

The Origami Embryo: A model of early organogenesis.

Instructions for folding your own embryo.

You will need: colored paper

2 sheets of blue ("ectoderm": most dorsal layer)

4 sheets of pink ("mesoderm")

2 sheets of yellow ("endoderm": layer adjacent to yolk)

Scotch tape

Stapler and staples

notochord representative (pencil)

allantois representative (a balloon, imagination)

1. Gastrulate

Assemble three germ layers.

Each layer must be fairly wide, since folding will take up a lot of surface. The embryo provides the surface partially by growth--your paper won't grow, so you have to start big.

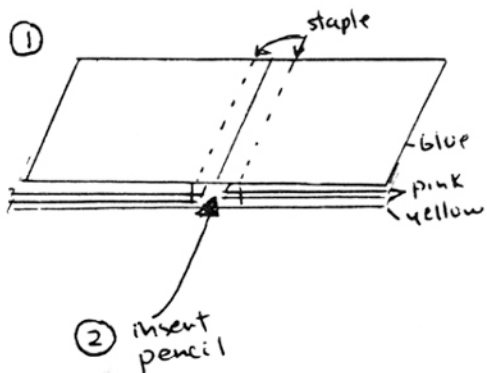
Overlap blue sheets slightly at their short ends and tape.

Overlap yellow sheets slightly and tape.

Between the blue and yellow sheets, place 2 layers of pink on each side leaving a 3/4 inch gap at the midline.

Staple the sheets together at each side of the midline, stapling through the most medial edge of the pink sheet.

Remember throughout these manipulations that the most lateral edges of your sheets have ends: in the embryo, these ends extend all around the yolk to form complete spheres.

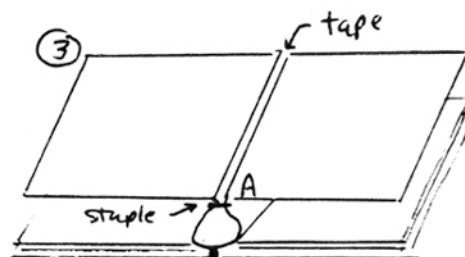
**2. Induce CNS: Primary induction**

Push a pencil between the two lines of staples.

This procedure represents the migration of Hensen's node:

The pencil represents the notochord laid down by Hensen's node.

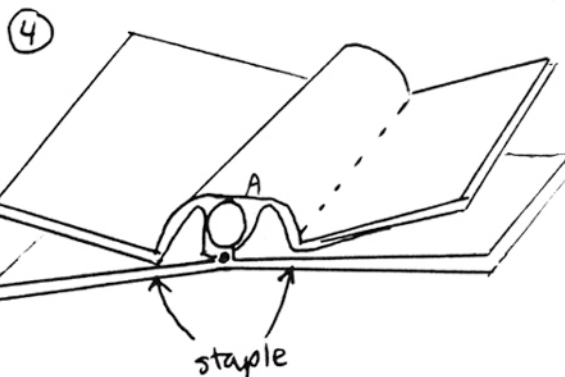
Mark the end where you inserted the pencil anterior (A). Tape the pencil in place.

**3. Neurulate**

Fold the blue paper up to make a tube about 1 inch in diameter.

Staple the neural folds together, representing fusion of the neural folds.

From the ectodermal side, tape the folds together at the midline, representing fusion of the ectoderm.

**4. Form mesodermal primordia**

Pinch all four sheets together 1-2 inches lateral to the neural tube and staple from anterior to posterior.

The two pink layers medial to the staples are the epithelial somites.

The staples go through the intermediate mesoderm.

The two sheets of pink extending laterally on each side are the somatic mesoderm (dorsal--toward ectoderm) and splanchnic mesoderm (ventral--toward endoderm).