

f5 Herbivorous mammals < hypocone >

I once ate a pea.

—George Bryan (Beau) Brummell (1778-1840), when asked if he ever ate vegetables.¹

Plant structure makes them inherently lousy as food. Spines, trichomes, gooey resins, waxes, and toxic chemicals all act to deter most herbivores from eating most plants. —Gordon Brown.²

Constipation was epidemic in the nineteenth century, because people were afraid to drink the water. That's why Thoreau raised beans at Walden; when he said, 'The mass of men lead lives of quiet desperation,' he was referring to a specific problem. —Garrison Keillor.³

The ancestral placental mammals, as evidenced by their dentition and small size, were insectivores. Their permanent teeth, on each side of the jaw, top and bottom, were: three incisors, one canine, four premolars, and three shearing molars (3I 1C 4P 3M).

Ancestral placental mammals that evolved to become herbivores acquired specialized molar-teeth features (**Figure f5.1**): the first being the acquisition of a hypocone.⁴ This squares off the surface of their formerly triangular upper molars. In keeping, a cusp, the paraconid, on the lower molars was lost to allow for a flatter contact between these teeth.

Hypocones arose independently at least 20 separate times in the course of mammalian evolution. Most appear in herbivorous mammalian stocks in the mid-Eocene some 40 million years ago when in response to climate cooling and greater seasonal extremes in temperature and rainfall, forest became scrub grassland. Hypocones have been dated to 65 million years ago.

As a measure of the evolutionary advantage conferred to mammals that could grind tough, fibrous, plant foods, John Hunter and Jukka Jemvall have found that 14 of the 26 mammalian orders with hypocones had 10 or more (up to 30) species; only 7 of the 28 mammalian orders without hypocones had as many.⁵ □

Figure f5.1⁶ Molar teeth of primitive placentals: an Eocene insectivore (*Didelphodus*), and a Lower Eocene horse (*Hyracotherium*). The insectivore triangular upper molar and lower molar as the jaws are closed shear past each other in their high sharp cusped triangular parts and crush together in only a relatively small area.

In herbivorous or mixed feeders, the upper molar is made more square with the evolutionary addition of a fourth cusp, the hypocone, and the lower molar is squared by the building up of the heel to the level of the rest of the tooth and by the deletion of the paraconid.

