

Embryonic Development

by
Chas B. Selby.

Thesis

Subject, ~~university~~ Embryonic Development

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"Embryonic Development"

In the world of animal organisms is found one of the most comprehensive studies with which mankind interests himself, and in which the supernatural work & wisdom of God is exemplified.

Its study affords more opportunity for continued thought and extended investigation.

Although mankind continues to add to this already vast accumulation of facts which began primarily with the advent of man, yet, seemingly, it approaches but little nearer a complete science, than it was when its principles were first enunciated by the Grecian writers.

The reason for this running in complete circles

is due to the fact that so many intricate questions and discoveries must be accounted for, and these again explained.

The more facts discovered, the more must be explained; and it seems we will never reach, what we term an, exhaustive & adequate knowledge of this, a branch of the most complex of the natural sciences.

The early writers dealt more with anatomy and gave very little thought to other physiological questions - and especially, they gave the subject of prenatal development little consideration, yet a few of them merely touched the subject, thereby giving a basis to that which has followed.

They understood, thoroughly, the organic forms of the organs of the body, but seem to have known nothing of their structure - and also they did not know their functions.

Their knowledge of animal development was equally meager and it was not until the 13th century that the subject was knowingly discussed. The early investigators, have furnished, as has been stated, only a key to what has followed although many of their conclusions were entirely false. To understand thoroughly the develop-

opment of an individual from the time its history, as an individual, begins (which is when the male cell unites with the female cell), we must have a knowledge of the organs in which this development takes place. The organ, in which the development, proper, takes place is called the "uterus." The organ from which the cell comes, is the "ovary" - the two being the "ovaries." The cell which is the product of these "ovaries" is termed the "ovum" or "pro-nucleus" of the female. The ovaries discharge at intervals of every twenty-eight days, with this pro-nucleus, blood & mucus.

Next is the pro-nucleus connection, the "fallopian tubes" about four inches in length. These clutch, or grasp the ovary, so that when the ovum is discharged it must pass from the ovaries through these tubes, thereby reaching its place of final development. The uterus is connected with the outside world by the vagina.

In the cell transition a period of six days are required.

The fallopian tubes grasp the ovaries, by dilating and then closing them, so that the ova can-

not fail to pass to the uterus.

after entering the uterus from the exterior, the male cell (spermatozöon) works its way up the uterus, and enters the fallopian tube in which it unites, after a time, with the pronucleus of the female. After their union, ~~it~~ works down the tube, and enters the uterus, to the walls of which ~~they~~ ~~attaches~~ it ~~self~~. The life history of the cell is said said to begin at this point, but it does not properly begin until the nuclei of both cells have united. At this point, movement, which is indicative of life, is noticeable as an amoeboid motion. The development now begins by the absorption of the nutritive elements in yolk of this cell. By the time these elements are exhausted, the vessels (corresponding to the mesenteric vessels in the adult) come from the uterine vessels and supply the embryo with food.

The union mentioned is complete, where the nuclei of the spermatozöon (which is the head portion) unites with the ovum - this by the head sinking into the body of the pronucleus, and gradually approaching the nucleus of the ovum. - This then forms the Blastosphere.

or period of "First Segmentation". In the transit of the ovum from the ovaries to the uterus, it becomes invested with an albuminous substance which afterward, by a peculiar process, forms the sac in which the foetus is ultimately discharged. The "First Segmentation" period contributes some of its minute globules to the formation of this investment. This segmentation is continued during the passage of the embryo through the fallopian tubes, or oviduct. As the word segmentation indicates, it is a division of the primitive united cell into an indefinite number of small cells, or spherules. Segmentation begins by this cell dividing in the middle by a constriction and these parts again dividing by an indefinite number of constrictions, forming when completed, a granular structure enclosed in their albuminous sac, zona-pellucida. Segmentation is continued until this embryonic formation reaches the uterus, where the intrinsic granules make their way to the surface and reinforce the zona-pellucida, leaving within it a clear liquid.

The reinforced zona-pellucida now forms

the yolk sack which is done of the "Splanchnopleure".

Kirk & Fowler, authorities on embryology, illustrate the processes of foetal development, by giving the changes which take place in the egg of the chicken previous to and during incubation. They say the Blastoderm forms, when the egg is being incubated, three coverings to the yolk, viz - the Epiblast, Mesoblast, & Hypoblast. These are mentioned because they form the primitive tissue from which the tissues of the adult is formed. They occupy positions indicated by the prefixes, the Epiblast, or outer forming the tissues of the tegumentary system, the other tissues formed will be mentioned near the close of this paper. These three tissues then make up the Blastosphere which is now transparent.

After incubation begins, we can notice in the "area pellucida" or "zona pellucida", the first animal resemblance called the "primitive streak": as this streak elongates in its development, it causes the area pellucida to elongate also, and it forms

a pear shaped body, having at its small end three slight depressions, which correspond to the three parts of the brain - viz, the cerebrum, cerebellum, & pons varioli.

From this primitive streak extends a line which intersects at the extreme surface of the zona pellucida with a segmental shaped formation which afterward develops into the exterior portions of the trunk.

The line mentioned is what afterward becomes the notochord, and the vertebra which afterward develop from the medullary groove (formed from epiblast already mentioned).

The medullary cavity from which the upper portion of the spine is formed is of uniform thickness, but the remainder of the primitive streak is not.

From what is known as the "Body Cavity," the alimentary canal, mesentery etc are formed; but none of the internal organs such as the liver, kidneys, lungs, & heart are formed from this.

When the "yolk elements" are exhausted, the foetus calls upon the parent for nutrition, and this it receives through the al-

lautoise & chorionic membranes. In the hen's egg, they are to be present, but they collect their food through and from the albuminous substance surrounding the yolk.

In mammals the alauntia with the blood vessels, form the placenta. The wastes exuded by the foetus are retained in the enclosing sack, and this watery excretion forms a protection to it, from fire, blow &c. The fluid is known as the "amniotic fluid".

During parturition this fluid is discharged and causes the vagina to become moistened and also dilates it so that the offspring is more easily delivered.

The most important organs together with the tissues from which they develop, are named below:-

From the anterior portion of the Blastoderm which is the epiblast, is formed:-

- The epithelial tissue, epidermis, and its appendages (skin, hair, teeth & nails).

The mesoblastic layer forms the inner organs, as generative organs, most of the muscles, bone and vascular tissue - also connective.

The Hypoblast forms the epithelium of the

urinary organs, bronchial tubes, eustachian tubes and air sacs of the lungs. The cranial development has been mentioned, also the development of the spinal cord, and vertebral column.

The extremities are developed from depressions visible in the early primitive stage. The digits of the hands and feet are not developed until late in this gestation period, showing the probable condition of the hands and feet of primitive man.

The heart first appears as two collateral tubes joined at both ends, but they afterward unite as one tube to the opothalmo-mesenteric at one end, the other uniting to form the abdominal aorta. By a peculiar contraction, this tube buds, and forms the heart. The development of the lungs is similar, the two tubes forming, above, the trachea, and aryepopharynx. The lung-forming tissue is Hypoblast.

The numerous other organs are formed in similar ways and to work their development out would be a pleasure since, in it, we can see our own origins and development; and having attempted to become acquainted with it we are enabled to appreciate the words of him who said, "Man,

know thy self, for thou art fearfully
and wonderfully made."

Chas. B. Sibly. "P.S."