CHAPTER III

EARLY LAND ANIMALS

The first land animals appeared in central North America toward the close of the Pennsylvanian. In the succeeding Permian Age they became prolific in numbers, particularly in favored localities. Among these animals were certain ancient amphibians some of which were giant species seven feet long with a head nearly two feet long while others were diminutive creatures with skulls no longer than a man's thumb-nail.

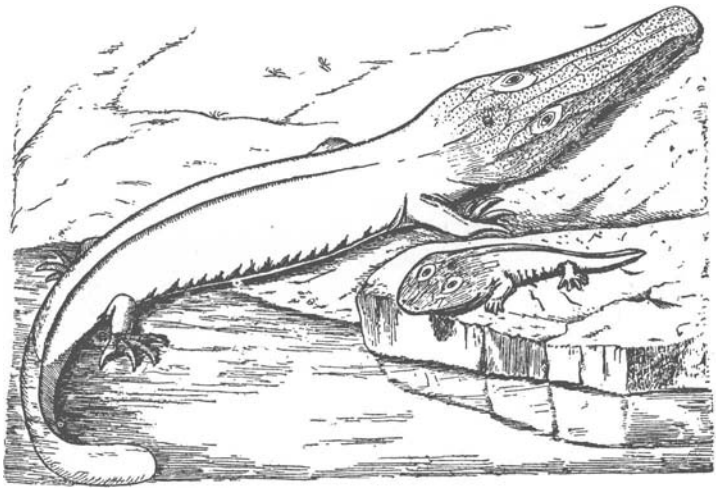

FIG. 21. STEGOCEPHALIAN AMPHIBIANS OF THE LOWER PERMIAN.
One of the larger Stegocephalia (Archegosaurus), 5 feet long, with a heavily armored skull and a small tadpole-like form (Branchiosaurus), 6 inches long, whose entire ventral surface bears scales. Note the third or pineal eye. From Museum Guide of the University of Tubingen.

With them are found early types of reptiles some with great beaks armed with conical teeth. At this time also appeared insects including enormous dragon-flies some of which had a wing-spread of over two feet and giant cockroaches three to four inches in length. In fact the Pennsylvanian is known to entomologists as the "Age of cockroaches" since more than five hundred kinds are known from this period. Several hundred species of insects are known from the American Coal Measures

alone, contemporary with the amphibians as land animals and with tree-ferns and conifers as the dominant plant forms.

During the Permian the amphibians began to be overshadowed by the reptiles which were undoubtedly their descendants and by the end of the Paleozoic the amphibians had forever lost their place as the foremost of land animals. Although they were the ancestors of all terrestrial vertebrates, the amphibians declined rapidly until today they are among the most insignificant and unsuccessful of all of the animals of their phylum.

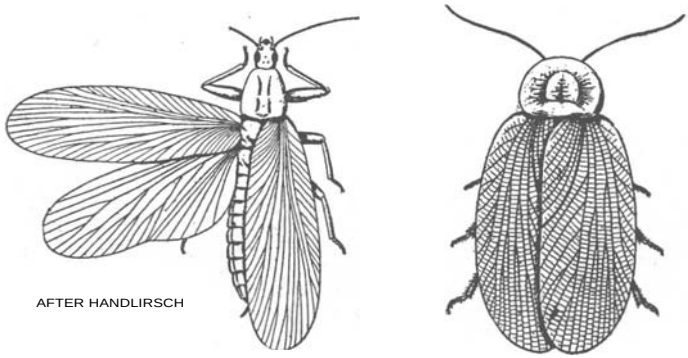

FIG. 22. ANCIENT COCKROACHES.
Very similar in appearance to those of modern times.

On the other hand the reptiles prospered and increased. New forms and unusual types of specialization evolved rapidly. During the Triassic the swimming reptiles, the flying or gliding reptiles and the scaled reptiles appeared upon the scene—crocodilians, turtles, lizards, serpents—a vast assemblage of reptilian forms, and by the middle of the Mesozoic Era the giant dinosaurs had taken their place as the lords of this mighty horde. The reptiles were the rulers of the earth.

