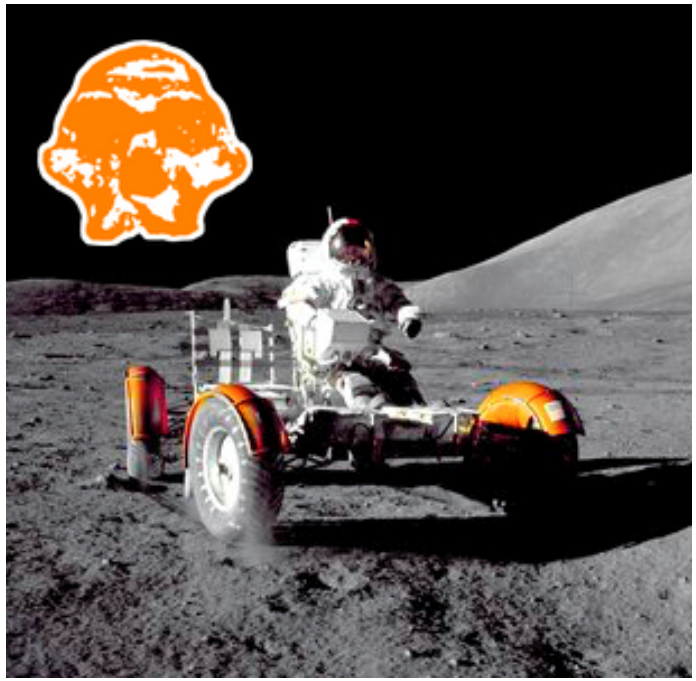

FROM APEMEN TO SPACEMEN:
THE STORY OF HUMAN EVOLUTION

PART 2.1: THE HOMININS - ANATOMICAL BACKGROUND

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In part 1 we learnt about the primates, our closest living relatives. In part 2.3 we will look at the first hominins, the first members of the human family to which we and our closest extinct relatives belong. However, we first need a bit of background context.

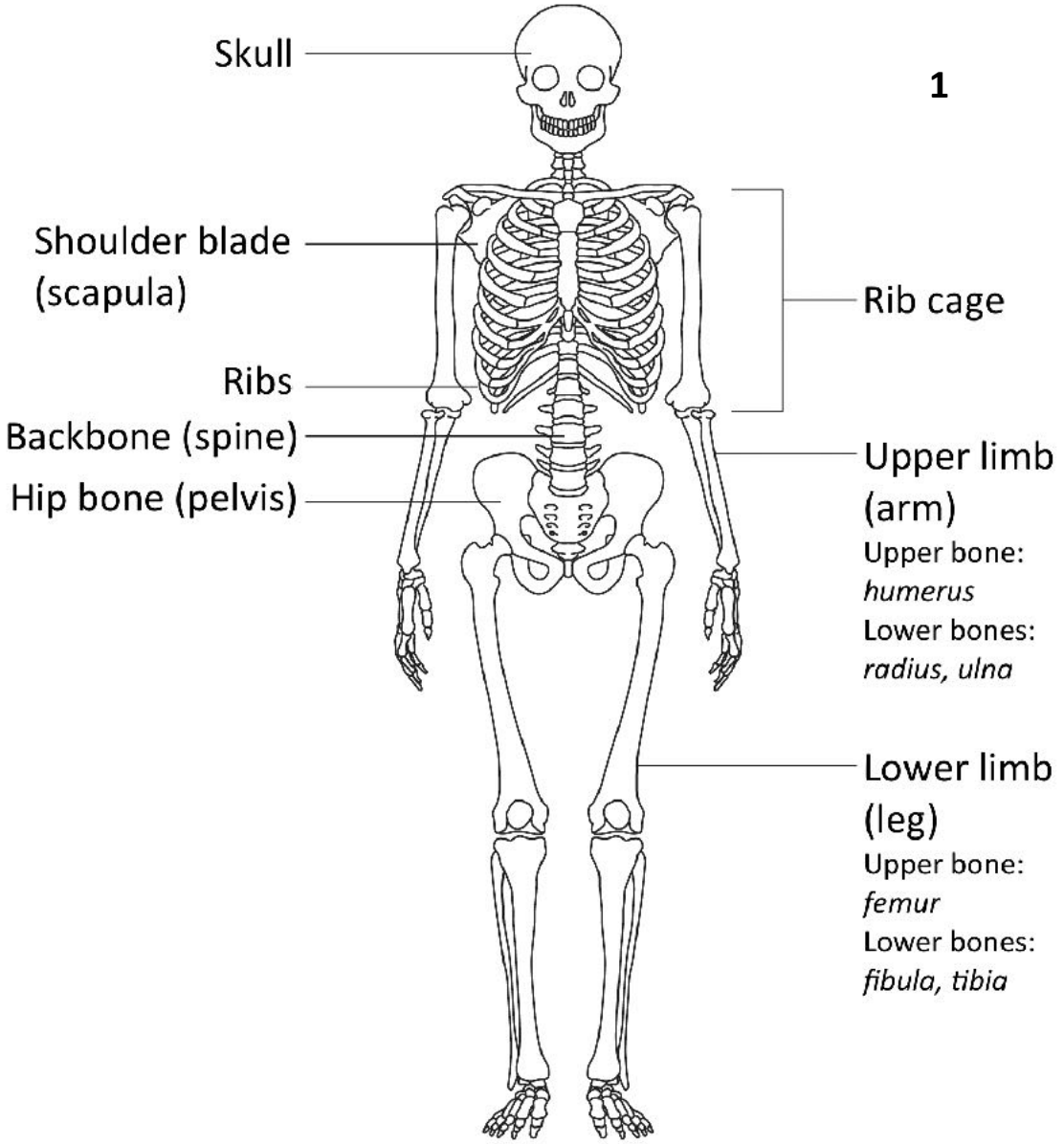
In part 2.1 you will learn about:

- Definition of a hominin
- The defining characteristics of hominins that separate them from the other apes
- The last common ancestor of humans and chimpanzees

WHAT IS A HOMININ?

Hominins are members of the taxonomical tribe Homininae, and include humans and their extinct relatives, e.g., those species that fall on the human side of the chimpanzee-human divide.

Before getting on to the earliest known hominins though there are some basic anatomical terms that may be useful for the rest of the course:



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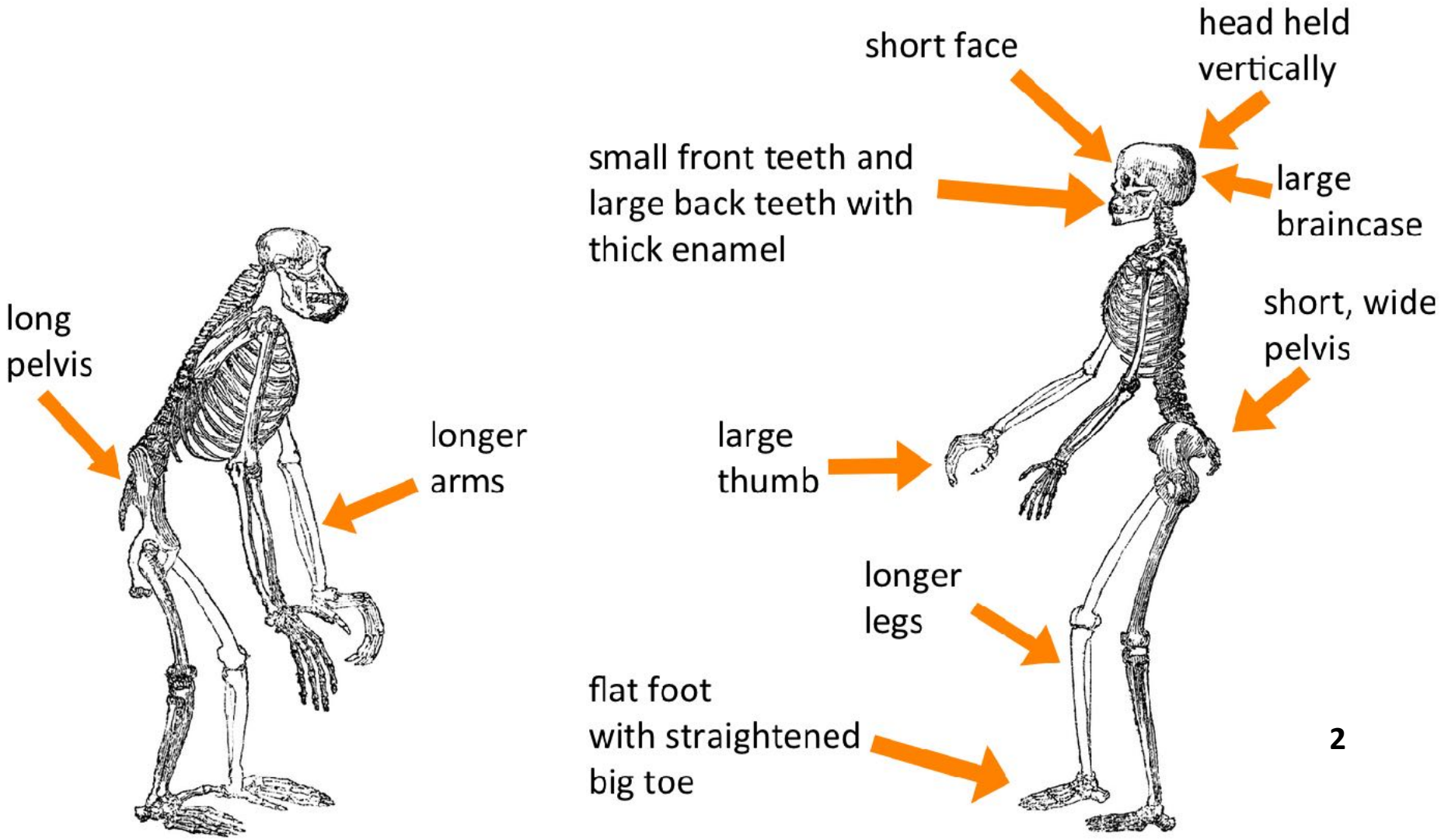
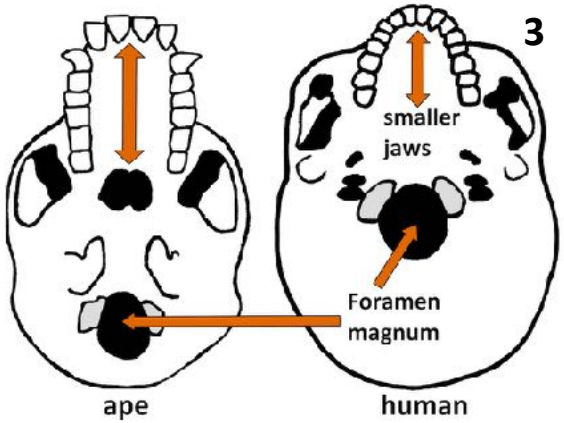
Despite their relatively recent ancestry, humans and apes differ in a number of ways:



2

The skull, teeth, and jaws

Humans have relatively small jaws and teeth, especially the front teeth (incisors and canines), and have especially thick tooth enamel. The hole for the spine (foramen magnum) is located centrally rather than at the rear of the skull (fig. 3).

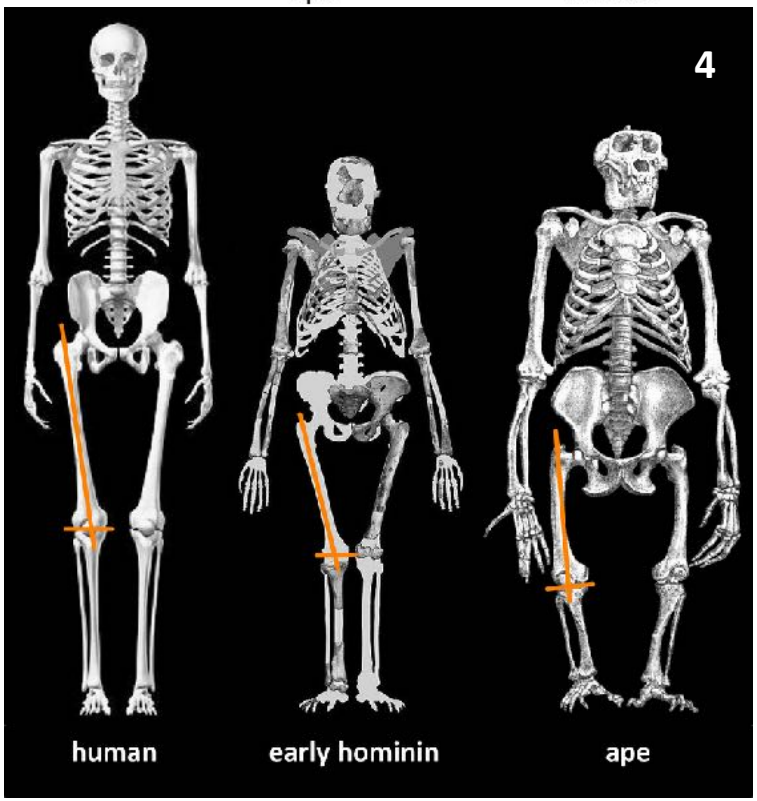


The ribcage and pelvis

Apes have a conical ribcage, in humans it is barrel-shaped allowing the arms to swing freely while walking (earlier hominins still had a conical ribcage). Apes have a long and narrow pelvis while in humans it is short and broad, which is an adaptation to bipedal locomotion.

