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School
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Natural History of Medicine: Evolutionary Principles and Anthropological Applications Mini-Elective Spring 2009

<u>Course Dates:</u>	February 5, 12, 19 and 26 Thursdays, 2:00-4:00 PM
<u>Maximum Students:</u>	15
<u>Class Year:</u>	MS1
<u>Course Director:</u>	Christopher Beard, PhD
<u>Contact Information:</u>	Christopher Beard, PhD 412-622-5782 beardc@carnegieMNH.org
<u>Registration:</u>	Betsy Nero, Office of Medical Education betsy@medschool.pitt.edu

Description:

This four-session mini-elective will introduce students to the numerous intersections between natural history (particularly paleontology, archaeology, and evolutionary biology) and medicine. Using examples drawn from the vast collections at the Carnegie Museum of Natural History, we will examine some of the basic evolutionary principles underlying modern diseases and/or clinical conditions. We will investigate the evolutionary biology and archaeological history of certain diseases, as well as the health status of ancient human populations. The course will cover a range of topics including:

- Ecological and evolutionary aspects of disease
- Clinical implications of our own evolutionary history
- Archaeological evidence on the health status of ancient human populations
- Biogeography of disease: Why do so many virulent pathogens arise in Asia?
- Biomedical insights regarding human evolution

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 appreciate that virulent microbes evolve
- To understand that the same diseases often affect humans and other animals, and that many diseases are ancient
- To comprehend some of the current health implications of human evolution
- 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 based on any area of overlap between natural history and medicine

Course Outline

The Natural History of Medicine: Evolutionary Principles and Anthropological Applications

Course Director:

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Faculty:

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Course Objectives

- To understand how certain medical conditions arose through human evolution
- To appreciate that virulent microbes evolve
- 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 materials will be provided for class by the instructor or on-line.

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 – “Evolutionary Principles and Human Health”

February 5, 2009 (C. Beard)

- Introductions
- Evolutionary biology of infectious microbes
- Biogeographic rules and the Asian dominance of infectious microbes
- Some interesting examples of disease/pathology in the fossil record
- **Application:** During the second half of this session, we will examine skeletons of dinosaurs in the new gallery *Dinosaurs in Their Time*.

Session Two – “Evolutionary Development of Early Mammals, and its Bearing on Human Skull Abnormalities”

February 12, 2009 (Z. Luo)

- How and what do we know about the evolutionary development of mammal skulls?
- The problem of wisdom tooth impaction in humans: Heterochrony as a mechanism in skull and dental evolution
- Cleft palate: Evolutionary perspective on variability of human abnormality
- Mandibulofacial dysostosis: Reciprocal illumination of medical and evolutionary approaches
- **Application:** During the second half of this session, we will examine heterochrony in primate skulls from the museum collection and compare jaw structures of mammals and non-mammalian vertebrates.

Session Three – “The Evolution of the Auditory and Vestibular Systems in Humans”

February 19, 2009 (J. Wible)

- Hearing and balance: morphology, function, and evolution in humans.
- Medical consequences of auditory and vestibular evolution in humans and other mammals: otitis media and mastoiditis.
- **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 ears and mastoid air cells, including otitis media and mastoiditis.

Session Four – “Ancient Diseases: Their Likely Sources and History of Dispersal”

February 26, 2009 (S. Olsen)

- The nature of the evidence: skeletons, mummies, histology, artifacts, and art
- Tracking the antiquity of diseases, their origins and dispersal
- Forensics and determining the cause of death in prehistoric cases
- **Application:** We will examine X-rays and CT scanned images of the Egyptian child mummy (the boy from Abydos) and take a tour of the Walton Hall of Ancient Egypt where he is housed.

Requirement: Two weeks after final session: deadline for receipt of your ~2500 word term paper on any topic related to natural history and medicine.

