CAMBRIDGE MANUALS IN ARCHAEOLOGY

Teeth

Second Edition

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CAMBRIDGE MANUALS IN ARCHAEOLOGY

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The incisors in these animals are lost before maturity (Nowak & Paradiso, 1983) and, as in sea cows, horny pads at the front of the jaw are used to gather vegetation. The cheek teeth are lophodont (Figure 1.82), with enamel-coated crowns, and not dissimilar in form from those of the mastodon. Their correct identification is unclear but, as they wear and are lost, they are continuously replaced from behind by later erupting teeth. Up to seven may be present in each jaw quadrant at any one time, and the total number erupted throughout life per quadrant may be as many as ten. This represents an increase over the ancestral eutherian mammal condition (p. 12).

Order Hyracoidea

Family Procaviidae

Hyraxes: *Procavia*[AF,ASW]

$$\mathrm{i}\frac{1}{2}, \mathrm{c}\frac{0}{0}, \mathrm{p}\frac{4}{4}, \mathrm{m}\frac{3}{3}$$

These little animals eat grass, leaves and bark, with a dentition that functions like a rodent's. In fact, it is related to proboscideans, even though the cheek teeth (Figure 1.83) look most like those of a rhinoceros. They are hypsodont and the upper premolars and molars have three lophs – ectoloph, protoloph and metaloph. There is prominent, step-like cingulum. The first premolar is simple, but the teeth increase in complexity along the row to distal. Lower cheek teeth each have two U- shaped lophs – the metalophid and hypolophid. The upper incisors are relatively large, persistently growing and with enamel on all sides. Their transverse section is triangular in outline and they wear to a sharp point, rather than a chisel-like edge. The lower incisors are spatulate and together wear into a notch where the upper incisor grinds against them.

Order Perissodactyla

Perissodactyla is one of the two orders of ungulates (hoofed mammals). They are called 'odd toed' ungulates because the third digit of each limb is developed into a single hoof. All Perissodactyla are herbivores, with continuous rows of complex, hypsodont cheek teeth. Unlike the ruminants (below), they have a hindgut fermenting digestive system where the fibrous plant food is chewed only once, completely digested in a single chambered stomach, and then the cellulose is fermented to sugars in the colon and caecum (Macdonald, 1984). There are three living perissodactyl families. Tapirs (Tapiridae) live in the tropics of South America and South-east Asia. Their cheek teeth are lophodont, with two transverse plates not dissimilar from those of manatees (above). Rhinoceroses (Rhinocerotidae) in the past had a distribution throughout Europe, Africa, Asia and North America. Cheek