The reign of the reptiles was a long and successful one. All through the Mesozoic their supremacy was unchallenged. Early in the Triassic the stegocephalian reptiles attained dominance. The great crocodile-like reptile, *Mystriosuchus* is a common form among the earliest of the fossils of this period. The *Ichthysauria* (fish-reptiles) were apparently almost entirely aquatic in habit, differing from all other reptiles in the important

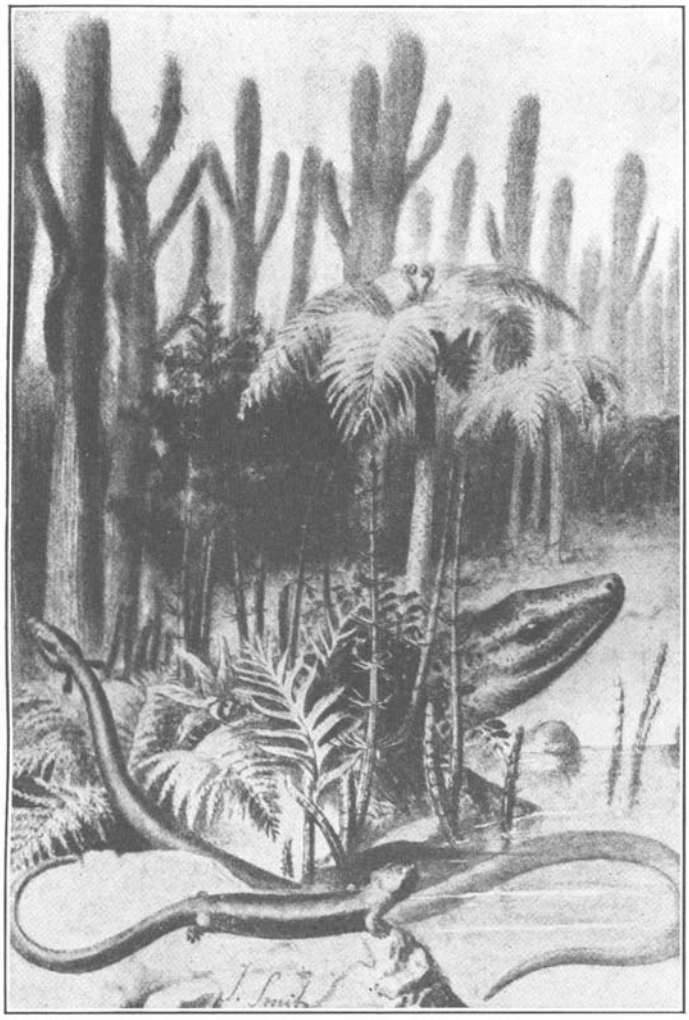

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FIG. 23. THE BEGINNING OF LAND LIFE.
A scene in Central North America during the Pennsylvanian Age.

reproductive function of coming ashore to lay eggs. They bore their young alive in the open sea. The *Plesiosauri* were large flattened saurians with long slender necks and short heads. They were active carnivorous fish-eating marine forms and doubtless the terror of all other inhabitants of the sea. The *Pterosaurs* were the famous "flying reptiles" a few of which had a wing-

PHOTO BY S. C. BISHOP

FIG. 24. THE SALAMANDER.
A modern amphibian.

spread of twenty feet. The most of these were much smaller. They were the "gliders" of the Jurassic seas. These flying reptiles were most peculiar in appearance with hollow bones, birdlike heads and great membranes or "wings" stretched bat-like from the forelegs to the hindlegs and tail. Several species of the Chelonia, true turtles, appear in the later Triassic indicating origin in the late Paleozoic, and toward the close of the Mesozioc, the giant sea lizard Mosasaurus. But most wonderful of all were the *Dinosaurs* which represented the last word in reptilian specialization. Nothing like them has ever been seen on the earth before or since.

