# THE HORSE

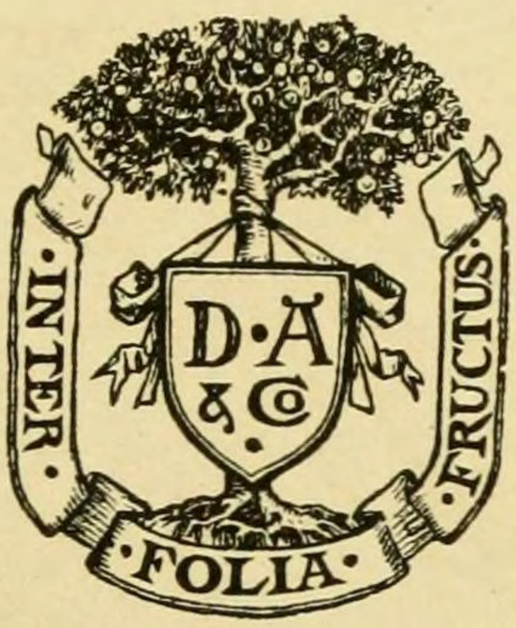
## *A STUDY IN NATURAL HISTORY*


BY

WILLIAM HENRY FLOWER, C. B.

LL. D., D. C. L., Sc. D., F. R. S., Pres. Z. S., Etc.

DIRECTOR OF THE BRITISH NATURAL HISTORY MUSEUM
FORMERLY HUNTERIAN PROFESSOR OF COMPARATIVE ANATOMY AND PHYSIOLOGY
AT THE ROYAL COLLEGE OF SURGEONS OF ENGLAND
AND SOMETIME EXAMINER IN ANATOMY
AT THE ROYAL COLLEGE OF VETERINARY SURGEONS



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## The Rhinoceroses (Family *Rhinocerotidæ*).

The name *rhinoceros* (meaning in Greek "nose-horn") was applied by the ancients to an animal the most striking external peculiarity of which was certainly the horn growing above its nose.

The following are the general characters applicable to all the existing members of the family:

Head large. Ears of moderate size, oval, erect, prominent, placed near the occiput. Eyes small. Neck short. Skin very thick, in some species consisting of massive, indurated, almost inflexible, plates, with thin soft intervals or joints, to allow of motion. Hairy covering scanty. Tail of moderate length, slightly tufted. Limbs stout, rather short. Three completely developed toes, with distinct, broad, rounded hoofs on each foot.*

All existing species have one or two horns, placed in the middle line upon the face. When one is present, it is situated over the conjoined nasal bones; when two, the hinder one is over the frontals. These horns differ in details of structure from those of any other animal, though belonging to the same category of epidermic growths as the horns of oxen, as well as nails, claws, hoofs, callosities, and warts. Their

* In some extinct species a small outer toe is present on the fore-foot.

structure, as seen under the microscope, has a great resemblance to that of whalebone, being composed of a solid mass of hardened epidermic cells growing from a cluster of long dermal papillæ. The cells formed on each papilla constitute a distinct horny fiber, like a thick hair, and the whole are cemented together by an intermediate mass of cells which grow up from the interspaces between the papillæ. It results from this that the horn has the appearance of a mass of agglutinated hairs, which, in the newly-growing part at the base, readily fray out on destruction of the softer intermediate substance; but any one acquainted with the structure and mode of growth of true hairs will see that the fibers differ from them in growing around a long free papilla on the surface of the derm, instead of from a very short papilla sunk deeply in a follicular involution of the same. These horns are really warts, which have assumed a solid and definite form, and the stages by which they may have developed are illustrated in the irregularly-shaped supplementary horns which are sometimes found either on the face or other parts of the body, the product of some local abnormal condition of the skin.*

* See a case of an African rhinoceros with a third horn described in the *Proceedings of the Zoölogical Society of London*, 1889, p. 418.

