UNIT TWO: Overview of the 4 fields Biological Anthropology: Primate studies, Hominids, and tool industries

UNIT TWO: Overview of the 4 fields

Unit 2: Overview: Week 3

This section covers a more detailed description of each of the 4 fields: Biological/Physical Anthropology, Archaeology, Linguistics, Cultural Anthropology:

Sources include:

Schoenberg, Arnie. Introduction to Physical Anthropology, 2/10/17
http://www.oercommons.org/courses/introduction-to-physical-anthropology/view

Evans, Tracy Cultural Anthropology Lumen Publishing: 2017. (Candela Open Courses)
https://courses.candelalearning.com/anthropologyx15x1/part/unit-9/

OUTLINE FOR UNIT TWO (Week 3):

UNIT TWO: Overview of the 4 fields

READ THE FOLLOWING: PRIMATES

Contemporary Primates

The Classification System

In order to understand the exact place of humanity among the animals, it is helpful to describe the system used by biologists to classify living things. The basic system was devised by 18th-century Swedish naturalist Carl von Linné.

The purpose of the Linnean system was simply to create order in the great mass of confusing biological data that had accumulated by that time. Von Linné classified living things on the basis of overall similarities into small groups or species. On the basis of homologies, groups of like species are organized into larger, more inclusive groups, called genera.

Through careful comparison and analysis, von Linné and those who have come after him have been able to classify specific animals into a series of larger and more inclusive groups up to the largest and most inclusive of all, the animal kingdom.

The Primate Order

Primates are only one of several mammalian orders, such as rodents, carnivores, and ungulates.

As such, primates share a number of features with other mammals:

- mammals are intelligent animals
- in most species, the young are born live, the egg being retained within the womb of the female until it achieves an advanced state of growth
- once born, the young are nourished by their mothers
- mammals have a constant body temperature, an efficient respiratory system featuring a separation between the nasal and mouth cavities, an efficient four-chambered heart that prevents mixing of oxygenated and deoxygenated blood, among other characteristics

- the skeleton of most mammals is simplified compared to that of most reptiles, in that it has fewer bones. For example, the lower jaw consists of a single bone, rather than several.

Species

In modern evolutionary biology, the term *species* is usually defined as a population or group of organisms that look more or less alike and that is potentially capable of interbreeding to produce fertile offspring. Practically speaking, individuals are usually assigned to a species based on their appearance, but it is their ability to interbreed that ultimately validates (or invalidates) the assignment. Thus, no matter how similar two populations may look, if they are incapable of interbreeding, they must be assigned to different species.

Populations within a species that are quite capable of interbreeding but may not regularly do so are called races or subspecies. Evolutionary theory suggests that species evolve from races through the accumulation of differences in the gene pools of the separated groups.

Primate Characteristics

Although living primates are a varied group of animals, they do have a number of features in common. These features are displayed in varying degrees by the different kinds of primates: in some they are barely detectable, while in others they are greatly elaborated.

All are useful in one way or another to arboreal (or tree-dwelling) animals, although they are not essential to life in trees.

Primate Sense Organs

The primates' adaptation to their way of life in the trees coincided with changes in the form and function of their sensory apparatus: the senses of sight and touch became highly developed, and the sense of smell declined.

Catching insects in trees, as the early primates did and as many still do, demands quickness of movement and the ability to land in the right place without falling. Thus, they had to be adept at judging depth, direction, distance and the relationship of objects in space.

Primates' sense of touch also became highly developed as a result of arboreal living. An effective feeling and grasping mechanism was useful to them in grabbing their insect prey, and by preventing them from falling and tumbling while moving through the trees.

The Primate Brain

By far the most outstanding characteristic in primate evolution has been the enlargement of the brain among members of the order. Primate brains tend to be large, heavy in proportion to body weight, and very complex.

Reasons for this important change in brain size are many:

- Prior to 65 Myrs ago, mammals seem to have been nocturnal in their habits; after 65 million years ago, primates began to carry out their activities in the daylight hours. As a consequence, the sense of vision took on greater importance, and so visual acuity was favored by natural selection
- another hypothesis involves the use of the hand as a tactile organ to replace the teeth and jaws. The hands assumed some of the grasping, tearing and dividing functions of the snout, again requiring development of the brain centers for more complete coordination.
- The enlarged cortex not only provided the primates with a greater degree of efficiency in the daily struggle for survival but also gave them the basis for more sophisticated cerebration or thought. The ability to think probably played a decisive role in the evolution of the primates from which human beings emerged.
-

Primate Teeth

Although they have added other things than insects to their diets, primates have retained less specialized teeth than other mammals. The evolutionary trend for primate dentition has generally been toward economy, with fewer, smaller, more efficient teeth doing more work. Our own 32 teeth are fewer in number than those of some, and more generalized than most, primates.

Primate Skeleton

A number of factors are responsible for the shape of the primate skull as compared with those of most other mammals: changes in dentition, changes in the sensory organs of sight and smell, and increase in brain size. As a result, primates have more a humanlike face than other mammals.

The upper body is shaped such as to allow greater maneuverability of the arms, permitting them to swing sideways and outward from the trunk of the body.

The structural characteristics of the primate foot and hand make grasping possible; the digits are extremely flexible, the big toe is fully opposable to the other digits in most species, and the thumb is opposable to the other digits to varying degrees. The flexible, unspecialized primate hand was to prove a valuable asset for future evolution of this group. It allowed early hominines to manufacture and utilize tools and thus embark on the new and unique evolutionary pathway that led to the revolutionary ability to adapt through culture.

Types of Living Primates

Prosimians

The most primitive of the primates are represented by the various prosimians, including the lemurs and the lorises, which are more similar anatomically to earlier mammalian ancestors than are other primates (monkeys, apes, humans). They tend to exhibit certain more ancestral features, such as a more pronounced reliance on olfaction (sense of smell). Their greater olfactory capabilities are reflected in the presence of a moist, fleshy pad at the end of the nose and in a relatively long snout.

Lemurs and lorises represent the same general adaptive level. Both groups exhibit good grasping and climbing abilities and a fairly well developed visual apparatus, although their vision is not completely stereoscopic, and color vision may not be as well developed as in anthropoids.

Coquerel's sifaka lemur of Madagascar

Lemurs

At present, lemurs are found only on the island of Madagascar and adjacent islands off the east coast of Africa.

As the only natural nonhuman primates on this island, they diversified into numerous and varied ecological niches without competition from monkeys and apes. Thus, the 52 surviving species on Madagascar represent an evolutionary pattern that has vanished elsewhere.

Lemurs range in size from 5 inches to a little over two feet. While the larger lemurs are diurnal and exploit a wide variety of dietary items (leaves, fruits, buds, bark), the smaller forms (mouse and dwarf lemurs) are nocturnal and insectivorous.

Lemurs display considerable variation regarding numerous other aspects of behavior. While many are primarily arboreal, others (e.g. ring-tailed lemur) are more terrestrial. Some arboreal species are quadrupeds, and others are vertical clingers and leapers.

This website shows a number of different kinds of lemurs and describes their basic characteristics

https://lemur.duke.edu/discover/meet-the-lemurs/

Pygmy slow Lorise

Lorises

Lorises are similar in appearance to lemurs, but were able to survive in mainland areas by adopting a nocturnal activity pattern at a time when most other prosimians became extinct. Thus, they were (and are still) able to avoid competition with more recently evolved primates (diurnal monkeys).

There are five loris species, all of which are found in tropical forest and woodland habitats of India, Sri Lanka, Southeast Asia and Africa.

Locomotion in lorises is a slow, cautious climbing form of quadrupedalism, and flexible hip joints permit suspension by hind limbs while the hands are used in feeding. Some lorises are almost entirely insectivorous; others supplement their diet with various combinations of fruits, leaves, gums, etc.

Tarsier

Tarsiers ** Debate – are they prosimians?

There are seven recognized species, all restricted to island areas in Southeast Asia. They inhabit a wide range of forest types, from tropical forest to backyard gardens.

They are nocturnal insectivores, leaping onto prey from lower branches and shrubs. They appear to form stable pair bonds, and the basic tarsier social unit is a mated pair and their young offspring.

Tarsiers present a complex blend of characteristics not seen in other primates. They are unique in that their enormous eyes, which dominate much of the face, are immobile within their sockets. To compensate for this inability to move the eyes, tarsiers are able to rotate their heads 180º, like owls.

Tarsiers used to be classified as prosimians, because they look and move like prosimians, but they turned out to be genetically more similar to monkeys and apes. So, scientists had to come up with a new division that was named after the differences in their noses. (Strepsirhine, Haplorhine, Platyrrhine, Catarrhine).

