20-th Century

TECHNOLOGICAL AGE

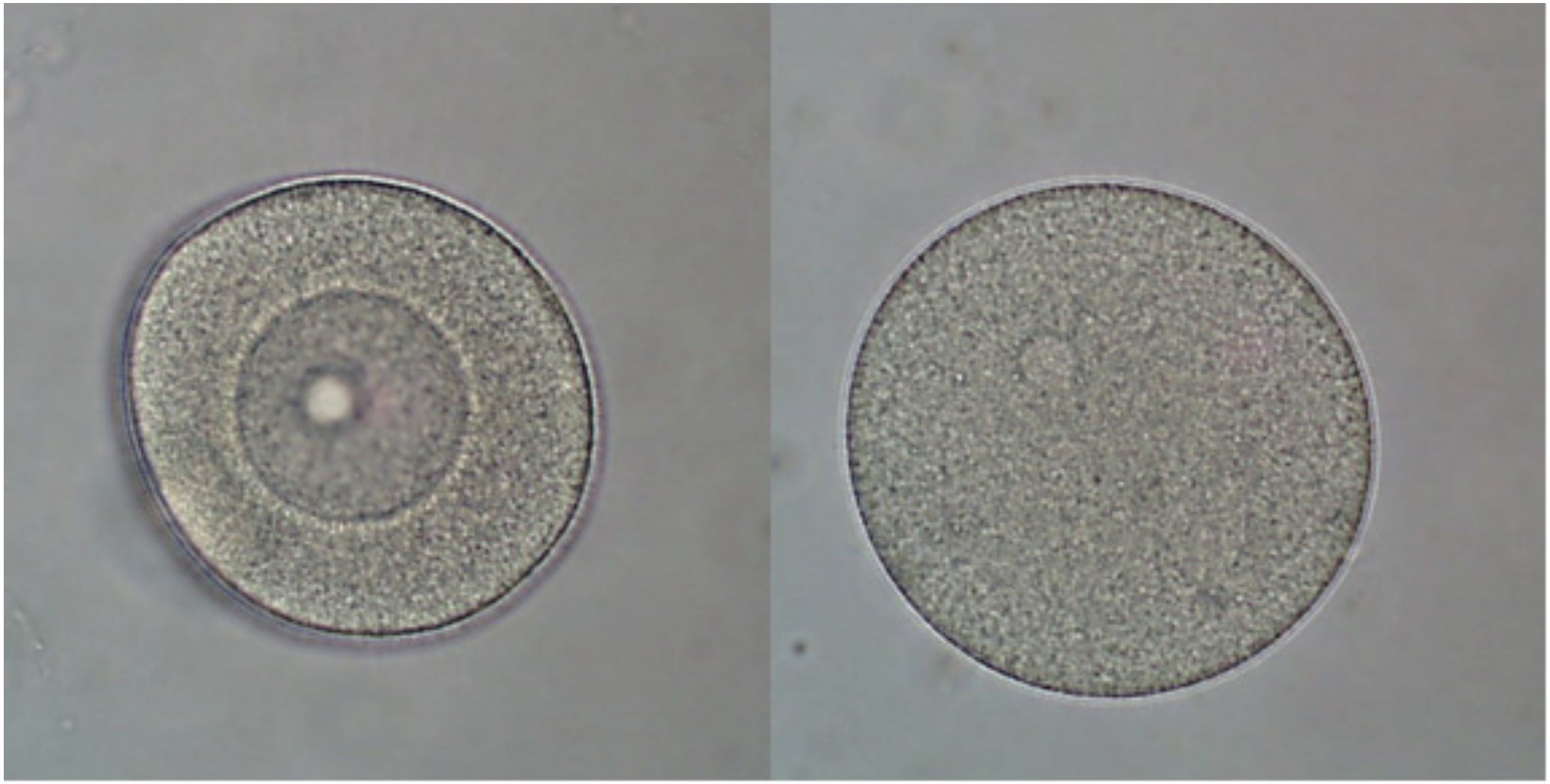
Special Topics: Sea Urchine lab

Collected and edited by Prof. Zvi Kam,

Common specie of the sea urchin and its skeleton

LAB MANUAL

1. Inject with a fine syringe needle 1cc of 0.5M KCl (which is isosmotic with seawater) into the soft skin close to the sea urchin “mouth” ..
2. Position the sea urchine above a small beaker mouth down. It will extrude the eggs (reddish) or sperm (white). Collect into a small Appendorf tube.
3. Dilute eggs into sea water in a Petri dish.
4. Dilute the sperm about x100 times, put a drop into the Petri dish, and watch under a microscope (Stereo microscope with magnification x10, or inverted microscope).
5. Follow sperms concentrating towards the eggs, detect sperm attachment, and the fast creation of the fertilization membrane. NOTE: Too many sperms will reduce the chance for good fertilization.
6. From now on nature will display the “movie” without your interference…
7. Under magnification of x20 it will be easier to detect the disappearance of the nucleus, and with polarization or better Nomarsky microscopy you will be able to see the mitotic apparatus, the splitting and formation of two nuclei.
8. The first divisions are every ¼ to ½ hour. Blastula will be seen after about 2-3hours, depending on the temperature, and Gastrula is after 3-5 hours.
9. Leave the Petri dish overnight.
10. Next day you will see the Pluteus “triangles” swimming around the bottom of the Petri dish with their cilia.



