant this in regard to these instances, it is surely unnecessary to invent a particular and gratuitous hypothesis for the explanation of the analogous anatomical anomalies observed in hermaphroditism. At present we must, we believe, merely consider the occurrence of anomalous duplicity of the sexual organs, and of various other individual parts of the body, as so many simple empirical facts, of which we cannot, in the existing state of our knowledge, give any satisfactory explanation, or, in other words, which we cannot reduce to any more simple or general fact; though from the success which

has attended the labours of many modern investigators in this particular department of anatomy, it seems to us not irrational to hope that ere long we may be enabled to gain much new light upon the question of double hermaphroditism and the whole subject of malformation by duplicity.

ANATOMICAL DEGREE OF SEXUAL DUPLICITY IN HERMAPHRODITISM.

Though the cases which we have brought forward do not present any instances of such perfect hermaphrodites in the human subject or in quadrupeds as those which are represented upon the ancient Greek statues and medals,* or that have been described and delineated by Lycosthenes, Paré, Schenkus, and the older authors on monstrosities, they yet present to us a sufficient number of instances in which, in accordance with the definition we have previously given of true hermaphroditism, there actually co-existed upon the body of the same individual more or fewer of the genital organs both of the male and female.

From the relations and size of the bony pelvis, and the fact of the penis and clitoris being repetitions only in situation and structure and organic connections of each other in the two sexes, it is useless perhaps to expect that we should ever find in any one case all the parts of both sexes present at the same time. For since the male penis is only a magnified condition of the female clitoris, and since both of these organs are connected by the same anatomical relations to the same part of the pelvis, it would almost require some duplicity in the pelvic bones themselves to admit of the simultaneous presence of both; and in no authentic case has any approach to their co-existence upon the same individual been observed.

Various authors who have written upon the subject of hermaphroditism have gone so far as to endeavour to refer all instances of it to some one or other of those varieties that we have described under the name of *spurious*. Thus, dogmatizing in a spirit of unphilosophical scepticism, Parsons† and Hill‡ have endeavoured to shew that all reputed hermaphrodites are only malformed females having a præternatural development of the clitoris, and in some instances with the ovaries descended into the labia. Others, on the contrary, as

* See Winckelman, *Hist. de l'Art*, t. i. p. 364; and Caylus, *Recueil d'Antiquités*, t. iii; Heinrich, *Commentatio quæ Hermaphroditum artis antiquæ operibus illustrum, origines et causæ explicantur*. Hamburg, 1805. Blumenbach, in his *Specimen Hist. Nat. Antiq. artis* (Goetting, 1808), mentions and figures (pl. i. f. 5, p. 15), a small ancient silver cast or impression of a case of hypospadias of the male genital parts, which he supposes to have formed a votive offering from some individual malformed in the manner represented.

† Enquiry into the nature of Hermaphrodites, p. 145. We would particularly point out the cases quoted by Dr. Parsons at p. 14, 26, 30, 88, 95, 130, &c. of his able essay as directly contradictory of his own doctrine, or as instances of hermaphroditic appearances in persons not of the female but of the male sex.

‡ Review of the *Philosophical Transactions*.

Professors Ostlander* and Feiler,† maintain with equal inaccuracy that every supposed instance of hermaphroditism is referable to a hypospadiac state of the penis and scrotum, in persons that are in other respects essentially male.

Various physiologists, again, while they admit the occurrence of all the different varieties of spurious hermaphroditism, are inclined to deny that any such combinations of male and female organs upon the same body as those which constitute our several varieties of true hermaphroditism, are ever observed to occur in the human subject, or among the higher classes of animals.‡ In despite of the recent accumulation of new and authentic cases, Professor Müller of Berlin is, in particular, in his excellent treatise on the development of the genital organs, published in 1830,§ still inclined to coincide in a great degree in this opinion. This distinguished physiologist does not indeed, as some have done, doubt in any degree the authenticity of the recorded cases, and even goes so far as to admit the occasional occurrence of a combination of male and female organs upon the same individual, when that combination does not (as in lateral and transverse hermaphroditism) imply a true sexual duplicity or repetition of any of the corresponding male and female parts; but he doubts altogether the probability of our third division of double or complex hermaphroditism, and conceives that in the examination of the cases referable to that section a sufficient degree of attention has not been directed to the accurate anatomical distinction of the particular parts supposed to exist, from others with which it is possible to confound them. We shall here, therefore, shortly inquire into some of the principal sources of fallacy which are apt to mislead the incautious observer in the examination of such instances as those to which we allude; and in doing so we shall consider the various sources of error in an order conformable with those divisions of double hermaphroditism that we have previously adopted,—speaking of the mistakes which may be committed in judging of the supposed co-existence, 1st, of a female uterus, and male vesiculæ seminales and vasa deferentia; 2d, of a female uterus and male testicles, &c.; 3d, of both testicles and ovaries.

