but then the lateral ligaments may remain sound, and the surgeon can keep the bones steady. I will tell you of a case of this kind: There was a surgeon who went into the country, and then went to the sea side, and, cockney like, he went out shooting sparrows, and, cockney like, put his hand on the muzzle of the gun; the gun went off, and went through the carpus of the hand, knocking it all to pieces. He came to town, and sent for a neighbouring surgeon of his, and the surgeon said, God, you must have your arm lopped off, if you don't, you will have the locked jaw, and you will die; but I recommend you to send for another surgeon. He sent for another surgeon, who was an hospital surgeon. When that surgeon saw him, he scratched his head, and said, he did not like sudden amputations, for in cases of sudden amputations, his patients always died. A dispute then arose between those two surgeons, and they sent for me as an umpire. I went; I saw the case, and I agreed with the hospital surgeon that sudden amputations did not generally do well, and I agreed with the other that if lock-jaw came on, it would be better to cut it off at once; but I said this is an injury where the lateral ligaments are entire, and therefore I thought it might do well; in short, I would not have mine cut off under the same circumstances. I said, "will you give me leave to dress it in my own way." I was allowed to do so. I then dressed it, made a little case for it to lie in, and when I had fixed it according to my own notion, I said, "Now, sir, sponge this continually, and never let there be any feeling of heat about it, and all will depend upon your constitution. You ought to feed yourself with particular food, keep your bowels regular, and so on." Now it was matter of perfect astonishment in that case, that there was so little discharge—so little swelling, and that the case did so well. Pieces of bone came away, but the wound was all healed in the course of two months; and in three months the surgeon (a surgeon being an abominably bad patient, as they are all) was absolutely driving about in his gig in the streets of London, which he should not have done if he had been a patient, because when the thing is healed in that way, there is yet a great deal to be attended to—the contracting of the new formed parts into some sort of an unyielding structure, the repairing of sinews, and so on. Well, I have no more to say about injuries to the carpus.

As to the fingers and the thumb, God bless me! there is no apprentice boy, in town or country either, who does not know when a man has got his finger out, and who can't put it in again. He compares the one joint with the other, and if it is dislocated, he pulls it until it goes in.

With respect to

Fractures of the Fingers,

I really can't speak of those things; common sense tells you how they are to be attended to. There is only one dislocation of the finger, and that is the dislocation of the last joint, which is perplexing; and that is often a very perplexing accident indeed. It may happen that *the last joint of a person's thumb is dislocated*: say that the proximal end of the last phalanx slips over the distal end of the one above it; what's to be done? Can you pull it? No. What's to be done? How can you put it in? Can you put tackle to this small point? or can you pull this? Your tackle would slip off, and you can't pull it. I have seen so much difficulty in reducing this dislocation, and have seen so many left unreduced in my time, that I am sure I felt myself exceedingly obliged to a gentleman who was a student here (Mr. Curwarden) for showing me how this dislocation was to be reduced. As to the extension, that will not do. Mr. Hey, of Leeds, and Mr. Curwarden, had some communication with each other on this subject, but Mr. Curwarden told me distinctly how the thing was to be done, and certainly more intelligibly than Mr. Hey's book. He said, instead of trying to extend it, you had better try to bend it a little more, and that will humour the *flexor tendon*, and by only getting it so far bent that the proximal end of the last phalanx is raised up, you will have it in. Now I have reduced two or three cases of dislocation of this kind since I had this information, which I am sure I should have bungled at excessively in any former stage of my life.

FOREIGN DEPARTMENT.

ANATOMY.

Paper on the Glands situated in the Head of the Serpent. By Y. F. MECKEL, Professor of Anatomy and Physiology, at the University of Halle.*

THE glands in the heads of serpents are particularly interesting from the poison which they secrete. They have been, during the last few years, the object of the researches of several anatomists, especially of Tiedemann, Cloquet, Rudolphi, and Desmoulins, who have described some with greater or less accuracy, and have confounded the others. Some of them have also been described by preceding observers, as

* Meckel's Archiv. April, 1826.

Charas, Redi, Ranby, Fontana, and Cuvier; the discrepancy that exists between these reports has induced Meckel to examine the subject with the attention which it merits, and to publish the results of his investigations.

