Systematic Classification of Contemporary Humans Galactic development ~13 787 Mya Cosmic Spacet Energy Matter ~13 600 Mya Chemical Stars Heavy elements Chemical diversity Origin of Life on Earth Hadean ~4 540 Mya Earth Atmosphere Oceans Urganic
Carbon-based molecules
Complex structures
Amino acids
Sugars
Nucleotides
Hydrothermal vent mediation
Polymerization
RNA
Peptidee Archean ~4 000 Mya RNA Peptides Lipid membranes ~3 800 Mya Prebiota Ribozymes Self-replicatiion Evolution by natural selection Proteins Enzymes Metabolic pathways Protocells Viruses • Single-celled life ~3 500 Mya Biota (Life) Self-reproduction
Cellular structure
Last Universal Common Ancestor (LUCA) Archaea, Bacteria | Proterozoic ~1 650 Mya Domain Eukaryota Membrane-bound organelles Cell nucleus Linear DNA Sexual reproduction Complex cytoskeleton Plants, Algae ~1 500 Mva Amorphea Amoeboid locomotion Heterotrophy Amoeba (~1 100 Mya Feeding groove Flagellar structures Signaling and regulatory pathways **Opisthokonta**Single posterior flagellum ~1 100 Mya Fungi (~1 000 Mya Food ingestion Internal digestion Cell differentiation ~760 Mya Filozoa Filose tentacles for Sensory perception, Feeding, Locomotion and Filasteres Multicellularity ~670 Mya Choanozoa Intercellular communication Intercellular cooperation Choanoflagellates ~665 Mya Kingdom Metazoa (Animals) Multicellularity
Specialized tissues
Internal digestive system
Locomotion
Diplontic lifecycle
Embryonic development Sponges Soft-bodied animals ~635 Mya Eumetazoa (True animals) Truly differentiated tissues Symmetry Mouth Anus Comb jellies ~580 Mya ParaHoxozoa Anterior-posterior patterning Distinct body regions Placozoa ~575 Mya Larval stage Gastrulation via Invagination Jellyfish, Corals ~567 Mya Bilateria Bilateria
Bilateria symmetry
Head
Three germ layers
Nervous system
Muscles
Digestive tract
Light-sensitive cells
Structured sleep patterns Xenacoelomorpha ~558 Mya Nephrozoa Coelom Excretory organ system Flatworms, Nematodes, Arthropods, Mollusks, Octopuses **Cambrian explosion** Cambrian ~538 Mya Deuterostomia Grows from anus to mouth Mineralized body parts Starfish, Sea urchins ~525 Mya Phylum Chordata Pharyngeal arches Notochord Dorsal hollow nerve cord Post-anal tail Thyroid Eyespots Cardiac structures ~518 Mya Olfactores Olfactory system Tunicates Vertebrates ~518 Mya Vertebral column Skull Nostrils Lampreys, Hagfishes Paired eyes Circulatory system Muscular heart Ordovician ~439 Mya Gnathostomata (Jawed vertebrates) Jaws Teeth Paired limbs Lens-equipped eyes Sharks, Rays Silurian ~425 Mya Osteichthyes (Bony fish) Bony endoskeleton Lungs or swim bladder Shoulders ~425 Mya Sarcopterygii (Lobe-finned fish) Coelacanths • Devonian ~416 Mya Rhipidistia s supported by bones Lungfishes • **Conquering land** ~409 Mya Tetrapodomorpha Weight supporting limbs Pelvic girdle ~409 Mya (Air-breathing lungs Internal nostrils Nasal passage ~385 Mya Elpistostegalia Shoulder girdle Neck Loss of dorsal and anal fins ~375 Mya Stegocephalia Strong vertebral column Complex teeth structures Carboniferous ~365 Mya Tetrapoda Four fully functional limbs Digits Terrestrial locomotion Complex respiratory system Amphibians (~350 Mya (Reptiliomorpha Keratinized skin and claws Internal fertilization ~320 Mya Amniota Amniotic egg Land-based Reptiles (including Birds), Turtles, Tortoises Mammalian characteristics ~318 Mya Synapsida Singular temporal fenestra Thermal regulation Eupelycosauria ~308 Mya Differentiated teet Primitive canines ~304 Mya Sphenacodontia Articulated jaw Canines Permian ~280 Mya Therapsida Warm-blooded Vertical limb posture ~266 Mya Flexible spine Mammalian locomotion Seven neck vertebrae ~260 Mya Cynodontia Secondary palate Proto-hair Single