

FERTILIZATION AND EARLY DEVELOPMENT OF ASCIDIANS GUIDE

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Ascidians are sessile marine organisms (urochordates/tunicates) which develop through a swimming tadpole stage (1). Some species develop directly into tailless juveniles (2). See species at : <http://biodev.obs-vlfr.fr/biomarcell/ascidies/species.html>

The ascidian tadpole is made of only 3000 cells and 6 different tissue types (1, 2, 3 4). These tissues differentiate from early blastomeres which acquire their fates from the 16 to the 110 cell stages (5,6). The egg undergoes characteristic reorganisations after fertilization and stereotyped cleavages including assymetric.cleavages (5,6). Informations about blastomeres fates and cell lineages can be found in references 1to 6) and on our web site : See From egg to Tadpole,Cleavages : <http://biodev.obs-vlfr.fr/biomarcell/ascidies/ascidiemenu.htm>

The popularity of ascidians embryos dates back to the days of Chabry who performed the first ablation experiments in 1887 (7) and Conklin who in 1905 understood that a particular cytoplasmic domain (the yellow crescent or myoplasm) was associated with the development of muscle cell in the tadpole's tail (8).

See Scott Gilbert's site : <http://zygote.swarthmore.edu/Conklin/Conklin.html> and Bioclip (below)

Fertilization and reorganisations of the egg are described in recent works, focusing on ; sperm entry (9,10) ; calcium signal (11,12,13) and cytoskeletal reorganisations during the first cell cycle (14,15,16). The cortex of the unfertilized egg has been isolated and characterized (17,18). See Fertilization,Calcium signals, Reorganisations, Egg cortex at <http://biodev.obs-vlfr.fr/biomarcell/ascidies/ascidiemenu.htm>

Remarquable micromanipulations (bisections, ablations, fusions, dissociations, reassociations) have been performed on eggs and embryos (5,6,16,19). These experiments indicate that ascidian embryonic development results from both determinate and inductive mechanisms and that determinants, for muscle, endoderm and ectoderm formation are relocalized in distinct areas of the egg after fertilization(5).See Muscle: <http://biodev.obs-vlfr.fr/biomarcell/ascidies/ascidiemenu.htm>

And : <http://zygote.swarthmore.edu/cyto1.html>

Things are moving rapidly now. Sequencing of the ascidian genome and a systematic analysis of gene expression patterns in *Ciona*, and *Halocynthia* are underway(20,21,22,23). See : <http://biodev.jgi.doe.gov/programs/ciona.htm> and <http://ghost.zool.kyoto-u.ac.jp/indexr1.html>. A particularly interesting localized maternal mRNA ; *Macho1* which is a muscle determinant has been described recently (24,25) . The story of the relocalization of PEM maternal cortical mRNAs like *Macho1* is told in the Bioclip « Inside the egg cortex » : download at <http://www.bioclips.com>

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