1. *Fallacies in judging of the addition of male seminal ducts to a female type of sexual organs.*—That form of sexual duplicity which we have formerly described as consisting in the supposed superaddition of male vesiculæ seminales and vasa deferentia to an organization in other respects female, appears to have been

hitherto observed principally, or indeed only among the Ruminantia, and has in particular been repeatedly found in free-martin cows. In judging of the reality of this variety of hermaphroditic malformation in any given case, there is one source of fallacy that requires to be particularly guarded against, and the consideration of which may probably go far to explain away most of the recorded examples of the malformation. In the female sexual parts of some Ruminantia and Pachydermata,* but particularly in the domestic cow and sow, Dr. Gaertner of Copenhagen pointed out in 1822† the existence of two canals or ducts which have since that time been generally described under his name. On each side of the body, one of these ducts arises in the vicinity of the ovary, or near the fimbriated extremity of the Fallopian tube, runs down first in the duplicature of the broad ligament, and afterwards in the substance of the parietes of the uterus and vagina, to near the meatus urinarius, and there opens into the vaginal cavity. Each duct communicates with several small glands, follicles, or cysts that are scattered along its course, and which perhaps may not be improperly described as diverticula from the ducts themselves. Now when we consider the relations of those imperfect ducts and cysts that are occasionally observed in the free-martin cow, situated along each side of the defectively developed uterus, and which Mr. Hunter has described as male vasa deferentia and vesiculæ seminales, it seems to us not at all improbable that these supposed male organs are only in reality the ducts of Gaertner, with their accompanying follicles or cysts generally perhaps existing in a morbidly developed and dilated condition. They seem at least to correspond much in their origin, course, and position with the canals and cysts discovered by Gaertner; and certainly in the present state of our knowledge it would appear more reasonable to refer them to this *normal* portion of the female structure, than to regard them, until we have more decided evidence on the subject, as *abnormal* male organs, and as affording, in consequence, an example of sexual duplicity.

In the course of the preceding pages we have had occasion to allude to cases in the human subject, and in the dog and sheep, in which vasa deferentia were stated to have existed in the same individual along with Fallopian tubes. Whether, in any of these instances, the supposed male seminal ducts were merely canals analogous to those described by Gaertner in the cow and sow, we shall not take it upon us to determine, but in connection with this inquiry it is interesting to remark that Malpighi, who seems to have been well acquainted with the existence of the ducts in the

* Neue Denkwuerdigk. für Geburtshülfe. Bd. i. n. 8.

† Ueber Angeb. mensliche Misbildung. Landshut 1820.

‡ Thus Portal, Anat. Méd. t. v. p. 474; Haller, El. Phys. t. viii. p. 7, "merito dubitatur;" Voigtel, Handbuch der Path. Anat. Bd. iii. s. 364; Lawrence, Art. Generation, in Rees's Cyclopædia.

§ Bildungsgeschichte der Genitalien.

* M. Delmas seems to have observed a somewhat similar structure in the Kangaroo. (Ephem. Medic. de Montpellier, t. v. p. 115.)

† Anatomisk Beskrivelse over et ved Nogle Dyr-Arters uterus undersøgt Glandulöst organ, &c. Copenhagen, 1822; Edin. Med. and Surg. Journ. vol. xxi. p. 460.

cow, has suggested that they may also exist in a more obscurely developed state in the human female, and may perhaps be identified with the ramous lacunæ described by De Graaf, Bartholin, Riolan, &c.

A. C. Baudelocque has, in a case published in the *Rèvue Médicale* for March 1826, described a human uterus which contained in its parietes a canal coming from the right Fallopian tube, and opening upon the internal surface of the cervix uteri; and Moureau and Gardien seem to have met with a second (?) similar instance.*

Before leaving this subject of the probable source of fallacy which we have to guard against in confounding the ducts of Gaertner with the male seminal canals, it is necessary also to observe, that some anatomists† are now inclined to consider these canals as the permanent remains of the ducts of those Wolffian bodies which we shall presently have occasion to allude to more at length, as forming a temporary type of structure in the sexual development of the early embryo; and certainly the two appear to accord in most points with respect to their situation and course. If, however, it happens that further and more accurate observations prove the two to be different, then the possible permanent state of the ducts of the Wolffian bodies must be looked upon as affording another source of error, by which we may deceive ourselves in judging of sexual duplicity from the supposed superaddition of male seminal canals to a female sexual apparatus.

2. *Fallacies in the supposed co-existence of a female uterus with testicles and other organs of a male sexual type.*—We have, in a previous part of this communication, adduced about twenty different instances in the human subject, and in the quadruped, in which a female uterus, or both an uterus and Fallopian tubes were described as having been found upon the bodies of individuals that were in other respects essentially males.

In reference to some of these instances it has been doubted whether the sexual organization of the malformed animal was not *entirely* male, the supposed and generally imperfect uterus being conceived to be formed either by a morbid dilatation and unfolding of the substance of the male prostate gland, or by an abnormal union and development of the vesiculæ seminales. Thus, in the case detailed by Ackermann, the only male sexual organ that was entirely deficient was the prostate, and the only reputed female organ which was present was an imperfect cystiform uterus differing greatly in structure from the form of this organ in the infant, and having, as in the normal state of the prostate, the vasa deferentia penetrating through its substance without opening into its cavity, and ultimately terminating along

with it in the posterior part of the urethra. In the analogous instance quoted in a preceding page from Steghlener, a similar arrangement of parts was observed; and in that case there was, in the enlarged ureters and renal infundibula, sufficient evidence (as we shall afterwards point out when speaking of the probable causes of hermaphroditism) of a distending power having acted upon the whole internal surface of the urinary and genital organs, and with so great a force (we may in the meantime allow) as to be capable of producing such a morbid dilatation and unfolding of the substance of the prostate as the doctrine alluded to requires. Such an effect would be the more liable to be produced if we can suppose this latter organ to have been disposed, by original tenuity of its coats, or by morbid softening or other diseased states of its tissues, to yield more easily to the dilating power, than any of the other surfaces to which it happened to be applied. At the same time, however, we confess that we conceive it unphilosophical to endeavour to account for *all* the cases which we have previously quoted of the addition of a female uterus to a male type of sexual organization upon this mechanical principle, or to attempt to explain away, in the mode we have just referred to, the evidence which these cases afford of the occasional occurrence of this combination as a true form of sexual duplicity. For even granting that the instances given by Ackermann and Steghlener, and perhaps one or two other cases, are not at all satisfactory in regard to the reputed existence of such a variety of sexual duplicity, and allowing, what seems indeed not at all improbable, that the supposed very imperfect uterus in these examples was merely an organ formed by a dilatation of the prostate and seminal ducts, there is still a sufficient abundance of cases left to which this explanation cannot possibly apply.

