

## f12 Elephants, mammoths, and ancestral mastodons

< trunk, tusks, emplacement of molars >

An elephant does not get tired carrying his trunk. —Burundi proverb

The feature that gives the subungulate (hoofs or nails, digitigrade forefeet, semiplantigrade hindfeet) mammal order Proboscidea its name is *proboscis* (L. for trunk, or literally, Gk. *pro*, forward, and *boskein*, feed).<sup>3</sup> Closely related are aquatic herbivorous mammals order Sirenia (**Footnote f12.1**).

The elephant's trunk is a fusion of nose (which provides gristle) and upper lip (which provides muscle).<sup>4</sup> This structure became elongated to enable feeding when these creatures evolved great height but retained a relatively short neck (with 7 cervical vertebra typical of mammals, other than sloths with 6-8, be they mice, humans, whales, or giraffes—Louis-Jean-Marie Daubenton's (1716-1800) Rule). For the paleontologist, what distinguishes the order Proboscidea are tusks, which, of elephants, are enlarged incisor (not canine) teeth.

In African and Asian elephants, the lower molar is a giant tooth (one to each jaw side). As that tooth is ground away, another pushes forward to take its place and then a final third. Savannah African elephants evolved large shading and heat-radiating fanning ears. The living groups of African elephants are more distinct between themselves than they are to Indian elephants<sup>5</sup> which remain more closely related to ancestral (woolly) mammoths. Mammoths (at 6-8 tons or 30% bulkier than African elephants), which at the end of the Ice Age went abruptly extinct, had *survived* its duration in far northern climes. Their evolved cold-related coping features were: an enveloping shaggy coat of fur and thick underfur, a ten centimeters thick layer of fat under the skin, small ears, splayed snowshoe-feet and, above the forelegs, a hump of fat (a store of food for overwintering when forage was scarce). Elephant and mammoth molars have numerous ridges to grind grasses. Unlike the more evolved elephants, in mammoths the lower molars (3 to each jaw side) did not erupt sequentially. This was a retained feature in mammoths of the mastodons, the first "true elephants." Mastodons (mastodont elephants) went extinct during the Pleistocene. Their greatly thickened, jaw bones housed high-crowned molars emplaced in a row 3 to each jaw side at the same time. Mastodont molars have sharp cusps used for shredding bark and twigs.<sup>6</sup> They appeared in the early Pleistocene.

Elephants maintain, possibly habitually for these long-lived animals, open grassland by uprooting and pushing over trees:<sup>7</sup> from the tropics, as elephants do today in African savannah; to boreal climates, as the mammoth steppe (a grassland underlain by permafrost) record where otherwise taiga (spruce and fir forest) would have been.<sup>8</sup> The management of keeping woody plants out of grassy fields is also aided by rodents (as say in temperate climates where meadow voles bite off seedlings of red maple, white ash and tree-of-heaven, and forest verge white-footed mice eat fallen pine and oak seeds) but *not* habitually as their life of a few years is too short for the individual to benefit and for the behavior to be selected.<sup>9</sup> (Elephants flee upon hearing the angry buzz of bees<sup>10</sup> but do not notice mice—nor voles, which number at low density 80, and at high density 400, per hectare—and, Walter Elias (Walt) Disney (1901-1966) notwithstanding, are not scared to step on one. Also, of all footed animals, elephants can't jump.)

The common elephantoid condition is the second-upper incisors enlarged as tusks. However, Pliocene and Miocene proboscideans in America included four tuskers and shovel tuskers. In these an elongated lower jaw bore two tusks that extended between the two tusks of the upper jaw. All these primitive elephants had low-crowned teeth suitable for browsing.

In the Miocene, primitive elephants were in all parts of the world, save Australia and Antarctica.

The oldest elephant fossils are exclusive to Africa. This may surprise few for (the very poor reason that) wild elephants are there today. But what might surprise are reconstructions of the extinct archaic elephants that were there in the Eocene. Elephants then were small and they did not show much evidence of the trunk that is the hall mark of elephants today.<sup>11</sup> □