...going one step further

VP761/1

Orang-Utan[1]

English

Species	*Pongo pygmaeus* (Hoppius)[2]
Subfamily	Ponginae Allen, 1925
Family	Pongidae Elliot, 1913
Superfamily	Hominoidea Simpson, 1931
Infraorder	Catarrhina Hemprich, 1820
Suborder	Simiae Haeckel, 1866
Order	Primates Linnaeus, 1758

The skull of the mature, very large male orang-utan presents a very marked relief. The cerebral cranium and the facial bones (viscerocranium) have a rough appearance and are marked with bumps, ridges, etc., which were formed in response to the requirements of the masticatory and neck musculature. They are in no way comparable with those of the human.

In the orang-utan's skull too, the disproportionate size of the face/jaw part (the facial bones, i.e. the splanchnocranium or viscerocranium) in relation to the cerebral cranium is noticeable. This relationship, however, only develops in the course of postnatal growth – particularly at the time of the second dentition.

On the sagittal suture, that is down the middle of the skull, a bony sagittal crest (crista sagittalis) develops, becoming more pronounced towards the back. It is formed from the parietal bones and serves as the origin of the temporal muscle[3], which increases in size as it approaches the crest. At the back of the head (the occiput) the sagittal crest joins the occipital crest, which develops as the neck musculature becomes stronger.

The occipital condyles of the head joint and the great occipital foramen they enclose (*foramen occipitale magnum*) are located in the posterior region of the skull. Here too, the obvious contrast with the newborn or infantile animal is evident.

The sexual dimorphism of the skull appears at first sight more pronounced in the orang-utan than in, for example, chimpanzees, but less so than in the gorilla. As is the case with all primates that have been investigated in this respect, male orang-utans display on average a larger brain volume, larger and differently shaped canine teeth, and a significantly more pronounced skull relief. In any case, all mature males, but almost no mature females, have a sagittal crest. All adult animals develop occipital crests, due to their "front-heavy" heads. In orang-utans, however, these crests are noticeably smaller than in the African Ponginae.

Generally only supra-orbital arches develop. Related to this, there are no frontal sinuses. This development takes place in connection with the formation of the permanent teeth and then with the wear of the teeth with continuing abrasion from chewing[4].

The upward branch of the lower jaw (*ramus mandibulae*) is relatively low. Typical of the Ponginae is the more or less parallel arrangement of the premolar and molar teeth. In front of them are the incisor teeth. The sexually differentiated, dagger-like canine teeth extend distinctly beyond the occlusion plane. For this reason, in the upper jaw between the canine tooth and the first premolar, there is a gap, or diastema, into which the lower canine tooth engages.

The anterior teeth engage one over the other like shears, which makes it easier to bite off a piece of food, while the posterior teeth have broad, shallow crowns, suited to grinding; this constitutes-in the case of the molars–what is known as the dryopithecine pattern, which is also displayed by humans. In the orang-utan too, the enamel shows typical furrows on the occlusion plane next to the fissures. These are set close together, and their arrangement is so characteristic that even a lay person can identify an orang-utan tooth from them alone.

Since the pioneering studies of E. Selenka around 1900, orang-utans are no longer considered the closest living relatives of humans.

English

Orang-Utan[1]

Some dimensions of the original orang-utan skull[5].

max. length of cranium (inc. occipital crest)	134 mm
max. breadth of cranium	131 mm
skull breadth in region of max. postorbital narrowing	65 mm
volume of cranial cavity = “brain size”	440 ccm
length of face	182 mm
breadth of upper face (external biorbital breadth)	107 mm
breadth of zygomatic arch	160 mm
max. separation of zygomatic arch from skull wall	45 mm
length of palate	94 mm
breadth of palate	41 mm
bicondylar breadth of mandible	100 mm
bigonial breadth of mandible	135 mm
height of *corpus mandibulae*	42 mm
ramus height of mandible	107 mm
ramus breadth	61 mm
total mass of skull	873 g
mass of cranium	551 g
mass of mandible	322 g

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[1] This model was cast from a replica of the original skull from the Senckenberg Research Institute and Natural History Museum in Frankfurt/Main. For educational reasons the abraded teeth of the original were reconstructed following younger male specimens in Munich, so as to be able to give a better representation of the tooth pattern. In this process, some adaptations to the jaws had to be made.

[2] The scientific name of the orang-utan has been under dispute for a good 40 years. This does not just concern the correct attribution, as in the case of the chimpanzee, but also the specific name. Variant forms, known as synonyms, are found in the literature.

[3] Muscles cannot attach to one another, but require hard tissue for this purpose.

[4] With increasing flattening of the tooth biting surfaces, the chewing force must be increased, which leads to increased growth of the masticatory muscles, which in turn leads to more pronounced moulding of muscle attachment surfaces. Here too, the distribution of the ever-increasing chewing force over the facial skeleton results in more pronounced structures. Here we see the effect of the spatial relationship between the largest organ in the head, the brain, and the others, particularly the eyes. In the African Ponginae this relationship is mainly horizontal (one behind the other), whereas by contrast in the orang-utan they are arranged more vertically (one above the other).

[5] All measurements were taken, from an original, by Dr sc. A. Windelband, Berlin. In general, model dimensions will vary slightly from these.

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