Thus, in the person dissected by Petit, the imperfect uterus was furnished with two perforate Fallopian tubes of three and a half inches in length, and at the same time it is distinctly stated that not only the prostate gland, but the vesiculæ seminales and vasa deferentia were also present. The vasa deferentia, between their origin from the testicles and their urethral termination, were each above seven inches long, and they entered the urethra by two apertures that were quite distinct and separate from the orifice of the uterus, which opened into the urethral canal at a point placed between the neck of the bladder and the prostate. In this case we cannot suppose that the uterus and Fallopian tubes were formed at the expense of the prostate gland or male seminal ducts, as they and all the other male organs were present; and consequently we can only consider the female organs as a *super-addition* to, and not a *transformation* of the male structures; or, in other words, we must look upon the above as an instance of duplicity in a part of the sexual apparatus.

The same reasoning and remarks might be shewn, if it were necessary, to apply in a greater

* *Medical Repository* for 1826, p. 571.

† As Jacobson of Copenhagen in *Journal de l'Institut*, t. ii. p. 160; and *Die Ökenschon Koerper*, &c. Copenhagen, 1830.

or less degree to the other analogous examples in the human subject given by Harvey and Professor Mayer,* as well as to the hermaphroditic sheep described by Thomas, and the different cases in the goat mentioned and delineated by Gurlt and Mayer. In all these latter cases in the quadruped, the male organization appears to have been perfectly developed, the testicles, epididymes, vasa deferentia, and vesiculæ seminales being present in all of them; and in Thomas's sheep the superadded female uterus shewed internally the usual characteristic rugose structure, while its cornua terminated in two long Fallopian tubes. In Gurlt's goat case all the internal male sexual organs were found, with the exception of Cowper's glands; and yet we cannot suppose that these glands could have been transformed and moulded out into that distinct and hollow uterus with its two very long curved cornua, which the reporter has represented as being present; not to mention the total want of any collateral evidence in this and in the other cases to which we have just now referred, of any dilating power having acted upon the genital or urinary organs in the embryo.

3. *Fallacies in the supposed co-existence of testicles and ovaries.*—In several of those instances in which there has been supposed to be a co-existence of both testicles and ovaries upon the same side or sides of the body, it seems highly probable that there has been a fallacy in the observation, owing to a want of knowledge of some anatomical circumstances that are liable to lead us into error in making an examination of such a case.

We have previously had occasion to allude to the existence in the foetal state of the Wolffian bodies, which are placed one along each side of the spine, and occupy at an early period in the embryo a great part of the cavity of the trunk. These bodies, as is now well known from the investigations of Rathke, Meckel, Müller, Burdach, and others, form in Mammalia and Birds at least, and equally so in both sexes, the primordial matrices of the genital and urinary organs (see article Ovary), and in the natural course of development altogether disappear in man and in the quadruped during the earlier periods of development, leaving no vestige of their presence in the extra-uterine animal.

This particular foetal type of structure, like every other temporary type of the embryo, may, from an impediment or arrest in the natural course of the changes occurring in the development of the body in general, or of the genital organs in particular, become, we have every reason to believe, occasionally permanent in one or more of its parts, and thus by its presence in the animal lead us to suppose that a rudimentary testicle exists in an otherwise well-marked female, or, on the other hand, that an ovary exists in an otherwise well-marked male. Both of these mistakes will be the more apt to be committed if the original excretory duct of

the Wolffian body remains, for it may give the appearance of the addition of a vas deferens to the supposed testicle, or of a Fallopian tube to the supposed ovary.

The error, also, of confounding a permanent Wolffian body with the testicle will be the more liable to occur, in consequence of the former body being naturally composed of an accumulation of convoluted diverticula which might be readily mistaken by an incautious observer for the seminiferous ducts of the latter.

There is certainly strong cause for doubting whether, in some of the cases that we have cited of the supposed co-existence of testicles and ovaries upon the same sides, the unremoved Wolffian bodies and their ducts had not either been mistaken for testicles and vasa deferentia, while the sexual organization was otherwise truly female, or for ovaries and Fallopian tubes, while the type of structure was in other respects strictly that of the male. This remark may perhaps with confidence be applied, for example, to the case of the free-martin described by Mr. Hunter; and in this and in most other similar instances the supposed testicles and ovaries have not been at all examined with any thing like sufficient anatomical accuracy. At the same time, however, it appears to us impossible to explain away all the recorded cases of the supposed co-existence of testicles and ovaries upon this principle. In reference to this point we would particularly observe that the consideration of the *relative position* occupied by the reputed testicles and ovaries may perhaps afford us an useful guide in cases of doubt. In some of the instances that have been previously cited, the relative situation of the supposed testicles and ovaries was exactly such as the Wolffian bodies are known to bear to these parts. In other instances, however, as in the ape described by Dr. Harlan, the relative situation in which the testicles and ovaries were found, was that which they occupy in the perfectly formed male and female; and in such a case as this it would surely be over-sceptical, and at the same time in opposition to all that we yet know of the history of the Wolffian bodies, to suppose that these bodies had imitated the testicles so far as to move out of their original locality and travel downwards through the inguinal rings. At the same time we must recollect that in this case the distinctive anatomical structure both of the testicles and ovaries seems to have been satisfactorily made out, in so far that the former are described as "perfectly formed," and the latter as having "minute ova visible in them." "The male and female organs of generation," Dr. Harlan adds, "were as completely perfected as could have been anticipated in so young an individual, and resembled those of other individuals of a similar age." Now if we once admit in this, or in any one other particular instance, that the evidence of the co-existence of testicles and ovaries is satisfactory, then certainly we may in any equivocal case be entitled to doubt until we have some more sufficient criterion for distinction pointed out, whether the dubious double bodies that we may meet with be a

* See his second case in the foetus and those of the two adults in a preceding page.

rudimentary testicle or ovary conjoined with an imperfect Wolffian body, or really a true instance of the presence of both testicles and ovaries upon the body of the same individual.

