

# Neohipparion, A Three-Toed Horse

By CHESTER STOCK

**N**O other lineage of mammals illustrates quite so clearly or so fully its growth or evolution in geologic time as that of the horse. In the history of the Equidae many forms antecedent to the living animal are now known, each marked by readily identifiable characters in the teeth, skull and skeleton. From *Eohippus*, the "dawn horse" of approximately 50 million years ago, to the equines of today, a score or more different kinds of genera and numerous species of extinct horses have been described. The changes that have produced the large and specialized animal of today from the diminutive and distinctly less specialized Eocene ancestor of long ago are demonstrated by an amazing array of fossil remains, found for the most part in the land-laid formations of the western United States.

Tracing the evolution of the Equidae involves not only a determination of those kinds of horses that were in the lineal descent to modern *Equus*, but, likewise, a recognition of the types that belonged to collateral branches of the family tree. Among the latter are the hipparions and their offspring of the Pliocene. These horses, on the basis of the progressive characters of their teeth, were once regarded as ancestral to the existing *Equus*. They are, however, creatures that have persistently retained three toes in front and hind feet, although the side toes

are elevated above the ground and no longer function as supporting elements of the foot. In the retention of the lateral digits the hipparions were distinctly less progressive than the contemporary and monodactyl *Pliohippus*, and it is from the latter that *Equus* is now regarded to have sprung.

The hipparion group persisted through the Pliocene, but disappeared with the coming of the Pleistocene or Ice Age, at least in North America. During the late Miocene or early Pliocene, the true hipparions are found in North America and Eurasia. By the middle of this epoch, perhaps eight or nine millions of years ago, these horses gave way to the larger, heavier neohipparions which were characteristically North American in distribution. They have been found fossil, for example, in Florida, Texas, the western Great Plains, the Great Basin province, California and Mexico. Although described from a number of localities, nowhere has a specimen been found sufficiently complete to permit the construction of a mounted skeleton.

During one of the early expeditions of the Division of the Geological Sciences, California Institute, well-preserved materials of the species *Neohipparion leptode* were uncovered in the middle Pliocene, Thousand Creek deposits of northwestern Nevada. These have now been

