THE

PENNY CYCLOPÆDIA

OF

THE SOCIETY

FOR THE

DIFFUSION OF USEFUL KNOWLEDGE.

NEW YORK
PUBLIC
LIBRARY

VOLUME XIX.

PRIMATICCIO——RICHARDSON.

ASTOR LIBRARY
NEW-YORK

LONDON:

CHARLES KNIGHT AND Co., 22, LUDGATE STREET.

MDCCCXLI.

Price Seven Shillings and Sixpence, bound in cloth.

Digitized by Google

RHINELLA, Fitzinger's name for a genus of Frogs, *Oxyrhynchus* of Spix. [FROGS, vol. x., pp. 494-496.]

RHINO'CEROS (the Greek ῥινοκέρως), the name of a genus of pachydermatous quadrupeds, placed by Linnæus in his order *Bruta;* and by Illiger in his order *Multungula*, family *Nasicornia*. It has been a question whether one of the species, *Rhinoceros unicornis*, Linn. (*Rhinoceros Indicus*, Cuv. and Desm.) is not the ראם (*Reem*) or ריים (*Rem*) of Scripture (*Numb.* xxiii. 22, xxiv. 8; *Deut.*, xxxiii. 17; *Job*, xxxix. 9, 10; *Psalms*, xxii. 21; xxix. 6; xcii. 10; *Isaiah*, xxxiv. 7).

In the Septuagint the word is translated μονοκέρως (*Monoceros*, or *Unicorn*), except in Isaiah, where it is rendered ἀδροὶ (*Hadri*, or *the mighty or powerful ones*).

In the Tigurine and Vulgate versions the word is rendered (*Numb.*, xxiii. 22; *Job*, xxxix. 9, 15) *Rhinoceros*, with a note to the former, that others read *Monoceros;* and in Scheuchzer's *Physica Sacra* we have (tab. 313) *Numb.*, xxiii. 22, illustrated by a somewhat extravagant and exaggerated figure of a one-horned Rhinoceros, with 'Reem: *Rhinoceros*' below the plate.

In the Bible 'Imprinted at London by Robert Barker, Printer to the King's most excellent Maiestie' ('Breeches' Bible) the word used is 'Unicorne,' and 'Unicorn' is the expression in the version now in use in our churches.

Some are of opinion that the *Reem* or *Reïm* of Scripture were savage animals of the Bovine genus, and others that the word signified the *Oryx*, observing that *Reem* is the Arabian name for a species of wild goat or gazelle. These allege that the *Reem* was two-horned (*Deut.*, xxxiii. 17; *Psalms*, xxii. 21.) The better opinion seems to be that the animal or animals intended to be designated in most of the passages quoted, if not in all, was or were the *Rhinoceros Unicornis*, or *Great Asiatic one-horned Rhinoceros*. M. Lesson expresses a decided opinion to this effect; and indeed the description in *Job* (chap. xxxix.) would almost forbid the conclusion that any animal was in the writer's mind except one of surpassing bulk and indomitable strength.

The impotence of man is finely contrasted with the might of the Rhinoceros in this description, which would be overcharged if applied to the less powerful animals above alluded to.

It has also been doubted whether accounts of the Indian ὄνοι ἄγριοι (Wild Asses) given by Ctesias (*Indic.*, ed. Bähr) were not highly coloured and exaggerated descriptions of animals of this genus, and whether the ὄνος Ἰνδικός (Indian Ass) of Aristotle was not a Rhinoceros.

The account of Ctesias is evidently tinged with fable; but there are parts of it which suit well with the habits of a Rhinoceros. He describes his *Wild Asses* as being as large as horses, and larger, with white bodies, red heads (πορφυροῖ), and blue eyes (κυανέους), having a horn on the forehead a cubit long, which for the extent of two palms (παλαιστάς) from the forehead is entirely white; above it is pointed and red (φοινικοῦν ἐρυθρὸν πάνυ), and black in the middle. Of this horn drinking-cups are formed, and those who use them are said not to be subject to spasm (σπασμῷ) nor epilepsy (ἱερᾷ νόσῳ), nor to the effects of poison, provided, either before or after taking the poison, they drink out of them wine or water or any other liquid. Other asses, whether wild or domesticated, have no astragalus, neither have the other wild solipedes (μώνυχα); but these have an astragalus and a gall-bladder? (χολὴ ἐπὶ τοῦ ἥπατος). 'Their astragalus,' adds Ctesias, 'which I have seen, is very beautifully formed (κάλλιστον), in figure and size like that of an ox, heavy as lead, and red throughout like cinnabar. This animal is very swift and very strong. Neither a horse nor any other pursuer can overtake it. It begins its progress slowly, increasing in speed as it goes on, and runs quicker and faster. They are not naturally ferocious, but when they first lead forth their little young ones to graze, and are surrounded by many horsemen, they are unwilling to fly and leave their young, but fight with horns and heels (λακτίσμασι) and teeth (δήγμασι), killing many horses and men. They are also destroyed by arrows and javelins, for they are not to be taken alive. The flesh is not eatable by reason of its bitterness, but the animals are hunted for the sake of the horns and astragali.'