PHYSIOLOGICAL DEGREE OF SEXUAL PERFECTION IN HERMAPHRODITES.

Among those lower tribes of animals, such as the Abranchial Annelida, Pteropoda, &c. that are naturally hermaphrodite, every individual is in itself a perfect representation of the species to which it belongs. In the higher orders, however, in which the distinction and separation of the sexes comes to be marked, each individual being either solely male or solely female, can, as has often been remarked, be regarded only as representing one-half of its entire species. In most instances of hermaphroditism among these more perfect animals, the malformed being does not even attain to this degree of perfection, but is in general so defectively constituted as not to have the proper physiological characters and attributes of either sex. In cases of spurious hermaphroditism it would appear that sometimes, though the copulative or external sexual parts are greatly and variously malformed, the internal or proper reproductive organs are developed with sufficient perfection to enable them to perform the functions belonging to them. We have very little proof, however, that in any instances of what we have described as true hermaphroditism, the apparatus of either sex is even formed with such anatomical perfection as to empower the malformed being to bear a successful part in the reproductive function. Indeed in all, or in almost all cases belonging to this last order of hermaphroditism, the individual who is the subject of the malformation may, with much more than poetical truth, be described both anatomically and physiologically, as, in the words of Ovid,

*Concretus sexu, sed non perfectus utroque,
Ambiguo venere, neutro potiundus amore.*

There is on record one remarkable instance of apparent exception to this general observation, a notice of which we have reserved for this place on account of the want of any such precise knowledge of the true anatomical peculiarities of the case as might enable us to refer it to the section which it ought to occupy in our classification. The case to which we allude was described by Dr. Hendy of New York, in a letter dated from Lisbon in 1807, and the subject of it was a Portuguese, twenty-eight years old, of a tall and slender but masculine figure.* "The penis and testicles," to adopt the words of Dr. Hendy's own narrative, "with their common covering the scrotum, are in the usual situation, of the form and appearance, and very nearly of the size of those of an adult. The præputium covers the glans completely, and admits of being partially retracted. On the introduction of a probe, the male urethra appeared to be pervious about a third of its length, beyond which the resistance to its passage was insuperable by any ordinary justifi-

able force. There is a tendency to the growth of a beard, which is kept short by clipping with scissors. The female parts do not differ from those of the more perfect sex, except in the size of the labia, which are not so prominent, and also that the whole of the external organs appear to be situated nearer the rectum, and are not surrounded with the usual quantity of hair. The thighs do not possess the tapering fulness common to the exquisitely formed female; the ossa ilii are less expanded, and the breasts are very small. In voice and manners the female predominates. She menstruates regularly, was twice pregnant, and miscarried in the third and fifth months of gestation. During copulation the penis becomes erect. There has never existed an inclination for commerce with the female under any circumstances of excitement of the venereal passion." In the preceding case, (if we may confidently trust to the account given of it,) we have ample proof of the existence of the internal female sexual organs in the circumstances of menstruation and impregnation taking place; and at the same time there appears considerable evidence for believing that some of the male organs were present. For even if we were to argue that the bodies present in the scrotum or united labia might be ovaries and not testicles, and that the supposed semi-perforate penis was only an enlarged clitoris, still the masculine figure of the individual, the imperfect beard, the narrowness of the pelvis, and the form of the lower extremities would tend to indicate the probable existence of the rudiments of some male organs; and if we go so far as to admit this, we must further allow the present to be an instance of hermaphroditism, in which *one* of the sets of sexual organs was capable of assuming their appropriate physiological part in the process of reproduction, though perhaps unable, if we may judge from abortion having twice occurred, of ultimately perfecting that process.

The preceding remarks upon the functional reproductive powers of reputed true hermaphrodites have been meant to apply only to the supposed perfection of *one* order of their sexual organs. It becomes a still more interesting question whether it ever occurs that in any abnormal hermaphrodite among the more perfect tribes of animals, both kinds of sexual parts may be found in so perfectly developed a state as to enable the individual to complete the sexual act within its own body; or, in other words, to impregnate and be impregnated by itself. Though we have assuredly no positive proof to furnish* that a hermaphrodite so physiologically perfect has ever yet been observed, and should very strongly doubt its occurrence

* We do not certainly feel entitled to place among the category of correct observations either the alleged case given by Linneus (*Mangetus' Bibliotheca Chirurg. lib. iv.*) of a sow with perfect male organs on one side, and a womb containing several fetuses on the opposite; or that mentioned by Faber (*Hernandez' Nov. Plant. Anim. Mexic. Histor. p. 547*) and quoted by Haller and Rudolphi, of the co-existence, in a rat, of ovaries and a uterus with nine fetuses, along with complete male organs.

* *New York Medical Repository*, vol. xii. p. 86.

from the almost universal imperfection, in an anatomical point of view, of the malformed organs, yet we have, on the other hand, no very rational ground, except that of the experience of all observers up to the present date, for denying entirely and unconditionally the utter possibility of it. And perhaps we should look upon this possibility with a less degree of scepticism when we consider that a double hermaphroditism exists as the normal sexual condition of some of the lower tribes of animated beings, and at the same time take into account the fact of the more or less direct communication which has been generally found to exist between the female uterus and the male passages, in cases of lateral and of complex hermaphroditism in the human subject and in quadrupeds.