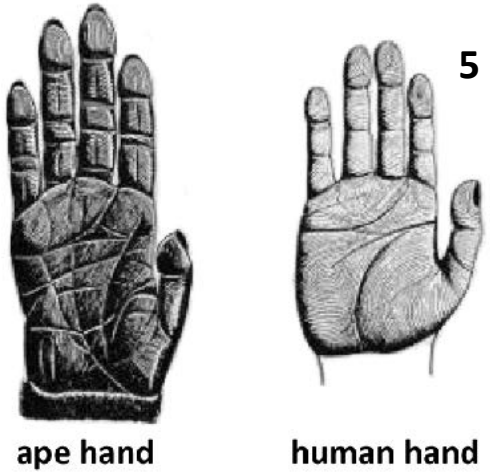
Leg and knee

In humans the femur (thigh bone) angles inwards from the hips so it is at an angle from the knee cap (fig. 4: orange lines). This is another bipedal adaptation. In apes the femur essentially angles straight down. Humans also have relatively long legs and short arms.



Hands and feet

Freed up from having to play a weight-bearing role in locomotion, human hands have relatively slender fingers with a highly opposable thumb, which allows us much better fine manipulation of objects. In human feet, large big toes aligned with the other toes, two arches, and wide heels allow the foot to push off with the toes and absorb the forces of bipedal locomotion.



Body hair and body fat

Additionally, there are features where humans differ from apes that do not show up in the fossil record. Humans have very thin hair over most of their body. Another major difference is that humans have a layer of subcutaneous body fat, that is a layer of fat under the skin. Humans also a different sweating mechanism. We sweat more and can therefore tolerate hot, arid habitats better though this requires increased water intake.

HOMININ CHARACTERISTICS

So we have seen that there are a number of physical differences between humans and living apes. The defining characteristics of hominins and their emergence can be summarised as follows:

- **Bipedal locomotion** (walking upright on two legs - while other apes can do this they do not do it habitually) - *6 million years ago*.
- **Tool users and makers** (again, while other apes do this none are able to manufacture tools like hominins have been making for the last three million years) - *3 million years ago*.
- **Large brains** - *2 million years ago*.
- **Language** - *??? - unknown.*

As you can see not all of these characteristics evolved at the same time and bipedal locomotion came first. The possible reasons for the evolution of bipedalism is something that we will explore after we have looked at the earliest-known hominin fossils in part 2.3.

THE LAST COMMON ANCESTOR

From comparative genetic studies of humans and other apes we know that humans and chimpanzees/bonobos share a common ancestor that lived about 7 million years ago (ma).

While we know that we share a common ancestor it is at the moment hypothetical and we do not really know what it would have looked like. We can be fairly sure that it would have lived in Africa as this is where chimpanzees and bonobos live today. It would have looked like some sort of ape but not exactly the same as a chimpanzee. Remember, chimpanzees as well as humans have evolved since the common ancestor.

The exact appearance of the common ancestor is further complicated by the fact that we know practically nothing about chimpanzee evolution, so we do not know which chimpanzee characteristics derive from the common ancestor and which have evolved in the intervening millions of years (for example, does chimpanzee knuckle-walking come from the common ancestor or did it derive only later?).

Nevertheless, we think that the common ancestor was probably still a quadruped (walked on all fours). However, 6 to 7 ma bipedal apes start to appear, apes on the human side of the chimpanzee/ human divide that walked upright on two legs. Before meeting the earliest hominins in part 2.3 we will first look at the environmental background to hominin evolution.

SUMMARY OF PART 2.1

In part 1 we looked at the closest living relatives of humans, the apes. The chimpanzee is our closest living relative. We share over 98% of out DNA and share a common ancestor which would have lived around 7-8 million years ago.

In part 2.1 we have begun our look at those apes on the human side of chimpanzee-human divide, the hominins, of which we are the last surviving members. We have defined what hominins are and explored their defining characteristics, many of which are a direct of our form of locomotion, bipedalism, something unique among the primates.

In part 2.2 will will look at the environmental background to human evolution while in part 2.3 we will meet the earliest known hominins who lived around 7 to 5 million years ago.

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