Case of mylacephalous acardiac twin / by H. Ernest Trestrail. Dissection of Mr. Trestrail's case of mylacephalous acardiac twin : with notes on acardiac monsters in the museums of London hospitals / by Alban Doran.

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CASE OF MYLACEPHALOUS ACARDIAC TWIN.

By H. Ernest Trestrail, M.R.C.P., F.R.C.S., Aldershot.

On November 5th, 1888, at 9 a.m., I was called to see the second wife of a sergeant-major in the Royal Engineers (his first wife having died in her confinement), and was informed that she had just completed the sixth month of her first pregnancy, and had regular pains since 3 a.m., which came on during her sleep, and for which she could not account by anything she had done.

Upon examination, I found the feet presenting, the toes pointing backwards. I ruptured the membranes, and delivered her of a living female child, perfectly formed, which survived its birth about half an hour.

The uterus contracted well, but as it appeared to me somewhat larger than if it simply contained the placenta, I made a vaginal examination, and found a rounded body presenting, not unlike a fat shoulder. Upon following this up I came to a cross cut (see part ~~representing~~ resembling head), and was at once convinced, as the body was freely moveable, that I had to do with a monster. I proceeded, therefore, to extract it at once. The placenta followed very shortly. I kept up continuous pressure on the uterus, and there was no hæmorrhage. There was only one placenta. The cord of the monster was connected with that of the child, there being only one insertion.

The patient made a rapid recovery. Her age is twenty-six years. She had been married eleven months. She was certainly somewhat larger than is usual at six months. The labour lasted seven hours. Her husband says that she was frightened by a parrot about the end of May.

His first wife was nineteen when she married. Her

first child was born dead. She was confined a second time in North America, and died on the tenth day of "inflammation of the womb." A midwife of little experience attended her, a doctor only seeing her shortly before her death. The only symptoms the husband remembers are that she had great abdominal pain, sickness, and was delirious for the last day or two. The child was perfect, and lived nine months.

DISSECTION OF MR. TRESTRAIL'S CASE OF MYLACEPHALOUS ACARDIAC TWIN, WITH NOTES ON ACARDIAC MONSTERS IN THE MUSEUMS OF LONDON HOSPITALS.

By Alban Doran.

Mr. Trestrail's specimen weighed thirteen ounces when fresh. In long diameter it measured five inches and a half. Its form is indicated in the annexed sketch, which I made before dissection. The surface was of a dull pink colour, like an infant's skin. By the aid of the lens I detected short, fine hairs, especially towards each extremity. There was no trace of a hairy scalp, such as has been seen in otherwise acephalous acardiacs. I cut a small square piece out of the œdematous integument, and allowed the specimen to soak for six days in equal parts of methylated spirit and water. Sections were made of the square piece of integument.

Owing to the extreme nature of the arrest of development, the dissection proved difficult, as I feared throughout that I might accidentally cut into some important structure. I have to thank Prof. C. Stewart and Mr. F. S. Eve for advice and assistance. I made a vertical incision along the side of the fœtus where the umbilicus lay. The incision was prolonged upwards, avoiding the umbilicus and the fleshy wattle (Fig 1, *Wat.*) and curved round towards the site of the head. Then it was prolonged downwards towards the foot. The integuments were then reflected; the subcutaneous tissue was very thick. The action of spirit has made it look much thinner.

Close behind the umbilicus I came on a mass of dense granular fat, and on dissecting through it I found a large solitary kidney. This organ bore hardly any indications of lobulation. Immediately in front of that organ was a

membranous pouch ; this I opened, it proved to be peritoneum and contained intestine. The kidney lay in the hollow of a curved cartilaginous body, which ended anteriorly in a pointed extremity a little above and in front of the umbilicus. Below the kidney the cartilage was prolonged forwards as a nodular mass, bearing in front of it ; immediately below the peritoneal pouch, a cartilaginous bar, which was united to the nodule by a distinct articulation (Fig. 2, *Cart. artic.*). A moveable articulation connected the main cartilage with a long cartilage which proved to be the femur. The fascia lata was conspicuous, the muscles very pale, and the anterior crural nerve distinct ; a large vessel accompanied it.

On parting the edges of the deep natural cleft (Fig. 1) I discovered a small fleshy elevation. One eighth of an inch below it was a circular opening, into which a stout bristle could be passed for nearly three quarters of an inch, entering the rectum. The elevation was a clitoris and prepuce (as the other twin was female, it may be concluded that this monster was of the same sex). A deep groove ran between the clitoris and the opening. Half an inch behind the opening a firm point, a process of the main cartilage, could be felt beneath the integument, and appeared to represent the coccyx. The half-inch tract may be considered as analogous to the perineum, not homologous, since the rectum opened in front of it, not behind (see Fig. 3).

I dissected up the kidney, and found behind it large nerves issuing from the main cartilage and uniting to form the great sciatic. A large vessel ran from the hilum to the umbilicus. This vessel sent a few small branches towards the main cartilage, backwards and downwards ; it was the sole trunk-vessel in the whole subject. A single narrow duct ran from the hilum of the kidney, and was lost in the integuments behind the genital groove. It was evidently the ureter.

The intestines consisted of the entire large intestine with a well-formed mesentery. The greater part was in the

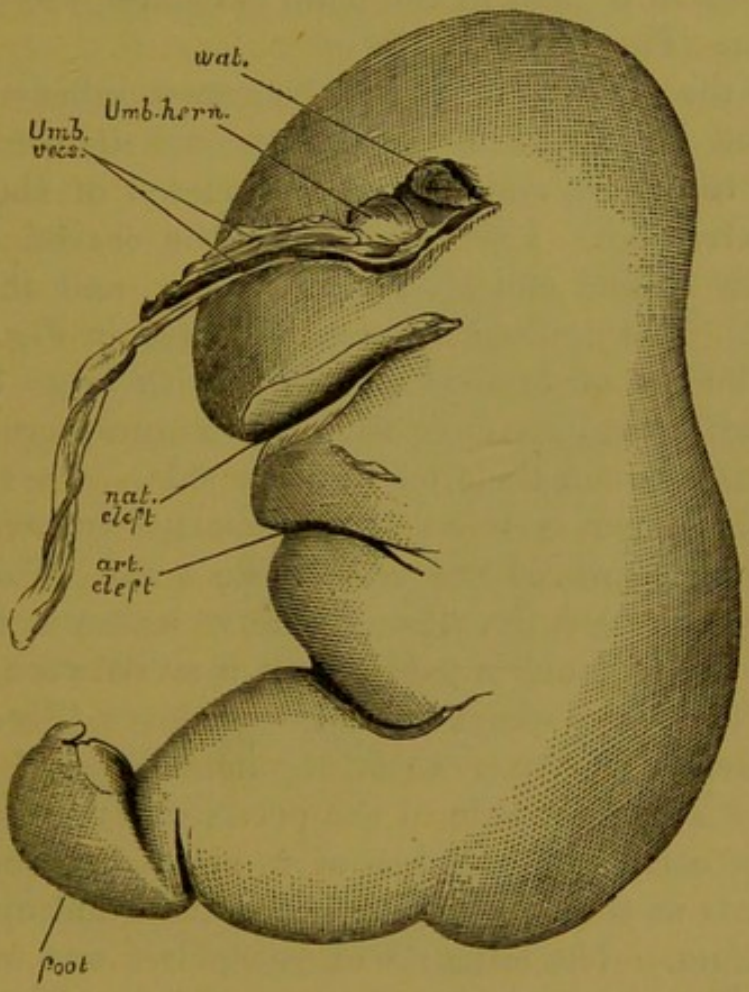

FIG. 1.—ACARDIACUS MYLACEPHALUS. Sketched before dissection. *Umb. vess.* The two vessels (one artery and one vein) in the cord. *Umb. hern.* Hernial pouch at attachment of cord (it contained the greater part of the large intestine). *Wat.* Fleshy wattle, nature uncertain. *Nat. cleft* (see Fig. 3). Deep cleft in which external genitals and cloaca lay concealed. *Art. cleft.* Superficial or artificial cleft, disappearing on extension of parts.

hernial sac (Fig. 1, *Umb. hern.*). The cæcum and vermiform appendix were conspicuous, a short piece of small intestine was traced from the cæcum, it was lost in the wall of the hernial sac. The rectum passed under the peritoneum in a fossa in the main cartilage, and opened at the cloaca (Fig. 3, *Clo.*).

