

DESIGNING EXPERIMENTS

When we do labs in embryology, we try to do experiments which will allow us to understand more about development.

We can do observational experiments which allow us to know more about what particular cells look like, or where they are in relation to others, we usually cut up live or preserved specimens, or we look at prepared slides. We have to have a plan before we start which will allow us to test some hypothesis and decide whether or not our observations support it.

We can do surgical procedures or micropipette injections which alter embryos to see how that affects development in comparison to normal development. The experiments must be designed around trying to answer a question, not just doing it because it's lots of fun to see what develops. We should try to understand some of the major concepts in development: induction, pattern formation, polarity, cell migration. All of these rely in their explanations on causative factors: 1. interaction between cells, 2. unequal distribution of gene products, 3. alteration of cell behavior and cell control mechanisms. So we need to think about how to demonstrate some of these by experiment.

Let's take the concept of induction: The explanation of neural induction involves interaction between chordamesoderm and ectoderm. How do we test to see if this is true?

When we do extirpation how are we affecting the embryo which remains, the piece of tissue we removed in terms of these three causative factors. When we graft in additional material how are we affecting the host and the graft? When we place chordamesoderm in atypical places what are we doing to the system? When we replace ectoderm with some other tissue what do we expect?

We can treat the embryos with various drugs which alter metabolism, cytoskeletal state, membrane potential, membrane permeability, cell division, so that if we have a hypothesis that the one of these is involved, we can apply drugs which interfere with specific components of it to see if our hypothesis is supported.

So when you write up your experiment, state the hypothesis, the type of procedure, the reason for using that type of procedure, and the expected results. Then prepare a way to show your data, such as a table to fill in and compare the actual with the expected results.