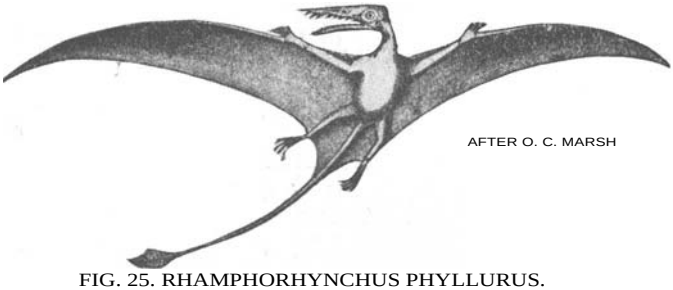

FIG. 25. RHAMPHORHYNCHUS PHYLLURUS.
A flying reptile.

The dinosaurs attained remarkable size and diversity early in the Triassic although a number of species such as *Dimetrodon* and *Naosaurus,* true lizards of large size with erect spiny backs were dominant in the Permian. Some were large and some small; some carnivorous and some herbivorous; some were quadruped and some biped; some had spoonbills, others were armed with enormous horns; some were smooth-bodied while others were protected by massive plates of armor. One of the great herbivorous dinosaurs, *Brontosaurus,* was over sixty feet in length and must have weighed many tons. The great *Tyrannosaurus rex* was nearly fifty feet long, twenty feet high, with teeth six inches long and claws which measured almost a foot in length. The power and strength of such an animal can hardly be imagined. Newman says:

"One can readily imagine a scene of carnage, the like of which the modern animal world cannot afford, when such a reptilian dread-naught went into action."

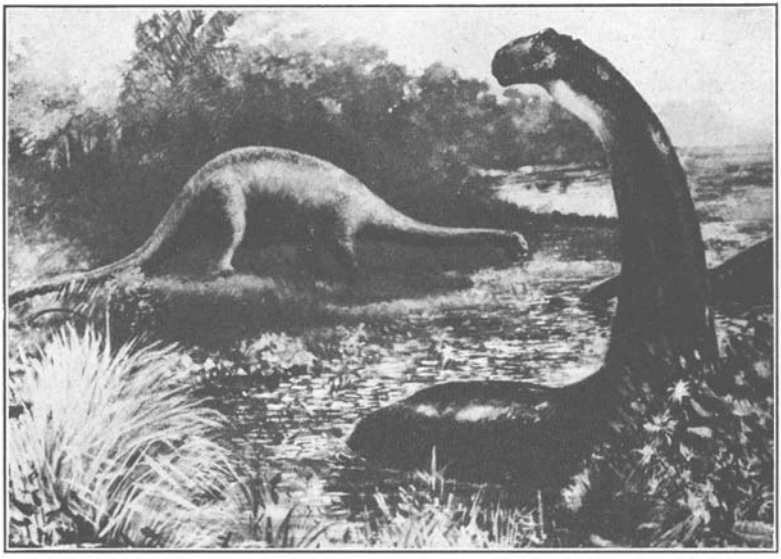

FIG. 26. A GIANT REPTILE.
Brontosaurus, an American dinosaur of the Mesozoic.

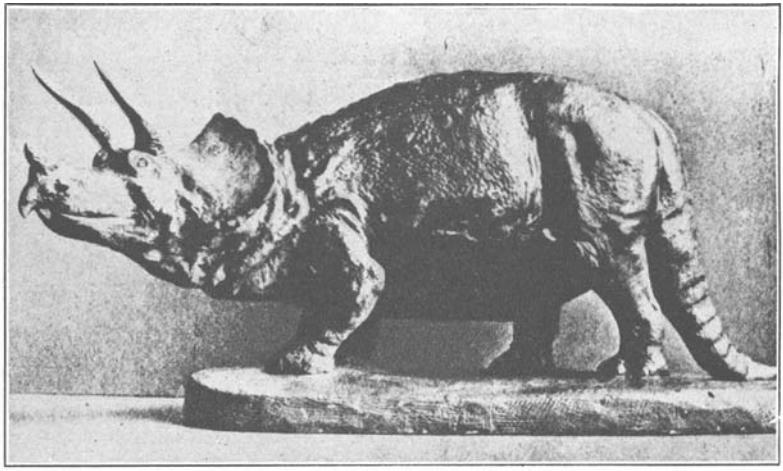

FIG. 27. A FORMER RULER OF THE EARTH.
Triceratops, a cretaceous dinosaur.