After the exposed parts had become toughened in spirit I directed Mr. Pearson, the professional dissector at the College, to expose and clear the skeleton of the solitary lower extremity. I then dissected the curved cartilaginous body behind and above the kidney, and the nodule below it. The appearances are indicated in Fig. 4.

Two bodies of lumbar vertebræ, with large interarticular cartilages, were exposed. The anterior crural nerve rose from between them on the left side. On the right side of the upper vertebra was a distorted transverse process turning upwards and resembling a rib. The sacrum was large; the left great sciatic nerve arose, in the usual manner, from branches passing out from between its foramina. The sharp point behind the cloaca (Fig. 3, *Coc.*) was evidently the coccyx; it lay immediately below the sacrum. The right side of the pelvis was represented by a piece of cartilage an eighth of an inch long, and curved downwards at the end, evidently the crest and upper part of the ilium. The left side of the pelvis was well developed. The crest of the ilium was high. The nodular mass below the kidney (Fig. 2) proved to be the ischium, the articulated cartilage in front of it was the os pubis, the three elements of the innominate bone being, of course, quite distinct from each other. The obturator foramen was well marked. The femur was two and a quarter inches long. The patella could be felt in the quadriceps tendon. The tibia was an inch and three quarters long, the shaft was straight. The fibula was well formed, the external malleolus large. The tendo Achillis was stout. There were four toes; the great toe was well developed, but rather short. Two other toes were long, with distinct articulations. The fourth lay between them, it was

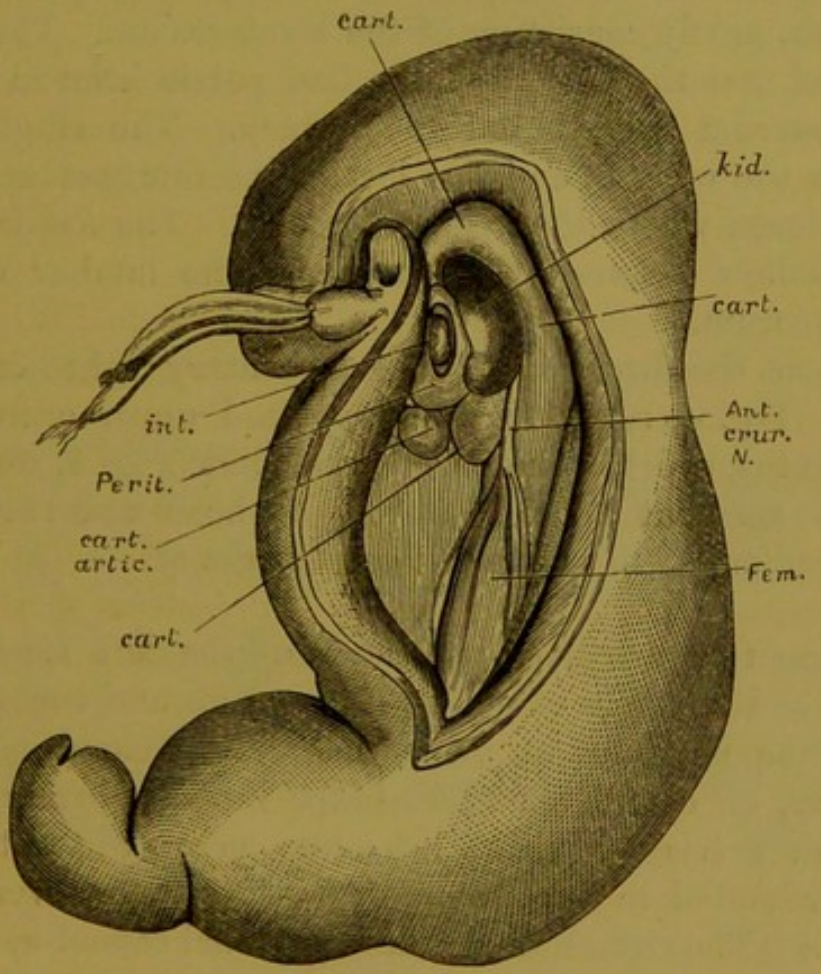

FIG. 2.—ACARDIACUS MYLACEPHALUS. Sketched after the reflexion of the integuments. *Cart.* Cartilaginous structures. *Cart. artic.* Cartilage apparently united by a moveable joint to those structures. *Fem.* Femur, also articulated to *cart.* *Kid.* Kidney. *Perit.* Peritoneum, with an incision exposing *int.*, intestine. *Ant. crur. N.* Anterior crural nerve.

thin and ill developed. Extreme talipes equino-varus existed.

The gap between the left os pubis and the point of the rudimentary right innominate bone was filled up by the rectum, which was enclosed in a fairly developed muscular sheath, partly consisting of the levatores ani. The rectum passed first through the imperfect pelvic brim in front of the sacrum and behind the kidney. The single ureter lay in the rectum, and was lost in the integuments behind the cloaca where the rectum opened. The kidney lay in the hollow between the ilium and the lumbar vertebræ and sacrum.

From the direction of the rudimentary right innominate bone (Fig. 4, *r. p.*), the blunt-pointed upper extremity of the fœtus, overhanging the genital cleft (Fig. 1, *Nat. cleft*), must represent not the site of the head and thorax but the rudiments of the left lower extremity.

Thus this acardiacus consisted of the left lower extremity and left side of pelvis, the sacrum and coccyx, large intestine pervious to its outlet at the cloaca, and left kidney, all complete. The lower lumbar vertebræ, right side of pelvis, and small intestines were rudimentary, the ureter ended in the integument, the clitoris overhung a cloaca. The right kidney, the suprarenal capsules, bladder, uterus, ovaries, upper abdominal viscera, upper lumbar vertebræ, dorsal and cervical vertebræ, upper extremities, and the thorax and its contents, with the cranium and its contents, were absolutely wanting. A blunt point of flesh represented the right lower extremity.

