

Human biology – Glossary

Anthropology: *the study of humans, past and present: the study of human beings and their ancestors through time and space and in relation to physical characters, environmental and social relations, and culture, dealing with the origin, nature and destiny of human beings. The academic discipline of anthropology includes four main subdisciplines or subfields: biological/physical anthropology, sociocultural anthropology, archaeology and linguistics.*

Phylogenetics: *that describes the evolution of groups of organisms (evolutionary history of species).*

Paleoanthropology: *the understanding of the similarities and differences between humans and other species in their genes, body form, physiology, and behaviour. Paleoanthropologists search for the roots of human physical traits and behaviour. They seek to discover how evolution has shaped the potentials, tendencies, and limitations of all people.*

Biological evolution: any genetic change in a population that is inherited over several generations; changes in the hereditary characteristics of groups of organisms over the course of generations; from long-term perspective, evolution is the descent with modification of different lineages from common ancestors; from a short-term perspective, evolution is the ongoing adaptation of organisms to environmental challenges and changes

Order Primates: includes the Anthropoids (Hominoidea) and Prosimians. Primates have diversified in arboreal habitats (trees and bushes) and possess many characteristics that are adaptations to this environment: retention of the collar bone in the pectoral girdle, shoulder joints which allow high degrees of movement in all directions, five digits on the fore and hind limbs with opposable thumbs and big toes, nails on the fingers and toes (in most species), a flat nail on the hallux (in all extant species), sensitive tactile pads on the ends of the digits, orbits encircled in bone, a trend towards a reduced snout and flattened face, attributed to a reliance on vision at the expense of olfaction, a complex visual system with stereoscopic vision, high visual acuity and colour vision, a large brain in comparison to body size, especially in simians, reduced number of teeth compared to primitive mammals, three kinds of teeth, two pectoral mammary glands, long gestational and developmental periods, a trend towards holding the torso upright leading to bipedalism.

Hominoid: the members of the infraorder Hominoidea, both present and past. Today it comprises humans, the gibbons, and the great apes (orangutan, chimpanzee and gorilla).

Hominid: the group consisting of all modern and extinct Great Apes (modern humans, chimpanzees, gorillas and orang-utans, plus all their immediate ancestors).

Hominin: the group consisting of modern humans, extinct human species and all our immediate ancestors (including members of the genera Homo and Australopithecus).

Human evolution: the lengthy process of change by which people originated from apelike ancestors. Modern understanding of human origins is derived largely from the findings of paleontology, anthropology, and genetics, and involves the process of natural selection. Although gaps in the fossil record due to differential preservation prevent the complete specification of the line of human descent, H. sapiens share clear anatomical, genetic, and historic relationships to other primates.

Bipedalism: the ability to walk on two legs. The order Primates possesses some degree of bipedal ability. Chimpanzees, gorillas and gibbons, macaques, spider monkeys, capuchins, and others are all frequent bipedal walkers. The Australopithecus anamensis tibia indicates bipedalism. It is the first species to walk upright.

Adaptation: the processes by which organisms cope with environmental forces and stresses. Humans used both biological and cultural means of adaptation. E.g. human bodies can adapt biologically in three ways to high altitude: genetic adaptation, long-term physiological adaptation, and short-term physiological adaptation. Culturally, humans have developed technologies, such as pressurized airplane cabins equipped with oxygen masks, to deal with extreme environments.

Ontogeny (ontogenesis, morphogenesis): describes origin and development of an organism.

Development: progression of changes from undifferentiated or immature state to a highly organized, specialized or mature state. A sequence of orderly, often irreversible changes; can occur with or without an increase in size. It results from genetic plans contained within the chromosomes. The developmental process depends upon a precisely coordinated interaction of genetic and environmental factors.

Growth: quantitative increase in size or mass, a component of development, achieved via increased cell number or size or production of extracellular matrices.

Maturation: the process and the state of reaching functional capacity in terms of biological, behavioural and cognitive capacities, a component of development.