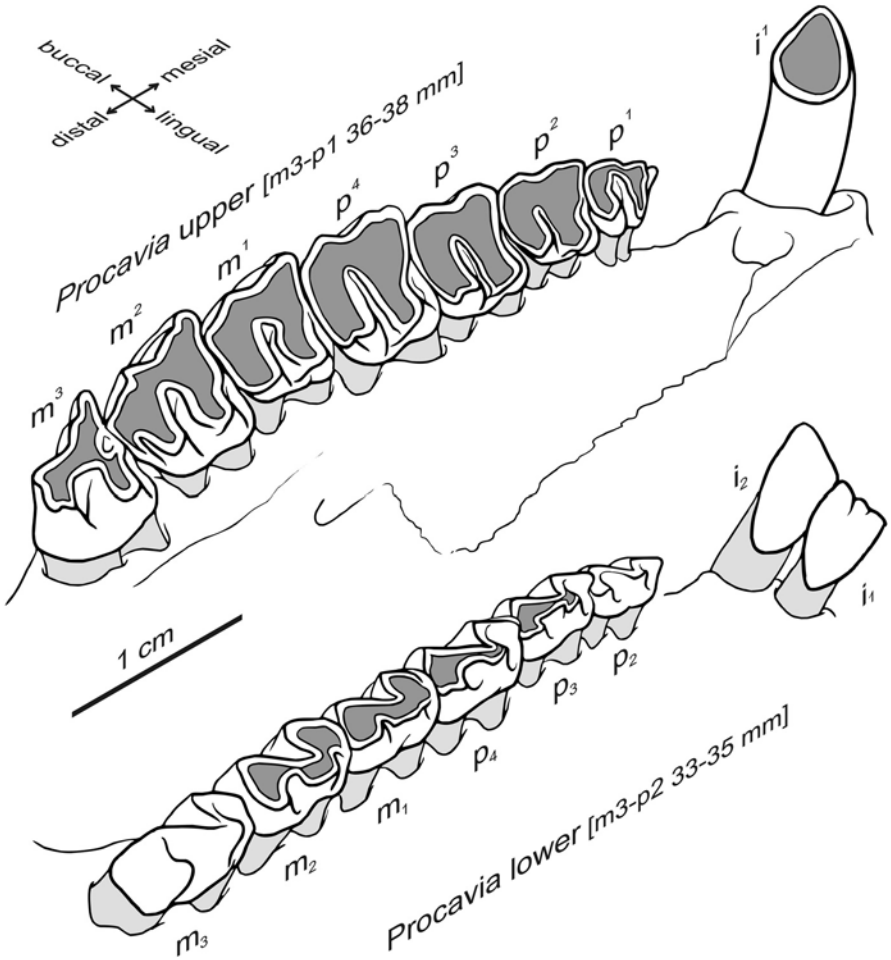

Figure 1.83 *Procavia*, upper right and lower left permanent dentitions.

teeth in this family are complicated by further lophs and ridges. Wild horse, asses and zebras (Equidae) were also widespread throughout the Holarctic, and have high crowned, selenodont cheek teeth.

Family Tapiridae
Tapirs: *Tapirus*[AMC]

$$\mathrm{i}\frac{3}{3}, \mathrm{c}\frac{1}{1}, \mathrm{p}\frac{4}{4}, \mathrm{m}\frac{3}{3}$$

Today, tapirs are confined to southern Mexico and South America but, during the Pleistocene, several extinct species of tapir were also found in southern parts of North America. Tapir incisors are spatulate, except for the third upper incisors which are tall and pointed (Figure 1.84). The small upper canines are isolated in a large diastema. The cheek teeth of living tapirs are molariform, relatively low crowned

