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I. Wissenschaftliche Mittheilungen.

1. Notes on the Early Stages of Segmentation in Petromyzon marinus, L. (americanus, Le S.).

By Charles F. W. McClure M.A., Instructor in Biology, Princeton, College, U.S.A.

(Schluß.)

In those ova which were developed in water at 6°C., the first furrow did not appear till very late and had not completely surrounded the ovum until the 14th hour after fertilization; while the second furrow made its first appearance at the animal pole at right angles to the first, about 4 hours later. In those ova which were placed in water at 8°C., the furrows made their appearance slightly earlier but in the regular manner.

In the case of both fertilizations it was observed that the third plane of cleavage was Meridional, and in no instance Equatorial, while on the other hand the fourth plane was always Equatorial.

At first glance it was thought that this was nothing but an abnormality, but on examining great numbers of ova it was found that these two planes occurred with great regularity in the order mentioned above and that in no instance were any ova observed where the third plane appeared Equatorially or the fourth plane Meridionally.

As the two sets of ova mentioned above were hatched in the dark and in rather cold water, much colder in fact than that of the stream from which they were taken, a set of experiments were made in hatching at much higher temperatures.

For example ova taken from a new set of females were fertilized and allowed to develop in water at 12°C. and 22°C.; a few were also placed in the sun where they naturally developed very rapidly.

In each of these three experiments the result was the same, namely that the third plane of cleavage was Meridional and the fourth Equatorial. It is almost unaccountable that in these latter experiments at higher temperatures, no abnormalities were observed, which seems to lend strong proof that the mode of cleavage observed in *P. marinus* is the regular one for that species.

In all of the accompanying figures the first and second planes are represented as extending completely around the ovum.

Fig. I.

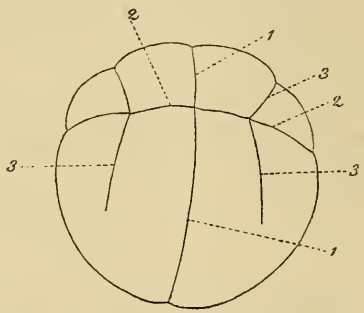
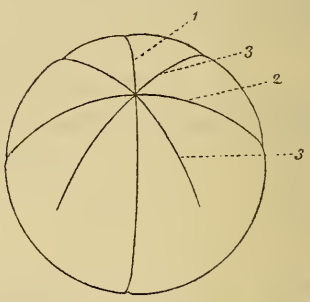


Fig. II.



Figures I and II. First (1), Second (2) and Third (3) planes of cleavage. Cam. Luc. Zeiss obj. a^2, oc. 3.

As is observed in figures I and II the Third or Meridional planes may be variable in regard to their position with respect to the first two planes (1 and 2). In some instances they made their appearance (always in a vertical plane) on each side of and almost parallel to the first plane; thus dividing the quadrants unequally (Fig. I, 3). While in other cases they formed an angle of 45°C. with each of the first two planes, dividing the quadrants into octants of equal size (Fig. II, 3). In regard to the relative frequency at which these two variations occurred, it can be said that the first appeared more frequently when the ova were developed at low temperatures, while on the other hand the second variation seemed to be more common among ova developed at high temperatures (22°C.)

The Fourth or Equatorial plane is situated well up towards the animal pole. It made its first appearance in ova developed in water at 6°C., 24 hours after fertilization as two furrows situated in each of the two octants nearest the first plane of cleavage (Fig. III, 4*a*).

Soon after the two furrows were formed they extended around the upper pole of the ovum, cutting off the upper ends of the remaining octants (4*b*) till they met; thus completing the 4th or Equatorial plane. The arrows in Fig. III show the directions in which they extend.

Whether the departure from the usual mode of segmentation in *Petromyzon* described above, is in the case of *P. marinus* an abnormality due perhaps to some unseen set of influences, or whether it is the regular method employed by the species, is I think still open to question. Considering the wonderful regularity with which the two planes in question occurred, the balance of favor seems to be for the second supposition; but then again as abnormalities are liable to occur so frequently in the early stages of segmentation one must be guarded against deciding too quickly.

Fig. III.