Acceleration: the rate of change in velocity over time. In the auxological literature, the term is often synonymously used with secular trend. Both terms must be used with caution as they are ambiguous. Some authors may not only refer to developmental tempo, but also to the amplitude of long-term secular trends in body height.

Life cycle: the stages of development (growth and maturation) from conception to death of any organism.

Zygote: the initial cell formed when two gamete cells are joined by means of sexual reproduction; in multicellular organisms, it is the earliest developmental stage of the embryo.

Embryo: stage of prenatal development lasting from second to eight week following fertilization, characterized by the rapid differentiation of tissues and the formation of organs.

Fetus: stage of prenatal development lasting from eight week following fertilization to birth.

Infancy: a stage of human life cycle, lasts from the second month after birth to end of lactation, usually by age 36 months. It is characterised by rapid growth velocity with a steep deceleration in velocity with time, feeding by lactation, deciduous tooth eruption, many development milestones in physiology, behaviour and cognition as well.

Juvenile phase: a stage in the life cycle: the time of life when an individual is no longer dependent on adults (parents) for survival, and prior to that individual's sexual maturation.

Puberty: the process of physical changes by which a child's body matures into an adult body capable of sexual reproduction to enable fertilisation. Puberty is associated with morphological changes in size and in shape, changes of body proportions and body composition, development of genitalia and secondary sex characteristics. Girls typically begin the process of puberty at age 10 or 11, while boys do at ages 11–12. Girls usually complete puberty by ages 15–17, while boys usually complete puberty by ages 16–17.

Adulthood: Adulthood is usually the longest lasting stage in the human life cycle, stretching from age 20 to 50. The prime adulthood lasts until the end of child-bearing years and is a time of homeostasis in physiology, behaviour and cognition.

Senescence: the period of the adult phase of life cycle characterized by a decline in the function of many body tissues or systems; usually begins after the end of child-bearing years, lasts until death.

Auxology: the science of somatic growth and development. Though auxology traditionally focuses on childhood and adolescence, growth and physical development remain an issue throughout the total life span of man.

Adrenarche: it refers the maturation of the zona reticularis of the adrenal gland, resulting in increased production of adrenal androgens associated with secondary sexual characteristics such as the development of pubic hair (pubarche), axillary hair, body odor, and acne. Adrenarche typically begins at the age of 8 years, but can occur as early as 6 years. Adrenarche is a process related to puberty, but distinct from hypothalamic-pituitary-gonadal maturation and function.

Menarche: the first menstrual period.

Secondary sexual characteristics: physical traits associated with the onset of sexual maturation, including pubic and axillary hair development in both genders, and the development of facial hair and muscularity in boys and the development of the breast and adult fat distribution in girls. Any of

various genetically transmitted physical (or behavioural) characteristics that appear at puberty and that differentiate between the sexes without having a direct reproductive function.

Gonadarche: maturation of the gonads (testes or ovaries) resulting in the secretion of gonadal hormones.

Adolescent growth spurt: The rapid and intense increase in the rate of growth in height and weight that occurs during adolescent stage of the human life cycle.

Catch-up growth: a physiological condition of temporary overgrowth. It is characterized by an increase in centile position and thus requires that height velocity exceeds the statistical limits of normality for age and/or maturity during a defined period of time, following a transient period of growth inhibition. It may not be mistaken for rapid growth, an abnormal condition of overgrowth.

Tempo of growth: based on a metaphor from classical music, this phrase refers to the pace at which individual pass through the stages of growth and development. Some humans grow rapidly and/or mature early, while others grow slowly or are late maturers. The tempo of growth is generally unrelated to the amount of growth that an individual will achieve.

Epiphyseal growth plates: consist of a small cartilaginous disc between diaphysis (the long part of a long bone) and epiphysis (the distal part of a long bone). Long bones usually have two Epiphyseal growth plates. These plates are well organized, cartilage cells are not only closely packed, but show a distinct "column-like" appearance. This characteristic feature is necessary for the direction of growth. Epiphyseal growth plates become smaller during childhood and adolescence and finally ossify in a strictly regulated sequence during puberty or a little later. When the plates have fused – usually after puberty – and when they are completely ossified longitudinal bone growth stops. Not all growth plates mature at the same speed. Therefore - particularly during puberty - body proportions change.