and Schuchert assures us, speaking of the Cretaceous ceratopsians:

"That the ceratopsians did fight, and that most desperately, is shown by the grievous 'old dints of deepe woundes' that remain on many a skull, fractured and healed jaws and horns, pierced crania and crests. As these were only the relatively few wounds which penetrated the bone, what battle-scarred old veterans they must have been after their century or more of life."

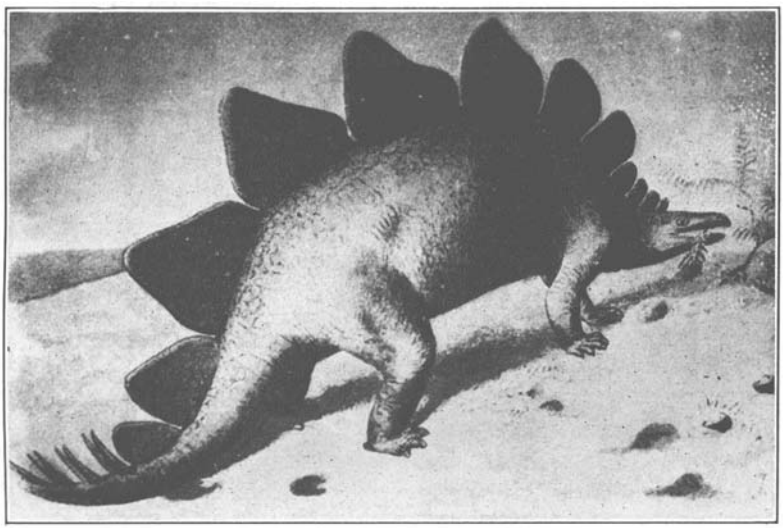

FIG. 28. STEGOSAURUS.
An armored dinosaur.

These mighty beasts ruled the earth for over nine million years and then suddenly, as geological time is figured, they disappeared, The real cause of ther downfall is ascribed to a rapid rise of the active and intelligent mammalian forms and a complete change in world climates,

Lull says:

"One of the most inexplicable of events is the dramatic extinction of this mighty race, for in the rocks of undoubted Tertiary age not a single trace of them remains. The causes of their extinction are conjectural; but this we know, that with the extensive changes which marked the close of the Mesozoic, came the blotting out of a heroic race. . . . Their career was not a brief one, for the duration of their recorded evolution was thrice that of the entire mammalian age. They do not represent a futile attempt on the part of nature to people the world with creatures of insignificant moment, but are comparable in majestic rise, slow culmination, and dramatic fall to the greatest nations of antiquity."

Thus ended the great age of the reptiles, an age which witnessed the rise and fall of an empire of giant proportions and immense dramatic interest. For the reptiles must be regarded with much respect since they were the dominant animals on the globe for a longer time than any other class and although their reign is over they are still a vigorous and persistent group. From the dawn of the Paleozoic up to the present have passed over thirty million years and during all this time the reptiles have held on though diminished in species and numbers. Compared with this record the dominance of man is of minor significance.

But in spite of the passing of the great reptiles, a few members of the class survived to become the ancestors of our present forms and these, as would be expected, were not the monsters of mighty bulk and heavy armor (the sure signs of a senescent race which can not survive world cataclysms) but the more primitive forms which had not become specialized and thus were readily adaptable.