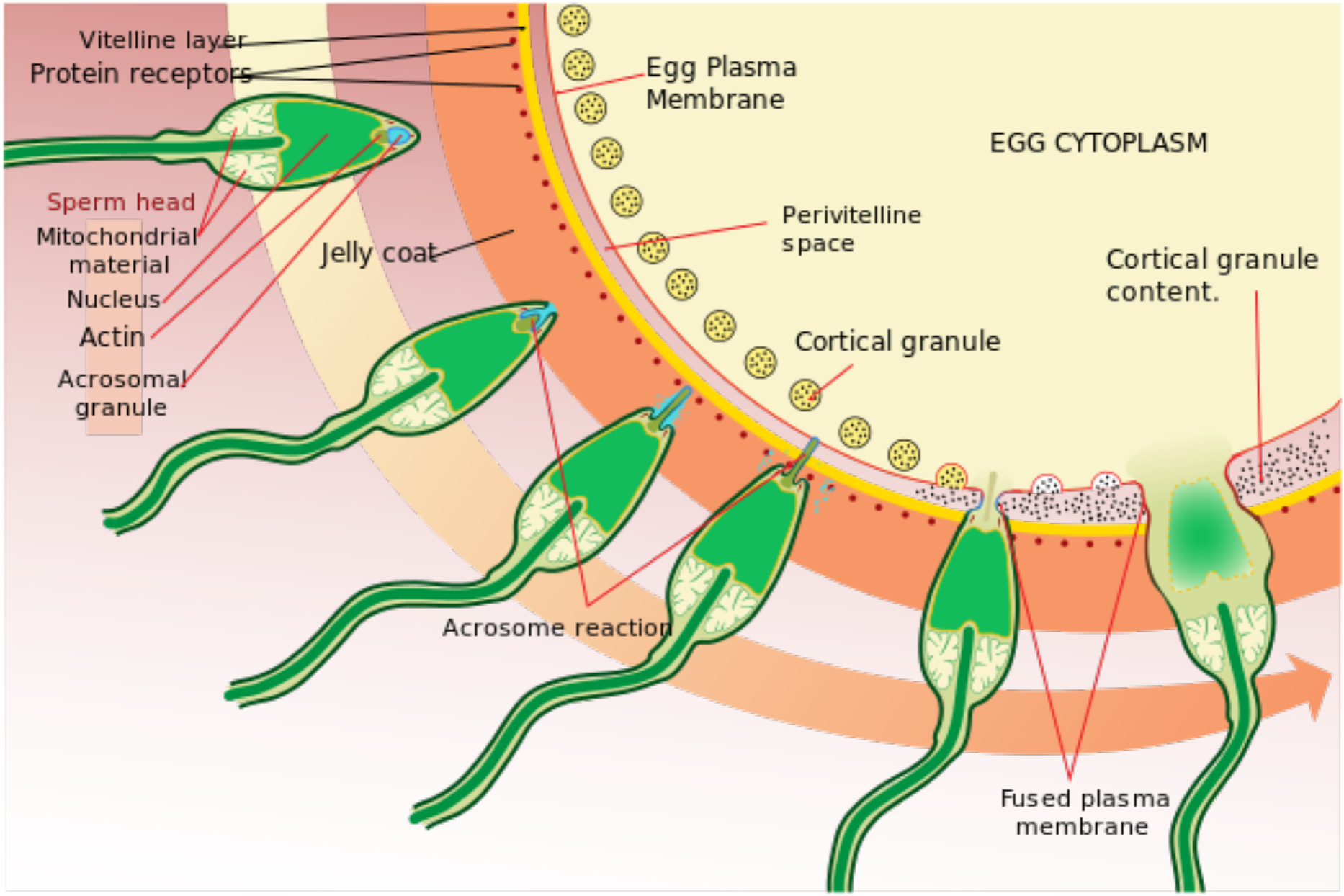
immature egg

mature egg

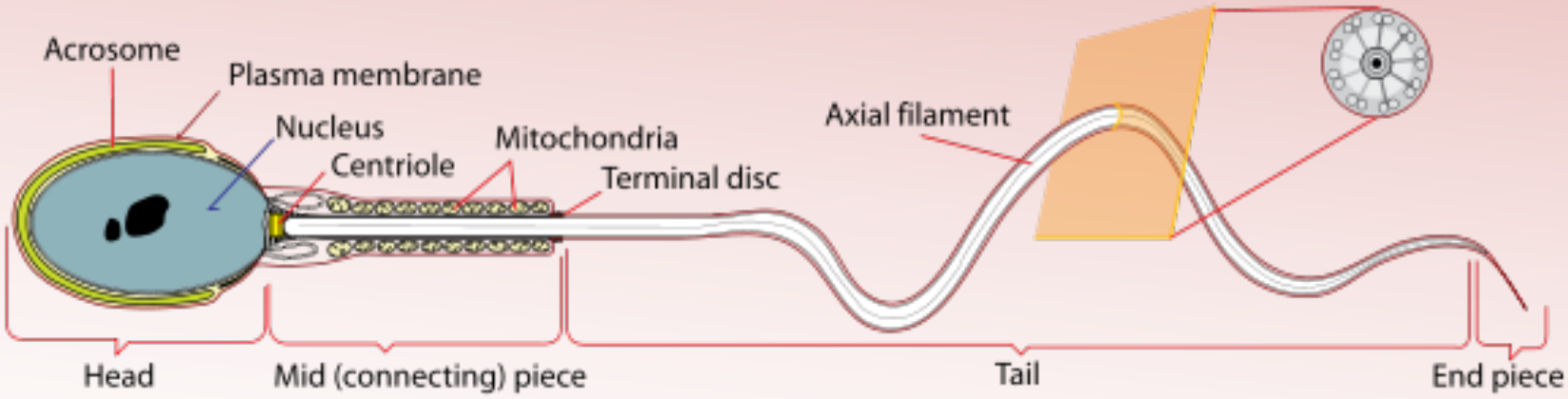
The ovum (egg)

