liament, a certain number will still be devoted to the defence of the empire; but not one will be thrown away, and the cost will always be counted, not in money only, but in blood and breath. So, likewise, if low dietaries are found fatal to the inmates of workhouses, though these asylums of the wretched be made tests of destitution, the Guardians will not push the rigour of their system inconsiderately far. They will not hurry precipitately forward, by looking at the economy, and believing that every ounce of food which they save is a gain to the fasting paupers. They will know that food is blood, that blood is life; and that the privation of food is the privation of life. This conviction will temper the severity of the period of transition.

Hence, serious blame attaches to the Poor-Law Commissioners, for sending forth, at the very outset of their career, ignorant partisans, to persuade the Guardians that the lowest dietaries are decidedly conducive to health,—a doctrine which we believe is entirely false, which is opposed to the common sense of the country, and which has not an iota of substantial evidence to adduce in its favour. If it be true that scanty food is a punishment, and increases mortality, the Guardians will cut down the dietaries with regret and slow deliberation; the consequences will stare their consciences in the face. If they believe—and the doctrine has been incessantly preached in their ears—that when they lower the rates and the dietaries they invigorate the sinews of the pauper, the deterioration of the workhouse diet may be expected to proceed in a rapid progression. Liberal men, like Lord RADNOR, when imbued with the fictitious belief that the “dyspepsia of the poor” is “simply caused by overfeeding,” and that the abstraction of butcher’s meat has “an effect altogether miraculous,” in preventing disease, will rejoice to see the wages of the labourer with a large family reduced to seven shillings a week, and they will regret to see his condition ameliorated, when that amelioration places the insidious poison of English beef within his reach.

DISCOVERIES IN EMBRYOLOGY.

BY

JOHN MILLER,

MECHANIC.

THE letter which I sent to your Journal, dated Nov. 25th, last, for insertion, addressed to M. Coste and Mr. Owen, with a view to have determined, from preparations made by themselves, the following points, has remained unnoticed, notwithstanding I have given them five weeks to reply, and also sent a letter to each by post. I therefore now, agreeably to my promise, forward to you the drawings of my preparations therein referred to. I hope you will examine the preparations, lest any one should doubt their genuineness, and dispute the truths which they teach, since I am poor, and the two parties opposed to me are great authorities. The two preparations which I have selected from my series are one of the human ovum and one of the cat, and both engravings which accompany this paper are of the size of nature. If I had given smaller dissections the existence of the vessels might have been disputed. The plan I have adopted is, to make three dissections of each animal, varying in the different stages of impregnation from eight to thirty days; and I preserve the duct, or the artery or vein, distinct, so that they are, as it were, so many links in a chain. The points under consideration are involved in the following questions:—

First,—Where does the duct from the vesicula umbilicalis in the kangaroo, and in herbivorous and carnivorous animals, terminate in the intestinal canal?

Second,—Where do the omphalo-mesenteric artery and vein commence and terminate in both classes of animals?

The vesicula umbilicalis, or vesicula alba, or blastoderm, was known to Wm. Hunter; he had even seen the duct filled with the same kind of fluid as the alimentary canal, but connected with it by an impervious thread.

In the ninth edition of Burn’s “Midwifery,” p. 219, the blastoderm, or vesicula umbilicalis, is seen “entering the caudal extremity by a short pedicle.”

In No. 597 of THE LANCET, p. 1029, Dr. Grant states as follows:—“That on the small intestine of the newly-hatched and even the mature bird, a minute coecal appendix is left in the situation where the yolk-bag formerly opened into the alimentary canal; this I have also seen on a corresponding part of the small intestine in the human foetus.”

“The duct terminating in the middle of the small intestines.”—*Burdoch*. “Into the coecum.”—*Oken*. “By a neck with the in-

testinal canal."—*Bojenus*. Breschet, Sallor, Woulf, and Beer, do not specify in what part the duct terminates. Velpéau states that he pressed the fluid in the duct into the canal, but he does not specify where the duct itself terminated. "The duct terminates at the lower part of the ileum."—*Meckel*.