It is not at all improbable that these parts, so much sought after on account of supposed virtues, underwent some process by which they were artificially coloured in the manner above described.

Aristotle, who (lib. viii., c. 28) speaks of Ctesias as not being worthy of credit, notices (lib. ii., c. 1) the Ἰνδικὸς ὄνος (Indian Ass). He observes that he has never seen a one-horned solidungulous animal: but there are a few which are monoceratous and solidungulous, such as the one-horned Indian ass (Ἰνδικὸς ὄνος μονόκερως), and that it is the only one of the solidungulous animals which has an astragalus.

Agatharchides describes the one-horned Rhinoceros by name, and speaks of its ripping up the belly of the Elephant. (*Phot. Bibl.*, ccl.) This is probably the earliest occurrence of the name *Rhinoceros*.

The rhinoceros which figured in the celebrated pompa of Ptolemy Philadelphus was an Ethiopian, and seems to have marched last in the procession of wild animals, probably on account of its superior rarity, immediately after the camelopard, and before the wain carrying Bacchus fleeing to the altar of Rhea from the persecution of Juno. (Athenæus, *Deipn.*, v., c. xxxii.)

Dion Cassius (lib. li.) speaks of the rhinoceros killed in the circus with a hippopotamus in the show given by Augustus to celebrate his victory over Cleopatra; and says that the hippopotamus and this animal were then first seen and killed at Rome. If the rhinoceros was one-horned, as it appears to have been from his description, he was certainly wrong as to the sight at least; for Pliny (*Hist. Nat.*, viii. 19), alluding to the games of Pompey the Great, remarks, 'iisdem ludis et rhinoceros unius in nare cornu, qualis sæpe visus;' and probably equally wrong as to the killing, for upon great occasions few animals left the arena alive, and, Pompey was not likely to have risked his popularity by baulking the Roman appetite for blood. It is not improbable that the rhinoceros slain upon the occasion of the victory of Augustus with the hippopotamus was African, and two-horned. If so, Dion would be right; for it does not appear that a two-horned rhinoceros had ever been either seen or slain previously.

The rhinoceros so clearly described by Strabo (lib. xvi., p. 774) as seen by him, was one-horned. The folds of the skin are distinctly alluded to: that noticed by Pausanias (lib. ix., c. 12) as 'the bull of Ethiopia' was two-horned, and he describes the relative position of the horns.

Mr. Wood (*Zoography*) gives an engraving of the coin of Domitian (small Roman brass) on the reverse of which is the distinct form of a two-horned rhinoceros: that coin which, with the epigram of Martial, has so puzzled antiquaries, and led some of them astray, when a very little knowledge of natural history would have kept them in the right road.

'The exhibition of the two-horned Rhinoceros to the Roman people, probably of the very same animal represented on the coin,' says Mr. Wood, 'is particularly described in one of the epigrams attributed to Martial' ('De Spectaculis Libellus,' *Ep.* xxii.), 'who lived in the reigns of Titus and Domitian.'

The following are the lines:—

> Sollicitant pavidi dum rhinocerota magistri,
> Sæpe diu magnæ colligit ira feræ.
> Desperabantur promissi prælia Martis:
> Sed tamen is rediit cognitus ante furor.
> Namque gravem *gemino* cornu sic extulit ursum,
> Jactat ut impositus taurus in astra pilas.