THE SPERM

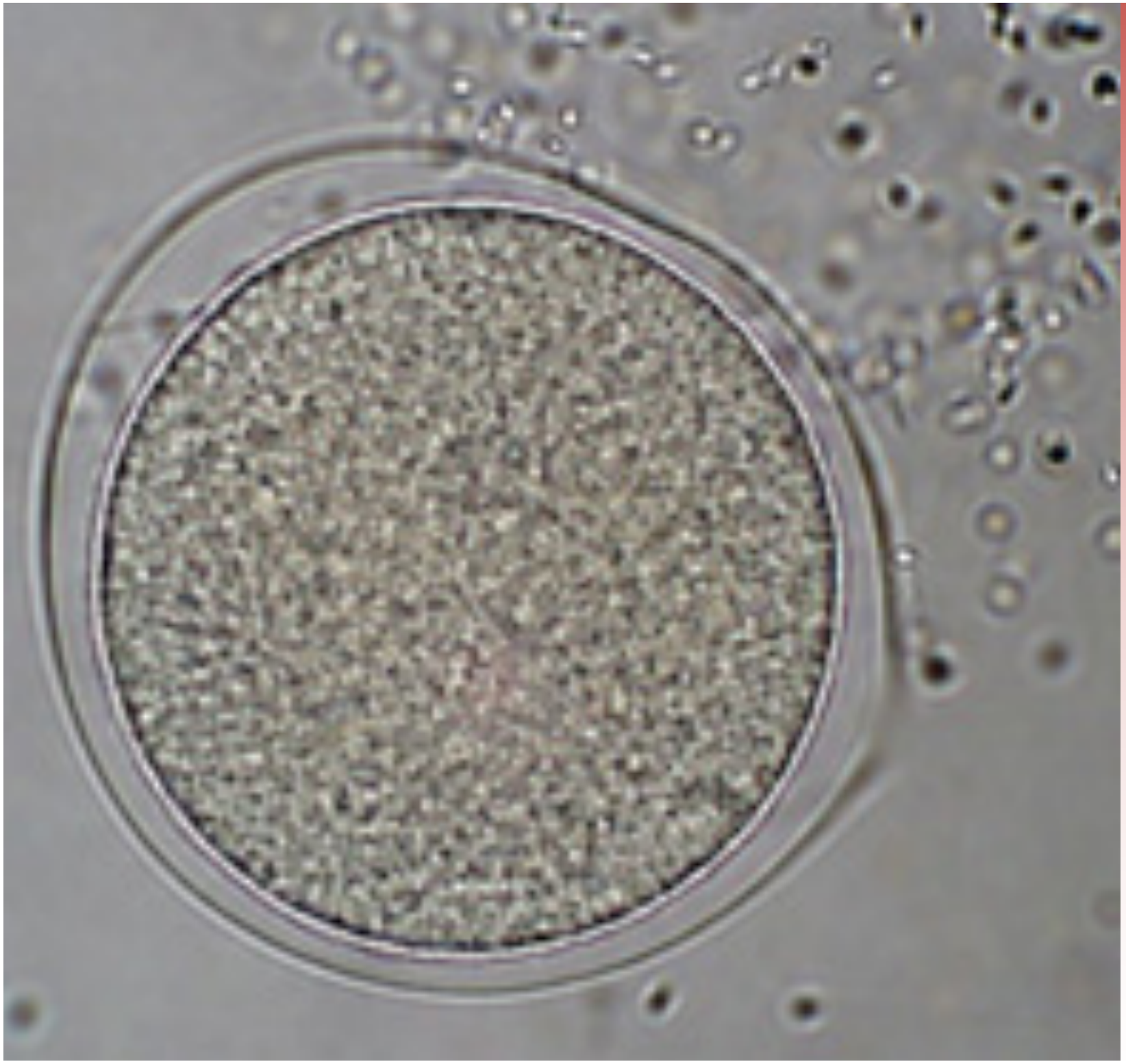
THE ACROSOM REACTION



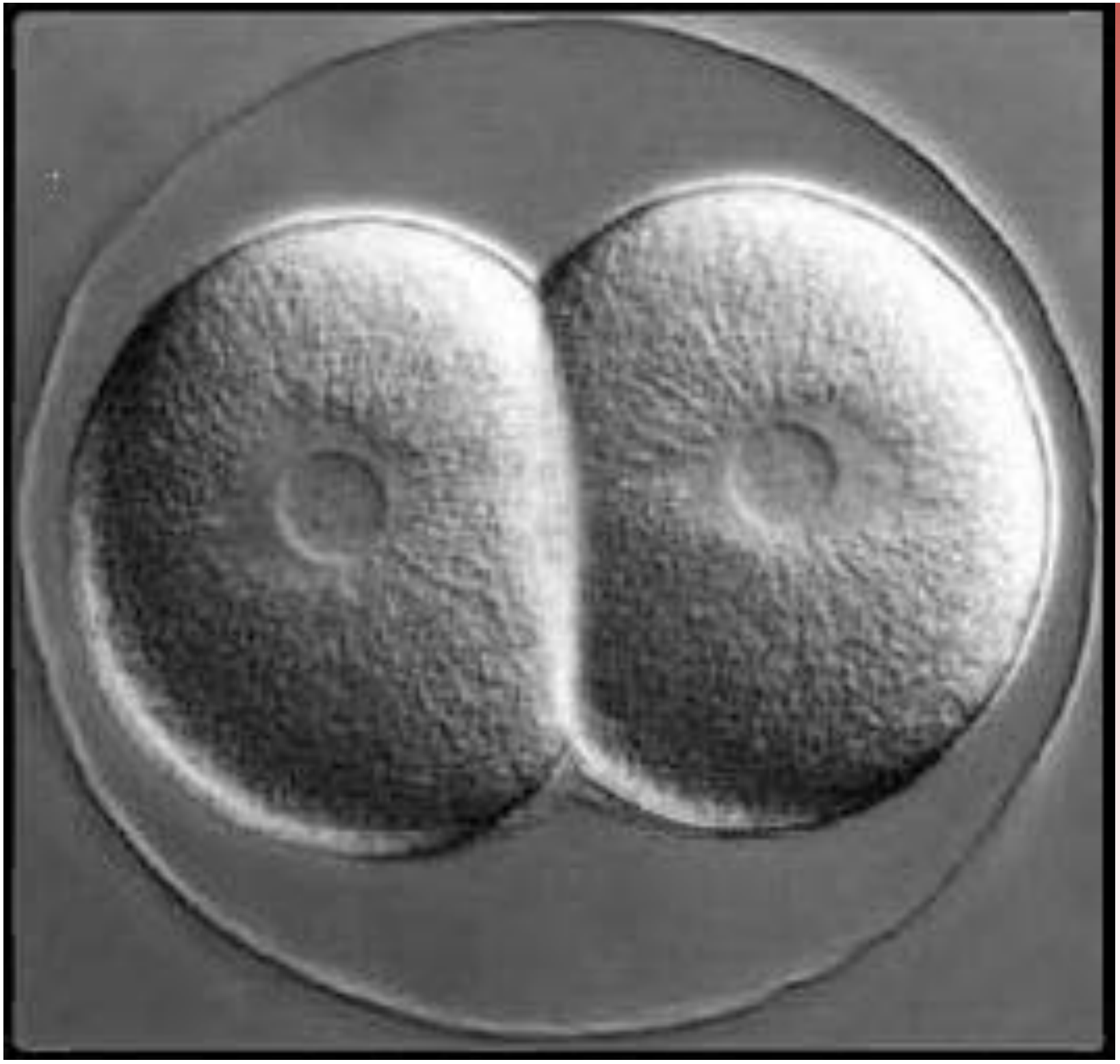
The structure of human sperm is similar to the sea urchin sperm