So out of the wreck of the reptilian empire of more than twenty great orders, we have only six orders left today (some authorities claim only four) and of these, two are questionable since chameleons, lizards and snakes may belong in one order as compared with fossil orders, and one order is represented by only one species (Sphenodon) which is rapidly becoming extinct.

From these early reptiles were developed the birds which at first were extremely reptile-like in appearance with sharp teeth, long tails and separate carpal and metacarpal bones. Other reptiles were more or less mammal-like in appearance and perhaps were ancestral to the mammals which later appeared upon the earth.

During the Cenozoic the mammals succeeded the reptiles as the highest and dominant form of life. Early in the Eocene mammalian forms are noticeable and their development was rapid and varied so that before the end of this period the herbivorous animals, the carnivores, the rodents and the bats were clearly distinguishable. In the early evolution of these lines, many curious forms appeared but most of these soon became extinct, while the more adaptable types survived to become the ancestors of the mammalian life of the present.

Thus during the long Mesozoic and Cenozoic Eras strange and grotesque creatures must have inhabited that part of the earth which is now Kentucky if we may judge from the fauna which is known to have been represented in this part of the American continent. In this state, however, the formations

FIG. 29. THE LIZARD.
A modern reptile.

which represent these eras are either absent or but slightly represented in Western Kentucky and therefore rather meager evidences of the life of this period are available. But with the Pleistocene Age the Kentucky record again begins and we have an abundant and interesting series of forms.

With the beginning of the Glacial Age we find evidence of abundant plant and animal life in Kentucky. During part of this period, the Glacial Age, the great ice sheets came down from

the north sweeping all life before them. Recent discoveries by Dr. W. R. Jillson, State Geologist, would indicate that some of the earlier glacial invasions penetrated for a considerable distance into Kentucky but in the later glacial periods these enormous masses of ice did not disturb the state to any great extent but melted along the Ohio River region and then slowly disappeared northward.

Immediately after the Ice Age there must have been a most marvelous and interesting assemblage of land animals in Kentucky. Certain northern forms had been driven southward by the advancing ice as is indicated by the discovery in the Breck Smith Cave in the Blue Grass Region of the remains of a polar bear. The enormous numbers of herbivorous animals are evidenced by the tons of bones of these forms which have been taken from such localities as Big Bone Lick and Blue Lick Springs where for centuries the great herds came for salt and where their bones were trampled into the swampy soil.

The ancient flesh-eating animals, attracted by the abundance of prey, followed the herbivorous forms and were thus assured of unlimited food. There is no lack of evidence regarding these animals. Bones of the mammoth and of the tapir, bones, teeth and tusks of the mastodon, and bones and impressions of many other animals, most of which are extinct and none of which are now native of this region, have been found in abundance in Kentucky. The Indians and later the early settlers were impressed with the "big bones" which they discovered in this State. As early as 1739 the French explorer de Longeil remarked on the interesting material seen at Big Bone Lick in Boone County and in 1751 Cristopher Gist brought a mastodon's tooth as a curiosity from this locality. Since then many complete skeletons have been secured from such repositories for the museums of this country but unfortunately none have been kept in Kentucky.

Some of the species of Pleistocene mammals actually recorded from the State are of such interest as to deserve special mention.

One of the most remarkable of these was the *Megalonyx* which was first discovered and named by President Thomas Jefferson. It was one of the ground sloths which were abundant and widely distributed during the Pleistocene. Its re-

mains have been found at Big Bone Lick and also near Henderson, Kentucky. A smaller sloth, *Mylodon harlani,* one of the eldest of the edentates of this continent is represented by bones discovered at both Big Bone Lick and at Blue Lick. Some of these prehistoric sloths were very large; one southern form, *Megatherium,* having a body as large as that of an elephant, though its legs were shorter,

