

Unit # - 5 – Embryology/Developmental Biology (2 weeks)

Standards Addressed	Student Learning Objectives For this Unit	Content Skills and Knowledge	Learning Activities and Instructional Strategies
<p>NSES Standards: Life Science Science as Inquiry Science & Technology History & Nature of Science</p> <p>PA STEE Standards: 3.2.10.A (sci. k) 3.2.10.B (app k) 3.2.10 C (meth) 3.3.10.A (liv frms) 3.3.10 B (str/fnc) 3.3.10.C (inherit) 3.3.10.D (evo) 3.6.10.A (biotech) 3.7.10.A (tools) 3.8.10 C (imp)</p> <p>1.2 read crit 1.4 writing 1.8 presentation</p> <p>2.2 comp/estimation 2.3 measurement/est 2.5 prob solving 2.6 data analysis</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> ▪ Understand fertilization and the early stages of embryonic development in vertebrates. ▪ Utilize basic terms related to the early stages of development. ▪ Understand the morphological and molecular similarities in the early development of vertebrates reveal a common shared ancestor. ▪ Use microscopic observations to sketch and measure changes in a representative organism. ▪ Explore alternative forms of fertilization. ▪ Understand the current research and bioethical considerations concerning stem cell techniques. 	<p>Knowledge:</p> <ul style="list-style-type: none"> ▪ Cleavages, morula, blastocyst ▪ Gastrulation ▪ Membranes: Amnion and chorion ▪ Ectoderm, mesoderm, and endoderm ▪ Neurulation: nerve cell differentiation ▪ Organogenesis: organs start to form ▪ Morphogenesis: limbs start to assume shape <p>Skills:</p> <ul style="list-style-type: none"> ▪ Sketch, labe, and measure the morphological changes that take place in the developing embryo. Suggested representative organisms: <ul style="list-style-type: none"> ○ Medaka ○ Zebra fish ○ Sea Urchin 	<p>Lab or Demonstration: Medaka or Zebra fish development Mitosis Onion Root Tip Brine Shrimp Development</p> <p>Reading: Observing Embryonic Development</p> <p>Worksheet: The Medaka Stages</p> <p>Comparative Embryology Using Japanese Medaka Fish</p> <p>http://www.accessexcellence.org/AE/AEP/C/WWC/1995/medaka.html</p> <p>Technology: Development of Medaka http://biog-101-104.bio.cornell.edu/BioG101_104/tutorials/Medaka_stills.html</p>

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Unit Modifications

- Use the still images of Medaka or Zebra fish
 - http://biog-101-104.bio.cornell.edu/BioG101_104/tutorials/Medaka_stills.html
 - <http://www.cas.vanderbilt.edu/bioimages/animals/danrer/zfish-devel.htm>

Unit Enrichments

- Relate DNA of Medaka to Database at...
- <http://medaka.lab.nig.ac.jp/>

Suggested Assessment Techniques for Unit

Core 1: Protein Synthesis: Replication, Transcription, and Translation

Core 2: The Origin of Eukaryotic Cells

Core 3: Core Concepts Assessment: Final Exam

Materials/Technology for Unit

- Comparative Embryology Using Japanese Medaka Fish

<http://www.accessexcellence.org/AE/AEPC/WWC/1995/medaka.html>