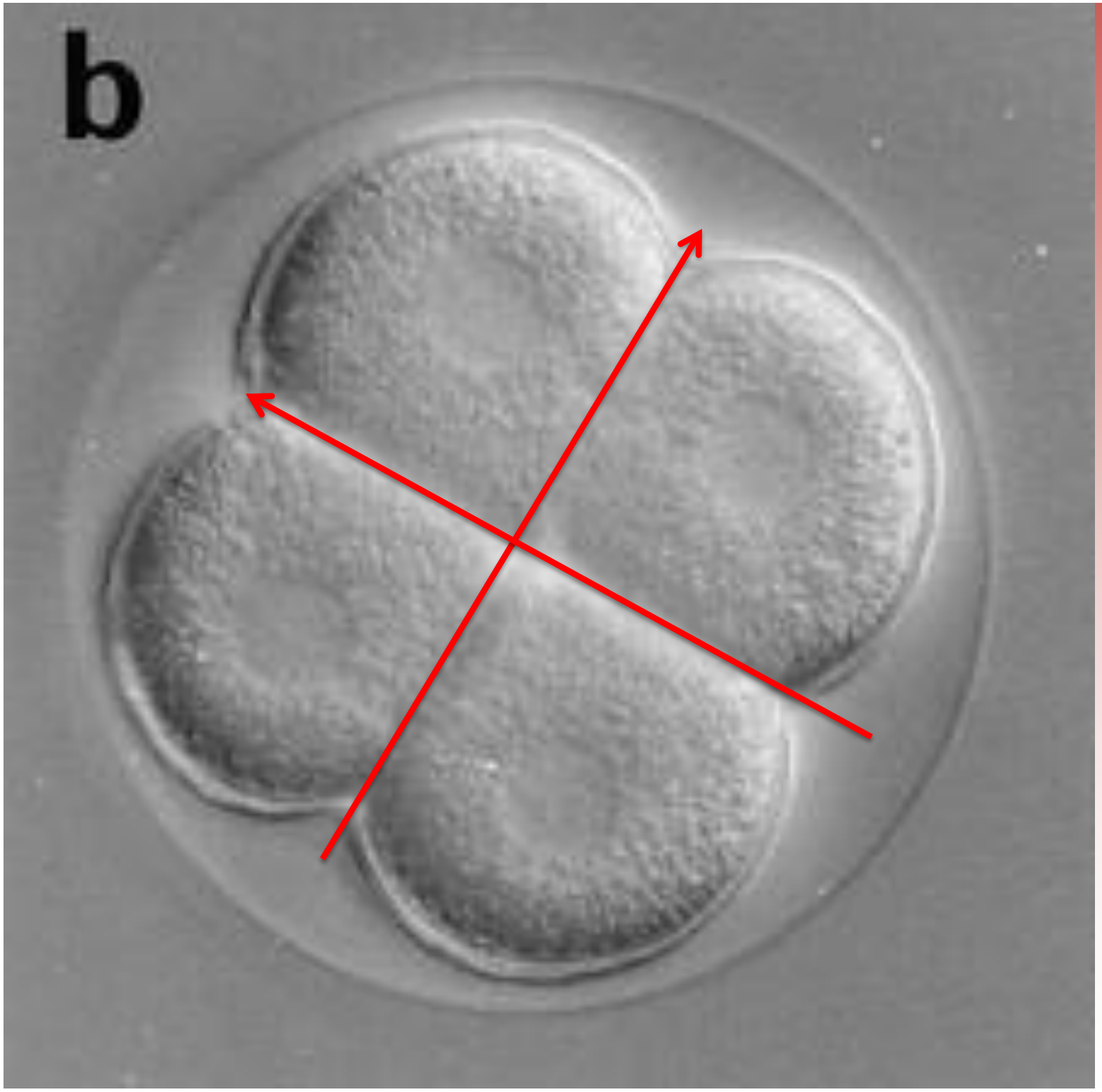
Sperm swimming towards the egg



Creation Of the Fertilization Membrane in order to prevent multiple sperms to eject their DNA into the egg.