'By this description it appears that a combat between a rhinoceros and a bear was intended, but that it was very difficult to irritate the more unwieldy animal, so as to make him display his usual ferocity; at length however he tossed the bear from his double horn, with as much facility as a bull tosses to the sky the bundles placed for the purpose of enraging him. Thus far the coin and the epigram perfectly agree as to the existence of the double horn; but unfortunately commentators and antiquaries would not be convinced that a rhinoceros could have more than one horn, and have at once displayed their sagacity and incredulity in their explanations on the subject. Hence we find a similar coin engraved in the second volume of Cooke's "Medallic History of Rome," where the animal is misrepresented, and particularly the horns, which appear like tusks, bending in different directions. After quoting the lines of Martial, Mr. Cooke observes, that it is the opinion of Bochart that the disputed line should be read thus:—

> Namque gravi geminum cornu sic extulit ursum.

By which alteration we should have two bears instead of one;* but Mr. Cooke proposes to omit only one letter, the *s* in the word ursum, by which means he turns the bear into a wild bull; and as it is perfectly natural that the wild bull, or urus, should have two horns, he translates the line thus:—

* And also a piece of bad Latin.

Digitized by Google

Struck with amazement, we beheld upborne
The buffal dreadful with his double horn.

If Cooke had seen the coin himself, or had consulted that book so useful to a medallist, the "Catalogue of Dr. Mead's Coins," he would not have deprived the epigram of its original and curious information.'

Two at least of these two-horned rhinoceroses were shown at Rome in the reign of Domitian.

The emperors Antoninus, Heliogabalus, and Gordian also exhibited Rhinoceroses, and Captain W. H. Smyth, R.N., noticing a coin of the emperor Philip (large brass), speaks of a noble lion on the reverse as representing one of the *Leones Mansueti* mentioned by Capitolinus. 'It seems,' says Captain Smyth, speaking of the *Sæculares Augustorum* (the legend on the reverse), 'that there were provided no fewer than 32 elephants, 10 tigers, 10 elks, 60 lions, 30 leopards, 1 hippopotamus, 1 rhinoceros, 40 wild horses, 20 wild asses, and 10 camelopards, with a vast quantity of deer, goats, antelopes, and other beasts. And still further to increase the public *hilarity*, 2000 gladiators were matched in mortal affray.' (*Descriptive Catalogue of a Cabinet of Roman Imperial large Brass Medals.*)

Cosmas speaks expressly of the Ethiopian Rhinoceros as having two horns and of its power of moving them.

The first Rhinoceros seen by modern Europeans appears to have been a *Rhinoceros unicornis*, Linn., sent from India to Emmanuel, king of Portugal, in 1513. Emmanuel sent it as a present to the pope, but the animal in an access of fury sunk the vessel on its passage. A sketch of the animal was sent from Lisbon to Nürnberg for Albert Dürer, who engraved the extravagant figure from which those of Gesner, Aldrovandi, Jonston, and Scheuchzer were taken. Among other monstrosities, the animal, which is represented as if it were clad in offensive and defensive armour, has a second small horn projecting from the top of the shoulders. A reduced copy of the same figure is given in the early edition of Petiver. In 1656 we find in the *Catalogue of the Musæum Tradescantianum* (sect. ii., '*Four-footed* Beasts, *with some Hides, Hornes, Hoofs*')—

'The Rhinoceros . { horn. jaw-bone. back-bone.'

In 1685 one was brought alive to England; another was shown throughout a great part of Europe in 1739; and a fourth, a female, in 1741. The Rhinoceros of 1739 was described and figured by Parsons (*Phil Trans.*, xlii.), and he also mentions that of 1741, which animal Cuvier believes to be the same that was shown at Paris in 1749, painted by Oudri, and afterwards engraved by Edwards (*Gleanings*), and that figured by Albinus. It was certainly that described by Daubenton, and the subject of the observations of Meckel. The Rhinoceros whose osteology is described by Cuvier was the fifth that had come to Europe. It arrived at Versailles in 1771, being then very young, and Buffon notices it in his supplement. This animal died in 1793, at the age of 25 or 26. In 1790 a Rhinoceros was brought from the East Indies to this country as a present to Mr. Dundas, who gave the animal away. It was afterwards purchased by Pidcock for 700*l.*, and was exhibited at Exeter Change and about the country. A seventh, very young, destined, it is said, for the menagerie of the emperor of Germany, arrived from the Indies in 1800, and died in London soon after its arrival: this animal was dissected by Mr. Thomas, who published his observations in the *Philosophical Transactions*. An eighth, which afterwards went to Germany, was seen at Paris not many years ago. All these were one-horned. Of late years several of the same species (*R. Indicus*) have arrived in London: one of these, a very fine healthy animal, was bought by the Zoological Society of London, and is now (January, 1841) alive in their gardens in the Regent's Park.