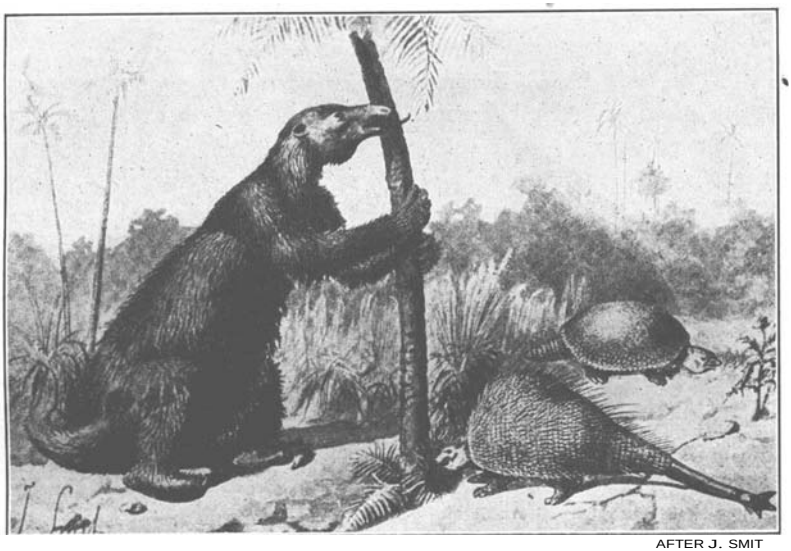

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FIG. 30. MEGATHERIUM
A giant sloth of the Pleistocene.

Another of the most remarkable of the animals of the Pleistocene was the giant beaver, *Castoroides ohiensis.* This animal was apparently peculiar to this part of the world as it has never been reported from the Old World or from South America. It was simply an enormous beaver much like those of today but as the common name would imply was a giant in size and is believed to have been as large as a black bear. Teeth and bones of this beaver have been found in the eastern mountains of Kentucky.

Of the odd-toed Ungulates, the *Perissodactyla,* two species are known from Kentucky—an ancient tapir and a pre-historic horse,

The tapir, *Tapirus sinensis,* is recorded from McConnell's Run in Scott County and from Yarnellton Station in Fayette County. Tapirs are now confined to more southern latitudes and the modern forms have changed but little from the earliest recorded types. They are characterized by the long, flexible snout which is indicated in the fossil skulls by the shortened nasal bones. Fossils of the tapir are rare, probably because these animals were forest-loving beasts whose habits kept them away from places where their bodies might be buried in sediments where they could be preserved.

The early horse, *Equus complicatus,* has been found at Big Bone Lick. Horses belonging to the modern genus *Equus* are known to have been in existence in North America as early as the Pliocene and by the Pleistocene they were abundant. Our modern horse, however, was not among them but was introduced from Europe after the American forms had perished as they did at about the close of the Pleistocene.

Of the even-toed Ungulates, the *Artiodactyla,* we have a much longer Kentucky series from the Pleistocene.

The peccaries, or American Swine, are now chiefly tropical and subtropical in distribution but in early times the old genus *Platygonus* must have been widely distributed. Remains of several skeletons of a prehistoric species, *Platygonus compressus,* have been found in Kentucky, three or four at Big Bone Lick and one on Crooked Creek in Rockcastle County.

The deer family, the *Cervidae,* are well known from Kentucky records. Deer were abundant here during the Pleistocene, the modern genus *Odocoilus* being then in existence. This deer, of which the common Virginia Deer is a familiar example, is a typically American form and must have had a long American ancestry.

The wapiti, *Cervus canadensis,* was common. Bones and horns have been found at Big Bone Lick and in Wayne County. This animal has persisted up to the present although not now found in Kentucky, and is generally but erroneously called the "elk." It is really related to the great stag of Europe and is probably of Old World origin.

The caribou, *Rangifer tarandus,* another Old World immigrant, was present in Kentucky during this period. Bones from

Big Bone Lick have been identified as representing this species, and fossil horns probably used for ceremonial purposes which have been found in old Indian graves seem to be the same.

Bones of a Pleistocene moose have likewise been found in this State. It seems to be the same species, *Alce americanus,* as our present form and probably like the wapiti and caribou was of European origin and came into Kentucky from the north. The moose is the largest and most powerful of the Cervidae and is distinguished by the prehensile proboscis-like snout and the broad, flattened, palmated antlers.