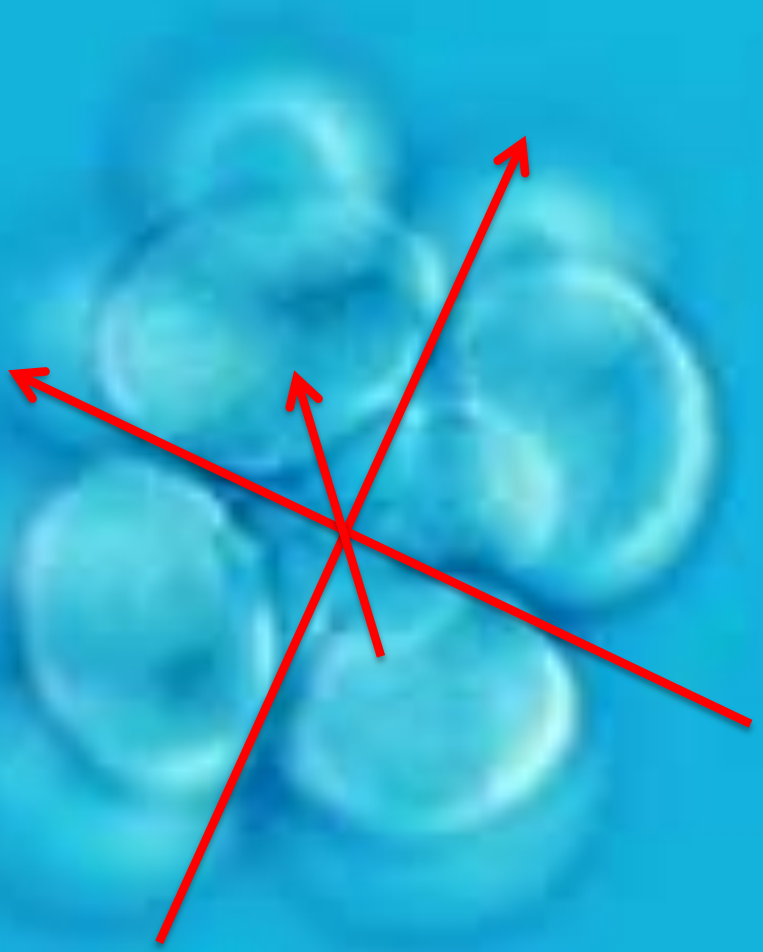


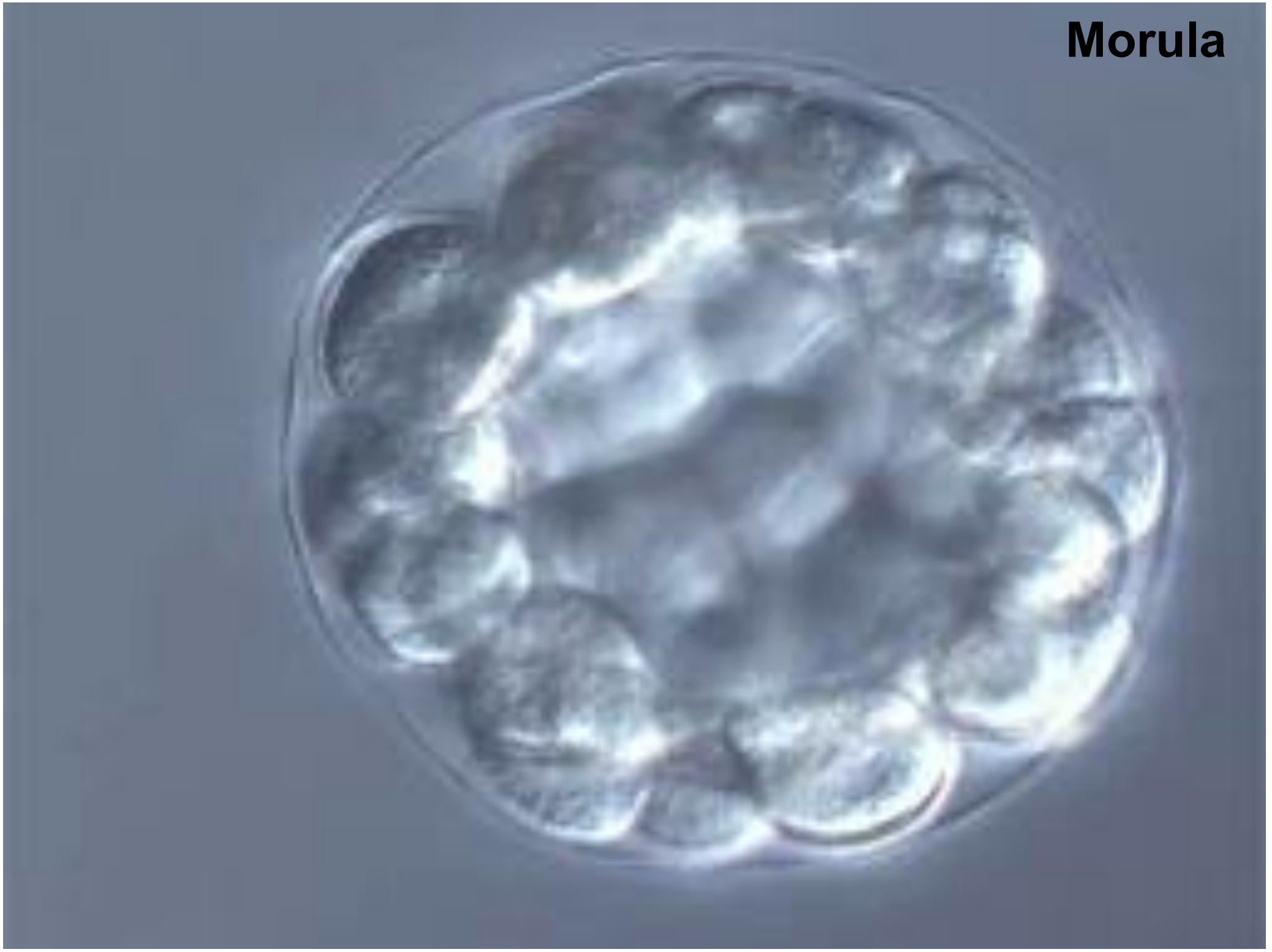
First division After two cells separated and two nuclei reformed.