Look at this website to learn more about Tarsiers
https://www.animalfactsencyclopedia.com/Tarsier-facts.html

Take a look at a Tarsier eating a grasshopper:
https://www.youtube.com/watch?v=gGsKDjvwVM8&feature=youtu.be
(2:47)

Simians or Anthropoids

Although there is much variation among simians (also called anthropoids), there are certain features that, when taken together, distinguish them as a group from prosimians (and other mammals)

- generally larger body size
- larger brain
- reduced reliance on the sense of smell
- increased reliance on vision, with forward-facing eyes placed at the front of the face
- greater degree of color vision
- back of eye socket formed by a bony plate
- blood supply to brain different from that of prosimians
- fusion of two sides of mandible at midline to form one bone
- less specialized dentition

- differences with regard to female internal reproductive anatomy
- longer gestation and maturation periods
- increased parental care
- more mutual grooming

Monkeys

Approximately 70 percent of all primates (about 240 species) are monkeys, although it is frequently impossible to give precise numbers of species because the taxonomic status of some primates remains in doubt and there are constantly new discoveries.

Monkeys are divided into two groups (New World and Old World) separated by geographical area as well as by several million years of separate evolutionary history.

Howler Monkey (notice prehensile tail)

New World monkeys exhibit a wide range of size, diet, and ecological adaptation. In size, they vary

from tiny marmosets and tamarins to the 20-pound howler monkey. Almost all are exclusively arboreal; most are diurnal. Although confined to trees, New World monkeys can be found in a wide range of arboreal environments throughout most forested areas in Southern Mexico and Central and South America. One of the characteristics distinguishing New World monkeys from Old World is the shape of their nose: they have broad noses with outward-facing nostrils.

Learn more about New World Monkeys :

https://animalsake.com/characteristics-of-new-world-monkeys

Mandrill

Old World monkeys display much more morphological and behavioral diversity than New World monkeys. Except for humans, they are the most widely distributed of all living primates. They are found throughout sub-Saharan Africa and Southern Asia, ranging from tropical jungle habitats to semiarid desert and even to seasonally snow-covered areas in northern Japan. Most are quadrupedal and primarily arboreal.

Learn about anthropological research on the Mandrill:

https://anthro.utah.edu/people/research/lknapp/research/old-world-monkeys.php

Apes and humans

This group is made up of several families:

- Hylobatidae (gibbons and siamangs)
- Pongidae (orangutans)
- Hominidae (humans, gorillas, common chimpanzees, bonobos)

They differ from monkeys in numerous ways:

- generally larger body size, except for gibbons and siamangs
- absence of a tail
- shortened trunk
- differences in position and musculature of the shoulder joint (adapted for suspensory locomotion)
- more complex behavior
- more complex brain and enhanced cognitive abilities
- increased period of infant development and dependency.

Orangutans

Found today only in heavily forested areas on the Indonesian islands of Borneo and Sumatra, orangutans are slow, cautious climbers whose locomotor behavior can best be described as "four-handed", a tendency to use all four limbs for grasping and support. Although they are almost completely arboreal, they do sometimes travel quadrupedally on ground. They are very large animals with pronounced sexual dimorphism: males weigh over 200 pounds while females are usually less than 100 pounds.

Learn more about research about Orangutans
https://anthropology.iresearchnet.com/orangutan-ecology-and-behavior/

Gorillas

The largest of all living primates, gorillas are today confined to forested areas of western and equatorial Africa. There are four generally recognized subspecies: Western Lowland Gorilla, Cross River Gorilla, Eastern Lowland Gorilla, and Mountain Gorilla. Gorillas exhibit strong sexual dimorphism. Because of their weight, adult gorillas, especially males, are primarily terrestrial and adopt a semiquadrupedal (knuckle-walking) posture on the ground. All gorillas are almost exclusively vegetarian.

Learn more about research on gorillas: http://anthropology.iresearchnet.com/gorillas/

Common Chimpanzees

The best-known of all nonhuman primates, Common Chimpanzees are found in equatorial Africa. In many ways, they are structurally similar to gorillas, with corresponding limb proportions and upper body shape, because of their similar locomotion when on the ground (quadrupedal knuckle-walking). However, chimps spend more time in trees; when on the ground, they frequently walk bipedally for short distances when carrying food or other objects.

They are highly excitable, active and noisy. Common Chimpanzee social behavior is complex, and individuals form lifelong attachments with friends and relatives. They live in large, fluid communities of as many as 50 individuals or more. At the core of a community is a group of bonded males. They act as a group to defend their territory and are highly intolerant of unfamiliar chimps, especially nongroup males.

Learn more about Chimpanzees http://anthropology.iresearchnet.com/chimpanzees/

Bonobos

Found only in an area south of the Zaire River in the Democratic Republic of Congo, Bonobos (also called Pygmy Chimpanzees) have a strong resemblance to Common Chimpanzees, but are somewhat smaller. Yet they exhibit several anatomical and behavioral differences. Physically, they have a more linear body build, longer legs relative to the arms, a relatively smaller head, and a dark face from birth. Bonobos are more arboreal than Common Chimpanzees, and they appear to be less excitable and aggressive.

Like Common Chimpanzees, Bonobos live in geographically based, fluid communities, and they exploit many of the same foods, including occasional meat derived from killing small mammals. But they are not centered around a group of closely bonded males. Instead, male-female bonding is more important than in Common Chimpanzees.

Learn more about Bonobos
https://evolutionaryanthropology.duke.edu/research/3chimps/chimps-bonobos

If you are curious, watch a video about Jane Goodall:

If you are curious, take a look at a video about Jane Goodall and her studies with Chimpanzees: Jane Goodall Study of ChimpanzeesDavid Frantz • 3.3K viewsLive56:07Playlist ()Mix (50+)

watch a video about primate evolution:

NOVA Science NOW: 41 – First Primates (13:36). Neil DeGrasse Tyson narrates

https://www.youtube.com/watch?v=W_X5ciqtbG0

No copyright intended, all the copyrights belong to PBS NOVA.
http://www.pbs.org/wgbh/nova/sciencenow/

Science & Technology

- License
  - Standard YouTube License

You should be familiar with five families of primate:

Strepsirrhines -- skim the following: https://en.wikipedia.org/wiki/Strepsirrhini

Haplorrhini – skim the following : https://en.wikipedia.org/wiki/Haplorhini

Platyrhines (New World Monkey) -- skim the following:
https://en.wikipedia.org/wiki/New_World_monkey

Catarrhine -- Skim the following : https://en.wikipedia.org/wiki/Catarrhini

Anthropoids

Anthropoids are monkeys, and apes (which includes humans). Anthropoids are primates, but not prosimians.

* *fossil found in Thailand suggest anthropoids evolved in Asia first (~45mya), and then migrated to Africa (~38mya)*

Hominoids

Hominoids are apes. Hominoids are Anthropoids but not monkeys.

The Miocene (23-5mya) was an important a time period for hominoid evolution and the adaptive radiation of apes led to extreme variation, and the ones in our clade were relatively generalized compared to *Gigantopithecus* for example.

Primate Taxonomy: Watch "Primates – What is a primate?" (5:07)

https://www.youtube.com/watch?v=BpnlS_ach-0

Filmed by Richard C. Kern and Richard S. Kern, Odyssey Earth, 2011.