In one of the cases of hermaphroditism in the goat, previously quoted from Mayer, and where there were present two male testicles, epididymes, vasa deferentia, and vesiculæ seminales, and a female vagina, uterus and Fallopian tubes, with a body at the abdominal extremity of one of these tubes that was supposed by Mayer to resemble a collection of Graafian vesicles, the male vasa deferentia opened into the female vagina; and its cavity with that of the uterus, and of all the male sexual canals, was distended with a whitish fluid of the odour and colour of male semen, and containing, according to Bergmann, the chemical principle proper to that secretion. It is not, therefore, altogether without some appearance of foundation in fact, that Mayer has added to the history of this case the following problematical remark: "Fuit ergo revera hermaphroditus semetipsum fœcundare studens."*

In a similar strain Dr. Harlan has added to the account that he has given of the very complete case of hermaphroditism already mentioned as met with in the Borneo ourang-outang, the following observations and queries. "Admitting," he remarks, "what in reality appeared to be the fact, that all the essential organs of both sexes were present in this individual, had the subject lived to adult age, most interesting results might have been elicited. Could not the animal have been impregnated by a male individual, by rupturing the membrane closing the vulva? or by masturbation, might not the animal have impregnated itself? by this means exciting the testicles to discharge their seminal liquor into its own vagina. The imperfection of the urethra most probably would have prevented the animal from ejecting the semen into the vagina of another individual."†

It has been sometimes urged as an argument conclusively illustrative of the fact of a double hermaphrodite impregnating itself, that in the hermaphrodite *Gastrophaga pini* described by Scopoli,‡ the insect is stated to have been seen to advance its penis and copulate with its own female organs; and afterwards, we are informed, the female side laid eggs from which young

caterpillars were produced. Before, however, admitting this case to present an incontrovertible instance of absolute hermaphroditism, with the functions of the two sets of sexual organs existing in a perfect condition upon the same individual, it is necessary to recollect a possible source of fallacy in this circumstance, that female *Gastrophagi* have been observed to lay fertile eggs, although they had not had previously any connection with the male, as remarked by Professor Baster* in one instance in a female *Gastrophaga quercifolia*, and in another in the *Gastrophaga pini* by Suckow.† The same fact is further alleged to have been observed in some few instances by Pallas, Treviranus, Bernouilli, and others,‡ in regard to individuals belonging to some other of the higher orders of insects and animals, as in the *Limnæus auricularis*§ and *Helix vivipara*|| among Mollusca, thus bringing them in this respect into analogy with the Aphides and Cyprides.

CAUSES OF HERMAPHRODITIC MALFORMATION.

As yet we possess very little accurate knowledge either in respect to the mode in which the determining causes of hermaphroditic malformation act, or the nature of these causes themselves.

Most of the varieties of spurious hermaphroditism may, as we have just explained, be traced to an arrest in the development of the sexual organs at one or other period of their evolution, in consequence of which some of those types of structure in these parts which were intended to be temporary and transitory only, are rendered fixed or permanent in their character. Our knowledge of the more immediate causes of such arrested development in these and in other individual parts and organs of the body, is as yet extremely limited, and for the discussion of it we must refer to another part of the present work, (see article MONSTROSITIES). We may, however, in reference to the particular forms of arrested development observed in hermaphroditism, remark that in consequence of the great influence which, as we have already pointed out, is exercised by morbid states of the ovaries and testicles, in retarding or preventing the evolution of the sexual apparatus and characters after birth, it has been suggested with considerable probability by Meckel¶ and Isidore St. Hilaire,** that in their ultimate analysis certain cases of hermaphroditic malformation may be traced in the course of their causation to morbid influences exercised in the early embryo, at a period more or less near to conception, upon the ovaries or testicles, or upon those organs of a neuter or yet undetermined sex which afterwards assume the structure of one or other of

* Icones, &c. p. 20.

† Medical and Physical Researches, pp. 23, 24.

‡ Introd. ad Hist. Nat. p. 416.

* Mém. de l'Acad. Roy. de Berlin, 1772.

† Heusinger's Zeitschrift für Organ. Phys. Bd. ii. s. 263.

‡ Burmeister's Entomology, s. 204. Burdach's Physiologie, t. i. § 44, 4-8.

§ Isis for 1817, p. 320.

|| Spallanzani, Mém. sur la Resp. p. 268.

¶ Anat. Gén. t. i. p. 609.

** Hist. des Anomal. de l'Organiz. t. ii. 58.

these bodies. Further, the effects which this supposed morbid influence exercises directly upon the embryonic ovaries and testicles, and indirectly through them, upon the rest of the genital apparatus, and consequently the modifications of sexual structure which it produces, may possibly be much varied according to its extent, duration, and nature, and according to the particular period of development at which it comes into action. It is evident that this explanation of hermaphroditism can only refer to the varieties of the malformation which consist of an imperfection or deficiency in the development, and cannot apply to those instances in which there is a superaddition of sexual organs. If, however, we can once satisfy ourselves that any set of cases whatever are traceable to a morbid action affecting the testicles or ovaries of the early embryo, our investigations into the causes of these cases will necessarily be much simplified, for our inquiries would be reduced from a vague and indefinite search after the production of a number of anomalies of structure affecting several different organs at the same time, to an attempt to trace out the nature of those morbid conditions to which the embryonic testicles and ovaries were subject, and which were capable of so far changing the structure and action of these organs as to give rise to the effects in question. Of the diseased states, however, to which the reproductive and other organs of the system are liable during the progress of their early development, we at present know little or nothing, although in the investigation of this subject a key, we believe, may possibly be yet found to the explanation of many of those malformations to which different parts of the body are subject.