No two-horned Rhinoceros seems to have been brought alive to Europe in modern times. Indeed, up to a comparatively late period, this form was known only by the horns which were preserved in museums, nor did voyagers give any sufficient details to impart any clear idea of the form of the animal. The rude figure given by Aldrovandi (to whom it was communicated by Camerarius), in his chapter *De Asinis Cornutis* (published in 1639), leaves no doubt that, wretched as it is, it must have been taken from a two-horned Rhinoceros. This is copied by Jonston (pl. xi.), who has given the animal the head of an ass or mule garnished with a couple of horns, and a flowing tail in order to make it more asinine. The collar, too, is made much more smart. These are the two earliest modern figures of a two-horned Rhinoceros known to us. Dr. Parsons endeavoured to show that the one-horned Rhinoceros always belonged to Asia, and the two-horned Rhinoceros to Africa: but, as we shall presently see, there are two-horned Rhinoceroses in Asia as well as in Africa. Flacourt, in his *History of Madagascar*, states that he saw one in the Bay of Soldagne, near the Cape of Good Hope, at a distance. Kolbe and others always considered the Rhinoceros of the Cape as two-horned: but Colonel Gordon seems to be the first who entirely described the species with any exactness, and his description was given by Allamand in the supplement of the Dutch edition of Buffon. Sparrman gave a very detailed description of the Cape Rhinoceros in the *Transactions of the Swedish Academy* (1778), and in his *Voyage*. The description, to which we shall hereafter refer, is accompanied by sufficiently accurate figures, though that of the animal is stiff and ill-designed. At this period it was well known that the Cape species was not only distinguished by having two horns from the Indian Rhinoceros then known, but also by the absence of the folds of the skin so remarkable in the latter. Camper, in his treatise on the two-horned Rhinoceros, not only confirmed Sparrman as to the point of the Rhinoceros of the Cape having 28 molar teeth, but also the statement of Dr. Parsons and Daubenton, that the Indian species has the incisors separated from the molars by a wide space.

Miller (Pennant, *Quadrup.*) had already noticed a Sumatran Rhinoceros, when Mr. W. Bell published, in the 'Philosophical Transactions' (1793), his account of a Rhinoceros of Sumatra apparently intermediate between that of the Cape and the Indian species already known; for whilst this species has two horns, and the skin but little folded, resembling in these points the Rhinoceros of the Cape, an interval intervenes between its incisors and molars, as in the Indian one-horned Rhinoceros; and it also has the small intermediate incisors below.

The observations of MM. Diard and Duvaucel confirmed the strong suspicion entertained by Cuvier, that the one-horned Rhinoceros, or *Badak* of Java, is a different species from the one-horned Indian species so long and so well known.

It now becomes necessary to notice the carelessness, to call it by the mildest name, of Bruce, who gave to the world a representation of a two-horned Rhinoceros from Abyssinia, with a strongly-folded skin. The truth appears to be, that the body of the animal figured by Bruce was copied from that of the One-horned Rhinoceros given by Buffon, to which Bruce added a second horn. Salt proves that the Abyssinian Rhinoceros is two-horned, and that it resembles that of the Cape. Mr. Burchell (1817) published a good and faithful account of a second species of African Rhinoceros, under the name of *Rhinoceros simus;* and Dr. Andrew Smith has added a third, to which he assigns the specific name of *Keitloa.*

Organization.

Skeleton.—The bony framework of the animal of this genus approximates to that of the *Hyrax*, the Tapirs, and the Horse among living genera. Though a general resemblance pervades the entire skeleton of the animals of this genus, there are certain differences, in the skull especially, which render it adviseable to notice certain of the species separately with regard to their osseous structure. All the species have seven molar teeth on each side, both in the upper and under jaw; but the species differ as to the incisors.

Rhinoceros Indicus. (*Rhin. Unicornis*, Linn.)

Dental Formula:—Incisors $\frac{4}{4}$; Canines 0; Molars $\frac{7-7}{7-7}$; = 36.

