Glossary: *Comparative Anthropogeny and Other Approaches to Human Origins*

Allele: Alternative **DNA sequence** at the same **locus** (location on the **chromosome**).

Allomaternal/alloparental care: Infant care provided by individuals other than the mother/parents.

Amino acids: Organic compounds that are the building blocks of **proteins** and participate in a number of processes such as neurotransmitter transport and biosynthesis. Amino acids are encoded by the **genome** as different three **nucleotide** codes.

"Archaic" *Homo sapiens*: Earlier forms of ***Homo sapiens*** who were anatomically and behaviorally distinct from modern humans.

Bonobos (Pan paniscus): One of the two **species** comprising the **genus**, *Pan*, having branched from **chimpanzees** ~1 million years ago. Sometimes referred to as "pygmy chimpanzee." Bonobos, compared to chimpanzees, are more gracile, have female social dominance, relatively long legs, pink lips, a dark face, a "tail-tuft" through adulthood, and parted long head hair. The species is omnivorous and inhabits primary and secondary forests, including seasonally inundated swamp forests. The bonobo is found in a 500,000 km^2 (190,000 sq mi) area of the Congo Basin, only south of the Congo River, in the Democratic Republic of the Congo. Due to political instability, little field work in their natural habitat has been performed. Most behavioral knowledge is a result of studies of captive bonobos.

Brain orgainoids: An artificially grown in vitro brain model used for investigating brain development and neurological disease. Brain **organoids** are derived from i**nduced pluripotent stem cells** and **embryonic stem cells**.

Callitrichadae: A family of New World monkeys.

Chimpanzee (*Pan troglodytes*): One of the two species comprising the **genus**, *Pan*, having branched from **bonobos** ~1 million years ago. Sometimes referred to as "common chimpanzees". Native to sub-Saharan Africa, chimpanzees are found in and around the Congo Basin (north of the Congo River) and throughout West Africa. Chimpanzees are divided into four subspecies, based on appearance and distribution. Compared to bonobos, chimpanzees are somewhat larger, more aggressive, and exhibit male social dominance.

Chromatin: A complex of **DNA** and **proteins** (histone and adaptor proteins) forming **chromosomes**.

Chromosome: Discrete strands of tightly packaged **chromatin**.

Concealed ovulation: A form of **ovulation** that lacks any exterior signs.

Culture: Behavior and norms that are shared, learned, and socially transmitted.

Denisovans: An extinct **hominin** population contemporary with **Neanderthals** that hybridized with ancient humans and Neanderthals. Knowledge of Denisovan morphology is limited to two small fossils found in Siberia and a jaw in Tibet.

Deoxyribonucleic acid (DNA): The **molecule** of inheritance, which consists of **sequences** of the four **nucleotide** bases: Adenine, Thymine, Guanine, and Cytosine.

DNA sequence: The specific order of the **nucleotide** bases along a strand of **DNA**.

Embryonic stem cell (ESC): The inner cell mass of the human blastocyst, the rapidly dividing fertilized egg at four to seven days post fertilization. ESCs are pluripotent, meaning they can differentiate into all cell types of the three embryonic tissue layers.

Estrus (or Oestrus): Cyclical periods of sexual receptivity and fertility. From the Greek word, *oistros*, for "gadfly/horsefly," with the additional meaning of "frenzy."

Ethnology: The practice of comparing and contrasting the features of multiple ethnohistorically-documented human societies.

Fecundability: The probability of achieving a pregnancy within a mentrsual cycle.

Follicular phase: The first part of the **menstrual cycle,** including menstruation and the period prior to **ovulation**.

Gene: A **DNA sequence** which encodes a specific function.

Gene expression: The process by which the information contained within a **gene** (**nucleotide sequence**) is used to direct **protein** synthesis and dictate cell function. Nearly all of the cells in the body contain identical genes, but only a subset of this information is used or expressed at any time. The genes expressed in a cell determine what that cell can do.

Genome: The totality of **DNA** in a cell. Also refers to the **DNA sequence** that typifies an individual or **species**.

Genus: A taxonomic rank used in biological classification of living and fossil organisms to group closely related **species**. In binomial nomenclature, the genus name plus species name forms the binomial species name (e.g. *Homo sapiens*).

