

LATERAL MOBILITY OF PLASMA MEMBRANE LIPIDS IN A MOLLUSCAN EGG:
EVIDENCE FOR AN ANIMAL/VEGETAL POLARITY

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The lateral diffusion of the lipid analog C_{14} -dil (3',3'-dihexadecylindocarbocyanine iodide) was measured in the plasma membrane of early embryos of the mollusc *Nassarius reticulatus* using the FPR-(Fluorescence Photobleaching Recovery) method. At almost all stages measured (from fertilized egg up to 8-cell stage) the diffusion coefficient (D) of the mobile fraction (MF) of C_{14} -dil is significantly higher in the plasma membrane of the polar lobe as compared to the plasma membrane of the animal half of the embryo (see Figs. 1 and 2). These results demonstrate the presence of an animal/vegetal polarity in the plasma membrane of the embryo of *Nassarius*, possibly related with the polar localization of morphogenetic factors.

The lateral diffusion of the lipid probe in the plasma membrane of the polar lobe shows a cell cycle-dependent modulation; the highest values for D are reached during S-phase, while at the end of G_2 -phase mean values for D have decreased significantly (see Fig. 2). Diffusion rates in the animal membrane of the embryo are rather constant, except for a peak during the S-phase of the first cycle.

At third cleavage, four small micromeres are formed at the animal pole (see Fig. 1). Both D and MF decrease dramatically in these cells ($D = 2.9 \pm 0.3 \times 10^{-9} \text{ cm}^2/\text{sec}$, $MF = 0.51 \pm 0.02$) as compared to the corresponding macromeres ($D = 4.9 \pm 0.3 \times 10^{-9} \text{ cm}^2/\text{sec}$, $MF = 0.78 \pm 0.02$; see Fig. 2). This significant difference in lateral diffusion of membrane lipids may be related with the commitment of these cells to the formation of special structures, such as eyes.

vegetal pole a transient protrusion is formed - the so-called polar lobe (pl) -, which is excluded from the division process. By this mechanism cytoplasmic and plasma membrane components are selectively chunted into only one of the two daughter cells. The polar lobe is known to contain important developmental information, b) 2-cell stage; the polar lobe is being resorbed into one cell only, c) 4-cell stage; the process of polar lobe formation is repeated at 2nd cleavage so that only one of the four cells contains the polar lobe constituents, d) 8-cell stage; four small micromeres are formed at the animal pole of the embryo.

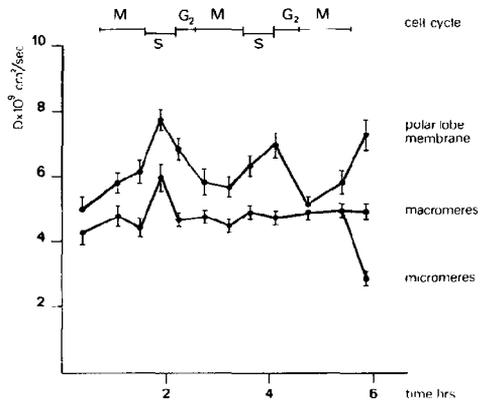


Fig. 2. Diffusion coefficient (mean \pm SEM) of C_{14} -dil during three successive cleavage cycles of the *Nassarius* embryo; the phases of the cell cycle are indicated at the top. The lower curve represents the animal plasma membrane which is divided over the micromeres and the macromeres at third cleavage.

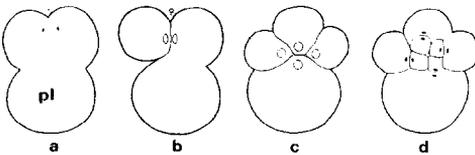


Fig. 1. Schematic representation of the early development of the *Nassarius* embryo showing a) onset of first cleavage; at the

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