Five pair of glands are found in the heads of serpents—but not, however, in all the species; of these glands the most constantly observable is a small elongated and rounded one, situated in the inferior part of the mouth near its anterior extremity, and which opens at the sheath of the tongue. This has been on just grounds considered as analogous to the sublingual gland in other animals. Cuvier has observed this in the *amphisbæna*, in which it is very large, and he is the only author who has described it; yet neither he nor any other person has mentioned its existence in other species, though it is found in them all, with the single exception of the *typhlops*, in which it may escape notice in consequence of the extreme minuteness of the parts. There is another gland seated behind the eye, which is larger than the latter; it is soft, white, and divisible into lobes. This has been particularly described by Tiedemann, Rudolphi, and Cloquet, it has been named by the latter, the lachrymal gland. Tiedemann has not found this in the *amphisbæna*, or the *anguis*, but it is of considerable size in these animals; in the former species it is even larger than the eye, at the inner side of which it is situated. The larger part of the gland, in many instances, projects beyond the eye, particularly in the *coluber*, *tortrix*, and *eryx*. But it is less prominent in the *boa*, *python*, and venomous serpents. As these glands are not attached to the skin, it is easy to discover them, but they altogether escaped the notice of Charas. Desmoulins asserts that these are the only glands which are to be found in a great number of the ophidian reptiles, particularly in the fine specimens of the *coluber*, and in one of the *scytala* and *elaps*, and that there does not exist in the head or in any part between it and the stomach, any glandular structure ministering to the function of digestion, such as the paroted sublingual or submaxillary. It is rather strange that such an assertion should be hazarded at any time by a Frenchman, inasmuch as his countrymen and contemporaries, Cuvier and Cloquet, have described and delineated several other glands; but the assertion is altogether unwarrantable at a period when the French naturalists have begun to make themselves acquainted with the literature of their neighbours, particularly with that of the Germans.

The third form of gland is of an elongated form, and situated at the external side of the ramus of the lower jaw, the openings

of its numerous ducts being ranged in a straight line along the external side of the lower jaw teeth. This is of considerable size in the *eryx*, *tortrix*, and amongst the venomous serpents in the *elaps*, but it is very small in the *crotalus*. In the other venomous serpents in which this gland is found, it is always smaller than in those which are not venomous, except in the *elaps*, in which it is of very considerable size. In structure, form, and position, it is strictly analogous to the buccal and labial glands in the *mammifera*.

Opposite this, and seated on the external surface of the upper jaw, is the fourth species of gland. This has been described by Tiedemann, and delineated, by Cloquet; the former considers it to be the paroted gland, but in structure, form, and situation, it is much more analogous to the buccal and labial glands.

The most remarkable, though the least common, of the glands, are unquestionably those which secrete the poisonous fluid. These are always situated behind and beneath the eyes, above the upper jaw, completely surrounded and invested by a very strong muscle, which must be dissected off in order to get a view of them. Their form is elongated, their texture lamellated, presenting internally a cavity. They are, moreover, distinguished from all the other glands by their excretory duct. This is of considerable size; its direction is from behind forwards, along the external surface of the upper jaw, and finally opens immediately before, and above the venomous tooth. It is contained within a membranous sheath, which invests it in such a way, that the poison is directed into the superior aperture of the tooth. The situation and peculiar manner in which these glands are invested by the thin muscular covering, will in some degree account for their having eluded the search of the older anatomists. Charas appears to have been acquainted only with the lachrymal and ocular glands, at least it is to these only that his descriptions apply. He says that they are situated in the posterior part of the orbits, behind and beneath the eyes; that they are composed of several lobes, partly covered by the temporal muscle, and that they are nearly of the same size as the eye. He appears, however, to have observed the excretory duct of the poisonous glands, but he has made a mistake in describing it, as being connected with, or proceeding from, the glands just described. As far as can be judged by his figures and descriptions, Ranby (*Phil. Trans.* No. 401, p. 378) appears to be the first who examined the venomous gland itself, for he described and delineated a gland in the rattle snake of the size of a pea, placed precisely in the

situation of the poison gland; but he could not have observed its excretory duct, for he says that the ducts of such small glands can never be *distinctly* seen; but he conjectured that it opened between the upper lip and the superior maxilla. He agrees with Charas in the opinion that these glands do not secrete the poison; but the experiments of Redi have long since set that question at rest, and have demonstrated that they are the true secretory organ of the poisonous fluid.