Skull.—The pyramidal elevation of the cranium is the first point that strikes the observer on viewing the skull of the *Rhinoceros Indicus*. The next remarkable parts are the *ossa nasi*, which are of a size and thickness without example among quadrupeds: these form an arch or vault, which overhangs what may be termed the incisive bones, and gives support to the horn, forming, with the parts of the maxillary bones which carry the incisives, the great nasal notch which distinguishes the skull of these animals. Hence three pairs of bones, the nasal, the incisive, and the maxillary, contribute in the Rhinoceros to form the contour of

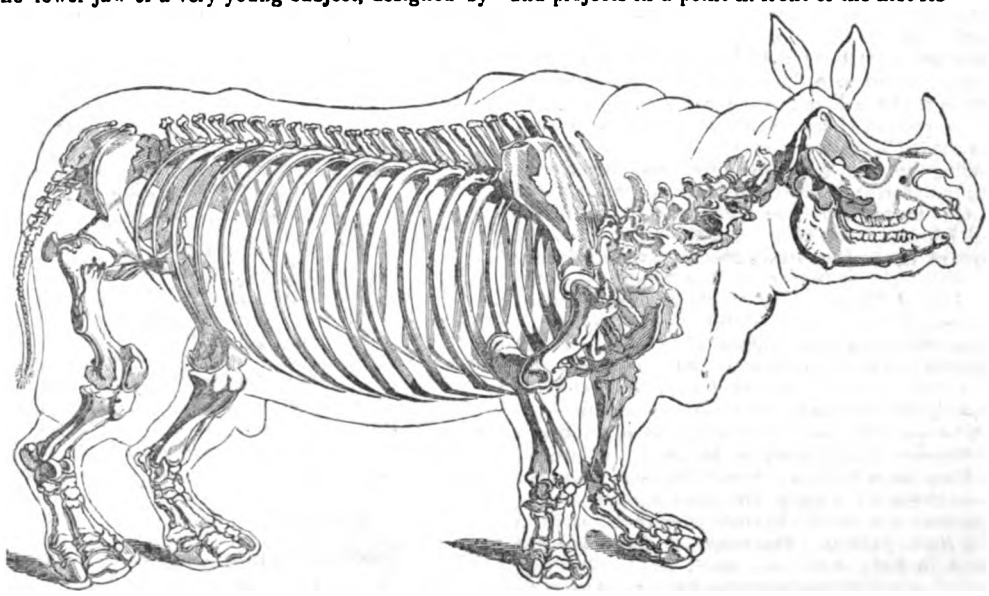
Digitized by Google

the external apertures of the nostrils; whilst, with the exception of the Tapir, the two first only are employed for this purpose in the other quadrupeds. The form of the molar teeth varies but little from that which characterises those of other species. The upper incisors are very much compressed, and placed obliquely at a very considerable angle: the lower incisors are large, pyramidal, and pointed, and between them are two very little incisors, which are supposed never, or hardly ever, to cut the gum! There are also two little incisors on each side of the two upper great ones; but these are, on the contrary, on the outside of the large incisor teeth. The form of the lower incisor teeth reminds the observer of the instrument generally used by husbandmen for extracting *Docks* (*Rumex*) from their pastures, and they appear to be calculated for uprooting plants, as well as tearing or stripping up branches or stems of shrubs or trees. In the case of uprooting, the nipper-like operation of the two great upper incisors, as opposed to the lower ones, would materially assist the extraction.

The number of molar teeth on each side often varies in different individuals, though there are never more than twenty-eight. The reason of this is well explained by Cuvier.

