INTRO TO ANTHROPOGENY - BIOM225

Fall 2020

INSTRUCTOR: **Pascal GAGNEUX, PhD, Pathology and Anthropology, Associate Director of CARTA (Center for Academic Research and Training in Anthropogeny)**

GOAL: **Explore multiple approaches to explaining a singular phenomenon: The human phenomenon, a phenomenon that is not the object of any single discipline**

FORMAT: **1 HOUR LECTURE AND 1 HOUR DISCUSSION, Remotely via ZOOM**

READING: **Broad review or book chapters, posted on the website as downloadable pdfs in advance**

DAY: **THURSDSDAY**

TIME: **1-3 PM**

LOCATION: **Remote sessions via ZOOM**

EXAM: **A) Student questions about each reading sent to instructor each week.**
B) Student presentation in teams of two.
C) 10 page essay "key questions in anthropogeny".

GRADES: **Grades will be based on student participation throughout, student questions about the reading, quality of the team presentation, and quality of the ten-page essay.**

WEB PAGE: https://carta.anthropogeny.org/training/specialization-track/courses/current-topics-anthropogeny-fall-2020

October 1: **HUMANS AS PECULIAR MAMMALS AND PRIMATES**

Instructor: Pascal Gagneux

Learning Objectives: Our place on the evolutionary tree of life. The molecules of life and how these help piece together the relationships between humans and all other organisms. Phylogenies as "grand summaries" of successful past reproduction. Primate mating systems and cultural impact on human mating systems. The importance of parenting and the delays in human development (childhood and adolescence).
Levels covered: phylogeny, the hominin fossil record, biochemistry (nucleotides, glycans, lipids, and proteins), reproductive biology, development, ecology, social organization.

No Reading

October 8: **GENETICS AND THE EVOLUTION OF THE HUMAN GENOME**

Instructor: Pascal Gagneux

Learning Objectives: Origins of the human genome structure and sequences as inferred from comparison with other primate genomes. Qualitative and quantitative character of genetic variation in the human population and how that compares to other well studied species. Genetic distinctness of *Homo sapiens*.
Levels covered: genome biology, DNA sequences, mechanisms of gene variation and its functional consequences, population genetics, mating systems.

Reading: Genetic and Genomic Features Unique to the Human Lineage. O'Bleness, M., Searles, V., Varki, A., Gagneux, P. and Sikela, J. 2012. ***Nature Reviews Genetics***.

October 15: **NUTRITION, ANATOMY, AND PALEONTOLOGY**

Instructor: Pascal Gagneux

Learning Objectives: You are what you eat and (until very recently) you eat where you are. Understanding the paleontological record as living ecology. Human nutrition in its comparative context. *Homo coquinus*?
Levels covered: nutrition, ecology, metabolism, anatomy, bone development, chemistry, paleoclimate, bones and stones.
Reading: Evolution of Early Homo: an integrated perspective. Anton, S.C, Potts, R.,Aiello, L.C. 2014. ***Science.***

October 22: **COMPARATIVE BRAIN ANATOMY**

Instructor: Pascal Gagneux

Learning Objectives: How brains with many shared characteristics, but with big size differences, can generate very different minds.
Levels covered: anatomy, cell biology, cellular architecture, neurobiology, histology, development, comparative anatomy.
Reading: The Human Brain: Evolution and Distinctive Features. T.M.Preuss. in "On Human Nature -Biology, Psychology, Ethics, Politics, and Religion. 2017

October 29: **COMPARATIVE MEDICINE**

Instructor: Ajit Varki (Confirmed)

Learning Objectives: Using disease differences between Humans and "Great Apes" as a window into "Human Uniqueness". The price of human evolutionary novelty. Medical consequences of mismatch between environment of evolutionary adaptation and "modern" life.
Levels covered: genetics, biochemistry, immunology, physiology, evolution in health and disease, society and mental health.
Reading: Biomedical differences between human and nonhuman hominids: potential roles for uniquely human aspects of sialic acid biology. NM Varki, E Strobert, EJ Dick Jr, K Benirschke, A Varki - 2011 **-** ***Annual Review of Pathology: Mechanisms of Disease***