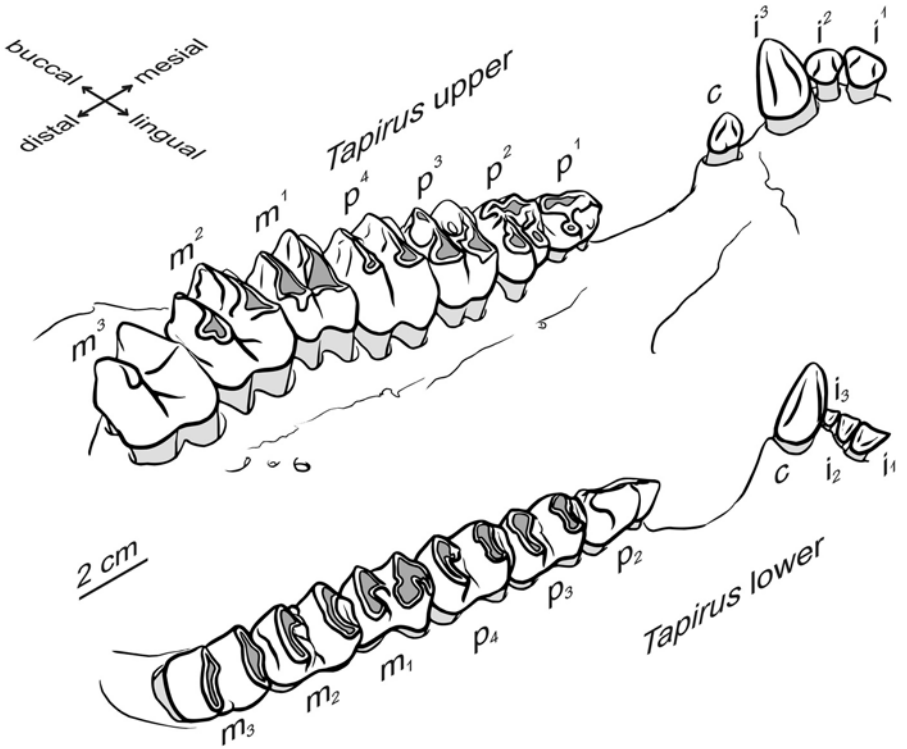

Figure 1.84 *Tapirus*, upper right and lower left permanent dentitions.

and strongly bilophodont, with a protoloph and metaloph. The ectoloph which is such a prominent feature of rhinoceros cheek teeth is only slightly developed, especially in the upper first premolar and lower second premolar. The fossil forms were somewhat larger animals and show less strong molarisation of the first and second premolars (Kurtén & Anderson, 1980).

Family Rhinocerotidae

Rhinoceroses: *Rhinoceros*[AS], *Diceros*[AF], *Ceratotherium*[AF], *Dicerorhinus*[AS], *Coelodonta*[EU,AS,AM], *Elasmotherium*[AS]

$$\mathrm{i}\frac{0-2}{0-1}, \mathrm{c}\frac{0}{0-1}, \mathrm{p}\frac{3-4}{3-4}, \mathrm{m}\frac{3}{3}$$

Rhinoceroses are divided into single- and tandem-horned varieties. Living Indian and Javan *Rhinoceros* have only one horn and the extinct giant *Elasmotherium* probably had a single very large horn arising from its forehead. Today's Sumatran rhinoceros *Dicerorhinus* and its extinct relatives, the living African black rhinoceros *Diceros* and the white rhinoceros *Ceratotherium*, and the extinct woolly rhinoceros *Coelodonta* all have two horns, arranged in tandem.

Anterior teeth are much reduced, although *Rhinoceros* and *Dicerorhinus* retain the upper first incisor and lower second incisor as large tusks (Figure 1.85). Cheek teeth form long curved rows along which complexity and size increase distally. Upper teeth are square in occlusal outline and are gathered up into three

