



Cornell University

BioG 105/106
Autotutorial Introductory Biology
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Unit 3: Demos

Objective 3:

[/lac operon \(Jacob/Monod model\) animation from Campbell Biology](#)

Objective 4:

[Positive v. negative control of prokaryotic gene transcription](#)

Objective 7:

[A Simplified Description of DNA Methylation](#)

[How is methylation passed down from cell to cell?](#)

[Methylation](#) (definition from Wikipedia, includes more detail than necessary for objective)

[How Does Methylation Control Synthesis of Proteins?](#)

[You are what your mother ate](#) - diet linked to methylation

Objective 9:

optional: [Cloning: Past, Present, and the Exciting Future](#) (scroll down to the section title "Totipotency")

optional: [Cloning report](#) (Washington Post)

optional:

[Human clone produces stem cells](#)

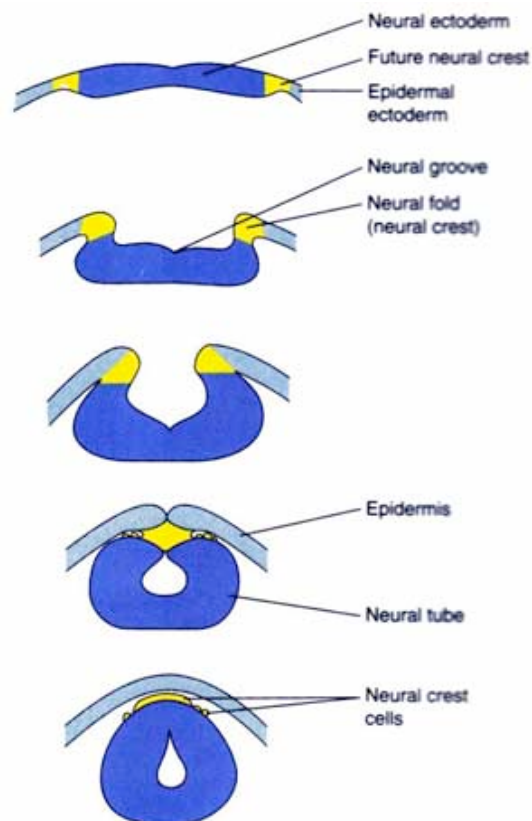
[Dolly not quite a clone](#)

[Diagram showing how they](#)

Neural Crest Cells

Neural crest cells are unique to vertebrates and give rise to a variety of important structures in the adult body. Their name suggests their origin. As neurulation proceeds and the neural tube begins to form, neural crest cells are groups of cells positioned on the top (dorsal) edges of the forming neural folds (see diagram below). Once the neural tube has formed and invaginated, the neural crest cells form a distinct population of cells resting on top of (just dorsal to) the neural tube. These cells will migrate away along defined routes to a number of locations as development proceeds.

In the end, neural crest cells form a wide array of different cell types including **skin pigment cells** (melanocytes and others), neurons of the dorsal root ganglia of spinal nerves, **the autonomic nervous system** (both sympathetic and parasympathetic ganglia - think about the paths these nerves take from the spinal cord to their target organs? These paths are formed during the initial migration of the neural crest cells away from the nerve tube), **Schwann cells** responsible for myelination of peripheral nerves, and the **adrenal medulla** - which is so intimately connected to the sympathetic nervous system via hormonal signaling with epinephrine and norepinephrine. Neural crest cells are also important in the head - forming some **bones and cartilage in the lower jaw** as well as **portions of the eyes, ears, and teeth**.



[made Dolly](#) (from Liem et al. Functional Anatomy of the Vertebrates, 3rd ed.)

[Give the dog a clone](#)

[Dog's Owners Are Throwing Late 'Missy' A Clone](#)

[Genetics Savings and Clone: Gene Banking and Cloning of Exceptional Pets](#)

Objective 15:

[Yolk content and cleavage in human eggs](#) (15c)

Zygote and morula (15d)

Zygotes: [sea urchin](#), [frog](#)
(zygote upper left, morula bottom right)

Two views of human morulae:
[1](#), [2](#)

Objective 17:

Neural crest cells (17c)

[Formation and fate](#) of neural crest cells

[Scientists Hatch a Few Odd Birds](#) (optional)

[Notochord development](#) (17d)

[Somite development](#) (17e)

Objective 18:

[Comparative development](#) (18b)

Objectives 21 & 22:

[Determinate v. indeterminate cleavage & embryonic induction](#)

Optional Supplementary

Material:

[Sonic Hedgehog Shapes the Brain](#)

Neural crest cells. Successive stages of amphibian neurulation diagrammed in transverse sections. Each of the drawings shows the neural ectoderm, the epidermal ectoderm, and the neural crest. When the neural folds fuse, they close the neural tube under a continuous layer of epidermis. The cells originally located at the crests of the neural folds, known as neural crest cells, then come to lie on top of the neural tube, from where they migrate to different locations and have a wide variety of fates. **Figure 13.22 from K. Kalthoff. 2001. Analysis of Biological Development. McGraw Hill, Boston.**

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