'All herbivorous animals,' says Cuvier, 'beginning with the horse, wear their teeth to the root; because in proportion as the crown diminishes by trituration, the alveolus is filled, and pushes the root out. When this tooth is composed of two branches, as in the Rhinoceros, and the body of the tooth is entirely used, there remain two stumps of root: these stumps are shed one after the other, being constantly diminished by the trituration, and pushed out by the growth of bone in the interior of the socket. In time the sockets themselves disappear. This is what happened to our Rhinoceros' (the Paris skeleton of *Rhinoceros Indicus*); 'he had already lost his first molar on each side, and the alveoli of it were nearly effaced; he had worn the next molar to the root, and had on one side lost even one of the stumps of the root, whilst both the stumps of the other side remained. But if this Rhinoceros had lost molars by age, he had not gained incisors: that happens not to the Rhinoceros more than to other animals who grow old. The two small intermediate incisors of the lower jaw exist from the period of youth, as may be seen in the head given to the cabinet by M. Adrian Camper; and still better by the end of the lower jaw of a very young subject, designed by his father, in the "Acta Petropolitana" for 1777, and given here after nature: but they always remain hidden under the gum, and this is the reason why Meckel did not see them in the living animal, whilst they are manifest in the skeleton. Mr. Thomas, a surgeon of London, who has published some anatomical observations on the One-horned Rhinoceros, also found these small teeth in the skeleton of an individual four years old. But what no one, to my knowledge, has yet published, is that the Rhinoceros has, at a certain period of its life, two similar incisors on the upper jaw; only they are on the outside of the large ones, whilst in the lower jaw they are between the large ones. This might have been inferred from the figure of the intermaxillary bone of a very young Rhinoceros, given by Camper (the father) in the "Acta Petropolitana," vol. i., pl. ix., fig 3, and which I reproduce more complete, pl. v., fig. 3. I even thought once that this character necessarily indicated another species; but in examining the drawings of the anatomy of our Rhinoceros, made with the greatest care by Maréchal, under the inspection of Vicq. d'Azyr and Mertrud, I discovered the figure of a very small tooth outside the great incisor of the right side; and I saw in the explanation which accompanies the drawing, and which is written by Vicq. d'Azyr with his own hand, that there was, in fact, a small tooth on this side which was wanting on the other; I ran to the skeleton, and there found the remains of the alveolus on one side; but the tooth, already too much loosened (déracinée), was lost during the maceration; on the other side the alveolus itself was effaced.' (*Ossemens Fossiles.*)

There are 56 *vertebræ* in all—7 cervical, 19 dorsal, 3 lumbar, 5 sacral, and 22 coccygian. The transverse apophyses of the atlas are very great and very wide, and without obliquity, so that their contour is nearly rectangular, which distinguishes them from those of the Hippopotamus; their extreme size distinguishes the atlas of the Rhinoceros from that of the Elephant still more clearly. The spinous process is only a large tubercle, and below the body of the vertebra is a small longitudinal crest. There are nineteen pairs of ribs, seven of which are true: they are easily recognised by their proportional thickness and the great arch formed by their curvature. The first pair are soldered together below. The sternum in the adult is composed of four bones; the first is compressed into a ploughshare-shape, and projects in a point in front of the first rib



Skeleton of Rhinoceros Indicus.

Of the *anterior extremities* the following parts are remarkable. The *scapula* is oblong; its greatest width is at its upper fourth; its posterior border is elevated and thickened at this point. The crest has a very projecting apophysis at its upper third, directed a little backwards; this crest terminates at the lower fourth of the scapula, and consequently there is no acromion; a tuberosity occupies the place of a coracoid process, and the glenoïd cavity is nearly round. This configuration distinguishes the scapula or blade bone of the Rhinoceros from that of other great quadrupeds; that of the Elephant, for example, forms a nearly equilateral triangle, and the spine a great recurrent apophysis. The widely crested *humerus* is very remarkable, and distinguishable from that of every other quadruped of the same size, but the carpus is formed after the same model as that of the Tapir and the Horse; though the Rhinoceros and the Tapir resemble each other more than they respectively resemble the horse in this part of the skeleton. The anterior face of the semilunar bone is square, and not pointed above, as in the Hippopotamus. None of the bones of the

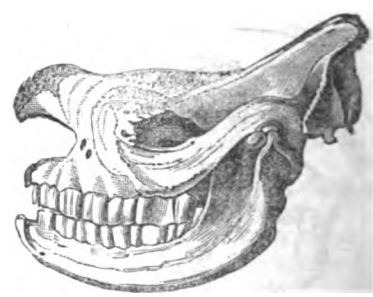
Digitized by Google

anterior extremities are liable to be confounded with those of animals of the same size, and though their greatest resemblance is to those of the Tapir, the smallness of those of the latter makes a sufficient distinction.