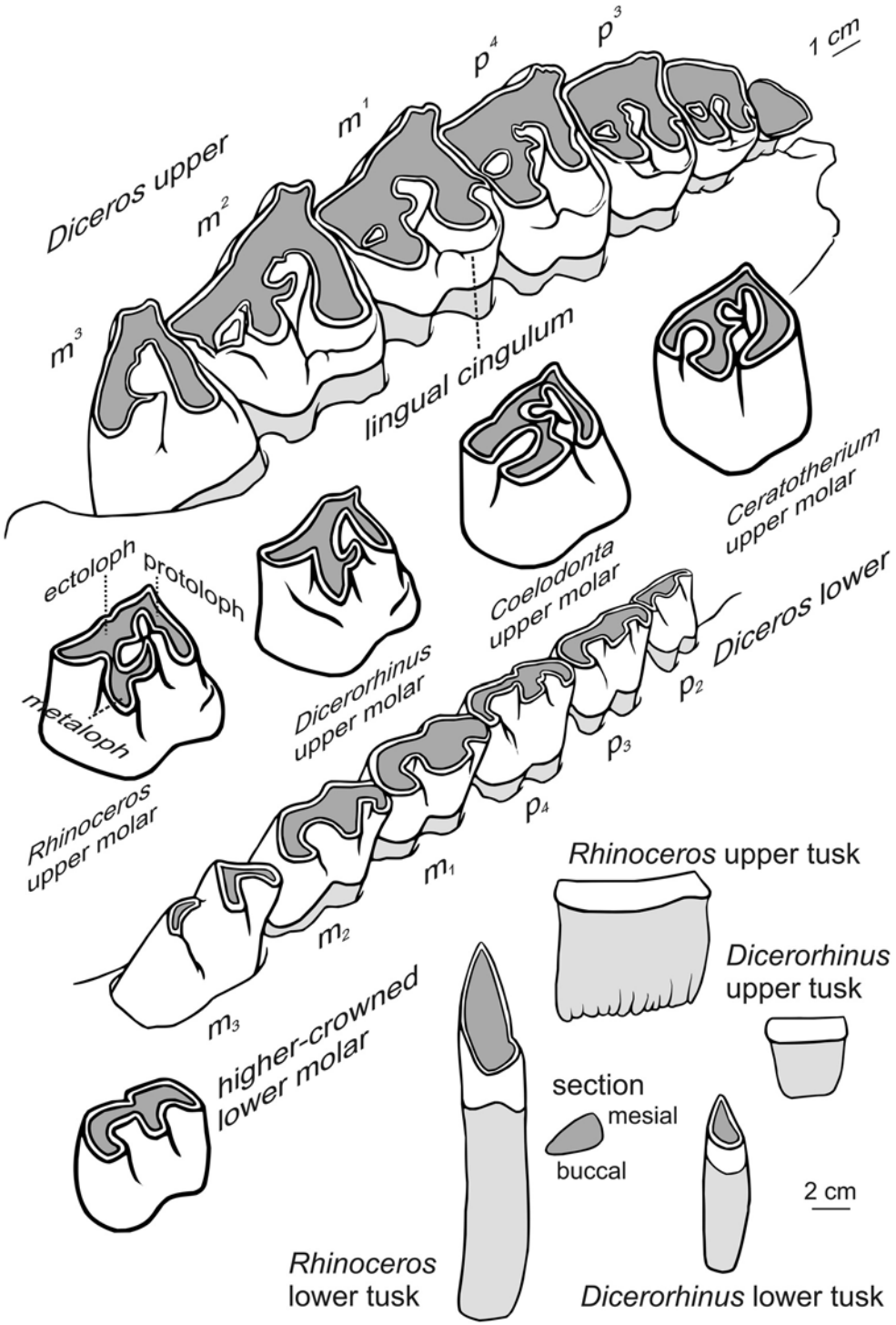

Figure 1.85 Rhinocerotidae, upper right and lower left permanent dentitions. Lingual views of the upper and lower incisor tusks.

lophs – ectoloph, protoloph and metaloph – with additional infoldings which produce a highly characteristic 'E' pattern in the worn occlusal surface. There is a prominent cingulum, above which the crown sides slope inwards to occlusal. The lower cheek teeth have paired U-shaped lophs, the metalophid and hypolophid, and are more rectangular in outline than the upper teeth. Jaw movement is from side to side, so the lophs grind diagonally across one another. *Coelodonta*, *Elasmotherium* and *Ceratotherium* are higher crowned than *Dicerorhinus*, *Diceros* and *Rhinoceros*. Their worn occlusal surfaces are flatter and their lower cheek tooth occlusal outline is different. The giant *Elasmotherium* had large, high-crowned teeth with 'plicated' or wrinkled enamel coating the lophs. *Ceratotherium* can be distinguished from *Coelodonta* by its more heavily built and chunkier crown, with copious cement coating. *Diceros* is distinguishable from *Rhinoceros* and *Dicerorhinus* by the stronger development of the lingual cingulum in upper cheek teeth. In *Dicerorhinus* this is restricted to its mesial and distal ends, and in *Rhinoceros* to mesial only.