I have classified this monster under St. Hilaire's subclass "mylacephalus," which lies between "amorphus" and "acephalus." As the left leg was well formed it could not be called "amorphus." On the other hand, "acephalus" is generally understood to imply acardiacs where both legs are fairly formed, or, at least, sireniform, the pelvic and lower abdominal viscera being fairly developed. Mylacephalus implies that the head, or more or

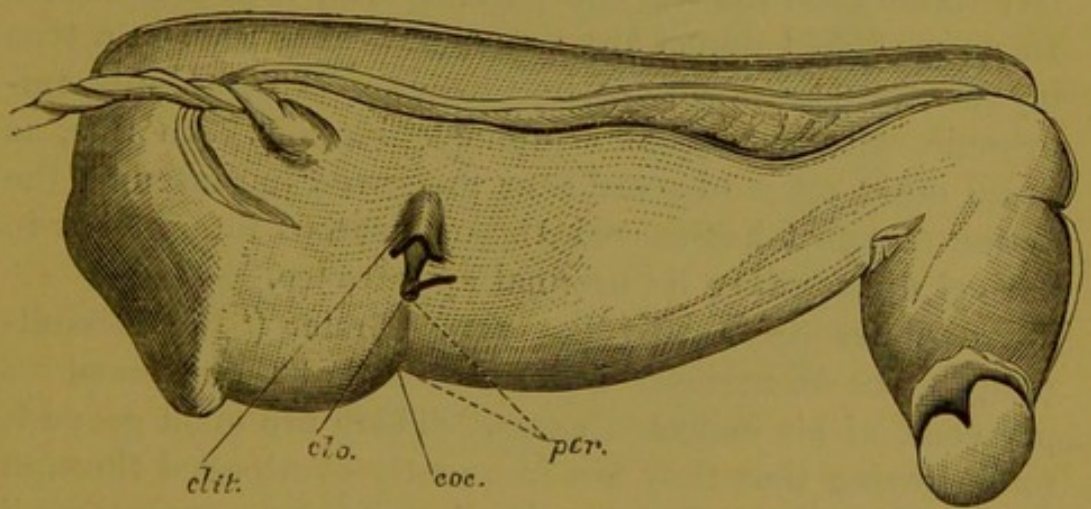

FIG. 3.—ACARDIACUS MYLACEPHALUS. Lateral view, with the cleft (Fig. 1, *nat. cleft*) left open. *Clit.* Clitoris. *Clo.* Cloaca, with bristle. *Coc.* Coccyx. *Per.* False perineum. The long incision, made for inflecting the integuments, is indicated.

less of the thoracic, abdominal, or pelvic viscera, are badly developed or entirely absent. The amorphous type, in fact, prevails, as in this case.

I have managed to get two good sections of the œdematous integument of the acardiacus prepared, and I exhibit them this evening. The true epidermis is thin. A layer of long fusiform cells beneath it seems to represent the muscularis mucosæ. The hair-follicles are ill developed. The thick layer of subcutaneous tissue is condensed close to the epidermis, thus accounting for the toughness of the skin in this case. It is very loose in its deeper part. It contains a great quantity of elastic fibres. The connective-tissue cells are very large and oval, with big nuclei. In no part do I detect any tissue such as is seen in a true myxoma. The structure in this case is essentially embryonic, with somewhat atrophic epidermis. In this, as in all other cases of acardiacus preserved in museums, the action of spirit has caused the œdematous integument to shrivel up, spoiling its original appearance.

Acardiacs are relatively rare. Förster ('Die Missbildungen des Menschen,' 1861) states that they formed 18 per cent. of his collected cases. There are good grounds for believing that they are frequently overlooked through being taken for "fleshy moles" or "false conceptions." Dr. A. Russel Simpson once ordered a suspected case to be disinterred ("The Acardiac Fœtus," 'Trans. Edin. Obstet. Soc.,' iv, 384. Contributions to 'Obstetrics and Gynæcology,' 1880, p. 23). It proved to be what he expected, but many other cases must have been thrown away. Some writers confound this form of monstrosity with anencephalus, a totally different condition, where the cranial vault remains open and the brain is more or less deficient.

Anencephalus is common, and cannot escape the notice of the midwife or obstetrician, as the aspect of the face is peculiarly hideous, and the body often large. A monster born without any limbs (amelus), or with arms but no legs (apus), must not be mistaken for the very rare acar-

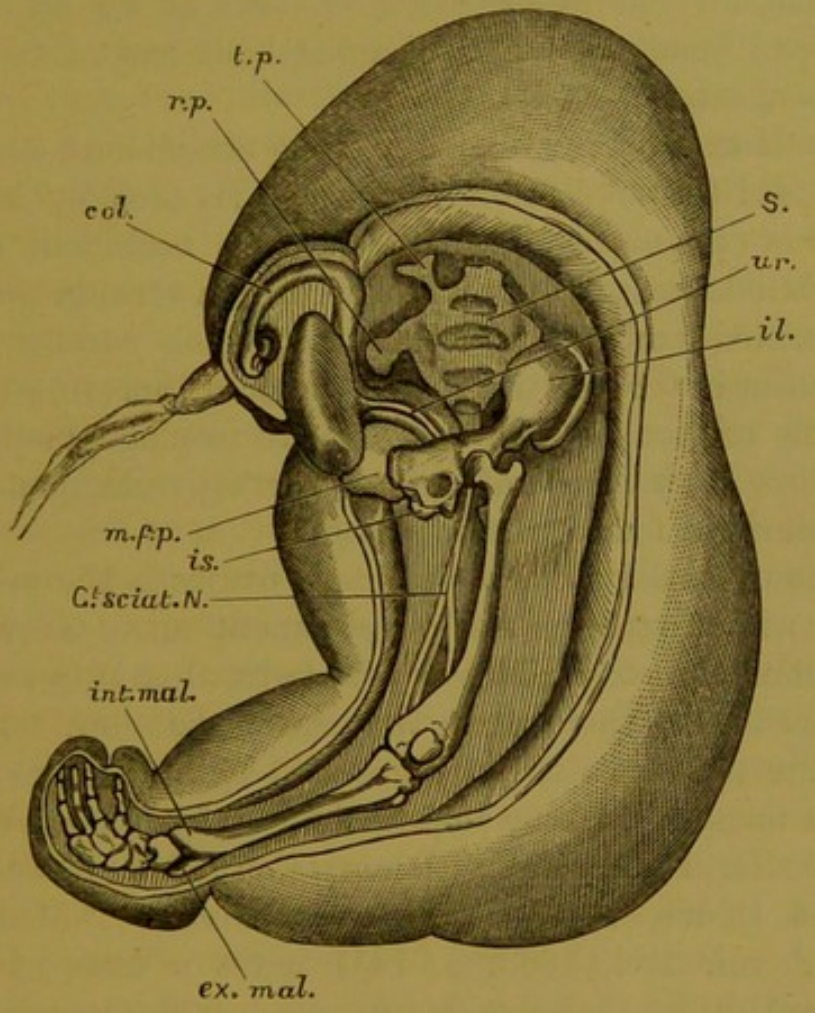

FIG. 4.—ACARDIACUS MYLACEPHALUS. The dissection commenced in Fig. 2 is here complete. *S.* Sacrum, with two lumbar vertebræ. *tp.* Malformed transverse process of a lumbar vertebra. *r. p.* Rudimentary right side of pelvis. *il.* Ilium. *is.* Ischium with os pubis above it. The femur, patella, tibia, and fibula are displayed. *ex. mal.* External malleolus. *int. mal.* Internal malleolus. *col.* Colon, lying on reflected flap of skin which includes insertion of umbilical cord. The cæcum and vermiform appendix lie over the hernial pouch. *ur.* Ureter, lying on rectum, which curves downwards, and lies covered in *m. f. p.* Muscular floor of pelvis, on its way to cloaca (Fig. 3, *Clo.*).

diacus acormus. In amelus the pelvic and abdominal viscera may be more or less deficient, but the head and neck are well formed, and the umbilical cord is present. Acormus, on the other hand, consists of an imperfectly developed head with a small amorphous bag of flesh ; the cord is absent.