Fontana is the first who described with clearness and precision the secretory apparatus of the poison. And then it was Russell, if I am not deceived, who also gave accurate descriptions and plates which I saw a long time ago at Paris and Gottingen, but which, unfortunately, I have not now before me. M. Cuvier has ably exposed this point. P. Tiedemann has also seen with precision, in the naja and vipera berus, all the parts in their connexion. The descriptions and drawings of P. Rudolphi are exact, but the representation of the orifice of the excretory duct, and its relation with the poisonous tooth, are wanting. Moreover, if I attribute to Fontana the complete discovery of the apparatus for the secretion of the poison, I am obliged to differ from P. Rudolphi, who thinks that he was the first who had shown the course of the poison, from the superior opening of the tooth to its lower aperture. This discovery belongs to the excellent Tyson, and has already been confirmed by Ranby. The first of these two authors says expressly, that he has found in all these teeth, very near the root, a large opening, and towards the point a septum always very distinct; that the tooth is crossed between these two openings, which he had remarked several times, by lightly pressing the gums with the fingers; by this pressure, the poison had been distinctly seen extending from the tooth, and the slit in it. Ranby describes the two openings, and the cavity, as Tyson; and he adds that the superior, probably, receives the poison, (secreted, according to him, in the sheath of the tooth,) whilst the lower ones transmit it into the wound.

These expressions are, undoubtedly, less precise than those of Tyson; but the words of the latter clearly indicate that he first discovered the passage of the poison across the tooth.

We will now proceed to the consideration of the poisonous gland; it may be an organ of a particular kind, or only a modification of another gland.

M. Cuvier entertains the first opinion; for he says expressly, that it is found independently of the salivary glands, although he does not speak of those of which it might be a modification. M. Desmoulins, who

pretends that, with the exception of the lachrymal gland, no other is found on the head of serpents, says boldly, that the same gland secretes the poison, tears and saliva, and regards it absolutely as an organ identical with the lachrymal gland. The expression of P. Tiedemann, who regards the two organs as forming but one, might lead to the same opinion: his words are,* "The glands of the orbit were in the vipera naja, very large and thick, and of a marked colour, being of a dirty yellow. The excretory ducts opened into the molar or poisonous teeth." In another place he says, "The glands situated behind the eye, or the poisonous glands in the vipera berus, were very large, thick, and elongated, much larger than in the snake, in proportion to the size of the body. The excretory ducts opened into the molar teeth."

But, unfortunately, an examination made with ever so little care, proves that the poisonous gland is entirely distinct from the ocular, and that these two organs exist by the side of each other. They do not communicate together, either by ducts or by the glandular substance, and are consequently independent of each other.

Rudolphi has already found them both present in the vipera berus, and has noticed the inaccuracy of Tiedemann; but he is in error when he admits for the trigonocephalus only (as M. Desmoulins has done for all the serpents) that this gland alone replaces all the others by its size; for, according to my own observations, we find the lachrymal and lingual glands in addition. The circumstance that the labial gland is entirely wanting, or frequently so, in several poisonous serpents, might have given rise to the idea, that the poisonous glands were but modifications of this; but the simultaneous presence of the labial and the poisonous glands in the vipera berus and the naja, is a sufficient refutation of this opinion. All that can be said is, that the poisonous gland is developed at the expense of the others, especially the lachrymal glands, because the function of the latter is supplied by the former.

Are the Parts at the circumference of an Organic System ever present, when the corresponding central portions are wanting? By Professor MAYER, of Bonn.

An answer to this question in the affirmative would favour the opinion, that the development of the organic system proceeds from without to within, from the circumference to the centre. A reply to it in the negative would lead one to infer, that the for-

* *Über die Speichel Drüsen der Schlangen.* München Denkschriften, 1813.

mation and development of the organs takes place from within outwards, from the centre to the periphery. We find frequent mention made in pathological works, of a deficiency of the central portions, in cases where the parts of the same organ were more or less developed at the circumference; for instance, the absence of the kidneys, when the ureters and bladder have been present; of the testicles, when the external genital organs have been perfect, has been frequently noticed. But I believe that this observation on the deficiency of the central organs, has been admitted into most of the manuals on pathological anatomy, without sufficient examination; and it appears to me possible to render it very probable, by reference to morbid anatomy, if not to establish by complete proof the opinion that the development of the organic systems proceeds from the centre, and that when the parts of an organ are manifest at the circumference, those of the centre are manifest also. We will now quote those cases bearing on the subject, which are most deserving of credit and notice.

