Early events during embryogenesis in *Zea mays* L.

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Abstract

The megagametophyte of *Zea mays* L. undergoes a series of structural changes after fertilization resulting in a well differentiated mature embryo and cellular endosperm at 480 hours after pollination in greenhouse conditions. In the present work emphasis was laid on the localization of the cytoplasm in the synergids, central cell-endosperm and egg cell-zygote prior to and after fertilization. The observations are discussed in relation to the process of early embryogenesis.

Ovaries of *Zea mays* L., strain Black Mexican Sweet (kindly provided by R. J. Lambert, University of Illinois, U.S.A.) were dissected and fixed in 3% glutar dialdehyde and 1% OsO_4 in 0.1 M Na-cacodylate buffer (pH 7.0, 20°C). Sampling times varied from the moment of pollination up to 160 hrs after controlled pollination (h.a.p.).

SYNERGIDS

At about 26 h.a.p. one pollen tube reaches the ovule at the micropyle, grows intercellularly through the nucellar tissue and discharges its contents in a synergid which often has already degenerated. The other synergid still persists at the two-celled stage of the proembryo. At this stage the cytoplasm near the well-developed filiform apparatus contains E.R. strands, some dictyosomes, polysomes and mitochondria with few cristae.

CENTRAL CELL — ENDOSPERM

Before fertilization (0 h.a.p.) the cytoplasm is mainly localized near the tip of the egg apparatus and surrounds the polar nuclei which are partially fused. After fertilization and division of the primary endosperm

nucleus, at about 29 h.a.p. the daughter nuclei move towards the periphery of the embryo sac in the micropylar region together with some cytoplasm.

EGG CELL — ZYGOTE

Before fertilization (0 h.a.p.) the cytoplasm and the nucleus of the egg cell are located near the micropyle. Organelles are distributed at random. After fertilization, the cytoplasm and the nucleus move towards the apical region of the zygote. Mitosis follows at about 32 h.a.p. resulting in two unequal cells. Organelle distribution does not change after cytokinesis but at the two-celled stage the basal cell is voluminous because of more vacuolation. This unequal distribution of vacuoles maintained during further embryogenesis.

It is suggested that the unequal division of the zygote is caused by a post-fertilization translocation of its cytoplasm, a phenomenon not mentioned by Diboll (1964, 1968) and Diboll and Larson (1966). Current experiments aim to elucidate the influence of the movement of the endosperm cytoplasm on that at the zygotic cytoplasm.

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