Second division, at a perpendicular orientation

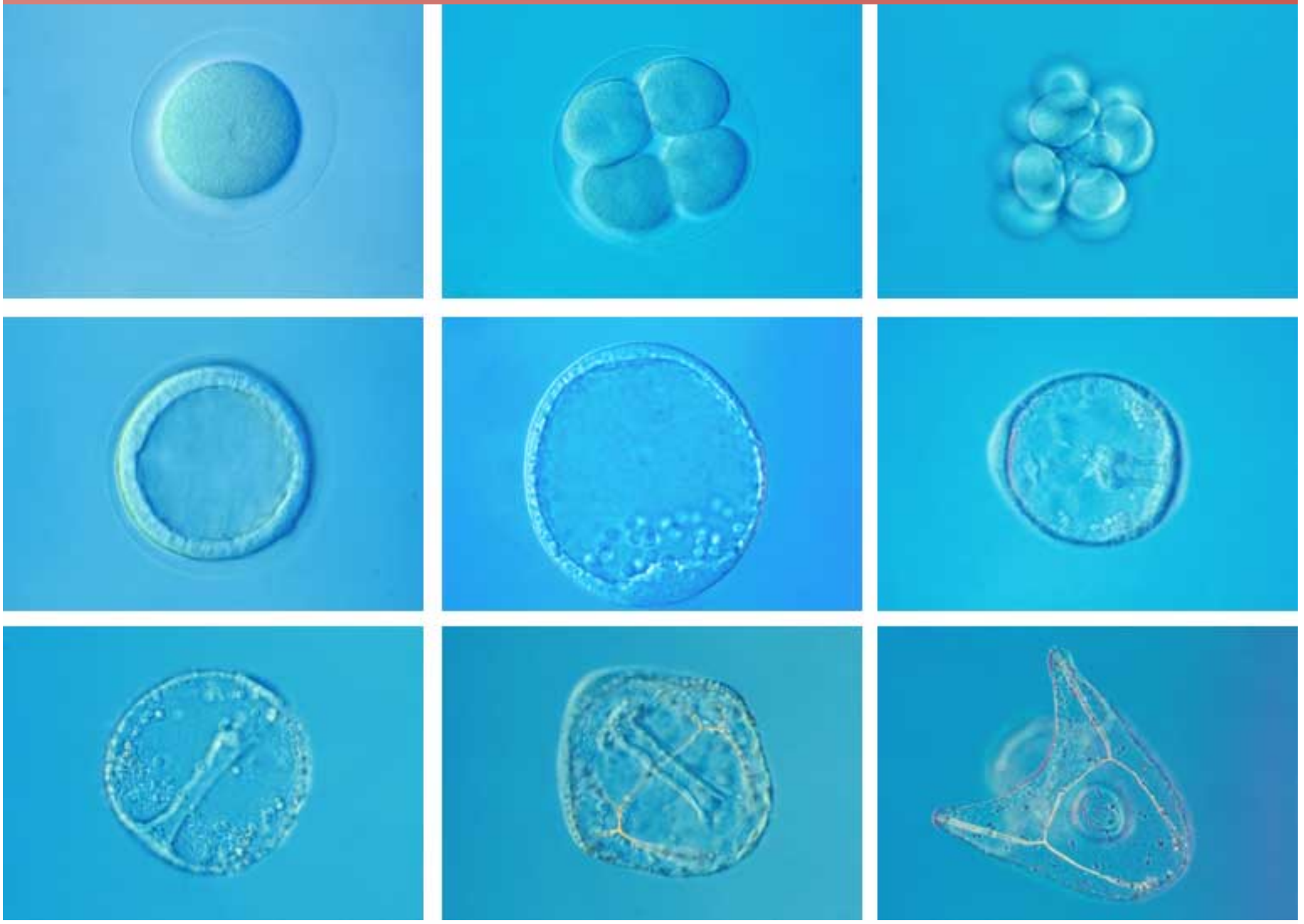
Third division
At the third perpendicular orientation