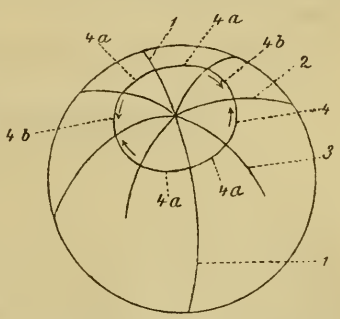


Fig. III. Semi-diagramatic[9]. 1, 2 and 3 same as in preceding figures. 4 Furth plane of cleavage. 4*a* Indicate the place where the 4th plane of cleavage first begins to show itself.

It is a well know fact that temperature influences the character of the segmentation, that low temperatures retard and high temperatures hasten the development and at the same time frequently affect the order in which the furrows occur. It might under certain conditions be possible to regard these irregularities for the normal course of development, as Calberla did in case of the first plane of cleavage. But when the question of temperature is eliminated as it certainly is in the experiments cited above, there is no other agent so far as I know that could have such an uniform effect upon the development of the ova, as to cause them all to segment in exactly the same manner, that is in a manner which was different from the one regularly employed.

If the above results had been obtained solely from experiments on the first two sets of eggs which were fertilized under conditions very similar to each other, objections might well be taken. But since ova from six additional females were fertilized by as many different males, in different vessels and under varying degree of temperature, it

[9] It was thought best to represent this stage diagramatically because by the time the 4th plane of cleavage is complete, the Blastomeres have assumed a somewhat irregular arrangement, rendering it less clear in making out the different planes and their relationship to each other.

seems to prove that there is some probability that the mode of segmentation described above is either regular for *P. marinus*; or that it may possibly represent a reversion to a primitive mode of segmentation; unless some underlying and unseen set of influences have acted on all of the ova in exactly the same manner and under all conditions of temperature and surroundings, which seems quite impossible.

That this has no morphological significance I am well aware; but so far as is known to the writer, there exists among the literature on this subject no account of any such marked divergence occuring with such regularity, for the early stages of segmentation in any Vertebrate.

Department of Biology. Princeton, N. J., June 27th, 1893.

2. Zur Morphologie der Antenne der Cyclopiden.

Von Al. Mrázek, Příbram in Böhmen.

eingeg. 26. Juli 1893.

Die soeben in No. 423 und 424 dieser Zeitschrift publicierte Mittheilung von Prof. Claus[1], welche, wie der Autor anführt, durch meine Notiz in No. 417 dieser Zeitschrift[2] veranlaßt wurde, nöthigt mich zur Publication nachfolgender Zeilen, in welchen ich zunächst meine Prioritätsrechte wahren will. Außerdem aber will ich noch einige kleinere Beiträge zur Kenntnis des Baues der Vorderantennen, insbesondere der Greifantenne, beifügen, und zugleich aus einander setzen, wie ich mir den phylogenetischen Übergang von der Urform der Antenne zu der jetzigen Antenne der Cyclopiden in allen seinen Einzelnheiten denke, da wir über diesen Gegenstand von Claus nichts erfahren.

In der erwähnten Mittheilung von Claus wird zwar constatiert, daß ich zu »ganz ähnlichen Ergebnissen« gekommen bin, wie Claus, leider aber vermisse ich in der speciellen Darstellung jeden Hinweis auf meine diesbezüglichen Angaben, obgleich sonst jeder (auch der kleinste) Gegensatz zu Vosseler und Schmeil hervorgehoben wird, so daß der Leser nirgends erfährt, daß ich dies oder jenes schon bereits festgestellt habe, oder inwiefern manche meiner Angaben von »allgemeineren Gesichtspuncten und umfassenderer Grundlage« aus betrachtet »in einem anderen Lichte erscheinen etc.« Ich erkläre mir die Sache so, daß, da mein Artikel erst unlängst und in derselben

[1] Claus, Über die Bildung der Greifantenne der Cyclopiden und ihre Zurückführung auf die weiblichen Antennen und auf die der Calaniden.

[2] Mrázek, Über abnorme Vermehrung der Sinneskolben an dem Vorderfühler des Weibchens bei Cyclopiden und die morphologische Bedeutung derselben.