The distinguishing feature of the acardiacus, according to Ahlfeld ('Die Missbildungen des Menschen,' 1880), is that it is connected, either through its umbilical cord or its umbilical vessels, with the cord of a strong, generally well-formed embryo, the heart of which carries on the circulation in the acardiacus. It should therefore be more correctly termed an allantois-parasite or placenta-parasite. A rudimentary heart, atrophied through changes in the circulation, is found in some cases.

Circumstantial evidence strongly confirms the prevalent theory which explains the development of an acardiacus. This monster is invariably a true twin, that is, an embryo developed from the same ovum as its brother. In such cases the sexes of the twins are said by authorities on the subject to be invariably identical.* I find, however, that Dr. W. H. Dickinson ("Description of a Fœtus born without Heart, Brain, Lungs, or Liver," 'Med.-Chir. Trans.,' vol. xlvi, 1863, p. 141) notes a case, of which more will presently be said, where a healthy female infant was born, the acardiacus being a male. Sir Astley Cooper was one of the first to detect an inversion of the circulation in the acardiacus, its umbilical artery being a branch of the same artery in the brother. Claudius and Ahlfeld have further investigated this theory. When in one-yelk twins the allantois of each brother reaches the chorion, a

* See Kleinwächter's valuable work on the physiology, teratology, and obstetrics of twins ('Die Lehre von den Zwillingen,' Prague, 1871). "In all those cases," he writes, "where the chorion is single, whether the amnion be single or double, the embryos are of the same sex." Arneth claims one exception. Meckel von Hemsbach believes that contrary assertions are based on error or illusory appearances; Hunter also noting that in twin calves developed from one yelk it not rarely happens that both are males, but that in one the genitals are imperfectly developed.

St Barts H. Museum 1299 E "Single placenta: Twins of different sexes" D.W.S.A. Griffith (List of additions 1906

common placenta is formed, with the two cords inserted far apart. Each twin has then an equal chance of development. When the allantois of one embryo grows faster than its brother's, the former allantois may more or less completely monopolise the chorion. The losing allantois can then only insert itself into the gaining allantois. The vessels in each allantois are brought into communication with each other. The umbilical cord of the twin whose allantois reaches the chorion develops well. The cord of the other twin fails to develop thoroughly, and forms a mere branch of the perfect cord. As its vessels anastomose with those of the perfect cord, the fœtus to which it is attached can only receive blood from its brother. The heart of the brother with the perfect cord propels blood into the vessels of the other twin, which is destined to become an acardiacus. The current goes backwards through the umbilical arteries, up the primitive aortæ to the rudimentary heart. That organ cannot develop, and, owing to the abnormal course of the circulation, only the lower parts of the body have much chance of development in the commoner varieties of acardiacus. When the cord of the acephalus is inserted partially on the placenta or into its brother's cord very near the placental attachment of the latter, the monster will be fairly developed. The nearer the attachment of the cord lies to the fœtal insertion of the normal twin's cord the more imperfect will be the acardiacus. In very rare instances there is no cord to the acardiac twin, its allantois having been so much intercepted that the embryo only touches its brother by its membranes. Circulation is then established through the membranes, and only those parts which lie above the heart can develop. Then the monster becomes an acormus, an imperfect head without a trunk.

The circumstantial evidence in favour of the above theory, lucidly demonstrated with the aid of diagrams by Ahlfeld in his work already quoted, is strong. The parasitic nature of the cord of the acardiacus, a mere branch of its brother's cord, has repeatedly been observed. It

existed in Mr. Trestrail's case. The inversion of circulation has been satisfactorily demonstrated. Hypertrophy of the heart of the well-developed fœtus has been noted. This condition was observed in a case described by H. Meckel, where there was a third twin in a separate ovum. The subject of close insertion of twins' cords into the common placenta, and its effects on development, is ably treated by Schatz.*

The inversion of the blood-current greatly affects the venous circulation in the acardiacus ; hence much stasis and consequent hypertrophy and œdema of the connective tissue. Cavities form in that tissue, and sometimes convert the monster into a shapeless mass. Acardiacs are rarely born in first labours (Geoffroy St. Hilaire) ; but the mothers in Mr. Trestrail's case, and another in St. George's Hospital, were primiparæ. The perfect twin is generally born first. The liquor amnii is usually abundant.†

Only two undoubted cases of acardiacus have been shown before the Obstetrical Society (Dr. Schofield, vol. xxi, Mr. F. Cookell, junr., vol. xxv). The nature of Dr. Gervis's "rare form of monstrosity" in a twin (vol. x) is not described. The "acephali," vol. viii, p. 316, and vol. xvi, p. 140, were anencephalous monsters. Dr. Lusk, in his well-known text-book, and Dr. A. R. Simpson (loc. cit.), figure the most frequent form of acardiacus. Rarer forms are given in Förster and Ahlfeld's works.

Before describing specimens of acardiacus, I will briefly explain the classification of its varieties. I feel bound to reject allied forms of monstrosity, included by Ahlfeld, such as epignathus (acardiac attached to the oral cavity

* "Die Gefässverbindungen der Placentakreislaüfe eineiiger Zwillinge," 'Arch. f. Gynäkologie,' vol. xxiv, p. 337, and vol. xxix, p. 419. This monograph is illustrated by fine coloured drawings of placentæ.

† Mr. Trestrail's patient was "certainly somewhat larger than is usual at six months." See Schatz, "Ein besondere Art von Polyhydramnie mit anderseitiger Oligohydramnie bei eineiigen Zwillingen," 'Arch. f. Gynäk.,' vol. xix, p. 329. The influence of the relative amount of liquor amnii on the weight of organs is very marked in his tables. See also Küstner, "Ueber Hydramnion bei eineiiger Zwillingen," ib., vol. xxi, p. 1.

of the brother, a more extreme condition than that already noted as explaining acormus. A cord may exist, running into the brother's cranium). Otherwise it would be hard to put aside some still more divergent types, as congenital sacral tumour and parasitic fœtus.

The varieties of acardiacus proper are:

AMORPHUS or ANIDEUS.

MYLACEPHALUS.

ACORMUS.

ACEPHALUS (var. *sympus, monopus, dipus, monobrachius, dibrachius*).

ANCEPS, or PARACEPHALUS.

ACARDIACUS AMORPHUS.—This variety forms a shapeless mass covered with skin; sometimes a tract of hairy scalp is seen. The subcutaneous tissue is very œdematous, with cystic cavities. Rudiments of the pelvis and adjacent bones may exist, with a few coils of intestine, blind at each end. The heart is never present. The cord is short, and never bears more than two vessels, one artery and one vein; in some cases it is absent, the vessels running from the brother through the membranes, as in acormus. I can find no genuine amorphus in any London museum. Sir W. Turner informs me that an amorphous sheep is preserved in the Museum of Edinburgh University. It forms "a rounded mass covered with wool, quite amorphous, but with an umbilical cord."

