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AN INHIBITORY ROLE OF GLUCOSE IN THE VITELLOGENIC PROCESS

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Many ovarioles have been shown to be surrounded by electrical fields which may be involved in the establishment of presumptive embrionic pattern as well as the disposition of stored reserves (Kunkel et al., 1986). Experiments had shown (Kunkel, 1986) that measurement of the pattern of currents about the ovariole of the cockroach could not be made in the S20 artificial medium of Landureau (1976). On the other hand, when the currents about an ovariole were measured while it was bathed in the insect's own serum, current patterns survived for hours. We concluded there was a component present or absent in the artificial medium that was fatal to the ionic currents about the ovariole. By chance, while improving a simplified medium for measuring *in vitro* vitellogenin uptake (Kindle et al., in prep.), we found that adjusting the osmolarity of our medium with glucose (but not sucrose or trehalose) had a drastic inhibitory effect on the uptake of Vg into oocytes. This suggested that it is the glucose in Landureau's (S20) medium that was inhibitory of ionic current patterns. To test this we used the newly implemented two dimensional vibrating probe at the MBL in Woods Hole MA. A preliminary experiment showed that currents about an oocyte can survive for up to five hours in a modified Landureau's medium in which glucose was replaced with sucrose (S20-g+s). Subsequently with a flow chamber we were able to probe oocytes in a further simplified medium minus amino acids and vitamins (S20-aa-v-g+s = S20s), switch to S20-aa-v medium (in which osmolarity is adjusted with glucose as in S20) and then switch back to S20s medium. In small oocytes glucose had a reversible inhibitory effect on oocyte currents. In large oocytes the glucose effect caused irreversible electrical death. We conclude that caution must be used in including glucose in any artificial medium for insects. Since glucose is normally a minor constituent of insect serum, it may cause severe problems for normal physiological function, as it does in diabetic mammals. This impaired function may not be detectable at the level of macromolecular synthesis.

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