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AN ANOMALOUS CHICK EMBRYO PULSATING AS A HEART

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During the regular laboratory work in embryological technique, the finding of anomalous chick embryos is so common that little interest is attracted. However, when one student reported the rhythmic beating of a solitary chick heart apparently without the accompanying chick, special interest was stimulated. This strange pulsating bit of protoplasm was noted in an egg of about 50 hours incubation. It was transferred to warm, normal physiological saline solution and observed for fifteen minutes. The beating was not unlike that of a normal chick heart of corresponding age. In order to assure a good fixation, the specimen was removed from the yolk and placed in Bouin's fluid, stained in Borax Carmine and mounted in toto on a slide by the usual borax carmine method.

Figures 1 and 2 show the specimen in photograph and pen sketch respectively. The blastoderm was omitted in the drawing and much of the photograph because of the normality of its appearance and functioning.

The embryo, as viewed from the dorsal surface, will remind one of a contracted Euglena that is almost as wide as it is long and possesses a flagellumlike tail. This so-called tail was first thought to contain blood vessels connecting the blastoderm with the mass of protoplasm, but later examination of its cross-section proved it to be composed of only the amnion and filled with its fluid. The lighter lateral areas of the embryo, as shown in the photograph, constituted the somatopleure, splanchnopleure, amnion, and chorion. The central portion, extending from anterior to posterior, shows an attempt at organization, but with very little success.

The dark, anterior, median, portion was found to be located below the splanchnopleure, apparently lying in the yolk, thus dividing the body into a dorsal and ventral half in that area, with the posterior end of the ventral half attached to, and finally absorbed by, the dorsal half. We were prone to believe that the ventral half could have been the loop of the heart as it contained two large vessels as shown in the cross-section. (Figure 3).

When the study of the whole mount was completed, the specimen was demounted, imbedded in paraffin, cut in cross-sections of seven microns thickness, and mounted on slides for study. The

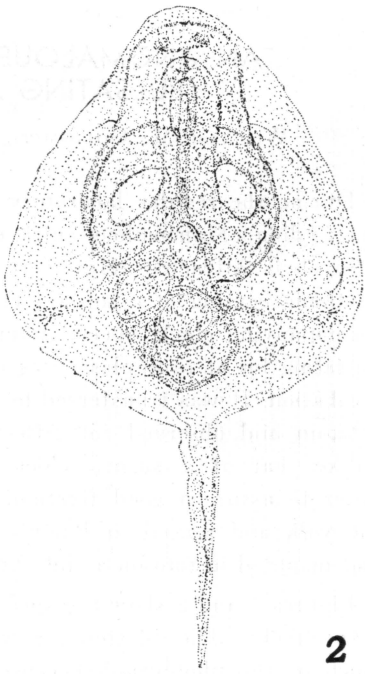

Fig. 1 and 2. Photograph and drawing respectively showing specimen in wholemount.

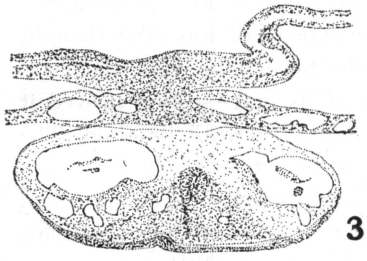

Fig. 3. Showing ventral and dorsal halves, fold of the amnion, somatopleure and splanchnopleure, (266 micron area).

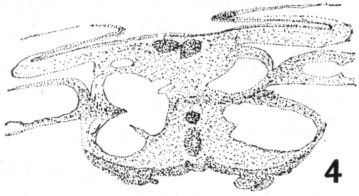

Fig. 4. The uniting dorsal and ventral halves with notochord and masses of tissue in neural tube area, (555 micron area).

cross-sections were counted to determine the length of the specimen from the anterior end to the posterior end at the base of the tail. By multiplying the numbers of cross-sections with the thickness of each section we determined the length to be 1553 microns and the aproximate width 1307 microns.

At the anterior end we find the amnion and chorion forming in folds on each side of the embryo and gradually coming together

in the 600 micron area and remaining normal throughout the rest of the embryo. These tissues are histologically normal. The amnion, as was previously mentioned, is the only tissue forming the tail and lies above and unattached to the splanchnopleure or what now may be called the blastoderm.

The somatopleure and splanchnopleure are, without a doubt, the most typical and normal areas of the complete chick embryo. However, the splanchnopleure is not related to, nor does it take part in, the formation of the folds which form the "probable" foregut, which is located on the ventral surface of the ventral half. The folds first appear at 434 microns and unite at 600 microns from the anterior end.

The notochord and neutral tubes are first formed in the ventral half and the dorsal half respectively. The notochord appears to be mediumly normal but as the ventral portion united with the dorsal portion the notochord elongates in the 600 micron area to unite with the undifferentiated mass in the neural tube area. This is quite important as its disintergration is the beginning of a line bisecting the two lateral areas.

The vascular system is the strangest phenomenon of this specimen. We have termed the ventral half of the anterior portion the true pumping organ. We know it contains one vessel of changing shapes and formations that makes a "U" turn and returns on the other side of the ventral half. (Figure 3). This body is the only muscular area which could act as the pumping organ and starts to unite with the dorsal half in the 544 micron area (Figure 4). The vessels in the lower ventral half unite with two vessels in the splanchnopleure area of the dorsal half. The ventral half migrates dorsally until it is completely absorbed by the upper half in the 740 micron area. These vessels migrate into the somatopleure and come to a "dead end" in the 1280 micron region. The completion of the foregut gives rise to two tubes which unite, in a few microns space, and continue dorsally as one to unite with another in the splanchnopleure. This last is connected with the blastoderm but does not form a complete circulatory system.

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