By far the most interesting and remarkable animal of the deer family in Kentucky during the Pleistocene was the famous "stag-moose," *Cervalces scotti.* The genus to which this animal is assigned *(Cervalces)* is different from any now living and as the name would suggest seems to include characters of both the stag genus *(Cervus)* and the moose genus *(Alce).* It was probably quite moose-like in appearance but with a much shorter snout and quite different horns. The stag-moose was apparently a late arrival in Kentucky, appearing during the last ice invasion. It must have been a magnificent animal, larger than our present moose. Its bones have been found at Big Bone Lick.

At Big Bone Lick has been found, also, the remains of an extinct musk-ox, *Bootherium bombifrons,* representing a group of animals now found only in the far north but which were apparently far more widely distributed in the Pleistocene.

The only true members of the great ox tribe, however, that ever reached America were the bisons, often incorrectly called "buffalo" in this country. The bison were migrants from the Old World where one species still persists with great difficulty just as another species in this county has persisted although in constant danger of extermination. Two Pleistocene species of bison are known from Kentucky, both from Big Bone Lick. Both were described by Leidy, one as *Bison antiquus* and the other as *Bison latrifrons.* The latter, a gigantic animal with immense horns spreading ten or twelve feet is believed by some authorities to be the parent form of all the bisons, passing through *B. priscus* into the present European form and through *B. bonasus* into the later American form. Since the bison known to the Indians and the early settlers (*B. bison*) also frequented

Big Bone Lick it would appear that this locality must have been known to the salt-loving animals through long ages and that it was actually used by bison representing successive stages of evolution.

The carnivores were undoubtedly abundant in the Pleistocene but only one form is positively recorded from Kentucky. This is a bear of the true bear genus, *Ursus,* remains of which have been found at Big Bone Lick and in the Phelps Cave in Fayette County. Bones of a fox (var. *scotti)* now an inhabitant of warmer climates were found in the Breck Smith Gave near Lexington; this may represent Pleistocene material. In the same cave were found bones which have been tentatively determined as those of a polar bear.

By far the most interesting, however, of all the animals which inhabited Kentucky during Pleistocene times were the great elephant-like animals of the order *Proboscidea.* From the view-point of the present geographical distribution of animals on earth it seems strange that the elephant group should have been represented in North America. That it was represented, and very abundantly, there is of course no question. Three types of these ancient beasts—the mastodon and two species of mammoths—are known from this State.

The mammoths were ancient elephants and are placed in the same genus *(Elephas)* as the elephants of today. They ranged over all of northern Europe and Asia and probably crossed over the old land bridge from Siberia to Alaska and thence moved southward through North America as far as Central America. They were named from the Tartar *mamma* (earth) because their bones were always found underground. The word has since come to mean "huge" on account of the great size of the animal and of its bones. Many curious ideas have been held regarding the mammoth. The Chinese believed it to be some form of giant mole since its bones were always found in the earth; the pious early Europeans believed the bones were those of Saint Christopher; and an equally pious New Englander pronounced them bones of Biblical giants. Much of the fossil ivory of commerce comes from the tusks of mammoths.

The best known mammoth, *Elephas primigenius,* was abundant throughout the northern hemisphere. It is of this species

that complete carcasses have been found frozen in northern Siberia. That it was adapted to cold climates is indicated by its dense woolly hair. The animal stood about nine feet high at the shoulders and its immense tusks had a tendency to spiral curvature. Perfect skeletons have been found at Big Bone Lick and excellent tusks and bones at Blue Lick Springs.