The description of the termination of the duct by Mr. Mayo, is the most remarkable of all. In his fourth edition, p. 421, he thus writes:—"In a remarkable specimen belonging to Mr. Sweatman, the connection of the vesicula alba with the alimentary canal is beautifully shown. The vesicula lies immediately without the amnios; the whole length of the thread leading from it is an inch and a quarter; the length of the umbilical chord is 22-50ths of an inch; the vessel is pear-shaped, 11-50ths of an inch in its long diameter, 8-50ths across. The filament of the vessel joins the duodenum, close upon what seems the pylorus, or at about 1-80th of an inch from it. It is supposed that the embryo was about two months old at the period of the sudden death of the mother."

Now, Mr. Sweatman had seen a part of the series of my preparations, in which the terminations of the omphalo-mesenteric artery and vein are shown. Subsequently, in a conversation with that gentleman, I remarked that I was amazed to hear him declare that the duct terminated in the duodenum, and asked him if his specimen showed the omphalo-mesenteric artery and vein, and where the vein terminated; if the vessel noted by him was the duct? To this he could make no reply, but gave me the names of eight eminent authorities in London, who had examined the specimen. I told him that if the conclusions of these eight men were the same as his own, they were all incorrect. He also stated that Mr. Owen had examined the specimen. I observed that truth required no support from authority, but stood upon its own basis. He asked me why I was so positive in my statement, not having seen his specimen. I rejoined, that the astronomer predicts the eclipse of the sun long before its occurrence; why, then, should not the physiologist tell the formation of each organ as it proceeds towards perfection?

Mr. Sweatman invited me to see the specimen, but not until it was put up in the bottle. I inquired why I was not among the eight authorities who examined it, after I had studied embryology as I have done, for so many years, and he visiting me very often, and seeing my preparations. Alas! I am a poor mechanic.

Termination of the Duct, proceeding from the Vesicula Umbilicalis, in the Germ.

The duct from the vesicula umbilicalis shoots into the germ, which, being always

below, admits of a ready transmission of the fluid into it. Hence the whole intestinal canal is no more than an elongation of the duct; so that if the intestinal canal be dissected out of the germ, it resembles the tendril of a vine, and is not like an open vessel, or gutter, as some authors have represented. There is great difficulty in distinguishing, during the first six weeks, what is duct, or duodenum, jejunum, ileum, or cæcum, in the embryo. No person has yet given the measurement of the duct, and this is a point which it is most important to know. In the human ovulum, and in the cow, in both of which the same period of gestation is occupied, the duct is always at least six lines in length. This duct is first absorbed at its point of junction with the vesicula umbilicalis. In the ovulum of the cow the duct is pervious at thirty days, and at six weeks it disappears, all except the remnant which is attached to the canal (intestinal). This I prove by the date of copulation in this animal.

The length of the intestinal canal, as compared with that of the body, is greater in the foetus and in infants than in adults. It is generally longer, in proportion to the body, in herbivorous than in carnivorous animals. The rule, however, has many exceptions; in the sloth, though herbivorous, the intestinal canal is scarcely as long as the body, while in the seal, which is carnivorous, it is thirty times as long. The rat and mouse being omnivorous, have an intestinal canal three times the length of their bodies respectively; man seven times; the hog thirteen times. I believe that no animal but man and the ourang outang has both a cæcum and an appendix vermiformis.

M. Serres states that the lateral halves of the body are developed apart from each other, and afterwards coalesce. I must differ from this authority, for I have dissected the duct out of the human germ, and find that there is no perceptible difference in thickness throughout its whole extent. I have preparations showing the duct and the omphalo-mesenteric artery and vein, all three dissected quite to the germ, but the parts are not fully developed, and might be disputed.*

* From the preceding descriptions it is apparent that I cannot concur with M. Serres in the statement that the development of the embryotic animal is from the surface of its two lateral halves, towards the mesial line. The instance adduced will show that the law which he wishes to establish is not of universal application. At a future period, probably in my forthcoming publication, I shall advert to the formation of the uterus and the bladder, as affording further evidence against M. Serres' views.