Sexual Dimorphism

Within the same species, males and females may be physically different in terms of size and shape, and these characteristics can be explained in terms of behaviors and adaptation>

Male to male competition:

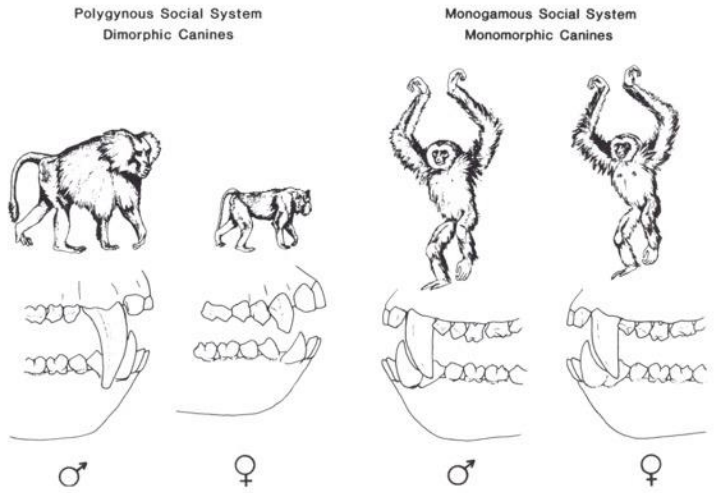
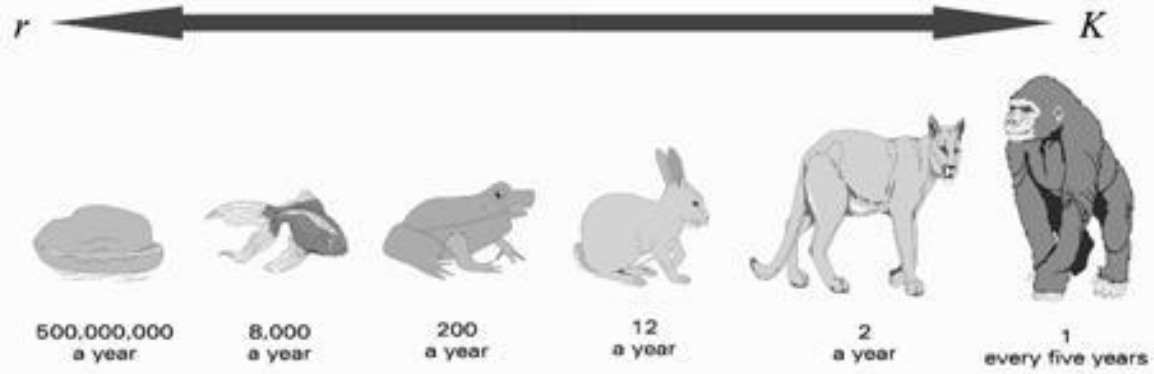


FIGURE 9.16 Canine differences between monogamous gibbons (*Hylobates*) and polygynous baboons (*Papio*)

K-selection r-selection

If you say something is r-selected or K-selected you are comparing a species or group of species to another, and comparing their strategies for growing their population. The terms come from variables in a math equation that describes how populations grow; r = the reproductive rate, K = the carrying capacity. r-selected animals have plenty of habitat to grow into, so they have more offspring and hope a few survive. K-selected animals have limitations on their resources, so they have few infants per birth, and longer birth spacing, and invest more parental care in making sure they survive. K-selection follows the human phylogenetic continuum closely. Vertebrates are more K-selected than invertebrates. Mammals are more K-selected than other vertebrates. Primates are more K-selected than other mammals. Anthropoids are more K-selected than prosimians. Hominoids are more K-selected than monkeys. Humans are one of the most K-selected species on the planet.(Arnie Schoenberg, 2/10/17)

The *r-K* Scale of Reproductive Strategy: Balancing Egg Output versus Parental Care



Oysters are an example of a very *r*-strategy. They produce 500 million fertilized eggs a year and provide no parental care. The great apes are an example of a very *K*-strategy. They produce one infant every five or six years and provide extensive parental care.

PALEOANTHROPOLOGY

paleoanthropology

6.1.1bipedalism

We are the only primate to walk on two feet. All primates can walk bipedally if carrying something or injured, but it is not their normal mode of locomotion. This is a trend that goes back to primate evolution and our arboreal adaptation. Natural selection selected for being comfortable while vertical, both for vertical clinging and leapers with their torsos aligned with the vertical trunks of trees, and brachiators, where gravity pulls us into a vertical position as we swing from tree to tree.

* Locomotor Energetics in Primates: Gait Mechanics and Their Relationship to the Energetics of Vertical and Horizontal Locomotion
* Human versus horse races

6.1.2 encephalization

cepha is Greek for head, encephalization is the head getting bigger, but we are really more concerned with brain development. Paleoanthropologists used to take skulls and fossil skull casts and pour rice into the foramen magnum until it was full, and then pour it out and you got the individual's cranial capacity. Now we use 3-D scanners instead of rice, but it is the same principle: how much brain did the individual have. It is usually measured in volume, like cubic centimeters, abbreviated as cc'. Both the absolute and the relative brain volume tends to grow as time goes on with hominid evolution, with a few exceptions. Neandertals actually had on average bigger brains than anatomically modern *Homo sapiens*.

Marino 2000

* article on the SRGAP2 gene associated with brain development

6.1.3 culture/tools

The classic theory is that bipedalism freed the hands from locomotion and allowed them to specialize in tool use, and this was supported by the correlation between complexity in stone tools and encephalization in hominids such as *Homo habilis*. Recent discoveries are pushing the dates of the first stone tools back before significant encephalization had occurred, but this is consistent with our observations of living primates. If we can see primates today make tools with a 400cc brain, we can imagine our ancestors doing the same with 450cc brain.

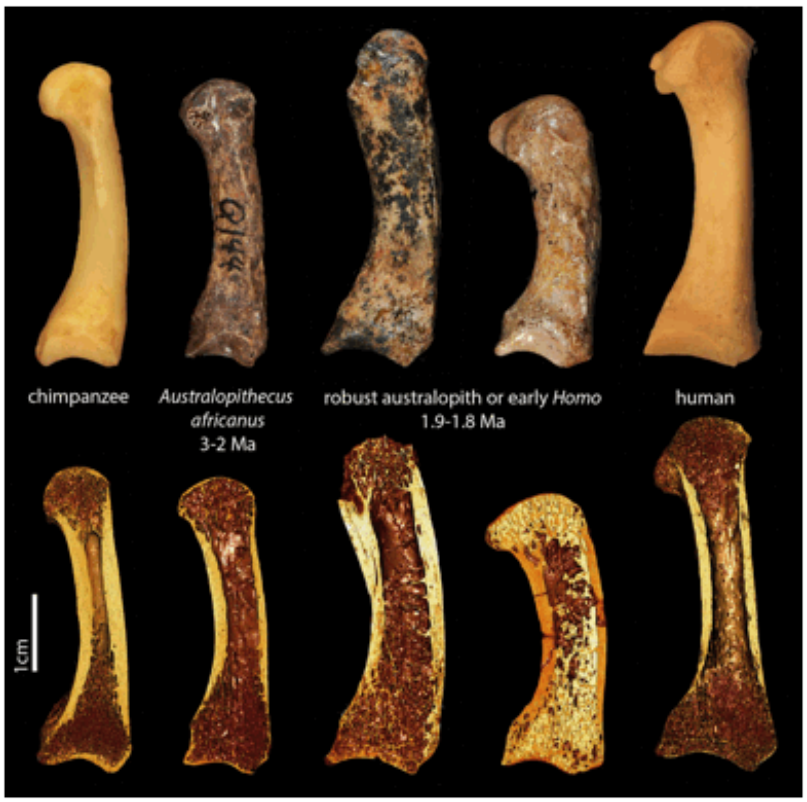


Figure 68 comparing finger bones Tracy L. Kivell, 10.1126/science.126173

* Radio interview on the origin of the precision grip:

googleoff: index

<iframe src="//www.googletagmanager.com/ns.html?id=GTM-K9RKM5" height="0" width="0" style="display:none;visibility:hidden"></iframe><iframe style="display:none;padding:0;margin:0;" width="0" height="0" src="//20655831p.rfihub.com/ca.html?rb=3035&ca=20501671&ra=gtmcb"></iframe>

T.L. Kivell & M. Skinner

share

shots - health news

Maybe Early Humans Weren't The First To Get A Good Grip

listen

react-text: 32 /react-text 0:00

react-text: 24 © /react-text react-text: 37 2015 /react-text react-text: 25 npr /react-text
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<iframe style="display:none;padding:0;margin:0;" width="0" height="0"
src="//20655831p.rfihub.com/ca.html?rb=3035&ca=20501671&ra=gtmcb"></iframe>

COMPARE THE TOOL SECTIONS OF THESE PAGES: OLDOWAN TO THE ACHEULIAN TO THE MOUSTERIAN TO THE UPPER PALEOLITHIC

* article that maps brain patterns to the hands and feet of primates suggests the dexterity required for tool used evolved before bipedalism

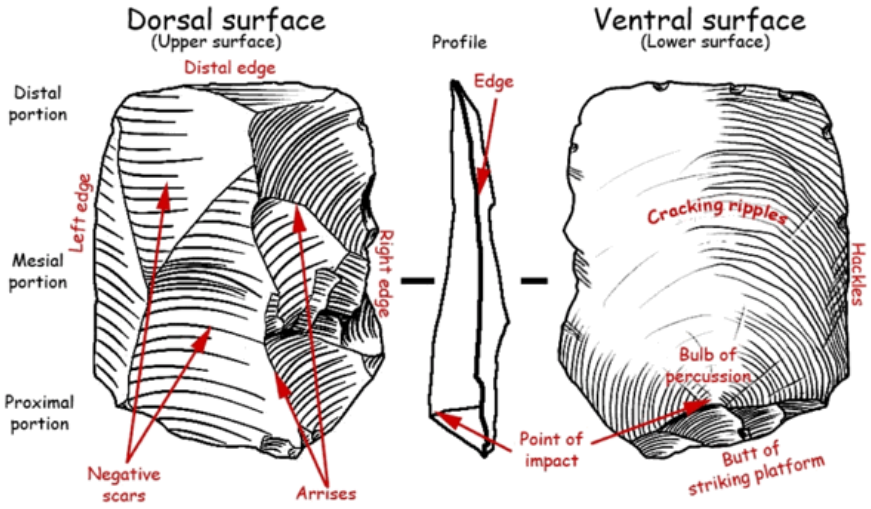


Figure 65 flake attributes by José-Manuel Benito Álvarez

6.1.4 language

The evolution of the human capacity for language is tied to the development of encephalization and culture. You need a brain to process language, and language enables complex cultural transmission. Unfortunately, the evidence for the evolution of human language is scanty. The study of the evolution of human language was even banned by the French linguistic society in the 1800s.