In reference to the want of the central organs of the parts of generation, I will mention first the absence of the ovaries. Morgagni (*de Sedibus et Causis Morborum* Epist. XLVI. V. 20) relates a case of this kind occurring in an old woman. But the ovaries shrivel up, turn to cartilage, and disappear in advanced age. I rest this assertion on cases which have come under my own observation, and which I have communicated to the public.* Morgagni also saw cartilaginous bodies in the tube, probably the remains of the ovaries. Pearson (*Phil. Transactions*, 1805, p. 225) mentions a second case of the kind in a young woman. He calls it "The case of a full grown woman, in whom the ovaria were deficient." "The ovaria," he says, "were so indistinct, as rather to show the rudiment which ought to have formed them, than any part of their natural structure." Also, in the plate the ovaries are evidently marked. The uterus was also only slightly developed. The menses never appeared. The absence of the ovaries amounts also in this case to shrivelling up of those parts. Moreover, cases are noted in which the ovaries and uterus were wanting, whilst the external organs were entire. If these cases be correct, then the opinion advanced above must be retracted.

Columbus (*de re Anatom.* LXV.) says, at the end of the book "Fœmina erat, injus

vulva ab aliarum fœminarum vulvis nihil peculiare et diversum habebat, et matricis colli portio prominebat vel matricis collo simile. Matrix autem nulla aderat in abdomine neque vasa seminaria neque testes, et quoties cum viro coibat (coibat autem sæpe) mirandum in modum conquerebatur." Did Columbus mean by the *vasa seminaria* and *testes*, the female organs, the fallopian tubes and the ovaries? This is yet to be proved, and therefore the case must be regarded as incomplete.

Klinkosch (*Dissert. Pragenses*, Tom. I. No. 11) describes an interesting case, where, in a woman 48 years of age, the ovaries and fallopian tubes were wanting, and still the external parts of generation were present. But this appears to me a case of hermaphroditism. The clitoris, for instance, was larger than usual, the breasts were wanting, the menses never appeared. The case is altogether imperfect, and there is no mention made of the opening from the bladder.

The case by Lucas, in the *Memoirs of the Medical Society of London*, Vol. IV. p. 96, is the only one of the kind which has been properly examined and accurately described; it evidently belongs to the hermaphroditic formation. De Monti (in *Brugnatelli Giornale Fis. Med.* Tom. I. p. 217.) found, in the place of the uterus, a sac four inches wide, evidently something intermediate between a uterus and vesicular seminales.

Zagorsky (*Nov. Act. Petrop.* Tom. XV. p. 473.) observed a case according to Meckel, where there were external, but no internal parts of generation. But this is not expressed by the author himself, for he says: *reliqua viscera hujus cavi perfecte naturæ conformabantur.*

All these cases of absence of the ovaries and the uterus at the same time, may probably be referred to hermaphroditic formations; some of the cases are badly described, and afford no proof either one way or the other.

But it is very remarkable that, on the other hand, a number of careful examinations and accurate cases are recorded, in which the uterus was wanting, but the ovaries were present in a state of perfect formation; thus the cases from Oberteuffer, Engel, Morgagni, Theden, Klinkosch, Meyer, Seron. How Voigtel, in the third volume of his *Pathological Anatomy*, p. 534, could say, "if the uterus is absent, the ovaries are wanting also," we are unable to comprehend. It must also be observed, that the external parts of generation belong, in part, to the urinary system; and that, in those cases, when the internal organs of generation were wanting, the urinary organs existed entire.

* *Vid. Beschreibung einer graviditas interstitialis uteri*, &c. Description of pregnancy in the substance of the uterus, with observations on the changes which the genitals and the uterus suffer in old age. Bonn, 1825.