A. MYLACEPHALUS.—Ahlfeld has discarded this variety, I think without sufficient reason. It conveniently includes all cases where the head is an amorphous or very rudimentary process or even absent, one or both lower extremities present or very rudimentary, the subcutaneous tissues markedly œdematous, and the cord with two vessels as in amorphus. The specimen 241-2 in the College of Surgeons is a true mylacephalus. I have explained why I classify Mr. Trestrail's case under the same head. It is now in the College Museum (240A, Terat. ser.).¹⁾

A. ACORMUS.—This variety should only include acardiacs

¹⁾ See "Acardiacus Mylacephalus" shown by Alban Doran for Dr Walter Lowe & Mr Harvey Bradbury." Trans Obstet. Soc. vol 37. p 209.

chiefly consisting of an ill-formed head, directly connected with the membranes and devoid of any umbilical cord. Its physiology has been already explained. It is exceedingly rare, no specimen exists in any London Museum.*

A. Acephalus.—This is the commonest variety of acardiacus. All parts around and below the pelvis are more or less distinctly developed,† and there may be a thorax, always fissured in front, and even an imperfect heart. The cord has two arteries and one vein, or one artery formed by the junction of two distinct arteries at the umbilicus. Acephalus generally appears as a ball of flesh with two legs. The thighs are usually more œdematous at the groin than at the knee, so that the limbs appear as though dressed in the trunk-hose worn in the reign of James I. Umbilical hernia is very common in this variety. Mr. Trestrail's case might be classified by some authorities under a sub-variety, acephalus monopus; but the rudimentary condition of the viscera and the vascular supply of the cord refer it (and most cases of monopus similarly undeveloped) to mylacephalus.

* In reply to a letter of inquiry concerning specimens of acardiacus in Edinburgh University, Sir W. Turner described one example in that collection as follows:—"Head well developed; neck present; trunk about size of a small orange; no trace of extremities. Specimen not dissected." To fresh inquiries for more minute particulars, the same anatomist very kindly wrote as follows:—"The specimen is the nearest approach to a trunkless fœtus in the human subject that we possess. The limbs show no trace of their presence on a surface view, but, as I stated in my former letter, the specimen is not dissected, so that I cannot say if some rudiments may or may not be present subjacent to the skin. For the same reason, I cannot say whether the heart is there. It cannot be said to be without a trunk, for as much is present as is equal in size to a small orange. The head, neck, and trunk somewhat resemble fig. 597 in Vrolik's article, "Teratology," in Todd's 'Cyclopædia,' only the upper limbs are absent. I see no trace of an umbilical cord. The specimen is without history." I hope to have an opportunity of examining this specimen. In some respects it appears to be an amelus (see p. 10) rather than an acardiacus acormus. Vrolik's case, to which Sir William Turner refers, was an apus, with a very long cord twisted round its neck.

† The liver is generally absent. This defect of development has not been satisfactorily explained. Strange to say, as Dr. W. S. A. Griffith has pointed out, meconium may be found in the bowels where no liver exists.

Ten specimens of acephalus proper in the human fœtus* are to be found (1888) in London museums. [Royal College of Surgeons' Museum, 238, 239, and 240 (the last two being sections of one specimen). St. Bartholomew's Hospital, 3435 and an unmounted specimen. St. Thomas's Hospital, LL 21, LL 21[1]. St. George's Hospital, 17 D and 23 B. Guy's Hospital, 2539[35]. London Hospital, O 79.]

Acardiacus Anceps.—This variety includes acardiacs with more or less perfect trunk and extremities, and with a distinct trace of a head. Ahlfeld asserts that the heart is always present, and that as columnæ carneæ are found there must be a double circulation, from the acardiac's rudimentary heart and from the perfect heart of the brother. An anceps is to be seen at St. George's Hospital (23 A), but it has no heart (Fig. 7), Acardiacus anceps (or paracephalus) must be distinguished from perocephalus, where the trunk and limbs may be perfect, whilst the head is reduced to a pair of ears or a trace of cranium with a few facial bones. The heart is perfect, and the monster is not necessarily a twin. True perocephalus is almost, if not entirely, confined to the lower animals. See Gurlt, 'Missbildungen der Thieren.'

I will now give a short description of each of the specimens of acardiacus in London museums. I must here express my thanks to the curators and other gentlemen for kind assistance in finding the specimens, and for granting me permission in some cases to draw them. In every case I have inspected the specimens myself. Altogether thirteen human acardiacs are to be found in London. None are as yet at hand in the museums of Charing Cross, Middlesex, St. Mary's, and Westminster Hospitals, nor in University and King's Colleges.

Acardiacus Mylacephalus. (Museum of the Royal College of Surgeons).—Firstly, Mr. Trestrail's case, also No. 241–2, Teratological Series. Mr. B. T. Lowne has de-

* Of specimens from the lower animals I find:—Mylacephalus, R. C. S., 243-4 (calf); acephalus, R. C. S., 245-6 (lamb); St. George's Hospital, 17 E (cat).

scribed this case very fully in his catalogue of the series. It forms a large elongate, ovate mass, with a hairy scalp and distinct occipital bone, and a spinal column, the spines of which form a long continuous rod of cartilage, a primitive condition highly developed. (Fig. 5.) Tympanic cavities exist; the thorax is filled with areolar tissue. A pharynx, pervious œsophagus, stomach blind at the pylorus, a quarter of an inch of small intestine blind at both ends and entirely unconnected with the stomach, a large intestine pervious at the anus, horseshoe kidney, Wolffian bodies and bladder, aorta, pneumogastrics and sympathetic ganglia exist, also an imperfect left lower extremity (242). The development and size of the Wolffian body is very remarkable. The sex is not indicated. The other twin was well formed. This specimen, which is mounted in two sections, is deserving of more study. Why so much is developed, and at the same time so much undeveloped, in every region of the subject, it would be interesting to discover. The development of an acormus or an acephalus is far easier to understand.

Acardiacus Acephalus. (Museum of the Royal College of Surgeons.—No. 238,* Terat. Ser., is a male fœtus with an œdematous trunk and rudimentary left arm; the other extremities are better formed. The spine has been exposed behind; it has a single curve with its convexity backwards, and consists almost entirely of cartilage. The cord is displayed. The body has been distorted by bad mounting.

239–40. A well-dissected specimen in two sections, organs of generation too imperfect to denote the sex. The right arm is ill-developed and ends in a single nail, the leg bears three toes; there is a left leg but no left arm.

* It is not stated in the catalogue that this specimen and 239-40 were developed in twin pregnancies; but that kind of gestation is implied in Mr. Lowne's general observations on amorphous fœtus (p. 59). Again, in the description of some of the cases in the catalogues of other museums, nothing is said about twins, but only in cases where there is no history of any kind.