When fully developed, the horns are of a more or less conical form usually curved backwards at their ends, and often grow to a great length (three or even four feet), but they are constantly worn away at the ends and sides by being rubbed against trees or stones, and are continually growing at the base. Their length and shape are, therefore, subject to considerable variation, even in the same individual at different times, and so cannot be depended upon for the distinction of species, as some naturalists have imagined. Though not normally shed, they are occasionally torn off at the base,* in which case a new horn will grow in its place, although, if the matrix, or portion of the skin to which it is attached, is much injured, it may assume a more or less irregular shape.

As regards the dentition, the incisors are variable, generally reduced in number, and often quite rudimentary and entirely disappearing at a very early age.† The canines in existing species are

* This happened in 1870 to the male Indian rhinoceros still living in the gardens of the Zoölogical Society of London, in an effort to raise with its horn a strong transverse iron bar at the lower part of the railings of the inclosure in which it was confined.

† It is difficult to see what advantage the great African two-horned rhinoceroses can find in the complete absence of their front teeth, but this is one of those numerous cases in which we must be content to acknowledge our ignorance and wait for the explanation.

absent.* In respect to the front teeth, therefore, a very marked amount of specialization has taken place. On the other hand, the cheek teeth are retained in full normal numbers—viz., four premolars and three molars on each side above and below, all in contact, and closely resembling each other, except the first, which is much smaller than the rest, and often lost early in life. The others gradually increase in size from before backwards up to the penultimate, which is the largest. The upper molars have a very characteristic pattern, admirably adapted for bruising and crushing coarse vegetable substances, and which is clearly a modification of the pattern already seen in the corresponding teeth of *Hyracotherium*. The lower molars are of simpler form, the two transverse ridges being curved into a crescentic form. In neither case are the deep depressions between the ridges filled up with cement, as in the horse.

The skull is elongated and elevated posteriorly into a transverse occipital crest. It has retained its primitive condition in possessing no post-orbital processes or any separation between the orbits and temporal fossæ. The nasal bones are large and stout, co-ossified, and standing out freely above the

* It should be stated that certain teeth, regarded above as incisors, are considered by some zoölogists as modified canines.

premaxillæ, from which they are separated by a deep and wide fissure; the latter bones are very small, generally not meeting in the middle line in front, often quite rudimentary, a specialization concurrent with the loss of the upper incisor teeth. The brain cavity is very small for the size of the skull. Vertebræ—Cervical, 7; dorsal, 19–20; lumbar, 3; sacral, 4; caudal, about 22.

The *Rhinocerotidæ* are all animals of large size, but of little intelligence, generally timid of disposition, though ferocious when attacked and brought to bay, using the nasal horns as weapons, with which they strike and toss their assailants. Their sight is dull, but their hearing and scent are remarkably acute. They feed on herbage, shrubs, and leaves of trees, and, like so many large animals which inhabit hot countries, sleep the greater part of the day, being most active in the cool of the evening or even during the night. They are fond of bathing or wallowing in the mud. None of the species have been domesticated. The family once contained many more species and was much more widely distributed than at present. As already indicated, our knowledge of them is as yet but fragmentary, though constantly augmenting, especially by discoveries made in the Tertiary deposits of North America, a region from which they all died out long ago, though, judg-

ing from the evidence at present available, this was the locality in which they first made their appearance. In the Eocene formations of the Rocky Mountains are found the remains of numerous modifications of the primitive Perissodactyle type, from which the rhinoceroses may have originated. In the Lower Miocene a form called *Hyracodon* by Leidy already presented many of the characteristics of the family, though, especially as regards the dentition, still in a very generalized condition. It had, however, already lost the fifth toe of the fore-foot. The next stage of specialization is represented by *Acerathe-rium* and *Aphelops*, found in the Miocene of Europe and America, which still, like the last, show no sign of having possessed a nasal horn. The former differs from the existing species, and also from *Hyracodon*, in having four toes on the anterior limb instead of only three. At the same period forms occurred (*Diceratherium*, Marsh) which show a pair of lateral tubercles on the nasal bones apparently supporting horns side by side. These, however, soon disappeared and gave way in the Old World to species with one or two horns in the median line, a stage of development which apparently was never reached in America. In the Pliocene and Pleistocene of Europe and Asia numerous rhinoceros remains have been found, all more or less nearly related to the existing