Family Equidae

Horses, asses and zebras: *Equus*^{EU,AF,AS,AM}

$$\mathrm{di}\frac{3}{3}, \mathrm{dc}\frac{0}{0}, \mathrm{dp}\frac{3}{3} \rightarrow \mathrm{i}\frac{3}{3}, \mathrm{c}\frac{0-1}{0-1}, \mathrm{p}\frac{3-4}{3}, \mathrm{m}\frac{3}{3}$$

Equids have the tallest crowns (Figure 1.86) of the perissodactyls. Each tooth erupts gradually as it wears down and only becomes rooted in its later life. The crown sides act as a surface to which the periodontal ligament is bound – effectively taking the role of root – so all teeth are heavily coated with cement. Permanent incisors are conical, with no clear cervix, and have a single infundibulum which makes them somewhat trumpet-like before wear. The tall, narrow pulp chamber runs up the crown next to the infundibulum. It fills with darker secondary dentine, making the so-called 'star' on the worn occlusal surface which forms part of the traditional age estimation method for horses (Chapter 3). There is a large diastema, separating the incisors from the impressive grinding battery of the cheek teeth. In the diastema, there may be small permanent canines with a simple conical crown (often reduced or missing in females), and a rudimentary upper first premolar. All the main upper permanent cheek teeth are selenodont, with deep cement-filled infundibula that appear as islands in the worn occlusal surface. The crown is prismatic in form; square in occlusal view except for the third molar and second premolar, which are triangular. Two broad, shallow infoldings leave three narrow buttresses on the buccal side; whereas two shallow and one deep infoldings isolate two broad buttresses on the lingual side. Superficially, this is the same arrangement as for large Bovidae (below), but the occlusal pattern is more complex and the crowns higher with a much squarer appearance. Lower permanent cheek teeth have the metalophid and hypolophid developed as tall buttresses, with three small infoldings on the buccal side and two deep, two shallow infoldings on the lingual side. This