* Approaches towards the origin of language
* article and video on an organtang's capacity for producing human sounds

6.1.5 dentition

The evolution of hominid teeth is basically reduction, with a few counter examples. Teeth are the hardest bone in the body, and so they tend to fossilize more than other bones.

SKIM THE EVOLUTION OF HOMINID DENTAL MORPHOLOGY

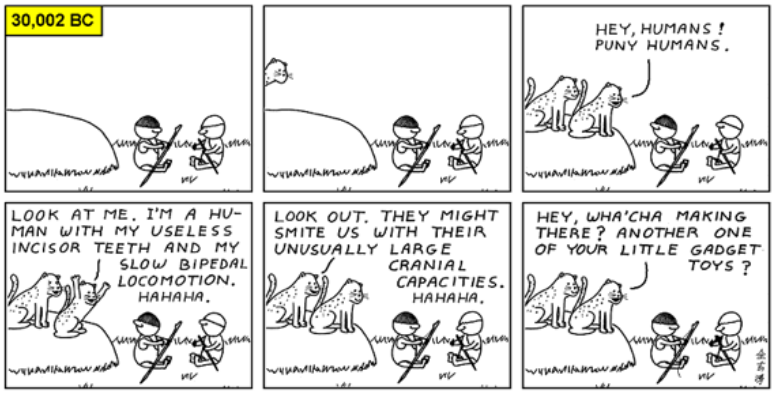


Figure 64 Puny Humans http://abstrusegoose.com/283

READ THE FOLLOWING: Early Humankind, australopithecines

What makes a Primate Human?

1. What are the implications of the shared characteristics between humans and the other primates?
2. Why do anthropologists study the social behavior of monkeys and apes?

Information about primate behavior and ecology plays an integral role in the story of human evolution.

1. Humans are primates, and the first members of the human species were probably more similar to living nonhuman primates than to any other animals on earth. Thus, by studying living primates we can learn something about the lives of our ancestors.
2. Humans are closely related to primates and similar to them in many ways. If we understand how evolution has shaped the behavior of animals so much like ourselves, we may have greater insights about the way evolution has shaped our own behavior and the behavior of our ancestors.

Primate social behavior

Over the past four decades, primatologists have made prolonged close-range observations of monkeys and apes in their natural habitats, and we are discovering much about social organization, learning ability, and communication among our closest relatives (chimpanzees, and gorillas) in the animal kingdom.

In particular, we are finding that a number of behavioral traits that we used to think of as distinctively human are found to one degree or another among other primates, reminding us that many of the differences between us and them are differences of degree, rather than kind.

The Group

Primates are social animals, living and travelling in groups that vary in size from species to species. In most species, females and their offspring constitute core of social system.

Among chimps, the largest organizational unit is the community, composed of 50 or more individuals. Rarely however are all these animals together at a single time. Instead they are usually ranging singly or in small subgroups consisting of adult males together, females with their young, or males and females together with their young. In the course of their travels, subgroups may join forces and forage together, but sooner or later these will break up into smaller units.

Dominance

Many primate societies are organized into dominance hierarchies, that impose some degree of order with groups by establishing parameters of individual behavior.

Although aggression is frequently a means of increasing one's status, dominance usually serves to reduce the amount of actual physical violence. Not only are lower-ranking animals unlikely to attack or even threaten a higher-ranking one, but dominant animals are also frequently able to exert control simply by making a threatening gesture.

Individual rank or status may be measured by access to resources, including food items and mating partners.

An individual's rank is not permanent and changes throughout life. It is influenced by many factors, including sex, age, level of aggression, amount of time spent in the group, intelligence, etc.

In species organized into groups containing a number of females associated with one or several adult males, the males are generally dominant to females. Within such groups, males and females have separate hierarchies, although very high ranking females can dominate the lowest-ranking males (particularly young ones).

Yet many exceptions to this pattern of male dominance:

- Among many lemur species, females are the dominant sex
- Among species that form monogamous pairs (e.g., indris, gibbons), males and females are codominant
-

Aggression

Within primate societies, there is an interplay between affiliative behaviors that promote group cohesion and aggressive behaviors that can lead to group disruption. Conflict within a group frequently develops out of competition for resources, including mating partners and food items. Instead of actual attacks or fighting, most intragroup aggression occurs in the form of various signals and displays, frequently within the context of dominance hierarchy. Majority of such situations are resolved through various submissive and appeasement behaviors.

But conflict is not always resolved peacefully.

- High-ranking female macaques frequently intimidate, harass, and even attack lower-ranking females, particularly to restrict their access to food
- Competition between males for mates frequently results in injury and occasionally in death
- Aggressive encounters occur between groups as well as within groups
- Aggression occurs in the defense of territories
-

Individual interaction

To minimize actual violence and to defuse potentially dangerous situations, there is an array of affiliative, or friendly, behaviors that serve to reinforce bonds between individuals and enhance group stability. Common affiliative behaviors include reconciliation, consolation, and simple interactions between friends and relatives.

Most such behaviors involve various forms of physical contact including touching, hand holding, hugging, and, among chimpanzees, kissing. In fact, physical contact is one of the most important factors in primate development and is crucial in promoting peaceful relationships in many primate social groups.

One of the most notable primate activities is grooming, the ritual cleaning of another animal's coat to remove parasites, shreds of grass or other matter. Among bonobos and chimps, grooming is a gesture of friendliness, submission, appeasement or closeness.

The mother-infant bond is the strongest and most long-lasting in the group. It may last for many years; commonly for the lifetime of the mother.

Play

Frequent play activity among primate infants and juveniles is a means of learning about the environment, testing strength, and generally learning how to behave as adults. For example, Chimpanzee infants mimic the food-getting activities of their mothers, "attack" dozing adults, and "harass" adolescents.

Communication

Primates, like many animals, vocalize. They have a great range of calls that are often used together with movements of the face or body to convey a message.

Observers have not yet established the meaning of all the sounds, but a good number have been distinguished, such as warning calls, threat calls, defense calls, and gathering calls. Much of the communication takes place by the use of specific gestures and postures.

Home range

Primates usually move about within circumscribed areas, or home ranges, which are of varying sizes, depending on the size of the group and on ecological factors, such as availability of food. Home ranges are often moved seasonally. The distance traveled by a group in a day varies, but may include many miles.

Within this home range is a portion known as the core area, which contains the highest concentration of predictable resources (water, food) and where the group is most frequently found (with resting places and sleeping trees).

The core area can also be said to be a group's territory, and it is this portion of the home range that is usually defended against intrusion by others:

- Gorillas do not defend their home ranges against incursions of others of their kind
- Chimps, by contrast, have been observed patrolling their territories to ward off potential trespassers

Among primates in general, the clearest territoriality appears in forest species, rather than in those that are terrestrial in their habits.

Tool use

A tool may be defined as an object used to facilitate some task or activity. A distinction must be made between simple tool use and tool making, which involves deliberate modification of some material for its intended use.

In the wild, gorillas do not make or use tools in any significant way, but chimpanzees do. Chimps modify objects to make them suitable for particular purposes. They can also pick up and even prepare objects for future use at some other location, and they can use objects as tools to solve new and novel problems.

Examples:

- use of stalks of grass to collect termites
- use of leaves as wipes or sponges to get water out of a hollow to drink
- use of rocks as hammers and anvils to open palm nuts and hard fruits

Primates and human evolution

Studies of monkeys and apes living today [especially those most closely related to humans: gorillas, bonobos and chimpanzees] provide essential clues in the reconstruction of adaptations and behavior patterns involved in the emergence of our earliest ancestors.