species. The present African two-horned type was already represented in the early Pliocene of Greece by *R. pachygnathus*, the skeleton of which is described by Gaudry as intermediate between the existing *R. bicornis* and *R. simus*. As many as three species were inhabitants of the British Isles, of which the best known is the Tichorhine or woolly rhinoceros, *R. antiquitatis* of Blumenbach, *R. tichorhinus* of other authors, nearly whole carcasses of which, with their thick woolly external covering, have been discovered, associated with those of the mammoth, preserved in the frozen soil of the north of Siberia, and which, in common with some other extinct species, had a solid median wall of bone supporting the nasals. From this peculiarity it has been inferred that the horns were of size and weight surpassing those of the modern species. The one-horned Indian type was well represented under several modificatons (*R. sivalensis*, *R. palæindicus*, etc.) in the Pliocene deposits of the sub-Himalayan region, and forms more allied to the African bicorn species have also been found in a fossil state in India. *R. schleiermacheri* of the late European Miocene in some features, especially in possession of incisor teeth and two horns, resembled the existing Sumatran rhinoceros, but it differed in important cranial characters.

The existing species of rhinoceros are naturally

grouped in three sections, which some zoölogists consider of generic value.

I. *Rhinoceros* proper. The adults with a single large compressed incisor tooth above on each side, and occasionally a very small lateral one; below, a very small median, and a very large, procumbent, pointed, lateral incisor (or canine?). Nasal bones pointed in front. A single nasal horn. Skin disposed in very massive, definitely arranged armor-like plates, with soft interspaces or joints between them.

There are two well-marked species of one-horned rhinoceros:

1. The Indian rhinoceros, *R. unicornis* of Linnæus,* the largest and best known, from being the most frequently exhibited alive in England, is at present only met with in a wild state in the Terai region of Nepal and Bhutan, and in the upper valley

* Many authors use Cuvier's name, *R. indicus*, in preference to this, on the ground that there are more than one species with one horn, forgetting that the name substituted is equally inconvenient, as more than one species live in India. The fact of a specific name being applicable to several members of a genus is no objection to its restriction to the first to which it was applied, otherwise changes in old and well-received names would constantly have to be made in consequence of new discoveries. Ill-considered attempts at precision of nomenclature are often sources of confusion and future difficulty. As Huxley has truly said, "It is better for science to accept a faulty name which has the merit of existence, than to burden it with a faultless newly-invented one."

of the Bramaputra or province of Assam, though it formerly had a wider range. The first rhinoceros seen alive in Europe since the time when they, in common with nearly all the large remarkable beasts of both Africa and Asia, were exhibited in the Roman

