Mechanisms of egg activation in the turnip sawfly, *Athalia rosae japonensis* (Tenthredinidae, Hymenoptera) A preliminary note

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The turnip sawfly, *Athalia rosae*, belongs to the Family Tenthredinidae of the Suborder Symphyta (Hymenoptera). Being a member of the Order Hymenoptera, the species shows haplo-diploid reproduction. Moreover, it has been shown that mature unfertilized eggs explanted from the adult female, if soaked in distilled water, can initiate parthenogenetic development (Naito, 1982). The species is thus expected to provide a useful experimental material for studies on one of the important developmental phenomena, egg activation, separated from the effect of fertilization. Since the mature unfertilized eggs and the early developing embryos can be manipulated easily in various ways such as microinjection and ligation, the species also permit detailed studies on the roles of cytoplasm and nucleus. We describe here some preliminary results on the process of egg activation.

First, we confirmed the observation of Naito (1982) that the unfertilized eggs can be activated in distilled water. We then noted that mature unfertilized eggs placed in 0.15M NaCl did not show any sign of development. The eggs can be kept in 0.15M NaCl for up to an hour and still are able to initiate development if transferred to distilled water. Mature unfertilized eggs were obtained by dissecting adult females in 0.15M NaCl, transferred to distilled water for various periods of time, returned to 0.15M NaCl and observed for development. Results shown in Fig. 1 demonstrate that the eggs once activated in distilled water can develop beyond the blastoderm stage in 0.15M NaCl. Activation is complete in 20min in distilled water. This agrees with the time required for the egg nucleus to go from the first meiotic metaphase, at which normal mature unfertilized eggs stay if they are kept in 0.15M NaCl for up to an hour, to anaphase. We next examined the effects of osmorality and various ions on egg activation. Mature unfertilized eggs were obtained as above and transferred to and kept in various solutions as shown in Fig. 2a and b. In general the frequency of activated eggs decreased with increasing concentrations of the solutions. Clearly osmolarity has an important role in egg activation. However, various ions showed different activation frequencies at the same osmoralities: NaCl completely inhibited egg activation at 200m0sm while KCl did so only at 600m0sm. These data are consistent with those of Sander (1985) on some lower dipteran species. Altogether, the present results might indicate the involvement of changes in membrane potential in the egg surface in egg activation in this system.

References

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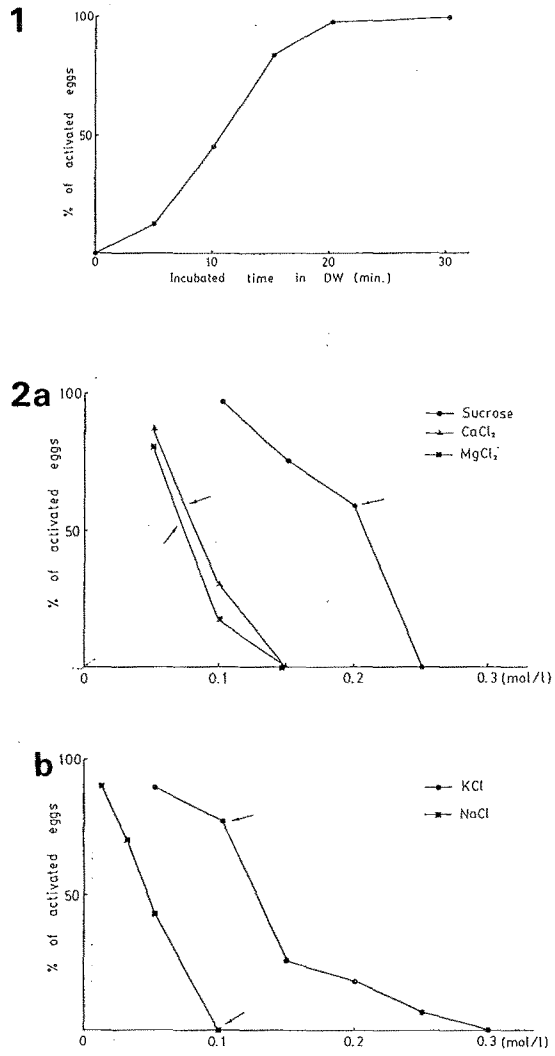

Fig. 1 Activation of eggs by exposure to distilled water. Mature unfertilized eggs were obtained by dissecting adult females in 0.15M NaCl. Eggs were transferred to distilled water for various periods, returned to 0.15M NaCl, and observed for blastoderm formation. Each point represents the results of *ca.* 200 eggs. Eggs can be kept for up to 1 hr in 0.15M NaCl without any loss in capability of being activated in distilled water.

Fig. 2a, b Effects of osmorality and various ions on egg activation. Eggs were obtained as in Fig. 1., transferred to and kept in solutions shown, and observed for blastoderm formation. Each point represents the results of *ca.* 200 eggs. Arrows indicate concentration points at 200m0sm.