Horse evolution

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Evolution of horse dates back to Eocene epoch, about 60 million years ago. Primary center of evolution were Great Plains of North America, from where species migrated to Europe and Asia from time to time. For some reasons horses became extinct in North America by the end of Pleistocene epoch but their offshoots in Europe and Asia flourished.

Evolution of horse was triggered by a change in the climate and vegetation during lower cenozoic period, when grasslands in most parts of the world replaced forests. The main modifications in the body of horses from small forest-dwelling animals to large, grazing and fast-running animals can be outlined as follows: ·

- Increase in the size and height of the body from a small, rabbit-like animal to 6 feet tall grassland animal.
- Gradual enlargement and better development of the third digit (median digit) and reduction of the other lateral digits.
- Lengthening of the limbs and perfection of the hoof for fast running in open grasslands.
- Reduction of ulna bone in the fore leg and fibula in the hind leg and strengthening of radius and tibia.
- Change from digitigrade to unguligrade locomotion for fast running.
- Elongation of the preorbital or facial region of the skull and migration of eyes to the top of head.
- Modification of teeth from brachydont (low-crowned) to hypsodont (high crowned) to withstand tougher food (grass).
- Increase in the size and complexity of the brain for superior intelligence.
- Reduction in pectoral girdle and disappearance of the weak clavicle.
- Body became streamlined, muscles tight, without loose fat, for long and sustained running.
- Nostrils became wide to allow more air into strong lungs and stamina increased.

Phylogeny of Horse

Eocene horses : ***Hyracotherium* or *Eohippus:*** Fossils of *Hyracotherium* were found in Europe and those of *Eohippus* in North America (Wyoming and New Mexico). Height was about 2 feet. Facial region was short and eye-orbits located about in the middle of the length of the skull. Dentition was brachydont (low-crowned) and bunodont (low cusps) to feed on soft vegetation. Premolars were simpler than molars. Ulna in the foreleg and fibula in the hind leg were complete. Fore foot had 4 digits and hind foot had 3 digits, all touching the ground.

Orohippus and ***Epihippus:*** Both are related genera and do not differ much from the preceding species. There were four digits in front foot and three in the hind foot. Median digit became larger and lateral ones shorter but all touched ground and carried the body weight.

Oligocene horses : ***Mesohippus*** and ***Miohippus:*** There is enlargement in size to about 24 inches. Three functional digits in fore as well as hind foot, all touching the ground but the median toe was much stronger than the others. Ulna and fibula became thin and slender. All premolars became molariform, as a pre-adaptation to harsh diet.

Miocene horses : ***Parahippus*** and ***Merychippus:*** There were three digits in each foot but the middle one was larger and stronger and the lateral digits did not reach the ground. Preorbital region of the face became elongated. All premolars became molariform and dentition became hypsodont but the milk teeth were still low-crowned. Central toe ended in a large convex hoof.

Anchitherium: I was found in Europe and Asia where it came from North America. It was larger than *Miohippus*. It had 3 toes and digitigrade locomotion. Teeth were low-crowned and molars were simple.

Pliocene horses: ***Pliohippus:*** Lateral digits reduced to vestiges. Skull had elongated. Crown of teeth was similar to modern horses but they were curved and pattern of ridges was not so advanced. Facial fossae were deep. It had acquired unguligrade gait of swift locomotion.

Dinohippus: Lived about 12 million years ago in North America. Its fossils have been discovered recently and it showed remarkable similarities with modern horse, much more than *Pliohippus* does. It had straighter teeth and reduced skull fossae. It is believed to have given rise to modern horses.

Hypohippus: Fossils were recorded from North America and China. Size was 40 inches, similar to pony. It was a 3-toed browsing horse, with well-developed lateral hooves and vestiges of the first and 5th digits still present in the fore leg.

Hipparion: Size about 40 inches. There were three toes in each foot but lateral digits were small. They migrated from North America to Old World through Alaska and Siberia.

Protohippus: It was a 3-toed grazing horse that had low crowned teeth.

Hippidion: It had short and stout feet having only one toe. Head was large with long and slender nasal bones.

Pleistocene horses: Because of the harsh climate of the Pliocene and glaciations of Pleistocene epoch, horses became extinct in North America. Only one genus, ***Equus***, survived in northern Africa, Asia and Europe. It soon spread to different parts of Asia, Africa and Europe and diversified into 5 distinct species, namely, *Equus caballus, E. zebra, E. hemionus, E. assinus* and *E. przevalskii*.

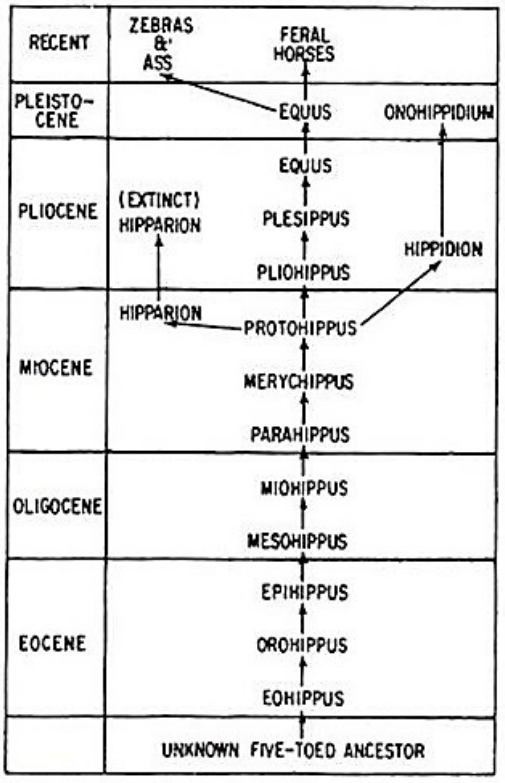


Fig. 1.24. Phylogenetic tree of horse (after Lull).