These practices have several implications:

- Chimpanzees can be engaged in activities that prepare them for a future (not immediate) task at a somewhat distant location. These actions imply planning and forethought

- Attention to the shape and size of the raw material indicates that chimpanzee toolmakers have a preconceived idea of what the finished product needs to be in order to be useful

To produce a tool, even a simple tool, based on a concept is an extremely complex behavior. Scientists previously believed that such behavior was the exclusive domain of humans, but now we must question this very basic assumption.

At the same time, we must be careful about how we reconstruct this development. Primates have changed in various ways from earlier times, and undoubtedly certain forms of behavior that they now exhibit were not found among their ancestors.

Also it is important to remember that present-day primate behavior shows considerable variation, not just from one species to another, but also from one population to another within a single species.

Primate fossils

The study of early primate fossils tells us something we can use to interpret the evolution of the entire primate line, including ourselves. It gives us a better understanding of the physical forces that caused these primitive creatures to evolve into today's primates.

Ultimately, the study of these ancient ancestors gives us a fuller knowledge of the processes through which insect-eating, small-brained animals evolved into a toolmaker and thinker that is recognizably human.

Rise of the primates

Summary

When did the first primates appear, and what were they like?

The earliest primates had developed by 60 million years ago and were small, arboreal insect eaters. Their initial adaptation to life in trees set the stage for the subsequent appearance of other primate models.

When did the first monkeys and apes appear, and what were they like?

By the Late Eocene (about 37 Myrs ago), monkeys and apes about the size of modern house cats were living in Africa. By about 20 million years ago, they had proliferated and soon spread over many parts of the Old World. Some forms remained relatively small, while others became quite large, some even larger than present-day gorillas.

When did group of primates give rise to the human line of evolution?

Present evidence suggests that our own ancestors are to be found among the African large-bodied hominoids, which were widespread between approximately 17 and 8 million years ago. Some of these ape-like primates

lived in situations in which the right kind of selective pressure existed to transform them into primitive hominines.

READ THE FOLLOWING: AUSTRALOPITHECINES

Source: Introduction to Physical Anthropology
Arnie Schoenberg, 2/10/17

Taxonomy

Linnaeus put all life into a huge family tree and correctly included humans on the primate branch. One of the goals of paleoanthropology is to fill-in as many details as possible for all the twists and turns of how that branch leads to us. The family tree metaphor can sometimes be misleading, Stephen J. Gould described taxonomy as more of "luxuriant bush", but for this introductory class, it is useful to minimize the groupings so we don't get overwhelmed: pre-australopithecines, australopithecines, the genus Paranthropus, early genus Homo, later genus Homo, anatomically modern Homo sapiens (us).

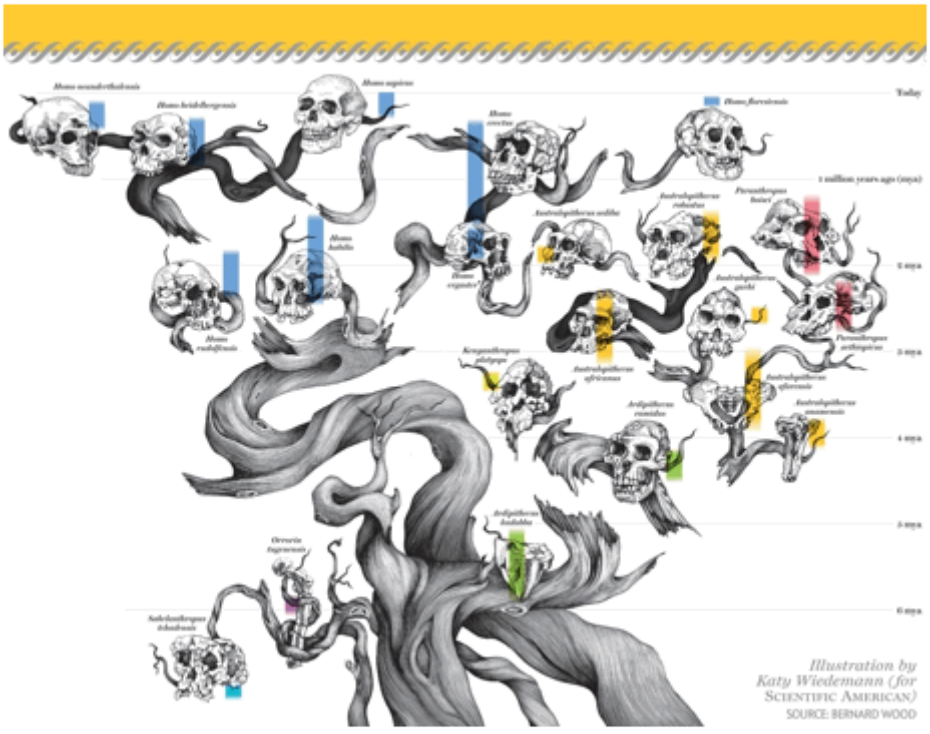


Figure 67 The Origins of Humans is Surprisingly Complicated 8-19-14

6.3 pre-australopithecines

For lack of a better name, we can define this group as primate fossils that date before the known group of australopiths, that show evidence of bipedalism, or dentition similar to later hominins who show bipedalism.

One of the major frustrations of paleoanthropology is that this represents a huge time period, and we're trying to answer some of the most important questions of hominid evolution centering around our coming down from the trees with just a handful of fossils.

read Dennis O'Neil's Early Hominins

6.4 australopithecines

Australopithecines currently come in two types, gracile and robust.The robust australopithecines were re-grouped into a separate genus, Paranthropus, because they are so different from the hominins that came after them.

READ Dennis O'Neil on australopithecine vs. paranthropoid species

6.4.1 gracile

Gracile australopiths have a wide range of dates and can be grouped into several species.

6.4.2 robust

We've had problems figuring out where to put the robust australopiths in our family tree. Kind of like that distant cousin that you have to invite to the wedding, but can't find a seat for. They are bipedal, so they are definitely closer to us than bonobos, chimps or gorillas, and they have many morphological similarities to other australopiths. But they look much different, with huge mandibles and molars, and a big muscle-head (saggital crest) like the rest of the great apes. They were nicknamed "Nutcracker Man" because of the huge mandibles, and there is probably some truth to that because we can tell from their teeth and jaws that they had a hard diet. So far, we have not found any stone tools associated with them. The robust australopiths have had their genus renamed a few times, from Titanohomo, Zinjanthropus, to Australopithecus, and now most paleoanthropologists have settled on Paranthropus.

READ THE FOLLOWING: EARLY GENUS HOMO

Source: Introduction to Physical Anthropology
Arnie Schoenberg, 2/10/17

early genus *Homo*

READ Dennis O'Neil on early genus Homo

Homo habilis

Homo habilis, known as 'handy man' is a species of the genus **Homo** which lived from approximately 2.33 to 1.4 million years ago, during the Gelasian Pleistocene period. The discovery and description of this species is credited to both Mary and Louis Leakey, who discovered the fossils in Tanzania between 1962 and 1964.

http://www.bradshawfoundation.com/origins/homo_habilis.php

Homo erectus

Source: Introduction to Physical Anthropology
Arnie Schoenberg, 2/10/17

Homo erectus is significant for many reasons, but one of the most important is because unlike so many contested hominid paleospecies, we have found so many Homo erectus that almost all paleoanthropologists agree that there was such a thing. Homo erectus was important for its longevity, more than any other hominid so far, it will take us another million years to beat their record.

Homo erectus was also important as the first documented hominid to leave Africa, and it definitely got around, because it's geographical ranges covers Africa, Europe and Asia (but not Australia or the Americas). Homo erectus begins the human trend of globalization and makes migration (gene flow) one of the important evolutionary forces for humans. Almost all paleoanthropologists acknowledge *Homo erectus* as a category of hominin in between Australopithecines and anatomically modern *Homo sapiens.* The transition from Homo erectus to Homo sapiens is less clear.

Dennis O'Neil on *Homo heidelbergensis*

6.6.1 Africa

Some African hominids at the same were more gracile, enough different from Eurasian to warrant another species name for some paleoanthropologists, *Homo ergaster*.

Lake Turkana

6.6.2 Asia

Java man

* classic Zhoukoudian fossils

* article on very early *Homo erectus* in China

6.6.3 Europe

* Tautavel man from Arago Cave

NEANDERTAL

Source: Introduction to Physical Anthropology
Arnie Schoenberg, 2/10/17

Neandertals

Some of the most fascinating recent research are the advances in decoding the Neandertal genome, especially that some were redheads and had an allele (FOXP2) involved with language . You will definitely hear more details about this in your lifetime.