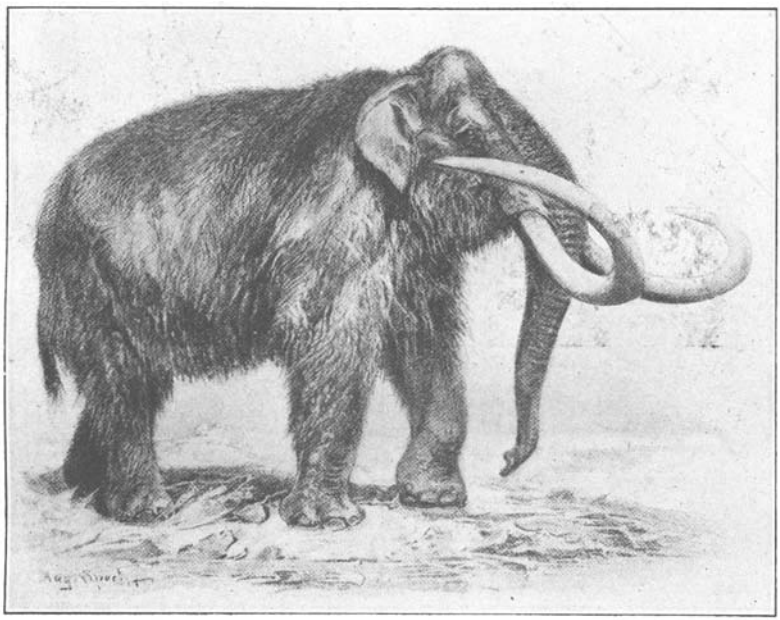

FIG. 31. THE MAMMOTH.
An early immigrant to Kentucky.

The Columbian Mammoth, *Elephas columbi*, was a larger and more southern form. Standing eleven feet high at the shoulders, its huge tusks curved first downward, then upward and inward, their tips crossing when full grown. Remains of this mammoth have been taken from Big Bone Lick.

The American Mastodon, *Mammut americanum*, belongs to a quite different and more ancient genus than the mammoths. It was old even in Pleistocene days and Scott speaks of it as "a belated survival of an ancient type, seemingly out of place even in the strange Pleistocene world, which had so many bizarre creatures." The mastodon was apparently a forest dweller and

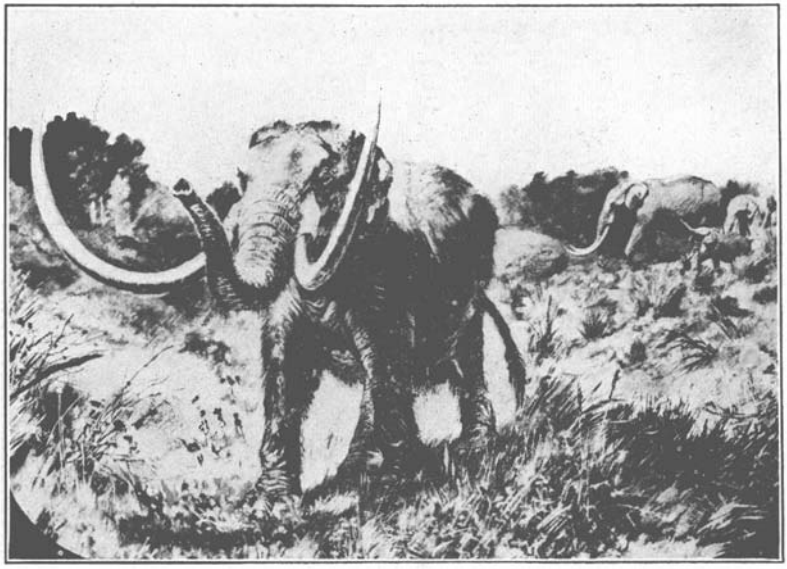

FIG. 32. THE MASTODON.
A Kentucky forest-dweller.

fed on the leaves and branches of trees. It was about the size of the mammoth with long coarse hair and long tusks which were directed almost straight forward. Curiously enough, it outlived the mammoths and may have been contemporary with man in North America. Its bones have been found in abundance in Kentucky, particularly at Big Bone Lick, Blue Lick, and in the Green River valley and it was of this animal that Dr. Goforth secured a four horse wagon load of teeth in 1804.