The termination of the duct of the yolk-bag in birds, in general, is in the cœcum. In most birds there is no cœcal valve, and in many there is no cœcum, consequently the duct must terminate in another part of the canal, as is the case with those oviviparous animals which have no cœcum. In sharks I have found the duct terminate above, but close to, the valve. The duct terminates sometimes at the lower part of

the ileum in the mammalia, which fact was observed by Meckel, who is the only physiologist, out of thirteen authorities whom I have named, that nearly approaches the truth. The remnant of the duct in the kangaroo, in my series of preparations, is in the middle of the appendix vermiformis, analogous with what is shown in the engraving of the cat.

Fig. 1.

Human Ovum at first Week.

- a.* Flocculent chorion.
- b.* Chorion membrane.
- c.* Amnion membrane.
- d.* Stomach.
- e.* Duodenum.
- f.* Vesicula umbilicalis.

g. Separation of the omphalo-mesenteric vein and artery.

h. Omphalo-mesenteric vein accidentally ruptured in the dissection.

i. Omphalo-mesenteric artery.

k. Urachus communicating with the bladder.

l. The umbilical chord.

Fig. 2.

Fœtus of the Cat at the sixth Week.

a. Alantois. b. Urachus communicating with the bladder. c. Stomach.	e. Duodenum. f. Appendix vermiformis. g. Remainder of the duct from the vesicula umbilicalis. h. Omphalo-mesenteric vein. i. Omphalo-mesenteric artery.

Termination of the Omphalo-Mesenteric Artery and Vein.

Wrisberg, in 1764, gives the best drawing of this, but says that the bifurcation is pretended. In Velpeau's work there are eight plates of the vessels, but none of them show their origin or their termination. In Breschet's work the same omission is observable; hence I imagine, that if these authors had preparations, showing the fact, engravings of them would have appeared in their works. Pockels states that the omphalo-mesenteric artery and vein are formed

in the germ, and that the vesicula umbilicalis receives them; this is incorrect.

The omphalo-mesenteric artery and vein are formed upon the surface of the vesicula, and shoot alongside of the duct, into the germ, the artery terminating in the anterior small branches of the mesentery of the ileum. In the whole course of my dissections I have only once found the artery terminating posteriorly, and that was in a human embryo. The mesenteric arteries proceed towards the vena portæ; the vein enters another vein of the duodenum, near the pylorus; the veins of the intestines run

into the meseraic, which go to the vena portæ.*

The first Circulation in the Embryo.

The blood is first seen on the surface of the vesicula umbilicalis, or blastoderm. The blood-vessels proceed from its surface with the duct, into the germ. If analogy derived from the cow can be admitted in reasoning on the human species, blood-vessels are seen on the 18th day; and the heart is not formed complete until the 30th day, so that the circulation is performed as in some of the lower animals which have no hearts. The views of Professor Alison, regarding the self-moving power in the blood, are beautifully borne out by the first circulation of the germ, if it be admitted that such a power exists at all in the blood. I believe this to be the first time that the origin and termination of those vessels has been explained.