Growth channels: the limited number of restricted pathways within which individual height gain occurs.

Growth potential: final height (h) minus current height (H) divided by final height (growth potential = $(H - h)/H$), and suggests that we can predict growth from the state of maturation alone. The idea is intriguing but in deed too simplistic. The remaining growth of a child is influenced by more factors than just by bone age and pubertal stage.

Epidemiology: *The study of the patterns, causes and transmission of diseases and effects of health and disease conditions in defined populations.*

Growth references: statistical summaries of anthropometry, conditioned (usually) on age and sex. References describe how children do grow, in contrast to growth standards that describe how children should grow.

Growth charts: graphic designs and illustrate growth references as a visual display.

Essential nutrient: a nutrient that cannot be manufactured by the human body from simpler elements and thus must be supplied from the diet.

Overweight: it is arbitrarily defined by body mass index above the 85th, in other publications by the 90th centile for age. Today, overweight is defined by a body mass index between 25 and 29.9 kg/m² in adults, the cut-offs in children are lower. Many Asian countries use lower thresholds for overweight.

Obesity: the medical condition of excessive body fat accumulation in adipose tissue, to the extent that it may have an adverse effect on health. Obesity has originally been defined by body mass index above the 95th centile for age, but today, is usually defined by a body mass index above 30 kg/m² in adults. The cut-off BMI in children is lower. Many Asian countries use lower thresholds for obesity.

Paleoanthropology: *the study of the prehistoric human past, using fossils and other remains.*

Paleodemography: *the calculation of prehistoric human population structure, including life expectancy, mortality rates at different ages, and general health and well-being indicators; the field of*

inquiry that attempts to identify demographic parameters from past populations (usually skeletal samples) derived from archaeological contexts, and then to make interpretations regarding the health and well-being of those populations.

Biological reconstruction of ancient populations: By studying mostly skeletal remains, the process of reconstructing a biological profile in order to understand the demographics of the population. This includes as a first step osteological description, age estimation, sex determination, paleopathological diagnose, stature estimation for every individual and then the statistical description of these biological parameters for the whole population. The next step is the lifestyle and health status estimation for the studied population.

Human races: Humans have been categorized into many distinct varieties or races. Races are phenotypically and/or geographically distinctive subspecific groups, composed of individuals inhabiting a defined geographical and/or ecological region, and possessing characteristic phenotypic and gene frequencies that distinguish it from other such groups of humans (King and Stansfield 1990). Many anthropologists argue that human races, in the biological sense of local populations adapted to particular environments, do in fact exist, since there is a greater variation within "racial" groups than between them.

By 30,000 years ago the divergent evolutionary branching or dividing of the human species had produced main lines or subspecies which are still extant (Australid, Negrid, Europid, Mongolid). These subspecies branched or divided in turn into separate races, and these races branched in their turn into subraces, as part of the continuing process of divergent evolution.

Racism: views, practices and actions reflecting the belief that humanity is divided into distinct biological groups called races and that members of a certain race share certain attributes which make that group as a whole less desirable, more desirable, inferior, or superior. Unfortunately, "Race" thus evolved as a worldview, a body of prejudgments that distorts our ideas about human differences and group behaviour. We must emphasize that racial myths bear no relationship to the reality of human capabilities or behaviour. Given what we know about the capacity of normal humans to achieve and function within any culture, we conclude that present-day inequalities between so-called "racial" groups are not consequences of their biological inheritance but products of historical and contemporary social, economic, educational, and political circumstances (American Anthropological Association, Statement on "Race").

Secular trend: the process that results in a change in the mean size or shape of individuals of a population from one generation to the next. Secular change reflects the varying health and affluence of populations over time, and it also highlights inequalities of health and wealth within populations. It is the sense of temporal variations among generations or between populations with different geographical and socio-economic backgrounds.