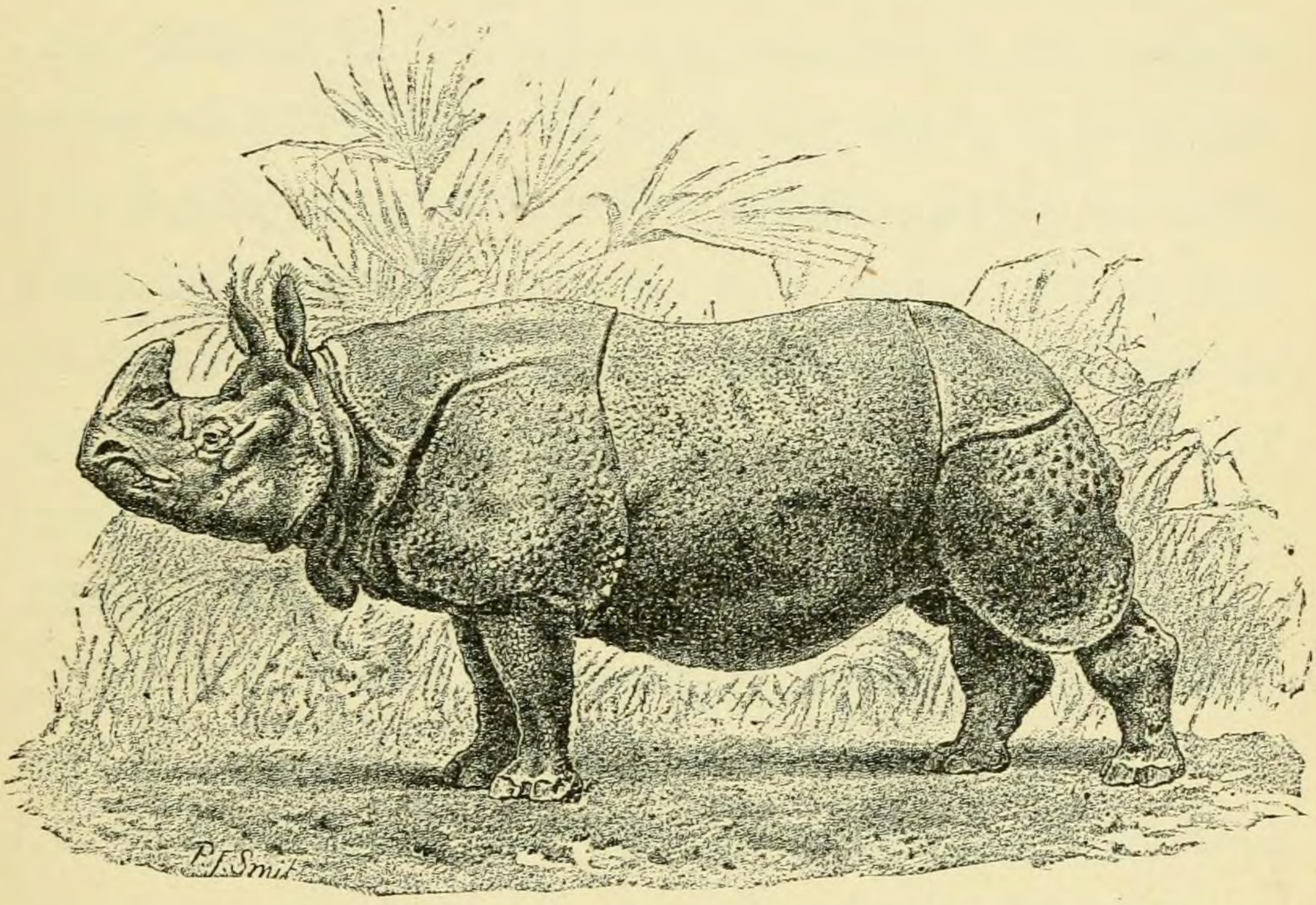


FIG. 9.—Indian Rhinoceros (*Rhinoceros unicornis*).

*From a photograph by Mr. Gambier Bolton of an animal living in the Zoölogical Society's Gardens. In wild animals the horn often grows to a greater length.*

shows, was of this species. It was sent from India to Emmanuel, King of Portugal, in 1513; and from a sketch of it taken in Lisbon, Albert Dürer composed his celebrated, but rather fanciful, engraving, which was reproduced in so many old books on natural history.

2. The Javan rhinoceros (*R. sondaicus*, Cuvier) is distinguished by smaller size, special characters of the skull and teeth, and different arrangement of the plications of the skin, especially in the deep depression which runs upwards and backwards from the middle of the side of the neck, passing over the back, joining its fellow on the opposite side, and thus isolating a plate proper to the neck from the great shoulder-plate. In the Indian rhinoceros (Fig. 9) this fold or depression does not pass over the back, but curves backwards and is lost above the shoulder. This species has a more extensive geographical range than the last, being found in the Bengal Sunderbuns near Calcutta, Burmah, the Malay Peninsula, Java, Sumatra, and probably Borneo. A hornless rhinoceros (*R. inermis*) which has been described is supposed to be the female of this species, but this is a point which requires further investigation.

II. *Ceratorhinus.* The adults with a moderately-sized compressed incisor above, and a laterally-placed pointed procumbent incisor below, which is sometimes lost in old animals. Nasal bones narrow and pointed anteriorly. A well-developed nasal horn and a small horn behind it, separated by a considerable interval. The skin thrown into folds, but these are not so strongly marked as in the former section. The smallest living member of the family, the Suma-

tran rhinoceros (*R. sumatrensis*, Cuv.), belongs to this group. Its geographical range is nearly the same as that of the Javan species, though not extending into Bengal; but it has been found in Assam, Chittagong, Burmah, the Malay Peninsula, Sumatra, and Borneo. It is possible that more than one species have been confounded under this designation, as two animals now living in the London Zoölogical Gardens present considerable differences of form and color.