In M. Coste's "Memoir," 1834, the following statements are found:—

First,—That the ovum of the rabbit is completely free from adherence to the uterus for the first nine or ten days; that the nutrition which the embryo receives is derived from the fluids secreted by the uterus, be-

* These vessels go to form the first portion of the vascular system of the foetus, which is the vena portæ, which terminates in the liver. This will serve to explain the great size of that viscus before the heart is formed; and it is well known that the umbilical vein from the placenta, in the second circulation, terminates in that organ also. The great size of the liver in the foetus has attracted the notice of physiologists in all ages, and various conjectures have been offered to explain that phenomenon. Dr. Robert Lee, in the "Philosophical Transactions" for 1829, attempts to show that the liver is an organ which secretes albumen during foetal existence, and forms albumen for the nourishment of the foetus. The Doctor's ideas must be imaginative, and not deduced from facts; as he thus maintains that the organ performs two functions, namely, that of secreting albumen before, and bile immediately after, the birth of the child. The difference between albumen and bile is as great as between any two secretions of the body. I have dissected 135 embryos and foetuses, and have never found albumen in the gall-bladder, but a considerable quantity of gall is universally found in the cystic bag during the whole period of foetal existence. If the liver be an organ which secretes albumen for the nourishment of the foetus, I would ask Dr. Lee to explain the source of nutrition in those cases in which the liver is wanting. There are many such on record; that of Dr. Clarke, "Phil. Trans." 1793; and that of Sir B. Brodie, "Phil. Trans." 1809, are instances.

cause the small quantity of the vitellus which the ovum in the ovary contains, disappears within the first few days, and is consumed in the rapid formation of the vesicula umbilicalis membrane.

Second,—The fluid contained in the vesicula umbilicalis is a secretion, and not a nutrient fluid, because the quantity increases rather than diminishes during the early development of the embryo.

Third,—As the embryo becomes developed a small portion of the blastoderm membrane is found attached to the intestine by a very small pedicle, of which the greater portion is on the outside of the belly.

Fourth,—In the rabbit this vessel is very considerable, and the embryo, whose abdomen is turned towards it, is sunk in a depressed line in the vessel, and this becomes, by degrees, inclosed in a double bag, similar to that which is formed by a double nightcap on the head. This development of the embryo is only in the rodentia.

Fifth,—That the embryo of the other mammalia has a different origin.

Sixth,—On the ninth day we also begin to see the omphalo-mesenteric vessels passing from each side of the embryo to the inner surface of the invaginated vessel.—(LANCET, No. 628).

While reviewing those statements from M. Coste's "Memoir," I beg attention to the following observations:—

First,—That the vesicula umbilicalis is formed in the ovary, and not in the uterus; and that the vitellus which it contains does not form the membrane.

Second,—That the embryo derives its whole nutrition from the vesicula umbilicalis. The vesicula is four or five times larger than the germ, when first visible, and the vitellus diminishes as the development of the germ proceeds.

Third,—M. Coste does not specify in what portion of the intestinal canal the duct terminates. This point will be found cleared up in a former part of this paper.

Fourth,—That the vesicula umbilicalis in the rabbit is three lines in length, and one and a half in breadth. Instead of the vesicula umbilicalis being larger in the rabbit it is smaller.

Fifth,—There is no difference in the germinal origin of the rabbit and the other mammalia.

Sixth,—M. Coste does not point out either the commencement or the termination of the omphalo-mesenteric artery and vein, the description of which I have likewise formerly given.

Would it be believed that a man who had been studying embryology during eight years could, on the presentation of such a Memoir, obtain from the Institute of France a gold medal? Where are the preparations that accompanied, or ought to have accompanied the Memoir? Is there none to illus-

trate the points advanced? or has the author no other support for his views than the imaginary ideas of a man who never studied the book of nature? If he really possess proofs I fear that he has only mutilated what he had seen, for he never could have committed such errors to paper.

That the embryo of a rabbit sinks into the vesicula umbilicalis, and forms a double bag, similar to a nightcap, is an anomaly never to be found in nature. The truth is, that M. Coste never has seen the vesicula umbilicalis in the rabbit, for the vesicula is only three lines in length, and one and a half in breadth. No doubt the vesicula in the kangaroo was a wonder to him,* for he has never seen it in any other animal, not even in a rabbit, but represents the alantois for that vessel.

The preparation above described was exhibited on August the 22nd, 1837, at the Zoological Society.