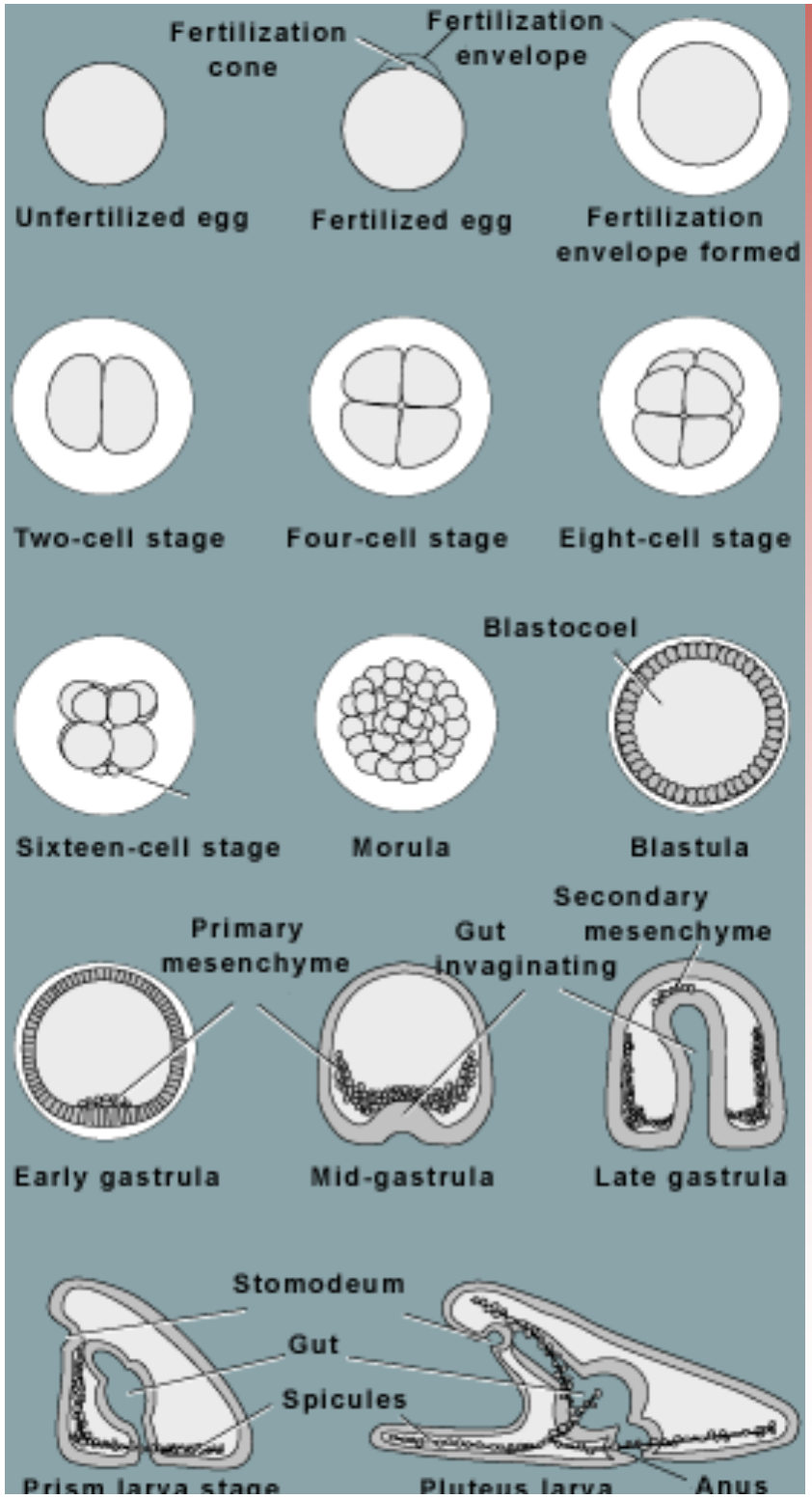



Morula

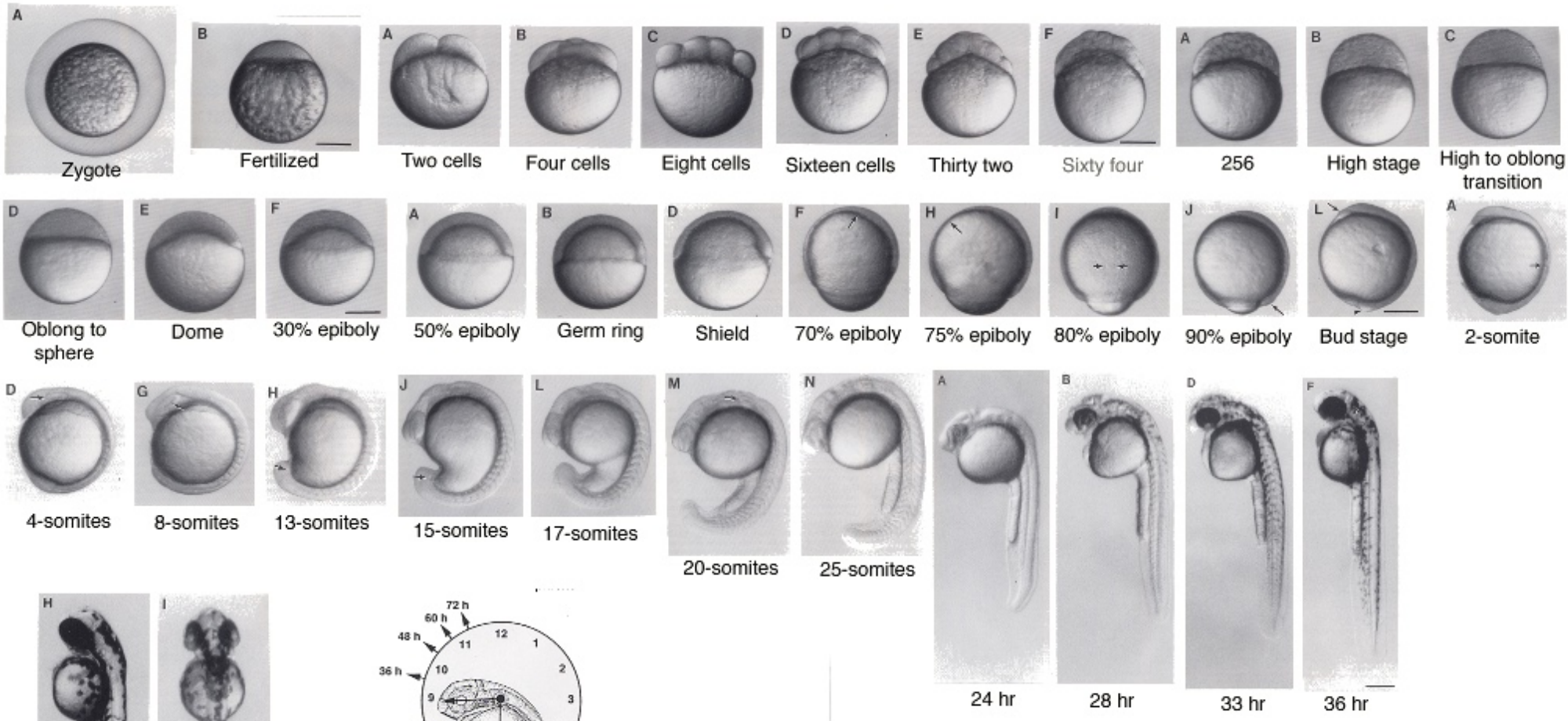
Blastula

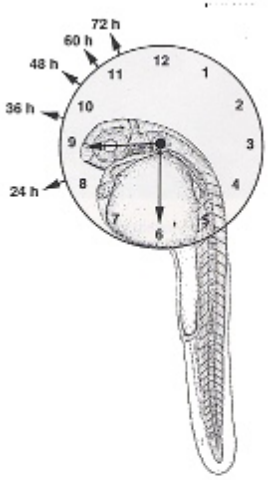

Gastrula
3 germ cell layers:
Ectoderm (outside)
Endoderm (inside)
mesoderm





Schematic drawings of the developmental stages till the larva

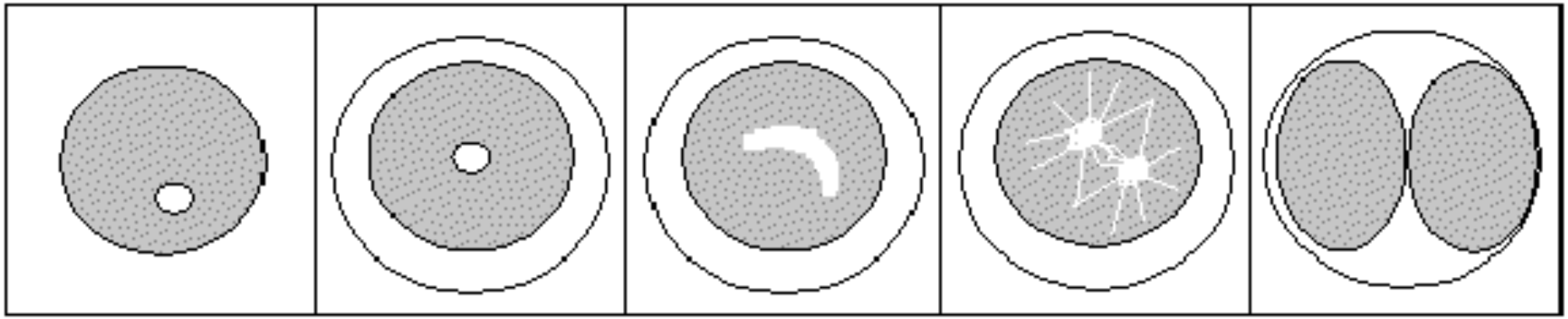




From: Kimmel et al. Stages of embryonic development of the zebrafish
Dev. Dyn. 203:253-310, 1995

Development of the zebrafish.
Can you notice similarities?

Zebrafish is a useful model organism for research in biology (Image Credit: Ajinkya Deogade)



unfert centered streak meta- 1st div

2nd div blastula gastrula pluteus urchin

This lab demonstration was conducted at the ”Israel Lotary Apple science center” at Ofaqim.
See urchins were provided by the marine biology center in Eilat