Few cases are to be found of deficiency of the central parts of the male organs of generation or the testicles. It is evident, that cases of absence of a testicle do not belong here. In the case which Murray communicated through Schulzen, (vide Rudolphi's *Schwedische Annalen*, Bd. 1. H. 1. p. 113,) the penis existed, but there were no testicles, *vesiculæ seminales*, &c., as it appeared. But the penis belongs also, in part, to the urinary system. Besides, a horny glandiform organ was found, in the region of the kidneys, the nature of which is not accurately given; perhaps the rudiments of testicles and kidneys joined together. In other cases, it was only an apparent want of the testes, for they were still concealed in the abdomen; as, for instance, in the case by Itard, (*Mem. de le Societe Med. d'Emulation*, an. 3,) and by others.

I come now to absence of the kidneys, without corresponding absence of the other urinary organs. In the case by Wolfstrigel, and in mine, in Tiedemann's and Treviranus's *Journal of Physiology*, Vol. I., all the other urinary organs were wanting. Murray, Sue, and Gilibert, have related similar cases. Cooper (*Phil. Transact.* Vol. LXV. p. 314.) found a bladder in a foetus, but no kidneys. He says, "there is also the appearance of a bladder, but it is so contracted as to have no cavity."

Further, our observation may be proved on reference to the central organs of the respiratory system. Where these are really wanting, the trachea and larynx, their peripheral evolution, are also deficient. It is the same in the cases by Roderer, Daniel, Marrigues, and also in the acephalous foetuses. The not unfrequent instances of absence of the centre of the circulatory system, or of the heart, whilst the arteries and veins are, in general, present, appear to tell against our opinion; but, from the imperfect investigations which have unfortunately been made of these cases, there is no doubt that a placenta, or a foetus provided with a heart close to the other foetus, have supported it, so that the central organ of its vascular system was external to its body.

Lastly, as regards the nervous system, has no case been observed where only one nervous filament has been seen without a ganglion-like swelling, serving to it either the office of root or centre?

With respect to the organs of senses, (the eye and ear being the only organs which can come under our consideration,) can the nervous parts of these organs be regarded as their respective central parts. But here, also, are no facts which subvert our statement. Klinkosch observed the absence of the retina and the optic nerve in the orbit; but in the cranium, the nerve was present. Magendie says, that he found

the optic nerve wanting, but the most remarkable circumstance was, the perfect development of the retina! Valsalva (*Morgagni, Epist. XLVIII. sect. 48.*) found the *meatus auditorius internus* so closed in a hydrocephalic child, that no filament of a nerve could possibly go through it. Whether the nervous expansion was wanting in the labyrinth, is not stated.

It remains for us, in conclusion, to speak of the osseous system. The centre of this system is to be sought for in the cranium and vertebrae. In numerous foetuses the middle parts of the head and spinal column have been found developed, whilst the parts at the circumference, the jaws, ribs, and extremities were wanting.

In regard to the formation of bone (osteogeny) the anatomy of the foetus contradicts, in this point, the opinion before advanced. It is known that the ribs are earlier ossified than the vertebrae, lower jaw, &c., earlier even than any parts of the cranium; and how does this take place? If it be answered that it is a law for the parts at the periphery to ossify sooner than those at the central portion, the assertion would be partly correct. The ribs are ossified earlier than the sternum; the fore-arm sooner than the bones of the carpus; the diaphyses of the cylindrical bones sooner than their epiphyses. But another circumstance must be borne in mind; the elementary fibres of the bones, which are spread lengthways on it ossify first; then the fibres which take their course along the breadth of the bone, and those fibres are last converted to bone which cross in all three directions of the trunk. But this law is modified by the law of the development of the animal organs, viz. that this development takes place in the direction from the centre to the periphery.—From this it happens that the bodies of the dorsal vertebrae, as circular bones, appear ossified as soon as the sacrum.

We have, from the circumstance that in the foetus the parts at the periphery of any organ are seldom or never found present, whilst the central portions are wanting, come to the conclusion that the parts are developed from the centre to the circumference, and not from the circumference to the centre.

REMARKS.

Professor Mayer has been labouring, in the above article, to prove that the development commences at the centre and proceeds to the circumference, and he has rested his opinion on the proofs afforded by morbid anatomy. The mode which Professor Mayer has pursued to prove his opinion, does not appear to us to be so certain a way as the examination of the foetus from the earliest periods of its formation to its