Mr. Owen's paper read before the Royal Society in London, in 1834, has also attracted during the last three years a considerable share of attention in Britain, as well as on the Continent, amongst physiologists,—the exhibition of a foetus of a kangaroo and its membranes, at the middle period of gestation, which in that animal lasts 38 or 39 days, being a novelty in comparative anatomy. The appearances described were found on about the 20th day after impregnation, when, he states, "there was no placental structure, nor villi, nor the appearance of vessels in the uterus nor the chorion." Now, if the reader will examine the uterus of a mare, or a sow, he will find precisely the same appearance at the same date after copulation, up to the fifth week, in both animals, and the same appearance on the foetal membranes. It is during this period in those animals which go longer than five months in utero-gestation, that the embryo is supported or nourished by the omphalomesenteric vessels, from the vesicula umbilicalis, and not from the vascular membrane or sac, which is the alantois. Hence I doubt whether Mr. Owen ever saw the vesicula umbilicalis, or he never would have so incorrectly represented for it, *the alantois*; and it is somewhat singular that Mr. Owen should perpetuate the same error as I have previously exposed in the conduct of M. Coste.

In London's "Mag. of Nat. Hist.," 1837, Mr. Owen describes the two sacs, and the pyriform sac he calls the *alantois*. It is the vesicula umbilicalis, but he did not know it. He likewise declares that "the vesicula umbilicalis is largest in the order glires, which is next to the marsupiala, and exhibits a striking affinity to birds, &c." I do

not know in what species of rats Mr. Owen found this large vesicula umbilicalis; but I have preparations of the sow showing the vesicula eight times larger than the vesicula in rats which I have dissected; and he likewise states that the vessel is more permanent in rats than in other animals. The preparations of the human placenta in my series show the vesicula with the omphalomesenteric artery and vein at the ninth month; which is denied by Velpeau and all authorities; and I could convince Mr. Owen that it is more permanent in the human subject than in animals. What resemblance the ovum of rats bears to that of kangaroos, and the ovum of kangaroos to that of birds, it is not for me to say. I will leave Mr. Owen to illustrate that point; but if any analogy obtains, the viviparous should be compared with the oviparous, and not with the oviparous, which all authors on embryology have done. It is now many years since I demonstrated by preparations that the embryo of all animals is nourished by a vesicula umbilicalis, or yolk-bag, such as the oviparous, and not by an alantois, as has been represented by M. Coste and Mr. Owen,—the one to the Royal Institute of France, the other to the Royal Society of London, the papers respectively being read in 1834. That these gentlemen are not themselves very well satisfied with their vaunted discoveries, I collect from the fact, that they have both lately, in 1837, announced to the Academy of Science in Paris the discovery of another vesicula umbilicalis in the kangaroo; and M. Coste makes mention of the name of Mr. Owen in the discovery, but Mr. Owen never adverts to that of M. Coste. I have little doubt that before 1839 they will discover another, as all the world knows that they are both men of "great scientific research," and physiology is greatly indebted to them for their discoveries.

JOHN MILLER, Mechanic.

3, Theobald's-road, March, 1838.

VIBRATORY CYLINDERS RECENTLY DESCRIBED BY HENLE.*

HENLE scraped a little mucus from the larynx of a frog, and placed it under the microscope, when cylindrical bodies, nearly of the form of incisor teeth, of considerable size, were seen revolving slowly, while small globules moved about in every direction; in a few minutes all became still. But before motion ceased, the cause of the motion became apparent; it lay in a fringe of fine cilia, along the larger extremity of the cylinder. The cylinder presents a long body, containing a nucleus, and surmounted by cilia; but in the stomach and intestines cilia are wanting; in the mouth the long cylindrical body is flattened into a polyedric

* M. Coste saw the vesicula in the kangaroo with Mr. Owen, in London, 1837. See LANCET, No. 742.

* In an Inaugural Thesis.