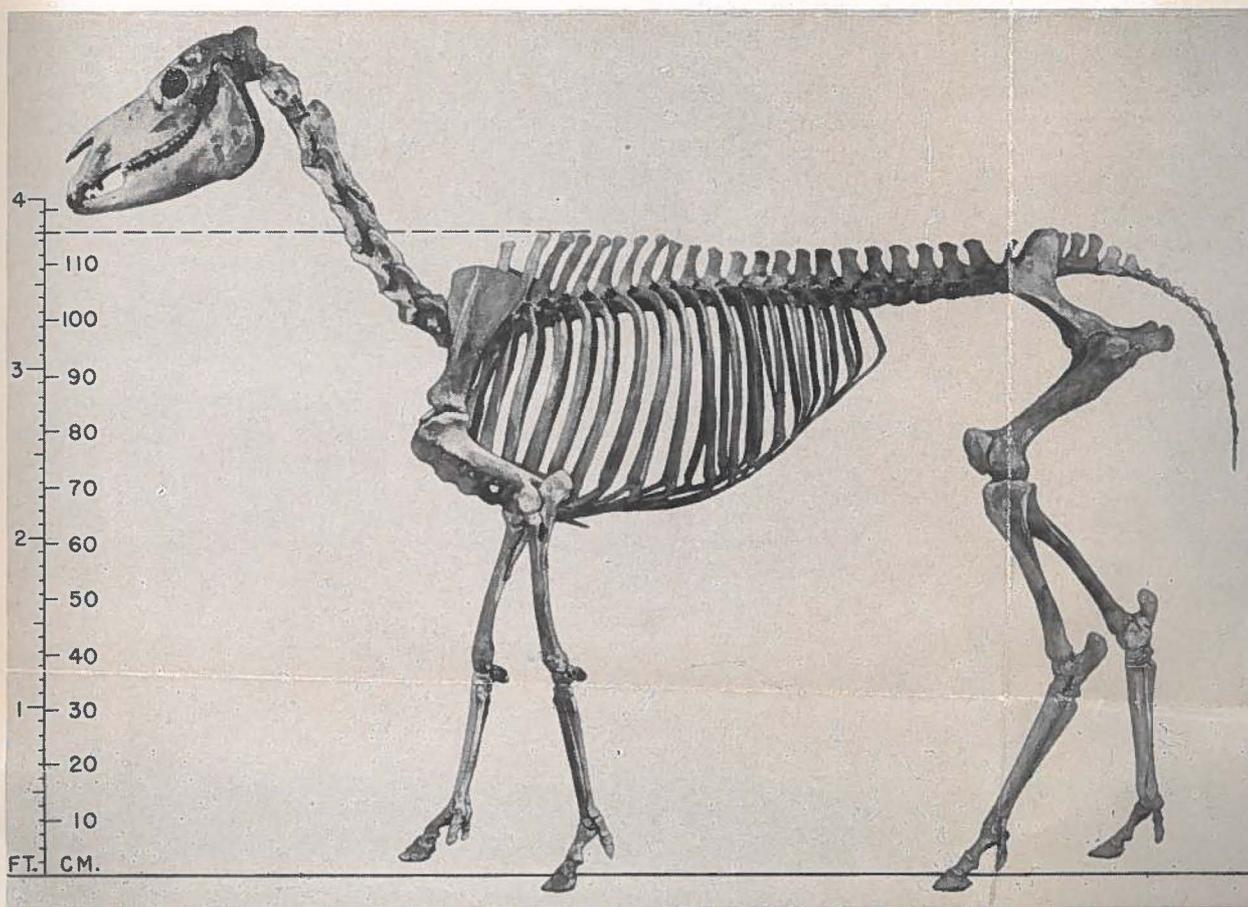


FIG. 1



FIG. 2

prepared by E. L. Furlong, and an exceptionally fine skeleton (Figs. 1 and 2) the first of its kind, has been mounted by William Otto, preparator in Vertebrate Paleontology.

The skull in this animal is of an adult male. The skeleton as it stands compares in size with that of the Burchell zebra, being a trifle over 3 feet 9 inches, or approximately  $11\frac{1}{2}$  hands, tall at the withers. However, the proportions of this Pliocene horse are noticeably different from those of modern *Equus*. A striking difference is seen immediately in the small size of the head. In the fossil specimen the skull is distinctly smaller in relation to the size of the body than it is in the zebra. While the body is proportionately as long as in the Bur-

chell zebra, the sides are flatter, the chest appearing narrower and "slab-sided." The limbs are, likewise, differently proportioned, the principal bones of the fore and hind feet being very much longer in relation to the arm and thigh bones, respectively, than they are in the zebra. This extra length in the feet of *Neohipparion* caused its limbs to be some six per cent longer, in relation to the size of its body than even the highly-specialized limbs of the modern race horse. The side toes are beautifully preserved, and, as shown in the skeleton, are distinctly shorter than the middle toe. They do not touch the ground. The hoof of the third or middle digit is larger than in the zebra, and shows a small median fissure. In running, *Neohipparion* could probably exceed the speed of the zebra, at least for short distances.

The mammalian associates of *Neohipparion leptode*, when it roamed the grasslands in what is now the arid Thousand Creek region of northwestern Nevada, were the more progressive horse, *Pliohippus*, short-legged rhinoceroses, large camels, curious twisted-horned antelopes, peccaries, cats, dogs, badgers, and rodents.

• • •

FIG. 1. *Neohipparion leptode* Merriam. Specimen No. 54, Calif. Inst. Tech. Vert. Pale. Coll. Skeleton as seen from the left side. Middle Pliocene, Thousand Creek deposits, northwestern Nevada.

FIG. 2. *Neohipparion leptode* Merriam. Specimen No. 54, Calif. Inst. Tech. Vert. Pale. Coll. Note particularly the heavy muzzle, strong cropping teeth, and the side toes. Middle Pliocene, Thousand Creek deposits, northwestern Nevada.