Osiander* and Duges† have suggested that the variety of spurious hermaphroditism which consists of a division of the perinæum in the male, may be produced *mechanically* in the embryo by the præternatural accumulation of fluid in the urinary canal, on account of an imperforate state of the urethra, and the consequent distension and ultimate rupture of the urethra, &c. From cases published by Sandifort, Howship, Billard, and many others, we are now fully aware of the fact that all the urinary canals of the fœtus in utero are occasionally found morbidly distended with a fluid, which, according to the interesting observations of Dr. Robert Lee,‡ would appear to possess the more characteristic qualities of urine. We have dissected one case in which the dilated fœtal bladder was as large as an orange, and have seen in the Anatomical Museum of Dr. William Hunter at Glasgow the preparation of another instance in which the bladder of a full-grown fœtus was dilated to the size of that of the adult subject. In one case mentioned by Dr. Meriman, the distended organ contained half a

pint of urine,* and in another detailed by Mr. Fearn it was capable of containing as much as two quarts of fluid.†

It is not impossible that the causes in question,—namely, the obliteration of the urethra and the consequent distention of all the urinary passages, and probably also of the sexual canals communicating with these passages,—may occasionally produce in the male embryo a re-opening of the perinæal fissure, giving thus to the external parts the appearance of a female vulva, and perhaps at the same time may lead to the retention and imperfect development of the testicles by the distention of their ducts, and the unusual compression to which these organs may be subjected. Indeed we have satisfactory evidence, in a few instances, that such a cause may have been in operation, by our detecting the other acknowledged effects of the urinary accumulation in question,—such as preternaturally dilated ureters, and a cystic form of the infundibula of the kidneys, as in a case of hermaphroditism given by Mayer, in a human fœtus,‡ in the kid described by Haller,§ and in the child whose case we have already quoted from Steghlener. (See *transverse hermaphroditism*.)

At the same time the total absence of these collateral proofs in most other cases of hypospadias, our knowledge of the fact that the perinæal aperture is in some cases never shut, and the difficulty of conceiving the possibility of its being re-opened when once it is firmly closed, are perhaps sufficient to shew that the cause or causes alluded to produce in but few if any instances the effect here attributed to them.

We deem it not uninteresting to point out in this place, under the question of the origin of hermaphroditic malformations, a circumstance which has struck us in considering one or two of the cases in which the sexual apparatus of one side of the body was more imperfectly developed than that of other, viz. that the opposite side of the encephalon was at the same time defectively formed. Thus in the case of Charles Durge, on the right side of whose body there was a well-formed testicle, and on the left an imperfect ovary, the right hemispheres of the cerebrum and cerebellum, but particularly of the latter, were found by Professor Mayer to be smaller and less developed than the left, and the left side of the occiput was externally more prominent than the right. The same author, in the account of his case of hermaphroditism in a person of eighteen years of age, which we have previously quoted,|| and where there was an imperfect testicle, &c. on the right side, but no trace of testicle or ovary in the left, incidentally mentions that the right side of the cranium was somewhat prominent,—“*dextra pars cranii paullulo prominens*,” in correspon-

* Neue Denkw. für Aertzte und Geburtsh, Bd. i. t. 264, 267.

† Ephem. Méd. de Montpellier, t. v. p. 17, 45, and 52.

‡ London Med.-Chirurg. Trans. vol. xix.

* London Med. and Phys. Journ. vol. xxv. p. 279.

† Lancet for 1834-35, p. 178.

‡ See p. 8, of Icones, &c.

§ Comment. Soc. Reg. Sc. Gotting. tom. i. p. 2.

|| Icones, p. 12.

dence, there is every reason to believe, with a slight predominance in size in the hemispheres of the encephalon of the same side. In adducing these two cases we do not wish to draw any inference with regard to the relation of causation between the size and development of the encephalic mass and the determination of the sex, but would merely point out the facts themselves in the meantime, for the purpose of drawing attention to the subject in the observation of any future similar instances that may happen to occur.

In connection with the question of the causes of hermaphroditism, it is interesting to remark that in some instances malformations of the genital organs giving rise to appearances of hermaphroditism have been observed both to be *hereditary* in particular families, and in other cases to occur among several of the children of the same parents. Thus Heuremann* mentions an example of a family the females of which had for several generations given birth to males who were all affected with hypospadias; and Lecat† alleges that a degree of hypospadias is not uncommon among families in Normandy. In Rust's Magazine an instance is related of a degree of hypospadias existing in a father and son.‡ Baum,§ in his essay on congenital fissures of the urethra, has referred to two instances of the existence of hypospadias in brothers of the same family, the first mentioned by Walrecht,|| and the second by Gockel.¶ Sir Everard Home** found two cases of hypospadias in two children belonging to the same parents. Kaul Boerhaave†† mentions an example of four hypospadiac brothers, and Lepechin another instance of three.‡‡ Naegele has reported a case in which two male twins were both hypospadiac.§§ and Katsky||| and Saviard¶¶ have mentioned similar instances.