Read Dennis O'Neil's intro to Neandertals

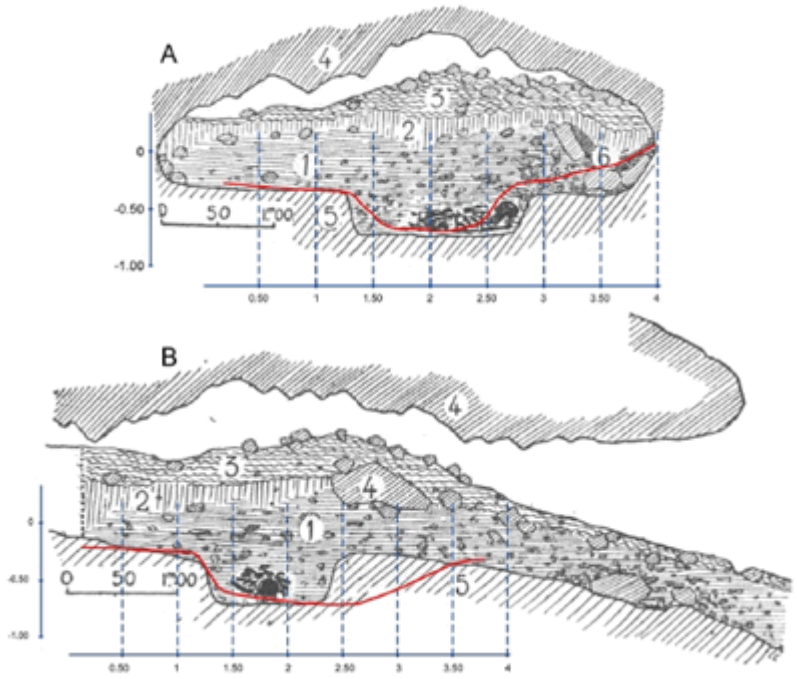


Figure 70 Dibble,H.L.,et al.,A critical look at evidence from La Chapelle-aux-Saints supporting an intentional Neandertal burial, Journal of Archaeological Science *(2014), http://dx.doi.org/10.1016/j.jas.2014.04.019*

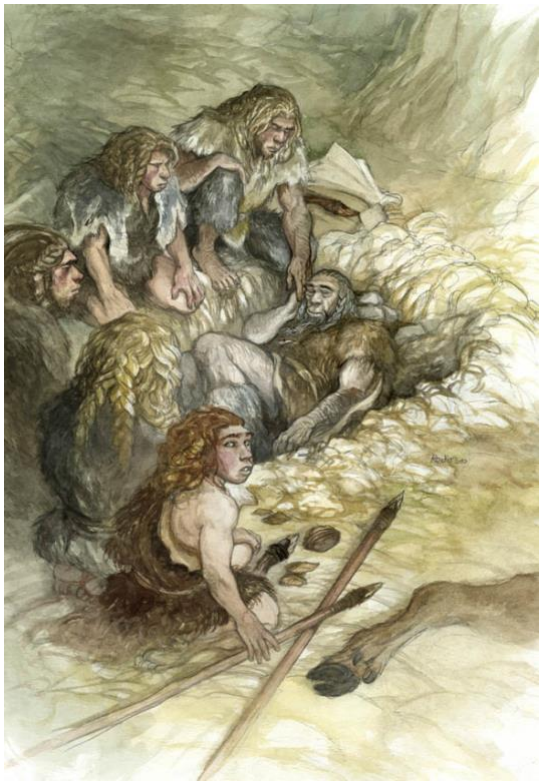


Figure 71 Emmanuel Roudier

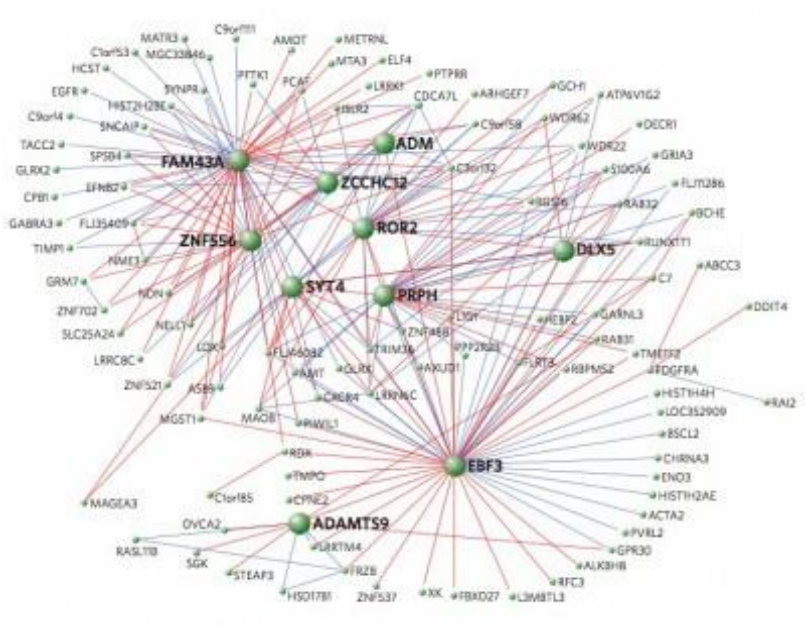


Figure 72 FOXP2 Network associated with language

* *FOXP2 network*

* *Read the first 5 pages of this article on Bone tools made by Neandertals*

What is a lissoir? *What was it used for? How do the archaeologists know that it is a tool and not just food remains?*

article on Neandertals eating pigeons a good example of the range of foods that hominids were exploiting.

6.8.1 Neandertals in popular culture

Our fascination with Neandertals in popular culture reflects the paleoanthropological debates of our relation to Neandertals. Are they us? Are we them?

GEICO caveman commercials:

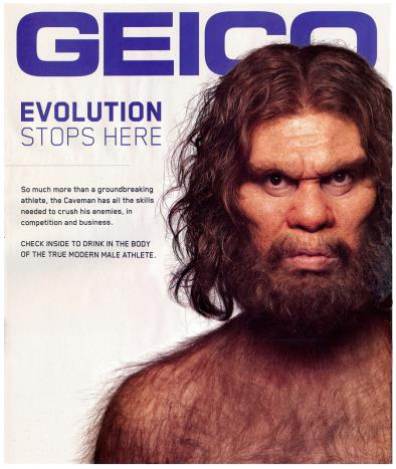


Figure 73 The Croods

6.8.2 Chatelperonian

Chatelperonian is a tool industry used be Neandertals. The **Châtelperronian** is a claimed industry of the Upper Palaeolithic, the existence of which is debated. It represents both the only Upper Palaeolithic industry made by Neanderthals and the earliest Upper Palaeolithic industry in Central and Southwestern France, as well as in Northern Spain. It derives its name from the site of *la Grotte des Fées*, in Châtelperron, Allier, France.

6.12 anatomically modern *Homo sapiens*

Homo sapiens, (Latin: “wise man”) the species to which all modern human beings belong. Homo sapiens is one of several species grouped into the genus Homo, but it is the only one that is not extinct.

https://www.britannica.com/topic/Homo-sapiens

6.12.1 Out of Africa vs. Regional Continuity Model

Chris Stringer talk, first 18 minutes: What is the Coalescent African Origins model?

The **Multiregional Continuity Model**[15] contends that after *Homo erectus* left Africa and dispersed into other portions of the Old World, regional populations slowly evolved into modern humans. This model contains the following components:

- some level of gene flow between geographically separated populations prevented speciation, after the dispersal
- all living humans derive from the species *Homo erectus* that left Africa nearly two million-years-ago
- natural selection in regional populations, ever since their original dispersal, is responsible for the regional variants (sometimes called races) we see today
- the emergence of *Homo sapiens* was not restricted to any one area, but was a phenomenon that occurred throughout the entire geographic range where humans lived

In contrast, the **Out of Africa Model**[13] asserts that modern humans evolved relatively recently in Africa, migrated into Eurasia and replaced all populations which had descended from *Homo erectus*. Critical to this model are the following tenets:

Out of Africa theory: homo sapiens arose in Africa and migrated to other parts of the world to replace other hominid species, including homo erectus.

- after *Homo erectus* migrated out of Africa the different populations became reproductively isolated, evolving independently, and in some cases like the Neanderthals, into separate species
- *Homo sapiens* arose in one place, probably Africa (geographically this includes the Middle East)
- *Homo sapiens* ultimately migrated out of Africa and replaced all other human populations, without interbreeding
- modern human variation is a relatively recent phenomenon

The **multiregional view** posits that genes from all human populations of the Old World flowed between different regions and by mixing together, contributed to what we see today as fully modern humans. The replacement hypothesis suggests that the genes in fully modern humans all came out of Africa. As these peoples migrated they replaced all other human populations with little or no interbreeding.

