
# INTRO TO ANTHROPOGENY - BIOM225

## Fall 2018

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| GOAL: | EXPLORE MULTIPLE APPROACHES TO EXPLAINING A SINGULAR PHENOMENON: THE HUMAN PHENOMENON, A PHENOMENON THAT IS NOT THE OBJECT OF ANY SINGLEDISCIPLINE |
| FORMAT: | 1 HOUR LECTURE AND 1 HOUR DISCUSSION |
| READING: | 2 BROAD REVIEWS OR BOOK CHAPTERS PER SESSION, POSTED ON THE WEBSITE AS DOWNLOADABLE PDFS IN ADVANCE |
| DAY: | THURSDSDAY |
| TIME: | 1-3 PM |
| LOCATION: | Biomedical Research Facility 2, Room 2A03 (and 4A03 on 10/18 and 11/15) |
| EXAM: | A) Student Presentation in teams of two<br>B) 10 PAGE ESSAY "KEY QUESTIONS IN ANTHROPOGENY" |
| GRADES: | Grades will be based on student participation throughout, quality of the team presentation, and quality of the ten-page essay. |
| WEB PAGE: | https://carta.anthropogeny.org/training/specialization-track/courses/introduction-anthropogeny-fall-2018 |

**SEPTEMBER 27:** **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.

**OCTOBER 4:** **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.

**OCTOBER 11:** **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.

**OCTOBER 18:** **COMPARATIVE BRAIN ANATOMY *BRF-2, 4A03***

**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, neurobiology, histology, development, comparative anatomy

**OCTOBER 25:** **COMPARATIVE MEDICINE**

**Instructor: Ajit Varki**

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.

**NOVEMBER 1:** **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.

**NOVEMBER 8:** **CELL BIOLOGY AND NEUROSCIENCE**

**Instructor: Alysson Muotri**

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.

**NOVEMBER 15:** **SOCIAL AND CULTURAL DIMENSIONS OF HUMANITY *BRF-2, 4A03***

**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.

**NOVEMBER 22:** **NO CLASS Thanksgiving**

**NOVEMBER 29:** **BIOLOGICAL ENCULTURATION**

**Instructor: Rafael Nuñez**

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.

**DECEMBER 6:** **WRAP UP AND AREAS TO WATCH**

**Instructor: Pascal Gagneux**

Learning Objectives: The multi million-year long process resulting in modern humans almost certainly allowed for a large number of factors to come to play. These likely included totally independent factors, climatic, biological and cultural, which have shaped who we have become.

Levels covered: climate, ecological niche, social selection, sexual selection, genome plasticity, biochemical constraints, nature via nurture, trans-generational effects; next challenges in human origins research.

**DECEMBER 13:** **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….