Great apes: A taxonomic family denoting the extant **chimpanzees**, **bonobos**, gorillas, and orangutans. This is biologically invalid grouping given that chimpanzees and bonobos are more closely related to humans.

Hominin: A classification of **species** comprising humans and our extinct relatives following the divergence from the common ancestor with **chimpanzees**.

Homo: The **genus** that comprises the **species *Homo sapiens***, as well as several extinct species classified as ancestral to, or closely related to, humans.

***Homo sapiens*:** The **hominin species** comprising all living humans. Meaning "wise man" in Latin, the name was introduced by Carl Linnaeus in 1758. The earliest fossil evidence of *Homo sapiens* appears in Africa around 300 kya (see **Jebel Irhoud Hominins**).

Hypoxia: A condition characterized by less than the normal amount of oxygen reaching the tissues; also, low partial pressure of oxygen at high elevations (hypobaric hypoxia).

Infanticide: The killing of infants by males or females.

Induced pluripotent stem cells (IPSCs): Somatic (body) cells that are artificially reprogrammed to an embryonic-like stem cell state and differentiated into other types of cells.

Interbirth interval (IBI): The amount of time between consecutive births.

Introgression: Transfer of **alleles** between **species**.

Jebel Irhoud hominins: The oldest known "early" human fossils discovered, dating to roughly 300 kya from an archaeological site in Morocco. The location of this discovery suggests a "pan-African" origin of humans, with a dispersed interbreeding population, likely aided by climactic factors.

Ju/'hoansi: An indigenous population of **San people** in northeastern Namibia and northwestern Kalahari desert region of Botswana.

Khoisan (or Khoe-Sān): A collective term for non-Bantu indigenous people of South Africa, as well as for the related languages they speak.

Language (human): A structured system of communication that is generative (combine words/symbols to convey an infinite number of ideas), recursive (builds upon itself without limit), and has displaced reference (describe things not present).

Life-history theory: An evolutionary framework for understanding the timing of developmental milestones and life stages.

Locus: A unique physical position on a **chromosome**.

Luteal phase: The part of the **menstrual cycle** between **ovulation** and menstruation.

Marine isotope stage 5 (MIS 5): The geologic temperature record between 130,000-80,000 years ago.

Mating effort: The portion of reproductive effort (time and energy invested) in the form of achieving matings (sexual access).

Menstrual cycle: Relating to monthly **ovulation** or menses.

Molecule: A group of two or more atoms covalently bonded together to form the smallest fundamental unit of a chemical compound that can take part in a chemical reaction.

Neanderthals: An extinct Eurasian **hominin species** that existed from 500-30 kya and interbred with ancient humans and **Denisovans**.

Neoteny: The delay or slowing of development. Compared to other primates, humans are considered neotenous due to the retention of physiological traits typical of juveniles such as facial features (globular skull shape, thinness of skull bones, reduction of browridge, flattened face, larger eyes), limb length ratio, and behavior.

Neuron: A specialized cell that transmits nerve impulses and forms **synapses** with other cells.

Nucleic acid: One of the four classes of major biomolecules. The overall name for **DNA** and **RNA**, which are composed of **nucleotides**. DNA is double-stranded and more stable while RNA is single-stranded and less stable.

Nucleotide: Molecular building blocks for **DNA** and **RNA** Specifically, they consist of three components: a 5-carbon sugar, a phosphate group, and a nitrogenous base. The type of sugar, either deoxyribose or ribose, determines if the resulting nucleic acid is DNA or RNA.

Operational sex ratio (OSR): The ratio of fertile males to fertile females that are ready to mate.

Organoid: Cell/tissue culture in vitro that aims to mimic organ structure and function.

Ovulation: The time point of the **menstrual cycle** involving the release of an egg from an ovary.

Pair bond: The formation of long-lasting bonds between two individuals.

Parental conflict: Evolutionary conflict between the sexes arising from differences in optimal parental investment in offspring across a lifetime.

Parental effort: The portion of reproductive effort in form of parenting (protection, feeding, provisioning).

Paternal investment: The parental effort of fathers.