To understand this controversy, the anatomical, archaeological, and genetic evidence needs to be evaluated.

http://www.actionbioscience.org/evolution/johanson.html

Figure 75 results from Arnie Schoenberg's Genographic test

skim Dennis O'Neil on the origins of modern humans

** watch the Svante Pääbo talk about Neandertal DNA*

** watch a good overview of recent hominid evolution: (Evolution of Modern Humans – Documentary 2016 (1:52:06) https://www.youtube.com/watch?v=V-1QpQESW7M*

READ THE FOLLOWING: Evolution and culture – tool industries

Stone Tools

The earliest evidence of material culture is in the form of stone tools found on sites dated to 2.4 millions years. This does not mean that early hominins did not use tools. New finds from Dikika, Ethiopia in the Afar region, indicate that A. afarensis used stone tools to extract marrow from bones 3.4 million years ago. What this study does not show is whether A. afarensis was making tools or using a found rock. You can read more about this new find and the Dikika Research project at http://research.calacademy.org/anthro/research/dikika. However, an announcement in May 2015 is rewriting what we know about stone tools.

Harmand et al. (2015) published that they had found 3.3 million-year-old (myo) stone tools at Lomekwi 3, West Turkana, Kenya, which they propose calling Lomekwian as the tools predate Oldowan tools (see below) by 700,000 years. What is particularly interesting is that the oldest *Homo* fossils found in West Turkana are 2.34 myo. Kenyanthropus platyops (not covered in the overview of early hominins, but you can learn about it at Becoming Human) is the only hominin known from the area at that time, although *Au. afarensis* is known from 3.39mya. Questions remain as to which hominin left behind the assemblage (an assemblage is a group of artifacts found together at a specific site) of 149 artifacts, including flake fragments, worked cobbles, and cores, and how it compares with Oldowan tools. As this is such a recent discovery, it is not covered in any more detail on this page.

Oldowan Tool Industry

Olduwan flake tool

The oldest stone tool assemblage is the Oldowan tool industry (at least it is the oldest until the field comes to a consensus about Lomekwian tools). First identified at Olduvai Gorge, Tanzania by Louis and Mary Leakey, Oldowan tools are stone pebble tools manufactured using a hard percussion technique. This technique involves striking two stones together to knock off a flake or create an edge on a piece of stone. While this seems like a simple technique, to make one of these tools, the individual needs to be able to understand how the stone will break when struck. The presence of Oldowan tools is an indication of changing cognitive abilities.

Originally, paleoanthropologists thought that the hammerstone was the primary tool used, but microwear analysis, a methodology whereby stone tools are examined under a microscope and the use wear patterns compared to use wear patterns established through experimental archaeology, indicates that the flake tools were the primary tool. Oldowan tools were used for cutting, chopping and scraping.

Louis Leakey believed that the Oldowan tools were evidence that *Homo hablis*, the fossil hominin found associated with the tools at Olduvai Gorge, hunted, especially since numerous animal fossils were found at the site. However, the mere presence of stone tools and animal fossils does not confirm hunting behavior. In the early 1980s, Rob Blumenschine conducted a year-long study on the Serengeti and in riparian (river banks) habitats. Blumenschine observed around 250 feedings by both predatory and scavenger carnivores such as lions, cheetahs, hyenas, and vultures. What he noticed that was when a predator ate, they would eat the meatiest parts of the body, leaving behind primarily limb bones. He suggested that if hominins were hunting that the artifact assemblage should contain those animal bones with the most meat. If hominins were scavenging then limb bones would dominate the fossil animal bone assemblage. Additionally, he noted that if hominins hunted then cut marks from tools would underlie animal tooth marks and vice versus if they were scavenging.

Olduwan chopper

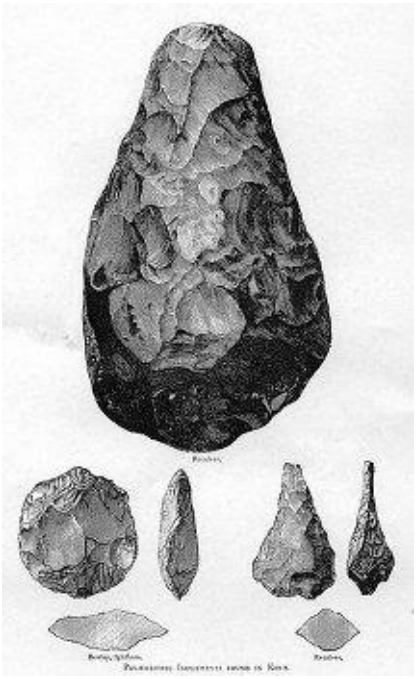
Armed with this information, the Olduvai Gorge material was reexamined. Several new points came to light: 1) the damage on the bones was most similar to that left by carnivore activity, 2) the percentage of limb bones in the artifact assemblage met the expectations of scavenging behavior, and 3) the cut marks overlay teeth marks. It was clear at this point that *Homo hablis* was not hunting but scavenging. While conducting his research, Blumenschine had used Oldowan tools to scavenge a carcass. He found that in about 10 minutes, it was possible to extract enough meat and bone to meet about 60% of the estimated daily caloric intake (approximately 1500 calories). Blumenschine demonstrated that it was an easy feat to scare off other scavengers and even some predators in order to gain access to the carcass. As a subsistence strategy, scavenging does have some advantages:

- it is less dangerous as the scavenger does not have to risk themselves for the kill
- it is quicker as the scavenger can simply follow the roar of the lion or look for vultures circling overhead
- there is less energy expenditure for the reasons listed above and the short amount of time it would take to butcher the remaining carcass using stone tools

The first definitive evidence of hunting is from Schöningen, Germany in the form of wooden spears dated to 400,000 years. The artifacts were identified as spears because they have similar morphology to modern javelins, e.g., the balance point is 1/3 the way from the spear point. The spears are about 7 feet long with sharpened points and were found with the remains of butchered horses.

Until recently, one of the long running debates has centered on who was the first tool user. With the recent announcement by the Dikika Research Project, the nature of that debate may change from who was the first user to who was the first maker. The previously oldest tools came from Gona, Ethiopia dated to 2.4 million years ago. As these tools were not found associated with any hominin fossils, paleoanthropologists debated who made the tools. The time frame puts several hominins in play: *Au. garhi*, *P. robustus*,

H, rudolfensis, and *H. habilis*. Studies show that *P. robustus* had the hand morphology for making tools, but many do not think that the species had the cognitive abilities. Plus, no *P. robustus* fossils have been found with stone tools. The same goes for *Au. garhi*. All researchers agree that *Homo* was making and using tools. Again, the recently reported finds from Lomekwi 3 may end up demonstrating that an early australopith was the first tool maker.



Acheulean Handaxes

Acheulean Tool Industry

One thing we see with tool technologies is that as time passes the tools become more and more sophisticated. About 1.9 million years ago, *Homo erectus* invented a new sophisticated technology for making stone tools, which started with the hard percussion technique, but then employed a soft hammer technique to get more refined and sharper edges. This new tool industry is called the Acheulean.

The Acheulean tool industry, first found at St. Acheul, France, is characterized by bifacial tools. This means that the stone is worked on both sides. This tool industry is a marked step in the cognitive abilities of hominins because the tool has to be conceptualized prior to manufacturing. Dozens of flakes have to be removed precisely in order to maintain the symmetry of the tool and keep the edges straight. The signature tool of the Acheulean tool industry is the tear-drop shaped handaxe. Often referred to as the Swiss Army knife of the Pleistocene, the handaxe was an all-purpose tool used for a multitude of activities including digging, sawing, and cutting.

Mousterian Tool Industry

Levallois points, Mousterian Tool Industry

Neanderthals took the next step in the evolution of stone tools by making tools for specialized tasks. Named after a cave site in Le Moustier, France, these flake tools developed out of a manufacturing technique called the Levallois. This technique first arose with the Acheulean and is characterized by preparing the core of raw material from which flakes can be struck and then worked. Sharper tools with a finer edge are produced using this technique. Neanderthals shaped these flakes into tools like scrapers, blades, and projectile points, specifically spear points. In fact, at Neanderthal caves sites in the Middle East, there are a higher percentage of spear points found than at neighboring Homo sapiens sites. Mousterian tools are a technological advance, taking a high degree of conceptualization and knowledge of the properties of the stone. On average, it takes about 200 blows to make one flake tool.