November 5: **LANGUAGE AND COMMUNICATION**

Instructor: Pascal Gagneux

Learning Objectives: Contrasting the uniqueness of human language with the many complex communication systems of other animals. Contemplating the behavioral consequences of language as a species-specific, open-ended communication system with rapidly arising understanding barriers between different languages.
Levels covered: animal communication, origin of language, basic linguistics, anatomy of speech, molecular aspect of speech e.g FOXP2, theory of mind, sharing brains through language.
Reading: Human Variability and the Origins and Evolution of Language. TW Deacon . in "On Human Nature -Biology, Psychology, Ethics, Politics, and Religion. 2017

November 12: **CELL BIOLOGY AND NEUROSCIENCE**

Instructor: Alysson Muotri (confirmed)

Learning Objectives: Appreciating biology at the level of a cell. From cells to organisms and societies. How cellular processes contribute to body and mind. The use of stem cells as evolutionary toolkits to generate and test trans-disciplinary hypotheses.
Levels covered: cell biology, biochemistry, gene expression, cell fate: from cells to tissues and organs.
Reading: Induced pluripotent stem cell technology: a decade of progress. Y Shi, H Inoue, JC Wu, S Yamanaka- ***Nature reviews Drug discovery*****,** 2017

November 19: **SOCIAL AND CULTURAL DIMENSIONS OF HUMANITY**

Instructor: Pascal Gagneux

Learning Objectives: Organizational bases of social life and the power of cultural phenomena: the ethnographic record. Humans are biologically cultural and culturally biological. Reconstructing past social and cultural behavior based on fossils and archeology. How Humans study humans: research methods of classical anthropology, the standard cross-cultural sample. Studying human societies in a globalized world.

Levels covered: social systems, social norms and sanctions, rituals, rites of passage and institutions. cultural evolution, archaeology, paleontology, history of anthropology, social versus natural sciences, sociology of science, the problems with studying ourselves.

Reading: Darwin's Unfinished Symphony: How Culture Made the Human Mind. Chapter 1. Laland, Kevin 2018 Princeton

December 3 **BIOLOGICAL ENCULTURATION**

Instructor: Pascal Gagneux

Learning Objectives: Human biology and culture —often seen as separate— have interacted over evolutionary and historical time in rich and complex ways. Special emphasis will be put on how cultural practices and traits such as cooking, animal domestication, writing technology, art, and mathematics, have actually affected and modified the very biological phenomena that made us the animal we are: from anatomical features to the immune system, from the genome to the brain.

Levels covered: human cultural niche, cooking and tool use as cultural forces that shaped human biology.

Reading: Is there really an evolved capacity for number? Núñez, R., 2017. ***Trends in cognitive sciences*.**

December 10: **STUDENT PRESENTATIONS**

Instructor: Pascal Gagneux & Student teams

Learning Objectives: Appreciate the common yearning for “umbrella” type hypotheses, focusing on a single factor to explain a large suite of human attributes. Student teams each pick one umbrella hypothesis and critique it for the class. Umbrella hypotheses include: Savannah Ape; Aquatic Ape; Machiavellian Ape, Handy Ape, Domesticated Ape; Warrior Ape; Religious Ape, Cooking Ape, *Homo economicus* etc….

STATEMENT ON ACADEMIC INTEGRITY:

“Academic Integrity is expected of everyone at UC San Diego. This means that you must be honest, fair, responsible, respectful, and trustworthy in all of your actions. Lying, cheating or any other forms of dishonesty will not be tolerated because they undermine learning and the University’s ability to certify students’ knowledge and abilities. Thus, any attempt to get, or help another get, a grade by cheating, lying or dishonesty will be reported to the Academic Integrity Office and will result sanctions. Sanctions can include an F in this class and suspension or dismissal from the University. So, think carefully before you act. Before you act ask yourself the following questions: a) is my action honest, fair, respectful, responsible & trustworthy and, b) is my action authorized by the instructor? If you are unsure, don’t ask a friend—ask your instructor, instructional assistant, or the Academic Integrity Office. You can learn more about academic integrity at academicintegrity.ucsd.edu” (Source: Tricia Bertram Gallant, Ph.D., UCSD Academic Integrity Office, 2017).