***Somatometry:** classification of individuals or groups according to body form, and relation of the types to physiologic and psychologic characteristics.*

***Anthropometrics:** the comparative study of human body measurements and properties; the scientific measurement of the human body.*

***Ergonomics:** the science of making the work environment safer and more comfortable for workers using design and anthropometric data. There are other 3 aspects of ergonomics beside safety and comfort: ease of use, productivity/performance, and aesthetics.*

Cross-sectional growth study: measurement on a single occasion of individuals grouped by age and sex, and sometimes other characteristics. Cross-sectional studies permit an instantaneous impression on growth and development, but they must be looked upon with great care when deriving information on growth velocity.

Longitudinal growth study: measurement of the same individual or group of individuals, repeated at regular intervals.

Dual Energy X-Ray Absorptiometry (DEXA): uses two X-ray energies to measure body fat, muscle, and bone mineral. A person lays in the supine position on an X-ray table. Based on the three component model of body composition, the results are whole body and regional estimates of

fat, muscle, and bone mineral. There is concern about radiation exposure so this is not a screening technique.

Bioelectrical impedance analysis (BIA): determines the electrical impedance of the human body. The electrical impedance reflects total body water content of the body.

Frankfurt horizontal plane: is a virtual plane that cuts through the lowest point of the bony orbitae and the tragions. It is used for reasons of comparability to keep the head in a defined position while measuring stature.

Somatotype: Somatotyping is the word used method to classify the morphological body shape by using anthropometric measurements (anthropometric method). The somatotype is expressed in a three-number rating representing endomorphy, mesomorphy and ectomorphy components respectively, always in the same order. Endomorphy is the relative fatness, mesomorphy is the relative musculo-skeletal robustness, and ectomorphy is the relative linearity or slenderness of a physique. Somatotypes with similar relationships between the dominance of the components can be grouped into categories named to reflect these relationships.

Biological age: estimates the functional status of an individual (organs or body parts) in reference to his or her chronological peers on the basis of how well he or she functions in comparison with others of the same chronological age (current age calculated from your birth date). Biological age in children is based in large part to the “physiological development of the various organs and systems in the body (e.g. the adequate development of bones: skeletal age). The tempo at which the biological age of an individual proceeds can differ from the tempo of the calendar age; it depends on sex, on genetics, ethnicity, type of body shape, and environmental factors.

Body Mass Index (BMI): describes a relation between body weight and stature: $BMI = \text{body weight} / \text{stature}^2$. Adults with BMI greater than 30 kg/m² are considered obese, adults with BMI between 25 and 30 kg/m² are considered overweight, age specific tables with reference data exist for children and adolescents.

Subcutaneous fat: the layer or compartment of adipose tissue that lies just under the skin.

***Paleopathology:** the study of ancient diseases. It is useful in understanding the history of diseases, and uses this understanding to predict its course in the future.*

***Forensic anthropology:** applies the theories and methods of physical anthropology (the study of the human body) to legal questions. Forensic anthropologists typically examine human skeletal remains to determine a person’s identity (age, sex, ancestry, height and recognizable features), and to look for evidence of how the person died.*

Antemortem: “before death.” Refers to injuries or events that occurred during life. Examples include conditions that alter the natural form of the bone such as healed fractures, infections or nutritional deficiencies.

Perimortem: “around death”. Refers to injuries or events that occurred at or around the time of death. Note: this term does not distinguish between an event that occurred immediately after death from one that occurred at the time of death.

Postmortem: “after death.” Refers to events or influences that occur after the time of death. This includes human, animal, insect, plant or environmental factors that change the condition of human remains.

Biological profile: a summary of the essential biological information regarding an individual. It generally includes estimates of age, sex, stature, and ancestry. It may also include personally identifying characteristics like healed fractures, diseases or medical interventions that can be linked to an individual’s specific medical history. Constructing a biological profile is an important first step when skeletonised human remains are discovered as this information can be used to identify specific individuals or narrow a list of possible missing persons.

Archaeological remains: Prehistoric or historic skeletal material that has no relevance to modern legal proceedings. In North America, these may include the remains of First Nations/ Native American individuals or European settlers. If an anthropologist or archaeologist determines a set of remains to be archaeological, they are not usually considered forensic cases.