

## Objective Evidence for the Polarity in the Spontaneous Activity of Acontial Muscle

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Spontaneous motile activity of the acontial filament isolated from the sea anemone *Haliplanella luciae* has been reported to take place in the form of recurrent ("semirhythmic") coiling and uncoiling of the freely lying filament (Wada and Yanagita, 1964; 1965). This is understood as due to shortening of the fine longitudinal muscle bands which run eccentrically along the axis of filament, possibly antagonized by elasticity of the mesogleal core or some other contralateral structures. It has been stated further that this contraction initiates customarily at the proximal (i. e., cut) end of the acontial piece and is propagated toward the distal side for some period of time (more than one minute in an average), during which its extent keeps growing all over the region once involved in that burst of activity. This would result in a coiled posture somewhat close to the spiral of Archimedes (see Batschelet, 1970, for the definition and an illustration) such as found to be assumed characteristically by isolated acontia, and the origin of this helical figure must be occupied by the proximal, and not the distal, end of the filament.<sup>2)</sup>

Actually, however, it must be admitted that this statement as to the functional polarity is based on somewhat poor evidence barely obtained through sear visual watching. The difficulty is in the homogeneity of the acontium as to dimensions as well as in structure all over its length, and also in the appearance of the cut (proximal) end which is closed soon and scarcely distinguishable from the opposite, intact end. Indeed, the observer is not allowed to quit his following sight for any moment from the wriggling filament once he has cut it free from the anemone's body until it takes eventually the coiled posture. Such a situation has made the witnessing observations

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2) Though the epithelial flagella that beat always toward the distal end and cause the filament to glide slowly in the opposite direction may somehow influence the exact shape of the helix, they can never be the cause for the coiling-and-uncoiling activity itself, for this is shown not to be affected in sea water which has been made viscous to stop practically all the flagellar stream (Fukuda and Yanagita, 1974).

necessarily limited in number as well as in reliability.

An attempt to be expected quite naturally in such a situation has been made by the writers to obtain evidence of more objective character by having one end of the acontium somehow marked prior to cutting free. Marking was achieved simply by staining intra-vitam with 0.1% reduced methylene blue solution prepared in natural sea water (see Pantin, 1948).

An anemone was placed on a small glass dish and submerged in a larger bowl of sea water. It was plodded with a blunt glass rod to make it eject its acontia as many as possible and then the dish was lifted from the bowl in a tilted position so as to have all the acontia come to lie on the glass bottom drawn straight in one direction by the leaving stream of water. Thus it was possible to drop the staining solution upon the desired half, either distal or proximal, of the acontia for marking. After staining for about one minute the anemone with its acontia stained locally was washed with fresh sea water, the acontia were clipped off at their bases and then allowed each to behave freely on the bottom of dish of sea water to take their characteristic helical position.

The results obtained using several specimens of anemone proved just affirmative of the statement in question. Pictures of acontia treated in this way are shown in Figure 1. Though they may never be said to be well-done ones, they serve at least as evidence for the innate polarity mentioned above. That the acontia make a coil always

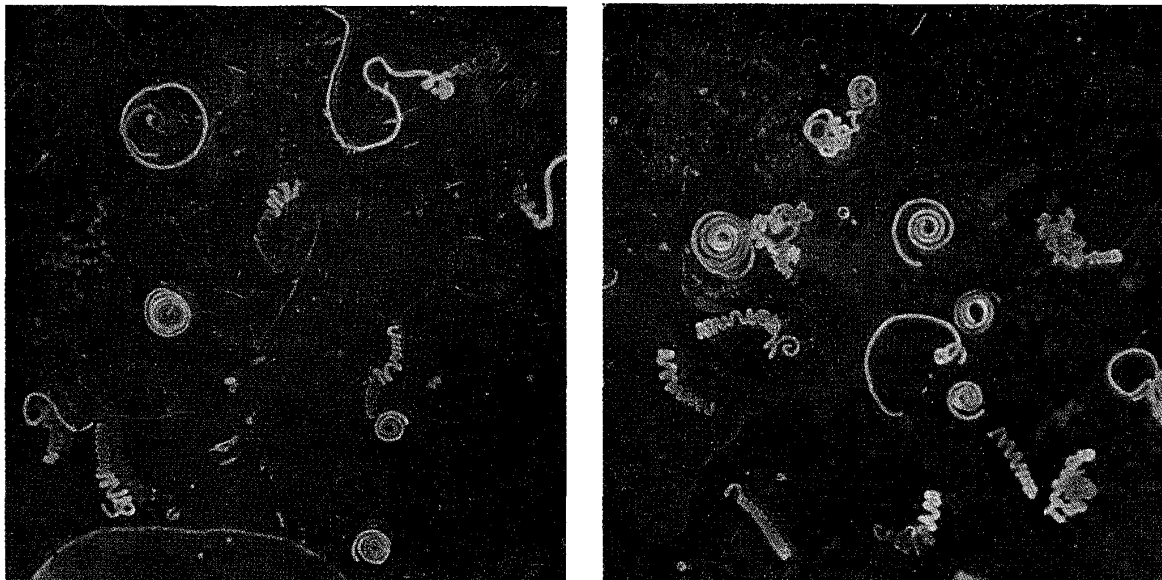


Figure 1. The pieces of acontia marked proximally (a) and distally (b) with methylene blue staining, left undisturbed on the bottom of dish of sea water. Many of them assume the shape of spiral of Archimedes type with the proximal end assigned to the center, while some others attain the shape of a screw conceivably due to some excessive excitation. (About  $\times 2$ .)

with their proximal end as the center irrespective of whether this is the stained (Figure 1, a) or unstained (b) end excludes the possibility of an effect of the staining itself in determining the polarity.

It may be mentioned in this connection that the polarity in question does not represent an artifact due to the one-sided presence of a cut end, because such pieces of acontium as have both ends cut also are observed to assume the helical posture in quite a similar way (Fukuda and Yanagita, 1974). Also in such pieces of acontium it is very likely that the proximal end comes to the center of helix, though we still miss for this the evidence that corresponds in character to the one just presented in this brief note.

### References

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