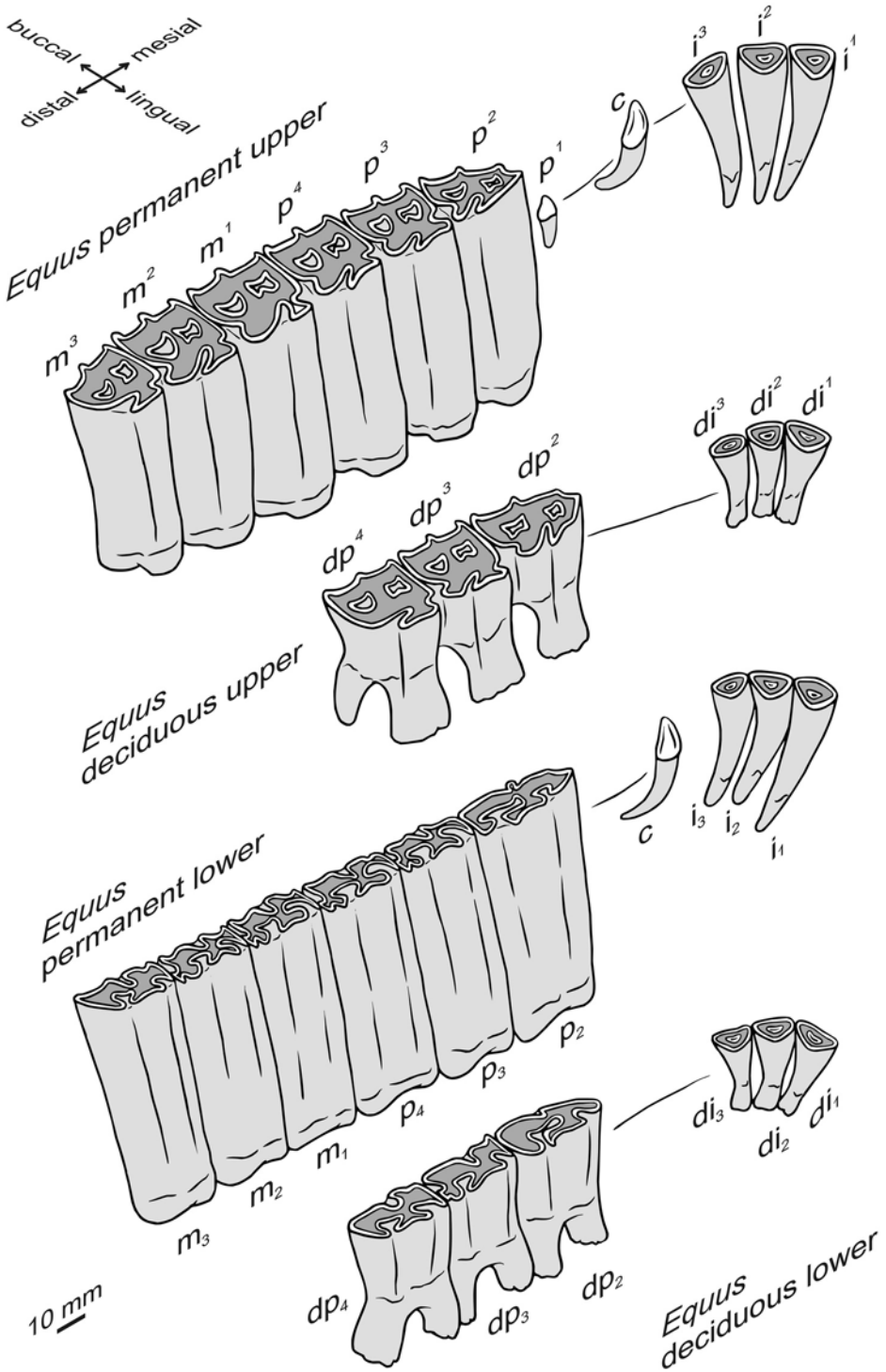

Figure 1.86 *Equus*, upper right and lower left permanent and deciduous dentitions. Dentine is shaded dark grey and cement paler grey.

gives a highly characteristic pattern on wear, with a rectangular occlusal outline except for the second premolar and third molar, which are triangular. Deciduous equid teeth are in many ways like their permanent successors, with similar occlusal dimensions in the cheek teeth, but they are lower crowned and have more prominent, wider-spread roots. It can in some cases be difficult to distinguish a deciduous cheek tooth crown, but signs of resorption on the roots can often be a deciding feature.

Order Artiodactyla
Suborder Suiformes

Suiform artiodactyls do not have a ruminant digestive system (below). Their cheek teeth are more or less bunodont and the canines are enlarged and tusk-like, with the incisors also sometimes taking on a tusk-like form.

Family Suidae
Pigs: *Sus*^{EU,AF,AS,AM}

$$di\frac{3}{3}, dc\frac{1}{1}, dp\frac{3}{3} \rightarrow i\frac{2-3}{3}, c\frac{1}{1}, p\frac{3-4}{2-4}, m\frac{3}{3}$$

The wild Suidae are confined to the Old World, but the domesticated pig *Sus scrofa* is found worldwide. Pigs are omnivorous. They root about in and on the ground with their powerful snouts for tubers, bulbs, nuts, seeds, insect larvae and carrion, and will also catch small vertebrates. There is considerable sexual dimorphism in their canines. In males, the upper canine tusks (Figures 1.87, 1.89) are large and curve upwards and outwards, with a rounded section, whereas the lower canines are slenderer, with a more sharply triangular section. These ever-growing tusks project sideways outside the mouth and are kept down in length by sharpening against one another, to produce a characteristic attrition facet. Only two sides of the section are coated with enamel. In females, both upper and lower tusks are smaller, and become rooted, with the enamel of the crown draped over the tooth like a hood in unworn teeth. The lower incisors (Figure 1.87) are not exactly tusk-like, but their tall narrow crowns and long roots give them a strongly chisel-like appearance. By contrast, the upper incisors are much smaller, curved teeth, with some superficial resemblance to female upper canines. The permanent molars and fourth deciduous premolars are based around four tall, but still bunodont cusps, with many subsidiary cusps around them – giving the unworn crown a very complex appearance. They wear down rapidly to expose the dentine. Permanent third molars and lower fourth deciduous premolars are very distinctive, with additional cusps at the distal end of their crowns. The lower permanent premolars and remaining lower deciduous premolars have their three main cusps gathered into a characteristic, blade-like line.