October 3, 2012

How Evolution Generates “Endless Forms, Most Beautiful”

Introduction:

Few biological concepts are as perennially captivating and contentious as the theory of evolution. Rather than reciting another litany of evidence in support of the idea, this seminar hopes to address the oft-asked but rarely discussed questions about how evolution actually works in nature.

The first section of this lecture will cover important concepts that inform how a seemingly unguided process can result in complex and even beautiful organisms we see today. The second portion will delve into specific ways that organisms develop their forms, and how these processes can be influenced by evolution and create large amounts of diversity through even small changes over time. The final segment will explore recent human evolution as an illustration of how some of these same forces act on us as well.

Speakers:

Marc Presler is a 2nd year PhD student currently working in Marc Kirschner’s lab, which studies embryology, cell division, and evolution of the early vertebrate form. Originally from Virginia, Marc graduated from the College of William & Mary in Williamsburg, VA with a degree in Biology. A talented musician, Marc often moonlights around Cambridge as a jazz trumpet player.

Peter Wang is a 6th year PhD student in Susan Dymecki’s lab, where he studies the embryonic development of a hindbrain structure known as the choroid plexus. He also serves as editor-in-chief of the Science in the News Flash newsletter. When he’s not at the microscope, Peter enjoys playing guitar and watching baseball.

Elizabeth Brown is a 5th year PhD student in the Human Evolutionary Biology department in the Graduate School of Arts and Sciences. She studies genetic selection in human populations on traits involved in metabolism and pregnancy. Elizabeth graduated in 2008 from Lehigh University in Bethlehem, PA with a BS in Biochemistry. Outside of academics, Elizabeth loves writing, reading, running, rock-climbing, and baking.
**Glossary of Important Terms:**

**Genome** - set of instructions detailing how to make all the proteins within a cell.

**DNA (deoxyribonucleic acid)** - the language of the genome. It is a molecule located within the nucleus of a cell that stores genetic information and codes instructions for how to build proteins.

**Gene** - a segment of DNA that has all of the information to make one protein.

**Protein** - a molecule, encoded by the DNA, that carries out a particular function within a cell.

**Mutation** - a change in the DNA code that can be inherited and is caused by external insults, such as UV light, or spontaneously accumulated due to errors in DNA replication.

**Evolution** - Change of the inherited characteristics of a population over time, or successive generations.

**Natural selection** - when traits become more common because they confer specific reproductive advantages.

**Population** - organisms that belong to the same species and live in the same geographical area.

**Development** - How an individual organism changes over time.

**Developmental Module** - A self-contained genetic program that controls a developmental process, and which can be moved around in space and/or time by evolution.

**Co-option** - How novelty can arise or become exaggerated.

**Variation** - variation in genes, occurring within and among populations.

**Homeotic Gene** - genes that determine the spatial identity of body parts, and are especially important in axis patterning.

**Heterochrony** - the shifting of developmental modules in time.

**Paedomorphosis** - retention by an organism of juvenile traits into later life.

**Lactose** - A sugar found in milk.

**Lactase** - An enzyme that digests lactose, allowing for its digestion.

**Lactase persistent** - a person who continues producing lactase into adulthood, enabling them to digest lactose.

**Adaptation** - a trait that is maintained and evolved by means of natural selection.

**Upcoming SITN Events**

October 10, 2012, Biotechnology and the Emergence of New Therapeutics

October 17, 2012, Living Foods: The Microbiology of Food and Drink

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