

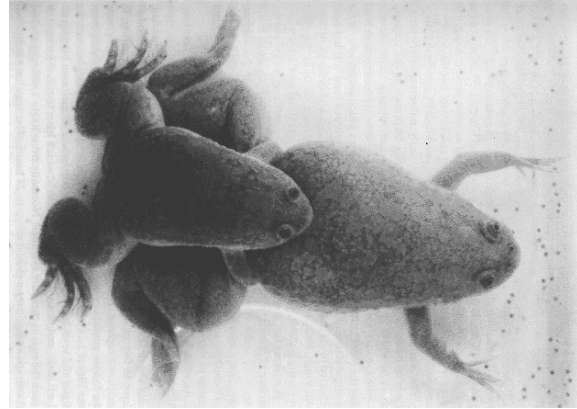
Modeling the Organism: The Cell in Development

Laboratory 8: Embryogenesis in *Xenopus*

Introduction

The developing embryo of the African clawed foot toad offers a unique window onto the processes that shape the vertebrate body. From external fertilization through maturation of a tadpole into an adult, the processes of blastula formation, gastrulation, neurulation, differentiation and organogenesis, and morphogenesis can be observed through the microscope as they take place in a Petri dish.

In today's lab you will have the opportunity to see different stages of development in living *Xenopus* embryos. Prior to the laboratory session, a gravid female and a male were introduced into a mating tank; courtship and mating followed. As the female sheds several hundred eggs, the male fertilizes them with sperm. Fertilization rapidly ensues, and the new embryos develop in relative synchrony (+/- 1-2 hours). By manipulating the temperature during development, we can modulate their progress (23°C=1x; 17°C=0.5x; 14°C=0.3x) and we will have both early embryos as well as more advanced developmental stages available for observation.


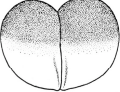
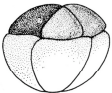
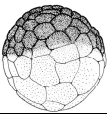
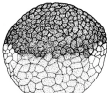
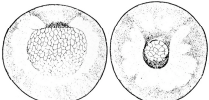


Source: http://www.mun.ca/biology/scarr/Xenopus_mating.htm cached
060421

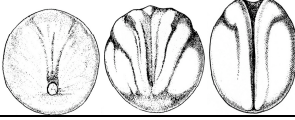
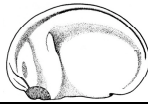



Using the material available in lab, and the staging criterion described on the reverse of this handout, identify representative stages that span the development of this organism. Remember that each Petri dish may contain a mixture of temporally related stages. Try to find both early and late representatives, sketching a few embryos in your lab notebook and labeling them as to your best estimate for stage/developmental age. Can you distinguish the animal pole from the vegetal pole? What surface features, if any, do you see? Are internal organs, such as the heart and other components of the circulatory system, visible? When does the eye develop, expressing the Pax6 program that we discussed in lecture?

Don't forget to check out the adult *Xenopus* in the lab frog tank. These particular frogs are the result of fertilizations that we did (or rather the frogs did) in the lab a number of years ago. It is important that we not release these animals to the local environment. Although Pennsylvania is probably too cold for them to survive the winter, *Xenopus* have been released in California (where is it against the law to do so!) and are thriving in the San Francisco area where they are displacing native amphibian species. Human introduction of invasive species, often into areas that contain no natural predators, continues to cause havoc in ecosystems around the planet.

Developmental staging of *Xenopus* embryos:

Stage 1		1 cell	Fertilization at t=0
Stage 2		2 cell	1:30
Stage 4		8 cell	2:15
Stage 7		Blastula	4:00
Stage 8		Blastula	5:00
Stage 10-12		Gastrula	10:00-12:00

<http://www.xenbase.org/atlas/NF/NF1-10.html>

Stage 12.5-17		Neurula	12:00-19:00
Stage 22		Tail Bud	24:00
Stage 26			1:05:30
Stage 40		Tadpole	2:18:00
Adult			

<http://dangas.grenouilles.free.fr/pages/timbres%20grenouilles/>