We have already, when treating of transverse hermaphroditism, alluded to another fact long and extensively known among our agriculturists, but first prominently brought before the notice of physiologists by Mr. Hunter, that the free-martin cow, or the cow that is born a co-twin with a male, is generally barren and has its sexual organs more or less defectively developed or hermaphroditically formed.*** In three dif-

ferent instances Mr. Hunter confirmed the fact of the anomalous sexual development of such animals by dissection; and Scarpa* and Gurlt† have published some additional observations and cases. We have lately had an opportunity of dissecting the sexual parts of two adult free-martins, and found them, as already detailed, formed after an abnormal and imperfect sexual type; and our friend Dr. Allen Thomson made some years ago a similar observation upon a free-martin twin foetal calf. Cases, however, exceptional to the general fact of the sterility and imperfect sexual conformation of the free-martin twin cow are not unfrequently met with. Mr. Hunter found the sexual organs of a free-martin calf that died when about a month old apparently naturally constituted. He speaks also of having heard of some free-martins that were so perfectly formed in their sexual parts as to be capable of breeding; and different instances of their fecundity have been published by Dr. Moulson and others‡ since the time that Mr. Hunter directed attention to this subject. In some pretty extensive inquiries which we have made in regard to this point among the agriculturists of the Lothians, we have learned only of two instances in which free-martins proved capable of propagating, and such cases seem to be always looked upon as forming exceptions to the general rule.

We are not aware that among other uniparous domestic animals, as the goat, mare, &c, when a female is born a co-twin with a male, this female is sterile, and has its sexual organs hermaphroditically formed, as in the free-martin cow; and we are sufficiently assured that no such law holds with regard to twins of opposite sexes among sheep. Sir Everard Home, in his essay on monstrous formations, § mentions that in warm countries nurses and midwives have a prejudice that such women as have been born twins with males seldom breed; and we have found the same prejudice existing to a considerable degree among the lower orders in Scotland. Mr. Cribb,|| of Cambridge, published in 1823 a short paper in order to refute this notion as far as regarded the human subject. He refers to the histories of seven women who had been born co-twins with males. Six of these had children, and the remaining seventh subject alone had been married for several years without any issue. We have ourselves made a series of extensive inquiries of the same nature

tica, lib. vi. chap. 22, speaks of "*tauræ* which occupy the place of fertile cows;" and Varro in like manner (lib. ii. cap. 5.) states that "the cow which is barren is called *taura*" (*quæ sterilis est, taura vocatur*). There is no evidence, however, that they were acquainted with the particular circumstances relative to birth under which free-martins are produced.

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

† *Lerbuch der pathol. Anat.* Bd. ii. s. 188.

‡ *Loudon's Magazine of Natural History*, vol. v. p. 765. See also Youatt on Cattle, p. 539, *Farmers' Magazine* for Nov. 1806 and Nov. 1807.

§ *Comp. Anat.* vol. iii. p. 333-4.

|| *London Med. Repos.* vol. xx. p. 213.

* *Medicin. Beobacht.* Bd. ii. s. 234, and Laroche sur les Monstrosités de la Face, p. 30.

† Arnaud, l. c. p. 312.

‡ *Magazin fuer die Gesammte Heilkunde*, Bd. xviii. s. 113.

§ *De fissuris urethræ virilis fissuris congenitis*, p. 54.

|| *Burdach's Metamorphose des Geschlechter*, p. 52.

¶ *Eph. Nat. Cur.* Dec. ii. Ann. 5. (1686), p. 85.

** *Comp. Anat.* iii. p. 320.

†† *Nov. Com. Acad. Sc. Petropolit.* t. i. p. 61. tab. xi.

‡‡ *Ibid.* t. xvi. p. 525.

§§ *Meckel's Archiv.* Bd. v. s. 136.

||| *Acta M. Berol.* Dec. 1. tom. ix. p. 61.

¶¶ *Observ. Chirurg.* p. 284.

*** From the Romans employing the female noun *taura* to signify a barren cow, it has been ingeniously conjectured that they were not unacquainted with the free-martin. Thus Columella de Re Rus-

as those published by Mr. Cribb, and have obtained authentic information regarding forty-two adult married females who had been born as twins with males. Of these, thirty-six were mothers of families, and six had no children, though all of them had been married for a number of years. Two of the females who have families were each born as a triplet with two males.* In the Medical Repository for 1827 (p. 350) an anonymous author has mentioned an instance of quadruplets consisting of three boys and a girl, who were all reared: the female afterwards became herself the mother of triplets. Limited as the data to which we here allude confessedly are, they are still amply sufficient to show that in by far the majority of cases the females of twins of opposite sexes are in the human subject actually fertile, and, as some of the cases we have collected show, they are occasionally unusually prolific.

On the other hand, however, it may be considered by some that the same data rather tend in a slight degree, as far as they go, to support the popular prejudice of the infecundity in a number of cases of the female twin, and her analogy in this respect with the free-martin cow; for out of the forty-two instances which we have mentioned, we find six in which the woman has had no children, though living in wedlock for a number of years, or one out of seven of the marriages of such women has proved an unproductive one,—a proportion, we believe, considerably above the average of unproductive marriages in society in general, or among women of any other class. But perhaps, before drawing any very decided conclusion with regard to this point, a more extended foundation of data would be requisite than any we have hitherto been able to adduce, as it is perfectly possible that *our* having met with six exceptional cases may be a mere matter of coincidence.

As to the cause of the malformation and consequent infecundity of the organs of generation in the free-martin cow, we will not venture to offer any conjecture in explanation of it. It appears to us to be one of the strangest facts in the whole range of teratological science, that the twin existence in utero of a male along with a female should entail upon the latter so great a degree of malformation in its sexual organs, and in its sexual organs only. The circumstance becomes only the more inexplicable when we consider this physiological law to be confined principally or entirely to the cow, and certainly not to hold with regard to sheep, or perhaps any other uniparous animal.

The curiosity of the fact also becomes heightened and increased when we recollect that when the cow or any other uniparous animal has twins both of the same sex, as two males or two females, these animals are always both perfectly formed in their sexual organization, and both capable of propagating. In the course of making the preceding inquiries after

females born co-twins with males in the human subject, we have had a very great number of cases of purely female and purely male twins mentioned to us, who had grown up and become married, and in only two or three instances at most have we heard of an unproductive marriage among such persons.