Paternity assessment: The ability of males to assess the likelihood of having sired a particular offspring.

Paternity confidence: A male's confidence in being the father of one or more offspring.

Paternity uncertainty: Uncertainty about paternity due to female mating behavior.

Perineum: The area around the anus and genitals.

Period synchronization (or menstrual synchrony): The phenomenon whereby women appear to synchronize their **menstrual cycles**.

Periovulatory: Around the time of **ovulation**.

Phenotype: Observable traits of an organism that result from interactions between **genes** and environment during development.

Phenotypic flexibility: The range of an individual's reversible variation in behavior, morphology, physiology, and life-history traits in response to changes in their environment.

Pheromones: Molecules that are produced by one individual and have signal value for another individual of the same species.

Polyandry: A mating system where females regularly mate with multiple males.

Polygynandry: A mating system in which males and females mate with multiple partners.

Polygyny: A mating system where males regularly mate with multiple females.

Polymorphism: The "many forms," or genetic **variants**, of a single **gene** that exist and are maintained in a population at a frequency of 1% or higher.

Post-partum amenorrhea (PA): Temporary cessation of **menstrual cycles** after giving birth.

Proliferative phase: The part of the **menstrual cycle** phase in which the endometrium, the lining of the uterus, expands.

Protein: One of the four classes of major biomolecules. Proteins are **molecules** encoded by **DNA sequences** and composed of **amino acids** connected by peptide bonds. These range in size from a few amino acids (short peptides) to large

molecules (long polypeptides) comprised of thousands of amino acids.

Protein coding sequence: A section of **DNA** or **RNA** that codes for **protein**.

Reciprocal exogamy: A mating system where individuals from different groups repeatedly from **pair bonds** across groups, track these relationships (with the help of personal names and kinship terms), and exchange goods and services.

Regulatory elements: Binding sites on **chromosomes** for **transcription factors**, which are involved in **gene** regulation.

Ribonucleic acid (RNA): A **molecule** essential in **gene** coding, decoding, regulation, and expression. RNA consists of **sequences** of the four **nucleotide** bases: Adenine, Uracil, Guanine, and Cytosine. Types of RNA include messenger RNA (mRNA), transfer RNA (tRNA), ribosomal RNA (rRNA), small nuclear RNA (snRNA), and other non-coding RNAs. Some viruses including Influenza A and SARS-CoV-2 have RNA genomes.

San people: Members of various **Khoisan**-speaking indigenous hunter-gatherer and former hunter-gatherer groups that are the first nations of Southern Africa, and whose territories span Botswana, Namibia, Angola, Zambia, Zimbabwe, Lesotho and South Africa. mtDNA and Y chromosome studies show that the San carry some of the most divergent (oldest) human haplogroups.

Secretory phase: Synonymous with **luteal phase**.

Sequence: The linear order of the **nucleotide** building blocks, which encodes individual form and function.

Sexual Swelling: Visible swelling of the perineum during **estrus**.

Social monogamy: A mating system where individuals form stable **pair-bonds** with regard to territory and raising of the young, but also mate outside of the pair.

Species: A population whose individuals can mate with one another to produce viable and fertile offspring. This is a debated definition and the concept is problematic for extinct fossil organisms for which **DNA** is not available. This definition is problematic in regard to **bacteria** as they can exchange genetic material across widely separate taxa.

Synapse: A structure that forms the connection between a neuron and another cell (neuron or other effector cell), that allows for transmission of electrical or chemical signals.

Syntax: The arrangement of words and phrases to create well-formed sentences in a **language**.

Transcription: The first step in **gene expression** during which the **nucleotide sequence** of **DNA** is transcribed into an **RNA molecule** that can ultimately be translated into **protein**.

Transcription factors: Proteins that initiate and regulate the **transcription** of **genes**. Transcription factors bind to specific sequences of **DNA** called **regulatory elements**, or other proteins that do so, and directly or indirectly affect the initiation of transcription. The activities of transcription factors determine where and when genes are expressed.

Transcriptional regulation: The process by which cells regulate the **transcription**.

Variant: **DNA** that differs among groups studied.

This glossary is the product of the symposium speakers, anthropogeny faculty, and CARTA staff.