III. *Atelodus.* In the adults, the incisors are quite rudimentary or entirely wanting. Nasal bones thick, rounded, and truncated in front. Two horns, both well developed and in close contact with each other. Skin thick but smooth, without any definite thickened plates or permanent folds.

The two well-marked species are peculiar to the African continent:

1. The common two-horned rhinoceros (*R. bicornis*, Linn.) is the smaller of the two, with a pointed, prehensile upper lip. It ranges through the wooded and watered districts of Africa, from Abyssinia in the north to the Cape Colony, but its numbers are yearly diminishing owing to the inroads of European civilization, and especially to the persecutions of English sportsmen. It feeds exclusively upon leaves and branches of bushes and small trees, and chiefly

frequents the sides of wood-clad rugged hills. Specimens in which the posterior horn has attained a length as great as, or greater than, the anterior horn have been separated under the name of *R. keitloa*, but, as already mentioned, the characters of these appendages are too variable to found specific distinctions upon. The two-horned African rhinoceros is far more rarely seen in menageries in Europe than either of the three Indian species, but one has lived in the gardens of the London Zoölogical Society since 1868. Excellent figures from life of this and the other species are published in the ninth volume of the Transactions of the Society.

2. Burchell's, or the square-mouthed rhinoceros (*R. simus*), sometimes called the white rhinoceros, though the color (dark slate) is not materially different from that of the last species, is the largest of the whole group, and differs from all the others in having a square, truncated upper lip, and a wide, shallow, spatulate form of the front end of the lower jaw. In conformity with the structure of the mouth, this species lives entirely by browsing on grass, and is therefore more partial to open countries or districts where there are broad grassy valleys between the tracts of bush. It is only known in the regions south of the Zambesi, and owing to the causes indicated above has of late years become extremely scarce;

indeed, the time of its complete extinction cannot be far off, if indeed it has not already arrived. No specimen of this species has ever been brought alive to Europe, and very few examples are to be seen in our museums. The flesh of both species of African rhinoceroses is considered very good eating by the natives of the countries in which they live, being, according to Selous,* "something like beef, but yet having a peculiar flavor of its own. The part in greatest favor among hunters is the hump, which, if cut off whole, and roasted, just as it is, in the skin, in a hole dug in the ground, would be difficult to match either for juiciness or flavor."

Before leaving the rhinoceroses, a huge creature belonging to the family, to which the name of *Elasmotherium* has been given, should be mentioned. It is only imperfectly known by fossil remains found in Pleistocene deposits in Russia; but it is interesting on account of the remarkable degree of specialization its molar teeth had attained, far beyond that of the existing rhinoceroses, and comparable in the length of the crowns and the complex folding of the enamel to that of the horses of the same or later period, though on a very much larger scale. It affords a good illustration of the fact previously mentioned,

* See F. C. Selous, *Proceedings of the Zoölogical Society of London*, 1881.

that the most highly specialized members of a group are not always those that survive the longest.

## The Horses. (Family *Equidæ*.)

As has been already stated, at about the time of the world's history when the Miocene was passing into what we term the Pliocene epoch, there were no true horses in exactly the sense in which we use the word now, but horse-like animals were extremely abundant both in America and the Old World, differing from existing horses in details of teeth and skeleton, especially in the presence of three toes upon each foot, a large middle toe and a smaller one, not reaching to the ground, placed on each side of it. To these animals, the step from the *Anchitherium* of the early Miocene, mentioned in the last chapter, was not a very great one.

Unfortunately, when remains of this type were first discovered, two generic names were given to them almost simultaneously—*Hipparion* and *Hippotherium*, the former being a diminutive of *hippos*, the Greek for "horse"; the latter a compound of *hippos* and *therion*, a wild beast, Latinized to *therium*, a termination very commonly employed in modern scientific language when coining new appellations for extinct animals. The first name was given