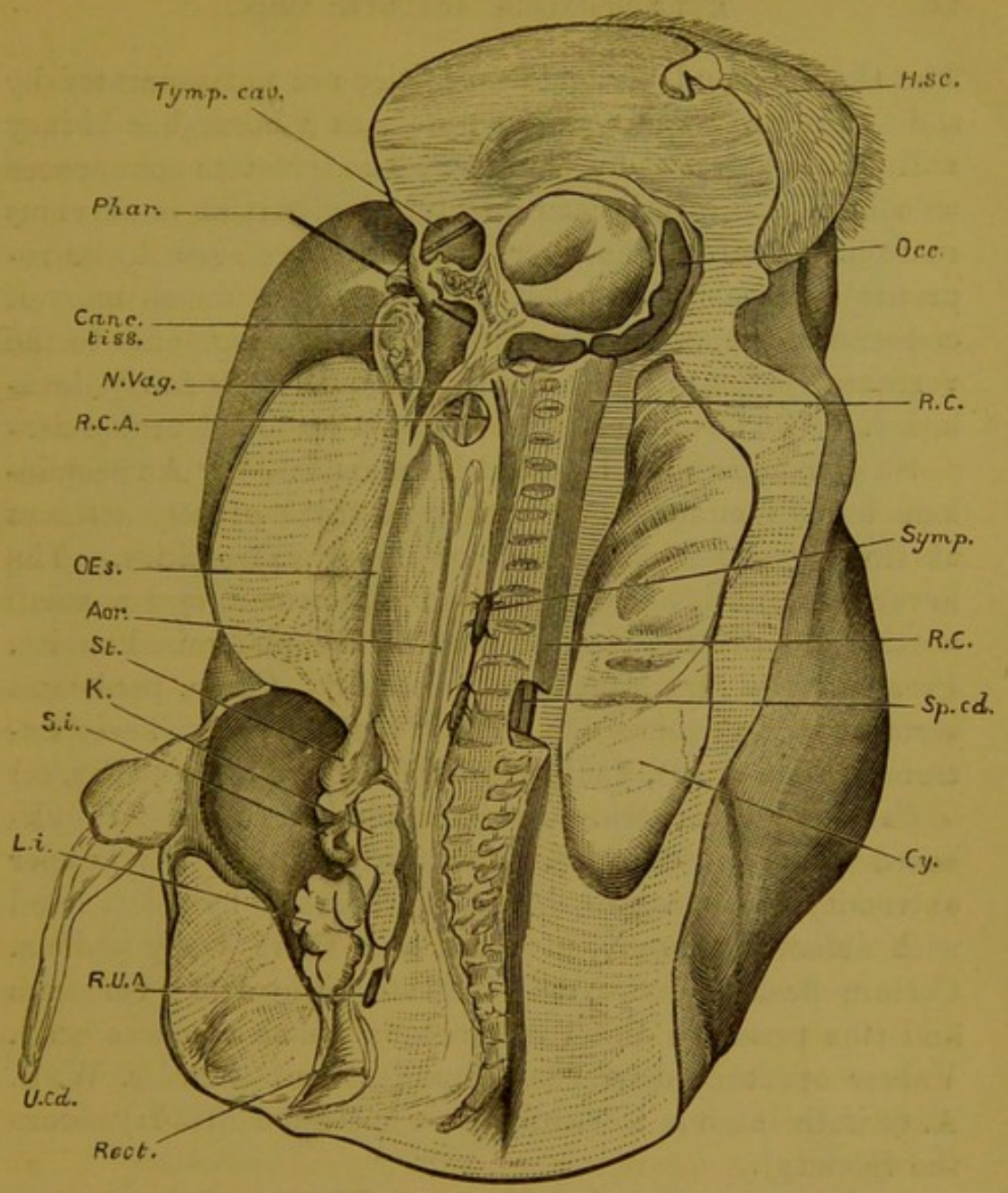

FIG. 5.—ACARDIAC TWIN (true MYLACEPHALUS). *Mus. R. C. S.*, Teratol. Ser., No. 241. Right half. *H. sc.* Hairy Scalp. *Occ.* Occipital bone. *Tymp. cav.* Tympanic cavity, containing a glass rod. *Phar.* Bristle passing into pharynx. Below and above pharynx is cancellous tissue (*canc. tiss.*), probably representing the jaws. *R. C.* Rod of cartilage representing the spinous processes of the vertebræ, "probably the remains of the unsegmented investing mass highly developed" (*Lowne*). *Sp. cd.* Cord in portion of spinal canal exposed by dissection. *R. C. A.* Right carotid artery. *R. U. A.* Glass rod passed into right umbilical artery. *Œs.* Œsophagus. *Aor.* Aorta. *N. Vag.* Right pneumogastric nerve. *Symp.* Ganglion of sympathetic. *St.* Stomach. *S. i.* Small intestine. *L. i.* Large intestine. *Rect.* Rectum. *K.* Kidney. The Wolffian body and duct lie hidden behind the intestines, which bulge into the peritoneal cavity. *U. cd.* Umbilical cord; a thin-walled pedunculated cyst lies in front of its insertion. *Cy.* Cystic cavities in œdematous tissue.

The thoracic and abdominal cavities are not separated by a diaphragm. The acardiac possesses a horseshoe kidney with two ureters, and a bladder. The intestine commences as a blind sac in the cord and terminates in an impervious rectum. There is no liver, and the lungs seem to be represented (according to Mr. Lowne) by a dense mass of connective tissue. There are twenty-two segments to the vertebral column, and a cord. The pelvis is fairly developed. The head is represented by a knobbed proboscis.

St. Bartholomew's Hospital Museum, 3435. "An acephalous human monster. There is no trace of any attempt at the formation of a head or upper extremities. The lower extremities are large and malformed, and a small portion of intestine may be seen in the abdominal cavity. Presented by Dr. Matthews Duncan." (Male, penis and scrotum well developed. Long "trunk-hosed" lower extremities see p. 16), double varus, defective toes. (Fig. 6.)

Unmounted specimen.—Large acephalous fœtus. "Trunk-hosed" lower extremities. Feet fairly formed. Left upper extremity phocomelous, being represented by a left hand with defective fingers, mounted on a short fleshy pedicle. Certain fleshy wattles may indicate right arm; vertebræ and ribs present; thick œdematous tissue replaces head. Vulvar aperture distinct. (I understand that Dr. W. S. A. Griffith intends to exhibit this specimen (3435A) before the Society).

St. Thomas's Hospital Museum, LL 21. "A monster consisting of the lower half of the body" (good description follows). Both lower extremities fairly developed, double varus, toes imperfect on right foot. Vertebræ, spinal cord, and some ribs present. Cyst in back; it had no connection with the spinal canal, and evidently resulted from œdema (see p. 14). External (male) organs well formed. No arms, no trace of head.

LL 21[1]. Large undissected acephalous monster, apparently female. "Trunk-hose" appearance very marked, legs tapering to ankle. Double varus, three toes to feet. Trunk very œdematous, almost spherical; no trace of head

