

## Morphogenesis of cricket embryo and its specific inhibitors

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There have been few reports on the relation between biochemical changes and morphogenesis of embryo in early development of insects. In the present study biochemical changes in the cricket embryo were examined during early development. Eggs of cricket, *Gryllus bimaculatus* (Insecta: Orthoptera), were laid on the wet cotton for 1 h and collected. Development of the eggs were observed under binocular dissecting microscope every 3 h and the progress of development was expressed by the proportion of each developmental stages as follow; germ band formation, yolk cell formation, volume increase, appendage formation, tail formation, eye pigmentation, head formation, hair growth, and hatching. Embryos were treated with n-octane for 15 min and immersed in physiological saline solution containing various inhibitors for 8 h at the different stages after oviposition.

Metabolic inhibitors used were colchicine, 2, 4-dinitrophenol, cycloheximide, and cepharanthin. Inhibitor-treated embryos were cultured on the wet cotton again at 28°C. Effect of inhibitor treatments was estimated from the percentage of embryos developed in the inhibitor-treated group at the period when 50 percent of embryos in the control group came to its stage.

Colchicine completely inhibited early development of embryos which were treated for initial 8 h from oviposition and its effect was lethal. This sensitive period appears to correspond to the stage of nuclear division or migration.

The development of embryos was suppressed by 2, 4-dinitrophenol treated for initial 8 h from oviposition. But the effect was not so remarkable even in the high concentration ( $10^{-3}$  M). This may be due to the low permeability of 2, 4-dinitrophenol.

Cycloheximide produced an interesting effect on the development of embryos by the treatment at the period of germ band formation. Eighty percent of treated embryos came to the 1/2- to 1/3-sized embryos. These smaller-sized embryos after the treatment of cycloheximide appeared to be normal in morphology. These embryos developed until just before hatching but all died thereafter. Though development of embryos treated with cycloheximide at the stage of yolk cell formation was suppressed, the smaller embryos were not observed during development. These results suggest that protein synthesis at the period of germ band formation is important for the subsequent development.

Cepharanthin has known as a membrane stabilizer, which affects on cell membranes and suppresses the differentiation of membrane. The smaller-sized embryos were also observed after the treatment of cepharanthin at the stage of germ band formation.

The stage-specific effect of metabolic inhibitors on embryo may be due to the alternation of permeability of these inhibitors during development. Accurate effect of inhibitors have to be examined with direct injection in future.