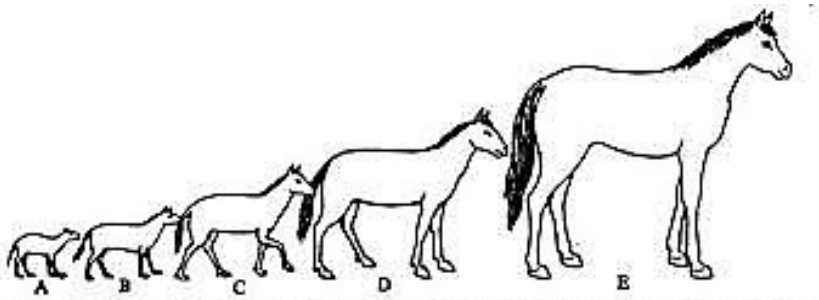
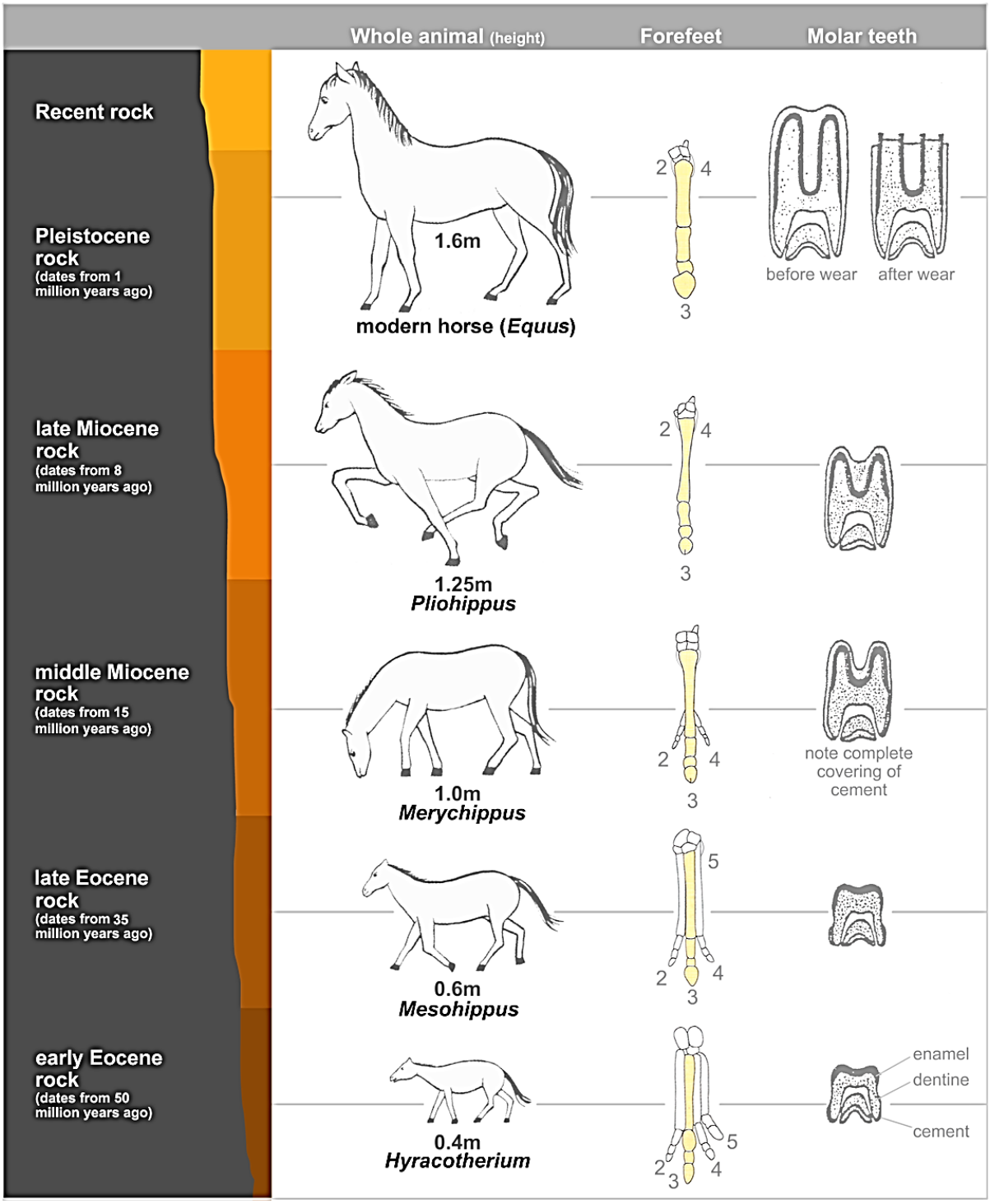


Fig. 1.22. Showing the gradual increase in size in the evolution of horse. A. *Eohippus*, B. *Miohippus*, C. *Merychippus*, D. *Pliohippus*, E. *Equus*.


Whole animal (height)
Forefeet
Molar teeth
Recent rock
Pleistocene rock
(dates from 1 million years ago)
1.6m
modern horse (Equus)
2
4
3
before wear
after wear
late Miocene rock
(dates from 8 million years ago)
1.25m
Pliohippus
middle Miocene rock
(dates from 15 million years ago)
1.0m
Merychippus
note complete covering of cement
late Eocene rock
(dates from 35 million years ago)
0.6m
Mesohippus
5
early Eocene rock
(dates from 50 million years ago)
0.4m
Hyracotherium
enamel
dentine
cement