

POLAR EFFECTS OF CONCAVALIN A ON THE PLASMA MEMBRANE/CYTOSKELETON COMPLEX  
IN A MOLLUSCAN EGG

M.R.Dohmen, J.E.Speksnijder, and K.J.Teerds

Zoological Laboratory, University of Utrecht, Padualaan 8, Utrecht, The Netherlands.

Eggs have a distinct animal-vegetal polarity which is an important factor in subsequent development. The structural basis of this polarity is largely unknown. The egg surface, particularly the plasma membrane, is likely to play a pivotal role in this respect. The results of experiments with the lectin concanavalin A support the view that a polar structure exists at the level of the plasma membrane. When fertilized uncleaved eggs of *Nassarius reticulatus* are treated with con A, the plasma membrane/cytoskeleton complex starts being affected at the vegetal pole of the egg and this reaction progressively spreads towards the animal pole. Irrespective of the moment of incubation with con A, the reaction of the egg begins when the first polar lobe is being formed, a process immediately preceding first cleavage (Fig.1a)(Dohmen, 1983). As soon as the polar lobe constriction appears, the microvilli start disappearing at the vegetal pole (Fig.3). Concomitantly, the vitelline membrane which is attached to the egg surface disappears at the same rate and to the same extent as the microvilli (Fig.3). This process stops short of the constriction of the polar lobe. The position of the polar lobe constriction may also be strongly influenced by con A treatment. At low doses (0.5  $\mu\text{g/ml}$ ) the constriction is situated in its normal position but an abnormally long and narrow stalk is formed (Fig.1b). At high doses (50  $\mu\text{g/ml}$ ) the position of the constriction may shift extremely towards the animal or vegetal pole of the egg (Fig.2). A cleavage furrow starts being formed at the animal pole, but its progression is inhibited and it soon regresses. Nuclear division is not impaired. After some time most of the eggs start lysing, a process which occurs invariably at the vegetal pole.

A local influx of calcium ions at the vegetal pole might explain many of the observed effects as calcium is an important regulator of membrane-cytoskeleton interaction. Con A is known to provoke an increase in cytoplasmic free calcium in several cell types (e.g. Felber and Brand, 1983).

## References.

- Dohmen, M.R. (1983). In: Time, space and pattern in embryonic development. Eds. W.R.Jeffery and R.A.Raff, A.R.Liss, Inc. pp. 197-220.  
Felber, S.M. and Brand, M.D. (1983). Biochem. J. 210, 885-891.  
Received: 13th February 1984.

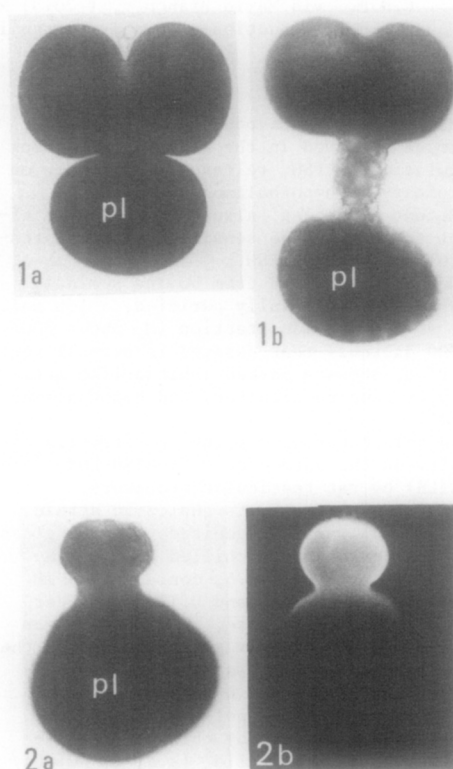


Fig. 2a) Egg treated with 50  $\mu\text{g/ml}$  con A at the uncleaved stage. The polar lobe constriction is shifted towards the animal pole. pl, polar lobe. 2b) Fluorescence micrograph of an egg having received the same treatment as in a), showing the distribution of FITC-con A. In the non-fluorescent area the microvilli and the vitelline membrane have disappeared.

Fig. 3 TEM-micrograph of an egg treated with 0.5  $\mu\text{g/ml}$  con A, showing the disappearance of microvilli and vitelline membrane (VM) from the vegetal hemisphere of the egg. Bar: 2  $\mu\text{m}$ .

Accepted: 14th May 1984