Further, we may, in conclusion, remark that among the long list of individual cases of hermaphroditism in the human subject that we have had occasion to cite, we find only one instance, (Eschricht's case of transverse hermaphroditism,) in which the malformed being is stated to have been a twin. Katsky, however, Naegele, and Saviard have each, as before stated, mentioned a case in which both twins were hermaphroditically formed in their sexual organs.

HERMAPHRODITISM IN DOUBLE MONSTERS.

One of the most curious facts in the history of double monsters is the great rarity of an opposite or hermaphroditic sexual type in their two component bodies, the genital organs of both bodies being almost always either both female or both male.

Physiological science affords us at present no satisfactory clue to the explanation of this singular circumstance. From two cases of double monstrous embryos observed in the egg of the domestic fowl by Wolff* and Baer,† and from a similar case met with in the egg of the goose by Dr. Allen Thomson, it appears certain that double monsters sometimes originate upon a single yolk, probably in consequence of the existence of two cicatriculæ upon this yolk,‡ or of two germinal points (or two of the vesicles of Purkinje and Wagner) upon a single cicatricula. In such a case the two bodies of the double monster are so early and intimately united together as to form, almost from the commencement of development, a single system; and therefore the fact of the uniformity of their sexual character is the less remarkable. But in other instances when the double monster originates (as from the phenomena of incubation in double-yolked eggs we know to be frequently the case,) on two separate yolks or in two separate embryos becoming fused or united together, at a more advanced stage of development, it appears more extraordinary that the sexes of the two conjoined fœtuses should be so constantly uniform as they seem to be in monsters perfectly double. This uniformity only becomes the more singular when we reflect that twin children are not at all unfrequently of opposite sexes.§

* Nov. Comment. Acad. Petropolit. tom. xiv. p. 456.

† Meckel's Archiv. für Physiologie, &c. for 1827, p. 576.

‡ We have in our possession a preparation, taken from a duck's egg, in which two full-grown fœtuses are developed on opposite sides of a single yolk of the common size.

§ In the Edinburgh Lying-in Hospital forty-six cases of twins occurred from 1823 to 1836, both years inclusive. In seventeen of these cases the two children were both females; in sixteen both males; and in the remaining thirteen instances one child was male and the other female. We know of

* Notes of the histories of these cases individually were read to a meeting of the Royal Physical Society of Edinburgh in the beginning of 1837.

The fact itself, however we may explain it, of the comparatively extreme rarity of both male and female sexual organs upon double monsters seems sufficiently established by various careful investigations made into the subject. Thus out of forty-two perfectly double monsters which Haller* was able to collect at the time at which he wrote, there were only two that were supposed to be of double sex, or, in other words, that had one body male, and the other female. Among double-headed monsters with single lower extremities, he found an hermaphroditic type more common, and adduces three examples of it.

In re-investigating this matter, the late Professor Meckel† could discover among the numerous class of monsters with perfectly double bodies united anteriorly or laterally by the thorax and abdomen, only one very doubtful case of exception to the above general fact. In the class of double monsters united in the region of the pelvis he mentions two exceptional cases from Valentin‡ and Hasenest;§ of double-headed monsters with single bodies, he quotes three similar cases from Lemery,|| Bacher,¶ and Bilsius,** and of monsters with a single head and double body he adduces two cases from Brissæus†† and Condamine,‡‡ in which in a like manner one body of the monster was supposed to have female, and the other male sexual organs. Several of these cases, however, certainly rest upon too doubtful authority and insufficient observation.

Isidore St. Hilaire has still further extended the data on which the above general fact is founded, by shewing that the same uniformity of sex holds good with respect to double parasitical monsters,§§ and even in monstrosities double by inclusion. Thus out of this last interesting class of double monsters, he alludes||| to ten distinct cases in which the sex of the included being was ascertained. In six out of these ten cases the including and included body were both male; and in the other four they were both female.

On the whole, therefore, we must consider as founded on a proper induction from the existing data, the axiom of Meckel,—“Sexuum diversorum indicia in eodem organismo, quantumvis duplicitate peccet, non dari, sed unum tantum observari.”¶¶ But while all the data hitherto collected with regard to this subject

would seem to point it thus out as one of the most constant and best ascertained laws in teratology, still we are not altogether disposed to consider it with Zeviani* and Lesauvage† as subject to no exceptions whatever. In the study of monstrosities, as in the study of other departments of medical science, we find many general, but no universal laws.

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one family in the different branches of which twelve pairs of twins have been born within three generations. In eleven out of these twelve pairs the co-twins have been of opposite sexes.

* Opusc. Anat. (1751,) p. 176.

† De Duplicitate Monstrôsâ, p. 21.

‡ Eph. Nat. Cur. Dec. ii. Ann. iii. p. 190.

§ Comment. Lit. Norimb. (1743,) p. 58.

|| Mém. de l'Acad. des Sc. de Paris, for 1724.

¶ Roux' Jour. de Méd. (1788,) p. 483.

** Blankaart's Coll. Med. &c. (1680.)

†† Six Observat. de M. Brisseau, (Paris, 1734,) p. 33.

‡‡ Mém. de l'Acad. des Sc. (1733,) p. 401.

§§ Hist. des Anomal. de l'Organiz. tom. iii. pp. 235 and 386.

||| Ib. p. 311.

¶¶ De Duplic. Monst. p. 21.

* Mem. della Soc. Italian. tom. ix. p. 521.

† Mém. sur les Monstr. par Inclusion (Caen, 1829); or Archiv. Gén. de Méd. tom. xxv. p. 140.

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THE END.

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