Upper Paleolithic Tool Industries

The Upper Paleolithic of Europe begins 45,000 years ago and ushers in further advances in tool technology. Not only are there a wider variety of tools made, but new materials are used, including bone and antler. Several regional types of tool industries emerge in the Upper Paleolithic. The first is the Aurignacian, which is characterized by blade tools. A blade tool is a tool that is at least twice as long as it is wide. The benefit of blade tool technology is that blades can be easily knocked off a prepared core and then made into a wide range of tools, e.g., projectile points, drills, needles, scrapers, burins. By 31,000 years ago, the Aurignacian is widespread throughout Europe, allowing archaeologists to trace the movement of modern *Homo sapiens*.

Aurignacian Backed Knives (Wellcome M0011849)

The Aurignacian tool industry disappears from the archaeological by 29,000 years ago. It is replaced by the Gravettian tool industry, which is found at European sites until around 21,000 years ago. This tool industry is characterized by small blades and denticulate (serrated) knives. The Gravettian also has projectile points with blunting (steep backing) that can be hafted onto a shaft. The small size of some of the projectile points leads some archaeologists to surmise that the bow and arrow was invented during the Gravettian, although the first definitive evidence of arrows comes from Stellmoor, Germany (10,500 years ago). It does appear that the atlatl, or spearthrower, was invented during this time frame. This is an important advance as it allowed a hunter to throw farther and with more force, making hunting the megafauna of the period a little safer.

Gravettian tools (Fleche Font Robert 231.4 (2))

The Gravettian is followed by the Solutrean and the Magdelenian tool industries. the Solutrean tool industry is characterized by bifacial, leaf-shaped projectile points. As far as stone tools go, the Solutrean points are some of the best made points of the Upper Paleolithic. The technology flourished from

Solutrean Point

around 21,000 to 16,000 years ago, but then disappears for thousands of years until a similar manufacturing process appears in North America during the Clovis period. to explain this, some archaeologists propose that there was a migration of peoples from the Iberian Peninsula to North America in the late Pleistocene who carried the technology with them; however, other there is little other evidence to support this contention. It is probable that the manufacturing techniques was rediscovered by North America's early inhabitants.

One of the reasons that Solutrean points were finely made was because the stone was heat treated before it was worked. Heat treatment means that the stone was placed in a fire for a period of time, making it possible to make pressure flaking more precise. Heat treating was also a hallmark of the Magdelenian tool industry, 16,000-11,000 years ago. Bone and antler tools flourish during the Magdelenian. Harpoons appear in the archaeological record, with true barbed harpoons showing up around 13,000 years ago.

Magdalenian Barbed Harpoons

EXPLORE AND INTERACT ON WEBSITE

Look at the Smithsonian National Museum of Natural History and explore, interact with their online display of "What does it Mean to Be Human: Human Evolution Research."'

http://humanorigins.si.edu/research

Click on the "Human Fossils" section to see the Human Family tree and characteristics of australopithecines. And check out their 3-D collections to get a more interactive look.
http://humanorigins.si.edu/evidence/human-fossils

(Disclaimer: the link to the Smithsonian website does not indicate that the Smithsonian endorses, whether expressly or implicitly, any products, services or opinions provided on City Tech's website. Once you click on the link, the user is leaving this website and accessing another).

WATCH THE FOLLOWING

Watch a short video (5:41) "Stone Tool Technology of Our Human Ancestors – HHMI BioInteractive Video." (A film by Rob Whittlesey, presented and narrated by Sean B. Caroll, Science advisor Timothy White, Camera by Andy Shillabeer, 2015)

https://www.youtube.com/watch?v=L87Wdt044b0

After watching the video, think about Darwin's theory of evolution and how tool making may have played a role in adaptation and evolution.

EXPLORE AND INTERACT ON WEBSITE

Look at the development of the tool industries over time, look back at the Smithsonian National Museum of Natural History and read and interact with the section related to stone tools:
http://humanorigins.si.edu/evidence/behavior/stone-tools

(Disclaimer: the link to the Smithsonian website does not indicate that the Smithsonian endorses, whether expressly or implicitly, any products, services or opinions provided on City Tech's website. Once you click on the link, the user is leaving this website and accessing another).

You should be able to explain:

-- What are the different kinds of tool industries?
(Oldowan, Acheuleun, Moustarian, Upper paleolithic)

Upper Paleolithic revolution

Upper Paleolithic revolution

To get a sense of the Upper Paleolithic revolution try taking some of the virtual tours available for the cave art, e.g. Chauvet-Pont-d'Arc Cave.

Also, compare the Lower Paleolithic and Middle Paleolithic to the Upper Paleolithic. Count how many years it takes for people to invent a way of making stone tools so different from before that it justifies a new name for the assemblage.

EXPLORE AND INTERACT ON WEBSITE

Forensic Anthropology, a subfield of Physical Anthropology, looks at clues from remains to discover the diet of the individual, how they individual may have lived and died. Explore the Smithsonian National Museum of Natural History interactive section on Fossil Forensics: http://humanorigins.si.edu/research/fossil-forensics-interactive

(Disclaimer: the link to the Smithsonian website does not indicate that the Smithsonian endorses, whether expressly or implicitly, any products, services or opinions provided on City Tech's website. Once you click on the link, the user is leaving this website and accessing another).

How do forensic anthropologists use modern day information to understand the past?

Summary Outline of this Chapter:

2.1c Primate Studies'

Contemporary Primates (Read excerpt from Wikibooks "Introduction to Paleoanthropology")

The Classification System
The Primate Order
Species
Primate Characteristics
Primate Sense Organs
The Primate Brain
Primate Teeth
Primate Skeleton

Types of Living Primates:

Prosimians (Lemurs, Lorises, *Tarsiers)
Take a look at a Tarsier eating a grasshopper.

Simians/Anthropoids (Monkeys, Apes & Humans, Orangatan, Gorillas, Common Chimpanzees, Bonobos)

If you are curious, watch a video about Jane Goodall
Watch a video about Primate evolution from NOVA

Be familiar with 5 families of primate and Strepsirrhines, Haplorrhine, Platyrhines, Catarrhines.

Primate Taxonomy: Watch short 5 minute video by Kern & Kern, 2011.

Sexual Dimorphism

K-selection, r-selection

Paleoanthropology (Source Introduction to Physical Anthropology, Arnie Shoenberg)

Trends
Bipedalism
Encephalization
Culture/Tools
Language
Dentition
Methods
Taphonomy

Fossils (Dating)

Early Humankind
(Read Source Wikibooks "Introduction to Paleoanthropology")

What makes a primate human?

Primate Social Behavior (The Group, Dominance, Aggression, Individual interaction, Play, Communication, Home Range, Tool Use)

Primates and human evolution
Primate Fossils

Rise of the Primates (Eocene primates, Oligocene Primates, Miocene Primates)

Australopithecines
(Read Introduction to Physical Anthropology, Arnie Schoenberg)

Taxonomy
Pre-australopitecines
australopitheseines (gracile, robust)

Early Genus Homo
Read Introduction to Physical Anthropology, Arnie Schoenberg)

Early Genus Homo
Homo Habilis
Homo erectus (Africa, Asia, Europe)
Dmanisi hominids

Homo Erectus
(Read Introduction to Physical Anthropology, Arnie Schoenberg)

Neandertal
(Read Introduction to Physical Anthropology, Arnie Schoenberg)

Neandertal
Neandertals in popular culture

Anatomically Modern Homo Sapians
(Read & follow links Introduction to Physical Anthropology, Arnie Schoenberg)

Out of Africa vs. Regional Continuity Model

Evolution and Culture – Tool Industries:
(Read Wikieducator "Biological Anthropology")

Stone Tools:
Oldowan Tool Industry
Acheulean Tool Industry
Mousterian Tool Industry
Upper Paleolithic Tool Industry

Explore and Interact of Smithsonian National Museum of Natural History website their online display of fossils.

Watch a short video (5:41) "Stone Tool Technology of Our Human Ancestors – HHMI BioInteractive Video." (A film by Rob Whittlesey, presented and narrated by Sean B. Caroll, Science advisor Timothy White, Camera by Andy Shillabeer, 2015)

Explore and Interact of Smithsonian National Museum of Natural History website their online display of tools.
Upper Paleolithic revolution
(Read & follow links from Introduction to Physical Anthropology, Arnie Shoenberg)

Forensic Anthropology:
(Explore and interact on Smithsonian National Museum of Natural History)

References by Section:

PRIMATES - References

Source Wikibooks “Introduction to Paleoanthropology”
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