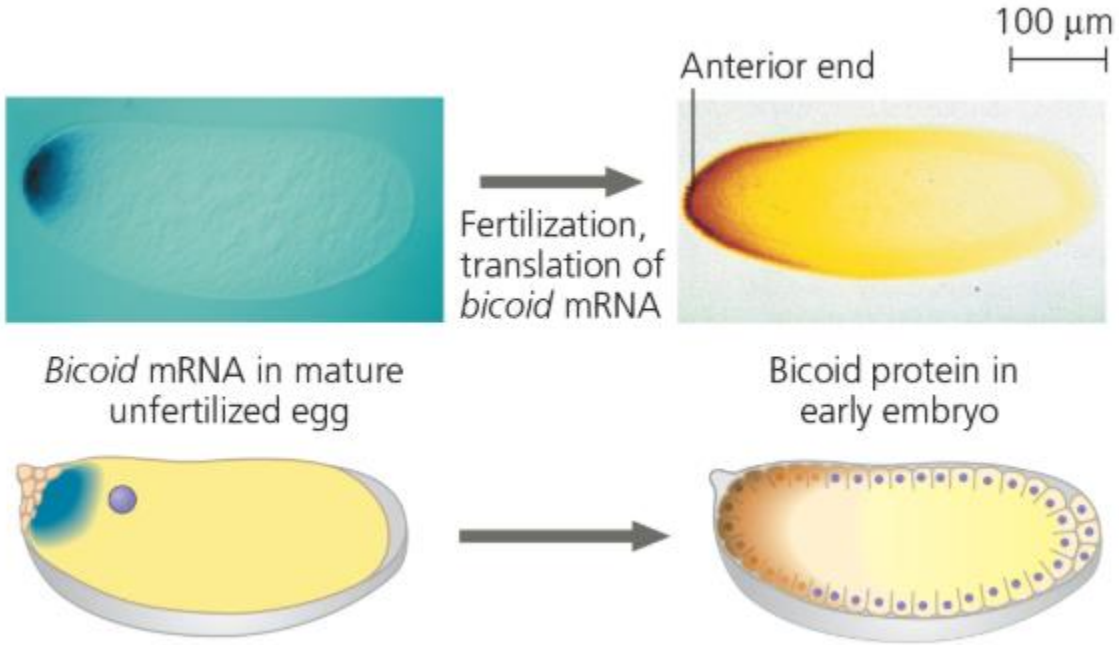
Effect of Bicoid on Fruit Fly Morphogenesis

Using a genetic approach to study *Drosophila* development, Christiane Nüsslein-Volhard and colleagues at two research institutions in Germany analyzed expression of the *bicoid* gene. The researchers hypothesized that *bicoid* normally codes for a morphogen that specifies the head (anterior) end of the embryo. To begin to test this hypothesis, they used molecular techniques to determine whether the mRNA and protein encoded by this gene were found in the anterior end of the fertilized egg and early embryo of wild-type flies.

In the light micrographs and drawings below, *Bicoid* mRNA is dark blue while Bicoid protein is dark orange.

1. a) Describe the distribution of *bicoid* mRNA in the unfertilized egg.
   b) Describe the distribution of Bicoid protein later in development.



2. Make a claim about the effect of Bicoid in morphogenesis of fruit fly embryos.

3. The researchers needed further evidence, so they injected *bicoid* mRNA into the anterior end of an egg from a female with a mutation disabling the bicoid gene. Predict the results you would expect to see.