UV IRRADIATION TO THE CLEAR ZONE OF CENTRIFUGED CHIRONOMUS EGGS

Hideo Yajima

Department of Biology, Faculty of Sciences, Ibaraki University,
Mito, 310 Japan

By centrifuging, Chironomus egg is stratified into three zones; a centripetal oily zone, a centrifugal yolky zone and an intermediate clear cytoplasmic zone with cleavage nuclei. UV irradiation of the clear zone of the laboratory egg centrifuged at two pole cell stage causes an increase of double cephalon (DC) frequency from the centrifuged controls (Yajima, 1985).

In the first part of the present study, I examined whether or not developmental types other than DC could be induced by the UV irradiation of the clear zone. When the field eggs were centrifuged at 2,000g for 5 min (centrifugal force in the early study was 2,600g) at 45'-60' after the two pole cell stage and the clear zone was irradiated at 30' after the centrifugation from the lateral side at 3,000 J/m2, double abdomen (DA) and inverted embryo (IE) were obtained at the expense of normal larvae. This result, considering together with the earlier ones (Yajima, 1985), suggests that DC induction is not the only developmental result brought about by the clear zone irradiation, that is, the developmental results are changeable depending on the conditions of centrifugation.

In the second, to investigate where the UV effective site inducing double malformations (DM), DC and DA, and IE is in the clear zone, the superficial or the inner part, or both, following two experiments were performed.

(1) UV irradiation to an area of uncentrifuged egg which corresponds to the topographical range of the clear zone in the centrifuged egg was performed to test whether the immovable superficial layer of the zone is the site of UV action for inducing DM and IE. UV irradiation of the area of uncentrifuged

egg did not induce the formation of DM and IE, except defective embryo.
(2) Comparison of the clear zone irradiation between the anteriorly and posteriorly centrifuged eggs was made. Because, if the egg components of the zone movable by centrifuging carry the UV targets, the clear zone irradiation should yield almost the same developmental result between the eggs centrifuged to different directions. As a result, whereas the irradiation of the clear zone of anteriorly centrifuged eggs yield DM and IE, the irradiation of posteriorly centrifuged eggs did not induce any DM and IE. These results of (1) and (2) show that simultaneous UV irradiation to both superficial and inner parts are effective for inducing DM and IE, but the irradiation to each component alone is not.

Furthermore, UV irradiation applied to the original site of the clear zone at different irradiated stages after centrifuging to examine whether or not the site retains the UV reactivity during the redistribution of the stratified components. As a result, it was clear that the developmental result changes with the irradiated stage. The fact again shows that the original superficial area alone is not the effective site.

References

Yajima, H. (1985) Int. J. Inv. Rep. & Develop., 8:243-251.