

**Note on the Development of the Atrial Chamber
in Amphioxus.**

By

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OWING to the promotion of my friend Professor MacBride to a post in the University of Montreal in Canada, it has not been possible for me to confer with him personally as to the significance of certain passages in his interesting and valuable memoir on "The Early Development of Amphioxus" published in the present number of the Journal. I must therefore take the passages in question as they stand, and deal with them in print.

Professor MacBride has made the interesting discovery that the lymph-canals in the metapleura of Amphioxus are prolongations of the pair of cœlomic pouches which immediately follow the head cavity (bifid in its later growth). He identifies them with the collar cavities of *Balanoglossus*, and sees in this relation a confirmation of the view, advanced originally by Bateson, that the atrial chamber may be considered as morphologically identical with the small region overhung by the free posterior margin of the collar of *Balanoglossus*, and the wall enclosing the atrial chamber with the free projecting ring of the *Balanoglossus* collar. Whilst I by no means deny that there is a relationship between the metapleura of Amphioxus and the collar of *Balanoglossus*, it appears to me that MacBride has been led by theoretical bias into a serious misapprehension of the significance of the observations on the development of the atrial chamber in Amphioxus published by me in conjunction with Dr. Arthur Willey in 1890.

In referring to those researches Professor MacBride says (p. 591), "Lankester and Willey's paper on the development of the atrial chamber confirms in most points Kowalevsky's statements." Later (p. 605) he says, "Kowalevsky was the first to discover that the atrial cavity was formed by the meeting in the mid-ventral line of two long ridges or folds." And further, "Lankester terms the folds which actually wall in the atrial cavity 'epipleural,' and the projecting angles after these folds have united 'metapleural.' I shall use the term 'atrial fold' to include the whole, of which both are parts."

It appears to me that both in his references to Kowalevsky's observations and in his iteration of the word "folds" and proposal to call what I had called epipleur and metapleur by the term "atrial fold," Professor MacBride is in error, and that his statements and use of terms are inconsistent with the facts demonstrated by Willey and myself.

The region of the body of *Amphioxus* termed "epipleur" by me (at a time when I accepted Rolph's theoretical scheme of its development based on Kowalevsky's observations, and now shown to be erroneous) includes the whole of the atrial wall on each side from the level of the dorsal artery to the median ventral raphe. It seems to me absolutely unjustifiable to speak of this as a "fold" since my paper of 1890, the more so inasmuch as the erroneous view of its origin (that of Rolph) was that it arose as a horizontal down-growing fold. To call it and the metapleur resting on it "the atrial fold" at the present day, as Professor MacBride does, is simply to ignore Willey's and my results, and to perpetuate error.

It seems that Professor MacBride has somehow forgotten what Willey and I actually showed, since he declares that we confirmed Kowalevsky, and further that Kowalevsky discovered that the atrial cavity was formed by the meeting in the mid-ventral line of two long folds.

As a matter of fact, Willey and I did not confirm Kowalevsky. The whole point of our paper lay in a correction of a misinterpretation made by that most distinguished observer.

So far from confirming the existence of "folds," or admitting anything which Professor MacBride can justifiably term "atrial folds," we showed that there are no atrial folds. We showed that what Kowalevsky had mistaken for "atrial folds" are really the metapleura, and that these do not grow round and meet in the middle line, but that a very small in-sinking is formed between them, and is covered in by a minute horizontal growth right and left which we called the "subatrial ridges or folds," their union resulting in the formation of what is, at first, a very narrow "subatrial floor" lying between the two upstanding metapleura. We showed, then, that "the two long folds" of Kowalevsky, quoted by MacBride as though it were established that they are the rudiments of the epipleura (as in Rolph's scheme) do not form the atrial cavity, but are really the metapleura. MacBride says we confirmed Kowalevsky, and that Kowalevsky "discovered," the mode of formation of the atrial cavity. He did not do so, but, on the contrary, was misled as to the nature of what he thought to be coalescing folds. And Willey and I did not confirm him, but discovered a totally different mode of formation.

As to the continuity of the cavity of the metapleura with the *cœlom*, Willey and I showed that the space in the metapleura is not at any time freely open above into the adjacent *cœlomic* cavity, as was figured by Kowalevsky, who mistook the metapleural cavity for the lateral division of the *cœlom*, in which the gonads develop. We reproduced Kowalevsky's figure, and showed that it was defective. MacBride confirms us in denying a continuity of the lymph-space of the metapleur with the adjacent *cœlom*. We suggested, with reserve and caution, that the lymph-space of the metapleur might form as "pseudo-*cœl*,"—that is, as an *intercellular space*,—having no relation to enteric pouches. MacBride has now shown that the most anterior pair of enteric pouches (the collar-pouches) are the sources of the lymph-spaces in the metapleura. This is certainly altogether a different relation to that indicated by Kowalevsky's transverse section (fig. 1, p. 449, of Willey's

and my paper, 'Quart. Journ. Micr. Sci.,' 1890, vol. xxxi) and in no way justifies MacBride's implication that Kowalevsky was right in considering the metapleural canals as cœlomic in nature, and that Willey and I were wrong in denying their connection with cœlom.

I will conclude this note by a quotation from the paper by Willey and myself above cited (p. 455), in which the difference between the actual state of things made known by us and the theory of "atrial folds" so strangely resuscitated by MacBride, is set forth.

"It is important to point out that the mode of formation of the atrium as a narrow groove, which closes and sinks (as it were) into the body of the *Amphioxus*, is really different in important respects from the enclosure of a space by down-growth of large folds, though ultimately, no doubt, the two contrasted modes of formation come to the same thing, so far as the more obvious morphological relations are concerned. The mode of formation which really occurs in *Amphioxus* is readily harmonised with the existence of the post-atrioporal extension of the atrium, which gradually tapers to a fine cœcal canal. It also gives us an essentially different view of the region called "epipleur" by Lankester, and generally so designated, from that which Rolph's theory necessitated. That portion of the epipleur into which the myotomes of the body-wall extend is seen now to be no downgrowth, no extension or fold. It is the original unchanged body-wall, which bounds the sides of the animal's body in front of the atripore, just as much as it does behind. The only new growth in the atrial region which takes part in the limitation of the surface is the subatrial growth formed by the two little horizontal folds which floor in the atrium when it is a mere canal. These in the adult are represented by the region of longitudinally pleated ventral wall between the two metapleura."