- The human knee joint has a **valgus angle,** causing the **femur** to be angled inwards. This brings the knees and feet nearer the midline, which enables more efficient two legged walking compared to chimpanzees.These result in more efficient walking as the organism does not waste energy swinging from side to side and is much more balanced as they walk. In apes the knees bend outwards under the hips as their femur angled into the knee so when they lift one foot off the ground they lose balance. They must lean to one side to counterbalance. This produces a swaying movement as they walk.
- The **Foramen Magnum (big opening for the spinal cord),** shifted underneath and central in the skull for humans, whereas with apes it is towards the the back of the lower side of the skull. This is so that the eyes can face forwards when standing upright.
- Apes feet have an **opposable big toe** so the foot is able to grab things. Their feet are also flat. Humans have a **forward facing big toe** and their foot is arched which acts as a shock absorber and enables humans to spring off their feet when walking therefore making walking more efficient.
- Human **hands** are much smaller than a chimpanzee's, the thumb is relatively long and more mobile. The trend for this can be seen in early hominin fossils. A chimpanzee's hand is not suited to a precision grip but human hands can have both a power grip and a precision grip.
- Apes fingers are more curved with less mobile fingers. Like all primates both can grip objects with a **power grip**, but only humans can also use a **precision grip**.
- Reduced **nuchal crest** means less neck muscles to hold head up indicates bipedalism
- **Rounded brain case** (enlarged brain) for humans with reduced sites for muscle attachment, especially those used for chewing and aggressive facial displays which are no longer called for. Apes had a **flatter brain case** (smaller brain) which allows for greater muscle attachment sites needed for aggressive facial displays.

Teeth and Jaws:

- Some hominin fossils show teeth similar to chimpanzees, others have teeth similar to modern humans, which are small and have small jaws. It is very likely that large teeth and large jaws are associated with diets high in fibrous plant food.
- In humans the **lower jaw** is parabolic but U-shaped in apes, this is probably due to the changes in diet to soft foods
- Powerful chewing actions of the jaws of apes set up the stresses in the skull and lower jaw. These stresses are resisted by the **brow ridges above the eye sockets and the 'siminian shelf'** that strengthens the inside of the lower jaw.
- In humans, the buttressing of the lower jaw is in the form of a chin and brow ridges were lost quite late in the hominin evolution.
- **Canine teeth** in males and females are the same size in humans but in apes they are much larger in males.

The discovery of fire and development of tools also helped in terms of acquiring food aswell as preserving and eating food for later.

Discovery and development of fire

Fire was first used by Homo Erectus and the use of it meant that they could gather around the fire together and provided light at night for longer days where erectus could have spent more time in communication and thinking through the days problems

Benefits of using fire

- at night/in colder areas
- anti-predator defences eg. fire scares away predators
- easier to digest/destroy parasites/access greater range of food / more palatable / preserve food
- for tool making/preparing food /planning
- to get more food
- harden points of wooden tools/weapons.
- able to keep warm in cooler regions
- Use of fire lead to better / stronger tools more successful hunting and increased food
- Use of fire to cook food / meat to access additional protein / energy
- Use of fire as protection from predatory animals

Tools helping to acquiring food

The development of new tools and better refined tools helped with acquiring food

- **Oldowan** first used by *Homo habilis* were used to chop and scrap, this helped in taking out meat from bones and cracking bones open to eat out of
- **Acheulian** first used by *Homo erectus and Archaic Homo sapiens* used as hand axes and cleavers could help with cutting special parts of an animal or cutting down things from trees. The fire discovered by H. Erectus also made tools more sharp and strong
- **Upper Paleolithic** first used by *Homo sapiens and Neanderthals* were very well refined and specially made for catching different food. Fish hooks or spears to catch fish and nets and snares to catch larger prey.

Human cultural evolution between hominins with respect to shelter and comfort

(caves, temporary settlement, permanent settlement). **Shelter** brings:

- planning
- communication
- cooperative behaviour
- division of labour