The *posterior extremities* present the following remarkable parts. The *pelvis* is extremely wide, and that of the Elephant alone among living quadrupeds resembles it; but the pelvis of the Rhinoceros is at once distinguished by its forked spine. The angle of the *os ilium*, which reaches the sacrum, is besides more elevated, and its neck much longer and narrower. The external edge of this bone is nearly as great as the internal, whilst in the Elephant it is much smaller. The crest of the *pubis* commences from the top of the ossa ilii. The *oval holes* are wider than they are long. The tuberosity of the *ischium* is very large above, and in the form of a hook. The *femur* is, if anything, more remarkable than the *humerus;* its upper part is extremely flattened from before backwards; the eminence which Cuvier calls the third trochanter, projects extremely, and forms a hook, which ascends to touch a hook descending from the ordinary grand trochanter, so that there is an oval hole between these two eminences. The *tibia, fibula, tarsus*, and the upper part of the *metatarsus* are constructed upon the plan of those of the horse; but the pulley of the *astragalus* is wider, more oblique, less deep, and its posterior internal angle is obliquely truncated; the astragalus touches the *cuboïd bone* by a rather wide surface; the *scaphoïd* and the third *cuneiform bones* are less flattened; the second *cuneiform* and the *cuboïd* larger. In these points the Rhinoceros resembles the Tapir more than the Horse, and indeed were it not for size would be hardly distinguishable from the former; but it differs from both in having a larger and stouter *calcaneum*. Its anterior or astragalian surface is triangular. The *astragalus* has two large facets; that of the inside is prolonged into a tail-like process all along the lower edge of this surface, as in the Tapir. In the Horse the third facet towards the external angle is distinct. The facet, which touches the cuboïd bone, is very small. The *cuboïd bone* has a long and large protuberance behind, which does not exist in the Horse. On the inside of the foot is a similar one, produced by a supernumerary bone attached to the scaphoid, the internal cuneiform and the internal metatarsial bones, which represents at once the first cuneiform and the thumb in its entirety. This bone exists only in the Tapir and in the Horse; but in the latter it is promptly soldered to the second cuneiform bone. The scaphoïd bone then has three articular facets on its inferior or rather metatarsial face; the third cuneiform or internal bone is much smaller than the other. The *phalanges* are all wider than they are long; the second phalanx of the middle toe is especially short. The last are channelled like those of the hoof of a horse. (Cuv.)

In comparing the osteology of the Two-horned Rhinoceros (*Rhinoceros Africanus*) of Africa and *Rhinoceros simus* with that of the One-horned Rhinoceros of Java and that of the One-horned Rhinoceros of India, and the relations of the osseous parts of those species to each other, we commence with

The Two-horned Rhinoceros of the Cape.—The following differences appear on examining the skull:—I. On its upper surface the horizontal contour of the bones of the nose is rounded in the Cape species, and almost extravagantly so in *Rhinoceros simus*, whilst in the one-horned species it is pointed. A deep furrow marks their suture in the first. The space between the post-orbital apophyses is convex in *Rhinoceros Africanus*, or *Bicornis*, transversely concave in *Rhinoceros Indicus*. From this point up to the occipital crest the skull of *Rhin. Africanus* appears longer, because this crest is directed obliquely backwards, whilst it is vertical in *Rhin. Indicus*. The temporal fossæ are less approximated in *Rhin. Africanus*, which leaves the upper and truncated part of the occipital crest wider. The zygomatic arches are less separated backwards in *Rhin. Africanus*, whilst in *Rhin. Indicus* they form a salient angle, which, joined to the difference of the bones of the nose, makes the general horizontal contour of the skull of *Rhin. Indicus* triangular, whilst that of *Rhin. Africanus* and *Rhin. simus* is oblong. The skull of the latter agrees generally with that of *Rhin. Africanus*, but the bones of the nose are prodigiously wide and flattened in front. II. The principal differences in the profile relate to the form of the incisive bones, which in *Rhin. Indicus* advance as far as the bones of the nose, and have above a particular apophysis; in *Rhin. Africanus* and *Rhin. simus* the incisive bones are each reduced to a small oblong piece. Again, a principal difference exists in the convexity of the suborbital space of the skull of *Rhin. Africanus* and *Rhin. simus*, already noticed with regard to the upper surface; and also in the elevation of the occipital crest of *Rhin. Indicus*, and its low position in *Rhin. Africanus* and *Rhin. simus*, whence it results that at an equal distance between the occipital condyles and the muzzle, *Rhin. Indicus* has the upper part of the skull much shorter than *Rhin. Africanus* and *Rhin. simus*. III. On the lower surface, besides the differences which result from the form of the zygomatic arches, the direction of the occipital crest, and that which the difference of the incisive bones produces on the front of the palate, it may be observed that the series of molars is longer in *Rhin. Africanus* and *Rhin. simus*, and that it converges anteriorly with that of the opposite side. In *Rhin. Indicus* the two rows of molars are parallel or nearly so: the palatine notch is pointed anteriorly in *Rhin. Africanus*, and rounded in *Rhin. Indicus;* in both it advances to the penultimate molar: the basilary region is longer in *Rhin. Africanus*, so that it gains in length behind what it had lost before. IV. The posterior surface; which is demi-elliptical, and higher than it is wide in *Rhin. Indicus*, and rather wider than it is high in *Rhin. Africanus* and *Rhin. simus*, in which last the occipital foramen is wider than it is high; whilst in *Rhin. Indicus* those proportions are reversed. The principal differences of the lower jaws are (besides the length which precedes the molars, which is much less in *Rhin. Africanus* and *Rhin. simus* than in *Rhin. Indicus*), 1st, that the series of molars is longer in the African species; 2nd, that the rising branches are much less high; 3rd, that the coronoid apophyses are much shorter, less pointed, and less directed forwards; 4th, that the dental branches are much more convex externally. The upper molars of the African species taken separately are much larger than those of the two one-horned species, and may be distinguished because their posterior border being less elevated, the notch of this border does not change into a fosset, as in the two one-horned species, but remains a true notch, at least till the tooth is worn to a certain extent. There are also other differences in the bones of the anterior and posterior extremities of *Rhin. Africanus*, which our limits will not permit us to detail, but which are pointed out by Cuvier,* who has noticed the other differences above alluded to, excepting those relating to *Rhin. simus*, and which will be obvious on an inspection of the skeleton.



