

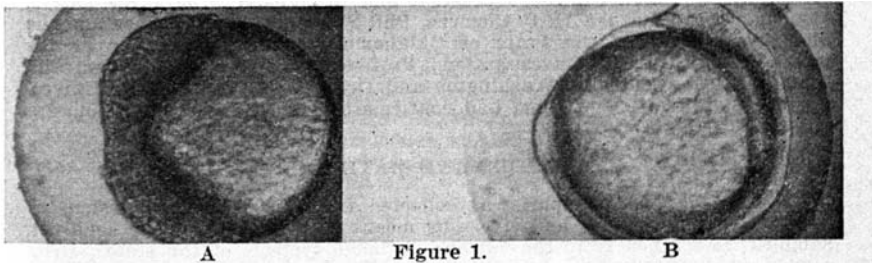
Observations on the Occurrence of Potential Twins in Early Cleavage in (*Brachydanio rerio*) Zebra Fish

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While studying the early embryos of *Brachydanio rerio* we have observed on four different occasions the organization of the cells of the early blastula into two clusters instead of the normal one. On each occasion the tendency toward the formation of twin blastulae was observed to occur in several embryos. Some of these were isolated each time for further study. In no case were twin embryonic shields ever observed to be formed. In fact, we have never observed twin embryos or embryonic shields among the thousands of Danlo embryos we have studied. In view of the fact that during the last seven years we have tested the effects of a hundred odd chemicals, many of which produce a variety of other abnormalities, the absence of twins seems significant.

The particular event which has been observed is the separation of the cells formed during early cleavage into two clusters or groups. Mr. Bert Blumenkrantz, one of our graduate students, first observed this condition in four embryos amongst some 600 being studied. The embryos were in the 16-32 cell stage. They were isolated and allowed to develop. Each produced a normal fish.

When first observed, the cell clusters were not in contact but were about $\frac{1}{2}$ of the way apart on each side of the yolk—(blackboard sketch.) As development progressed, the expansion of the cell masses brought them into contact with each other. Figure #1 A. By the time the embryonic masses had covered the upper half of the yolk, they had fused so that it was impossible to distinguish them. In each case, a single normal embryo developed. Figure #1 B.



Mr. Blumenkrantz on another occasion observed that about 20-30% of the embryos (1000 plus) showed fusing of the twin masses, similar to the first figure. This same condition has been observed by the author in two other instances.

The suggestion is made that the first two cells formed were completely separated by the forces producing their cleavage. Each daughter cell by division produced a cell cluster about itself. If it were possible for each cluster to develop far enough to undergo organization, then twin embryos might be formed.

It would seem that the occurrence of the twin blastulae indicates, perhaps, the manner of formation of twins in other fish. Why twinning does not occur in the Danlo is unknown.

No explanation is offered as to what environmental conditions may bring about this phenomenon.

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