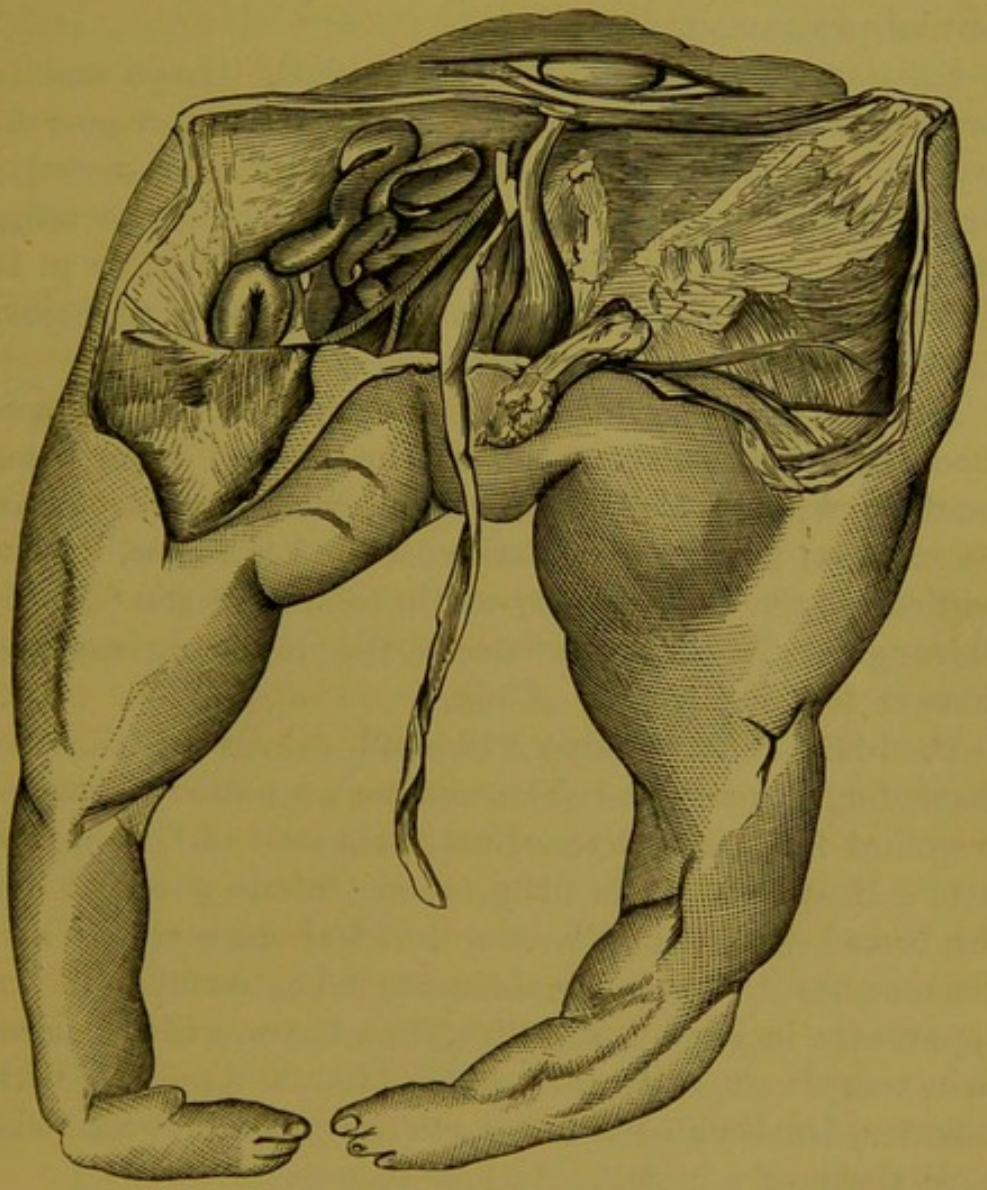

FIG. 6.—ACARDIACUS ACEPHALUS. *Mus. St. Barthol. Hosp.*, Path. Ser., No. 3435. The rudimentary trunk has been laid open and roughly dissected, exposing coils of intestine and the hypogastric artery on the right side; on the left nothing is seen except a vessel, and muscles cut across in an irregular manner. The relation of the umbilical cord to the structures in the abdominal cavity is indistinct. The penis and scrotum are flattened and pushed to the left. The lower extremities are almost equally developed, the feet much deformed. This specimen is a good example of the most frequent form of acardiac twin.

or arms. Umbilicus central and symmetrical, double hernial protrusion.

St. George's Hospital Museum, 17 D. Legs and feet large, arms fairly developed. *Male* external organs well formed. A tubercle indicates the head.* Presented by Dr. Blakeley Brown. This is the case where the normal twin was a *female*, described by Dr. Dickinson (see p. 12). The patient, as in Mr. Trestrail's case, was a primipara; this is unusual in cases of acardiacus.

As it is contrary to all experience that the ~~amorphus~~ acardiac should be of a different sex to the normal twin, I have recently written to Dr. Dickinson, who has very kindly taken great pains to recall the facts of the case. In the original paper in the forty-sixth volume of the 'Medico-Chirurgical Transactions' occur the following sentences relative to the disparity of sex:

P. 141. "The being, like all others of the same character, was a twin. The mother, an unmarried woman pregnant for the first time, was delivered in Queen Charlotte's Hospital. A healthy female infant was first born, the breech presenting." . . . After some words about the monster, the author continues, "The female child was apparently in good health." Thus the sex of the normal twin was dwelt upon. At page 142, in referring to the monster, Dr. Dickinson states: "The genital organs, which were those of a male . . . . were natural."

Dr. Dickinson wrote to me, December 15th, 1888: "The fœtus in question was brought to the museum by the late Dr. Blakeley Brown, who, being dead, cannot be appealed to. He was a very accurate man, and I took down the particulars from his lips, and I should have no

* "On its (the trunk's) front surface, in the median line, at a short distance from the upper end, was a small prominence of a reddish colour, which, from the fact of its being clothed with papillæ, was believed to represent the tongue."—Dr. Dickinson, loc. cit. The opinion that the "tubercle" represents the head seems to have been derived from the author of the catalogue. Perhaps the "tubercle" has been once more examined since Dr. Dickinson's paper was written. It is quite unlike the soft round mass representing the head in the specimen of acardiacus anceps, 23 A, in the same museum.

doubt they could be relied on." The register for 1862—1863 at Queen Charlotte's Hospital only mentions the fact of twin labour, without any comment. Dr. Dickinson's evidence, however, is strongly in favour of disparity of sex, for he twice employs the word female in reference to the normal twin, and he notes the fact that the monster was a male, as may be verified by inspection of 17 D., St. George's Hospital Museum. The possibility remains, however, that Dr. Blakeley Brown might have taken a male fœtus with imperfectly developed external organs for a normal female.* He would naturally take more pains in examining the monster than in the inspection of the live "healthy female infant."

23 B. "A fœtus of about the sixth month, consisting entirely of lower extremities and abdomen. The trunk ends, a little above the umbilicus, by a rounded surface covered with skin. The cord remains attached to the umbilicus." Female sex, labia and clitoris well marked; this point is not indicated in the catalogue.

Guy's Hospital Museum, 2539^{35}. Head, thorax, and arms wanting; rudiments of intestine, including vermiform appendix. Two kidneys. "Trunk-hosed" lower extremities. Sex apparently female. Rather large specimen.

2539^{40}. "Acephalous fœtus," in catalogue. This specimen is no longer in the Museum. I understand that it was rejected or exchanged many years ago by Dr. Hilton Fagge.

London Hospital Museum, O 79. Acephalous fœtus, male. Phocomelous left upper extremity, as in the unmounted specimen in St. Bartholomew's Hospital Museum. Two kidneys; intestines rather long. "Trunk-hosed" appearance of lower extremities.

Acardiacus Anceps, or Paracephalus. (St. George's Hospital Museum, 23 A.)—A soft round mass represents the head. The tongue is present. A large dorsal vessel communicates with the umbilical cord, but there appears to be no trace of a heart. (This is contrary, I

* See footnote, p. 12.

admit, to Ahlfeld's definition of anceps.) There are two kidneys. There is no right arm, and the left is imperfect. The lower extremities are "trunk-hosed;" double varus; toes imperfect. (Fig. 7.)

The embryological aspect of the phenomenon of acardiacus in twin labours has already been discussed. A good series of early twin ova is much to be desired. A precise knowledge of the human allantois is difficult to obtain. The latest work where that structure is described from direct observation of an early human embryo is Von Preuschen's 'Allantois des Menschen' (Wiesbaden, 1887). Of the placenta in twin pregnancies much more is known. I have already given references to papers on that subject.