lower jawbone Middle ear bones Heel Diaphragm Probainognathia Triassic ~235 Mya Incisors High metabolic rate Mammalian gait ~233 Mya (Prozostrodontia Upright running Mammalian jaw ~227 Mya Molars Hair Jurassic ~200 Mya Class Mammalia No teeth at birth Mammary glands Fur Three inner ear bones Platypuses, Echidnas Placenta & Pregnancy Theriiformes ~170 Mya Separate anus and urogenital tract External ear ~168 Mya Trechnotheria Radial articulation of limbs Ankle Two sets of teeth Cladotheria ~165 Mya Sensory capabilities: Hearing, Smell, Touch ~155 Mya 7atheria Cretaceous ~140 Mya Tribosphenida Tribosphenic molars Modern ear ~120 Mya Theria Marsupials (~110 Mya Eutheria (Placental mammals) Mammalian diversity ~100 Mya Placentalia Extended gestation Aardvarks, Sloths, Anteaters, Armadillos ~95 Mya Shrews, Moles, Hedgehogs, Bats, Carnivorans, Pangolins, Ungulates, Elephants, Whales, Manatees ~90 Mya Euarchontoglires Omnivory Diverse ecological niches Rodents, Rabbits, Hares, Pikas ~85 Mya Hand-eye coordination Symbiosis with seeds and berries Paleogene ~66 Mya Primatomorpha Forward-facing eyes Binocular depth perception Grasping hands and feet Colugos (**Humanoid form** ~65.9 Mya Order Primata (Monkeys) Opposable thumbs
Nails instead of claws
Larger brain-to-body ratio
Flexible shoulders
Extended parental care
Complex social structures ~60 Mya Haplorhini (Dry-nosed monkeys) Dry nose Reduced olfactory capabilities Vision as primary sense Group behavior Tarsiers • ~40 Mya Simiiformes (Simians) Loss of sensory whiskers Two pectoral nipples Naked pendulous penis Vocalizations New world monkeys ~30 Mya Catarrhini (Old world monkeys) Trichromatic vision Reduced tail Downward-facing nostrils 2.1.2.3 dental formula Flattened nails Baboons, Macaques, Mandrills Cognition & Awareness Neogene ~23 Mya Family Hominoidea (Apes) Advanced problem-solving Prolonged maternal care Learning by observation Tendency toward bipedalism Flexible shoulder joints ~17 Mya Hominidae (Great apes) Human-like teeth and ears
Primitive tool use
Recognizes their own reflection
Self-awareness
Empathy
Deliberate deception Orangutans Deliberate d Mourning Fingerprints ~12.5 Mya Family structure Facial expressions Emotions ~7.5 Mya Homonini Loss of penile bone Inter-group conflicts Culture Bonobos, Chimpanzees ~6.1 Mya Australopithecines Bipedal locomotion Human-like limb proportions Flexible fingers Thicker enamel ~4.5 Mya Australopithecus Efficient walking Smaller canines Reduced prognathism Varied diet Diverse habitats ~2.8 Mya Genus Homo (Human) Stone tool making Meat consumption Social complexity Division of labor Pleistocene ~2 Mya Homo erectus Homo erectus
Loss of body hair
Complex cognition
Passing on knowledge
Technological development
Hunter-gatherer
Food processing
Controlled fire
Roasting, Grilling, Smoking Homo heidelbergensis ~700.0 kya Shelter construction Complex communication Humanity Species Homo sapiens (Modern human) ~310.0 kya Perenially enlarged breasts Advanced language Social learning Clothing Human migration Behavioral modernity Spiritualism Art Art Fishing Trade Weaving Ceramics Bow and Arrow Bread Neolithic ~12.7 kya Civilized Settlements Agriculture Grindstones Pottery Domestication of animals Fermentation Metalworking ~5.2 kya Historic Writing
Copper smelting
Calendar
Formal education
Bronze smelting Copper age Bronze age Law Governance Literature Literature
Sail
Architecture
Mathematics
Alphabet
Medicine
Philosophy
Currency
Engineering
Compass
Gunpowder
Printing press
Scientific revolution
Enlightenment
Industrialization Antiquity Medieval Modern -70ya Contemporary (You are here) Space exploratio Globalization Digitization
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