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# Natural History of Medicine Evolutionary Medicine Mini-Elective Spring 2009

<u>Course Dates:</u>	March 26, April 2, 9, 23 Thursdays, 2:00-4:00 PM
<u>Maximum Students:</u>	15
<u>Class Year:</u>	MS1 and MS2
<u>Course Director:</u>	Christopher Beard, PhD
<u>Contact Information:</u>	Christopher Beard, PhD 412-622-5782 <a href="mailto:beardc@carnegieMNH.org">beardc@carnegieMNH.org</a>
<u>Registration:</u>	Betsy Nero, Office of Medical Education <a href="mailto:betsy@medschool.pitt.edu">betsy@medschool.pitt.edu</a>

## Description:

This four-session mini-elective will introduce students to some of the numerous ways in which our common evolutionary history impacts modern health care. Humans differ from our nearest primate relatives in several fundamental ways, notably including the increased size of our neurocranium, our habitually upright posture and our bipedal locomotion. We will investigate how the profound evolutionary changes in the human skull and appendicular skeleton have left us with "anatomical baggage" that continues to plague patients and frustrate physicians. The course will cover a range of topics including:

- The impact of human evolution on obstetrics and gynecology
- An evolutionary perspective on oncology
- Maladies of the eyes, nose & throat attributable to human evolution
- An archaeological perspective on the history of human health

During the course, students will have access to relevant parts of the museum's collections and exhibits. Class sessions will meet at the museum (4400 Forbes Avenue), a short walk from the medical school campus in Oakland.

## Objectives:

- To understand how certain medical conditions arose through human evolution
- To appreciate that many diseases are ancient
- To draw connections between diseases affecting ancient and modern human populations
- To enhance your ability to explain medical phenomena to laypersons (i.e., patients)

## Requirements:

1. Participate in all 4 course sessions
2. Complete a short paper that explores the intersections among human anatomy, human evolution, and modern medicine

## Course Outline

### **The Natural History of Medicine: Evolutionary Medicine**

March 26, April 2, 9, 23, 2009 (2:00-4:00 PM)

#### **Course Director:**

Chris Beard, PhD, UPSOM Neurobiology and Carnegie Museum of Natural History  
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#### **Faculty:**

Zhexi Luo, PhD, UPSOM Neurobiology and Carnegie Museum of Natural History  
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#### **Course Objectives**

- To understand how certain medical conditions arose through human evolution
- To understand that many diseases are ancient
- To draw connections between diseases affecting archaeological and modern human populations
- To enhance your ability to explain medical phenomena to laypersons (i.e., patients)

Supplemental reading materials will be provided prior to each class.

#### **Location:**

All sessions meet in the Center for Museum Education, located on the lower level of the Carnegie Museum of Natural History, 4400 Forbes Avenue.

#### **Session One – “Four Legs Good, Two Legs Bad: Obstetric Implications of Human Evolution” March 26, 2009 (C. Beard)**

- Introductions
- Phylogeny, the fabric of life
- Placentation in humans, primates and other mammals
- Anatomical compromises associated with human childbirth
- **Application:** During the second half of this session, we will examine skeletons of living mammals and casts of fossils from the museum’s collection, with the goal of understanding how “historical contingencies” during human evolution have engendered many common medical conditions.

#### **Session Two – “An Evolutionary Perspective on Medical Conditions Affecting the Eyes, Nose, and Throat”**

##### **April 2, 2009 (J. Wible)**

- Paranasal air sinuses: morphology, evolution, function, and disease.
- Language: morphology, evolution, and increased susceptibility to choking.
- Evolution of color vision in mammals and color blindness in humans.
- **Application:** During the second half of this session, we will look at skulls of living mammals and casts of fossils to understand how our evolutionary history has led to problems with our paranasal sinuses, pharynx, and larynx.

#### **Session Three – “Ancient Lifestyles and Their Impact on the Human Body” April 9, 2009**

**(S. Olsen)**

- Paleonutrition: assessing the evidence and determining ancient conditions
- Ancient working conditions and social status: impact on quality of life and life expectancy
- Warfare and its effects on ancient populations: treatment of wounds, recovery, and mortality
- Ancient and modern beauty treatments and their medical implications: foot binding, tattooing, body painting and perforating, neck rings, cranial deformation, and more
- Ancient and modern religious practices and their effects on health
- **Application:** We will take a tour of the Alcoa Foundation Hall of Native Americans.

**Session Four – “Evolution of the Axial Skeleton by Hox Genes and Fetal Cancer”**

**April 23, 2009 (Z. Luo)**

- Introduction: axial skeletal variability
- Hox gene patterning of vertebrae and mammalian vertebral evolution
- Homeotic changes of human vertebrae and fetal cancer
- Anti-cancer selection as evolutionary constraint for vertebral segment pattern
- **Application:** During the second half of this session, we will examine axial skeletons of higher primates from the museum’s mammal collections. Discussion: homeobox gene influence on vertebral segmental identity, and their pleiotropic link to fetal cancers; reciprocal illumination of medicine and evolution.

**Requirement:** Two weeks after final session: deadline for receipt of your ~2500 word term paper on any topic related to human anatomy, human evolution, and medicine.