The peculiarities of an acardiacus make us think of that great biological theme, the immediate stimulant or agent in development. Pretty theories about that harmonious balance between different organs which causes them to grow in strict proportion must fall to the ground. The existence of acardiacs proves that certain organs and structures may develop perfectly without any harmonious balance at all—indeed, without any other structures to balance them, even unharmoniously. W. Vrolik, writing of acormus in Todd's 'Cyclopædia' many years ago, observed: "This shows that in the absence of all the central organs, heart, lungs, skeleton, and brain, there may be a well-constituted skin surrounding an amorphous mass of cellular tissue, and only a single well-formed organ. . . . . Therefore we may conclude that each part is formed *sponte suâ*, and that it is in its evolution quite independent of the rest of the body."

The entire suppression of the absent parts, a condition quite distinct from atrophy, is strikingly displayed in acardiacus. The ductus arteriosus and the obliterated hypogastric arteries are never entirely effaced in the adult. Yet in an acardiacus three quarters of the body may be absent, and not represented even by a vestige of scar-tissue. Scarcely less singular is the absence of some of

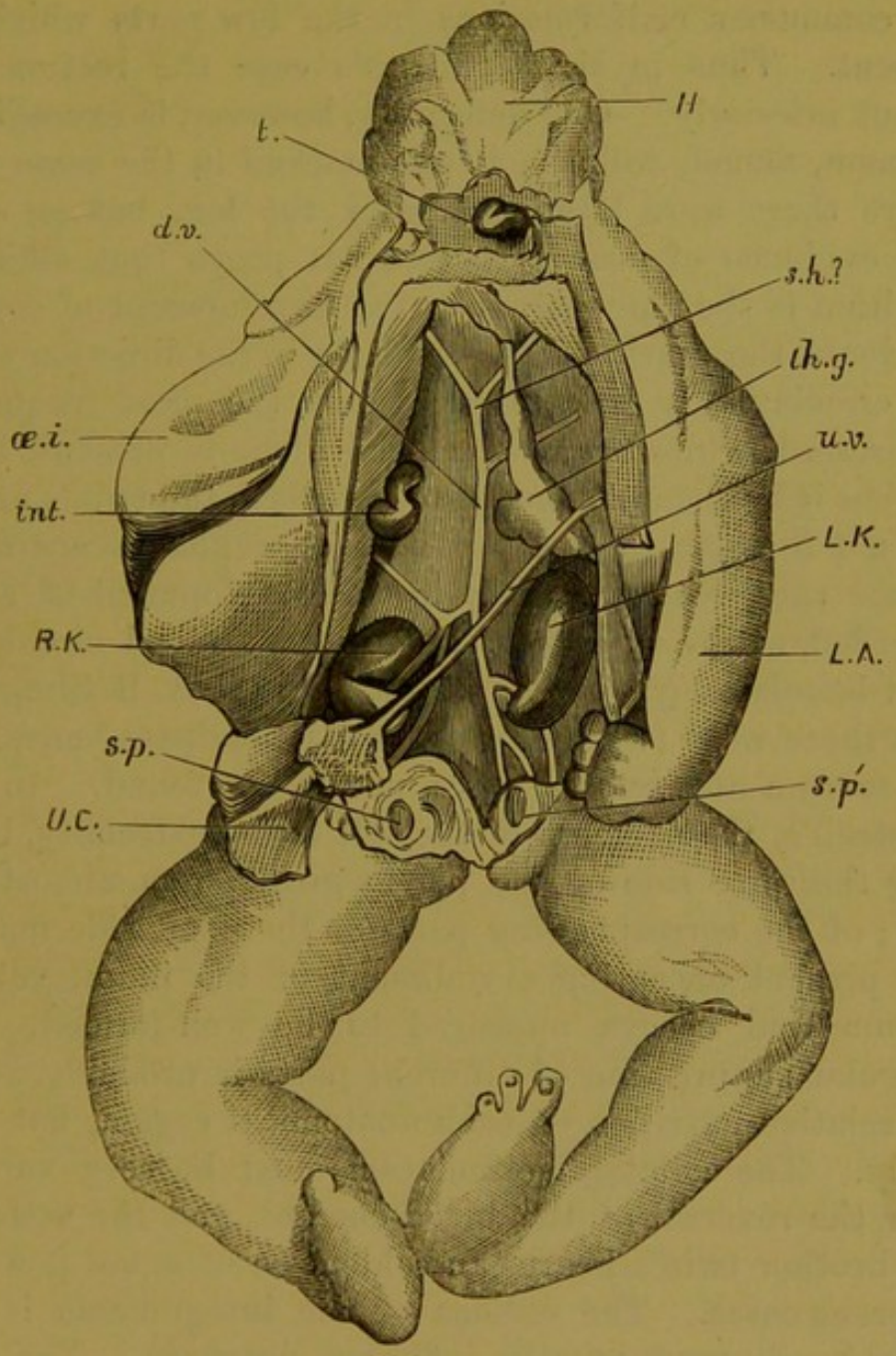

FIG. 7.—ACARDIACUS ANCEPS or PARACEPHALUS. *Mus. St. George's Hosp.*, 23A. *H.* The head, a tuberosity invested with wrinkled integument. *t.* Tongue. *th.g.* Thymus gland. *int.* Short blind coil of intestine; it has apparently been much displaced upwards during dissection. *R. K., L. K.* Right and left kidneys. *s.p., s.p'.* Symphysis pubis divided artificially. *œ.i.* Œdematous integument, wrinkled through the action of spirit. There is no trace of a right arm. *L. A.* Left arm. *U. C.* Stump of umbilical cord. *d. v.* Dorsal vessel. *u. v.* Umbilical vessel. It is said to have originally communicated with the dorsal vessel, but has apparently been separated from its connections. *s. h.?* Probable site of heart.

the commoner malformations in the few parts which are present. Thus in Mr. Trestrail's case the rectum was patent inferiorly. One deformity, however, is exceedingly common, namely talipes; it was marked in the same case, where there were large nerves in the leg, but no cord. The evidence of acardiacs does not prove that afflux of nutrition is the chief agent in the development of organs. No doubt the upper parts, which lie in the direction where the circulation is most impeded, are the most frequently suppressed, whilst, when the head alone is present, blood reaches it by the anastomosis of vessels in the twin's amnia, and not through the cord. Still, in acephalous acardiacs, we see the greatest variety in the development of structures below the umbilicus, where the arterial circulation must be relatively free and active. In Dr. A. R. Simpson's case there were two legs and two innominate bones, yet the sacrum and coccyx were not to be found. In Mr. Trestrail's, the skeleton of the left lower extremity, including the same side of the pelvic girdle, was almost perfect; of the corresponding parts on the right side nothing was present excepting a rudiment of the ilium, yet the sacrum and coccyx appeared to be well-formed. The irregular suppression of different parts is probably due to the relative nutrition of each anatomical region, but indirectly. The collateral circulation must be very variable after the reversal of the blood-current, and the action of the brother twin's heart can seldom be of equal power in different cases. The œdema of the integuments is also variable; it must greatly influence nutrition. Yet even when it prevails so as to make the monster "an indigested and deformed lump," we may still find that the scanty relics of viscera which are present, perhaps half an inch of intestine and a couple of vertebræ, may lie perfectly developed in their bed of œdematous connective tissue.

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