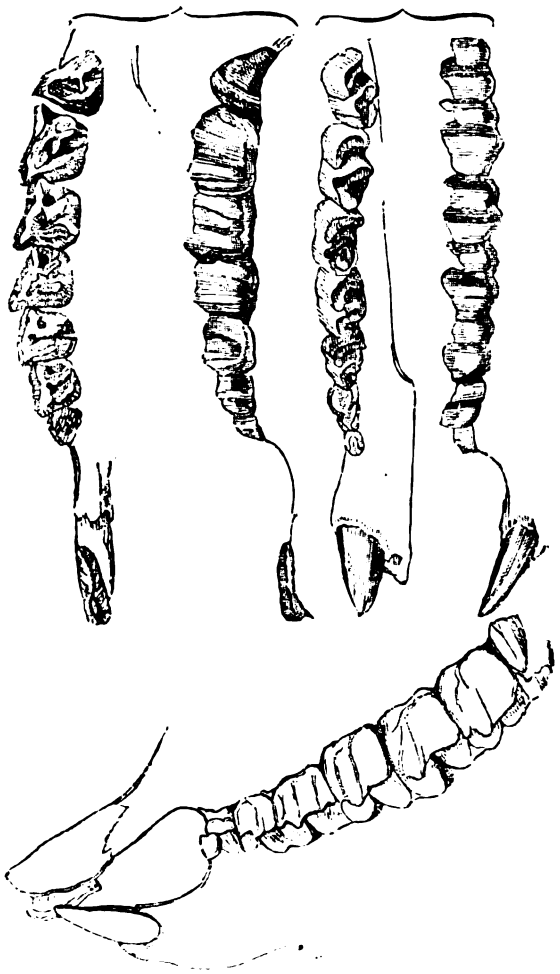
Skull of Rhinoceros bicornis.

The One-horned Rhinoceros of Java (*Rhinoceros Javanus*) resembles less, in the bones of the extremities, the *Rhinoceros Indicus*, than does the *Rhinoceros Africanus;* which, as Cuvier observes, is remarkable. But in the skull the resemblance to that of *Rhinoceros Indicus* is striking, though there are still remarkable differences. The whole cranium, for instance, is less, and the zygomatic arches, the orbits, and the nasal bones, which terminate in a sharp point, are less developed. The post-orbital apophysis can hardly be traced. The occipital crest is less elevated; there is no apophysis on the superior edge of the incisive bones; the orbit has a more forward position; the posterior base of the zygomatic arch is less approximated to the occiput; the region of the external opening of the ear is wider; the descending part of the occipital arch, which is trenchant in *Rhinoceros Indicus*, is here stout and obtuse. The posterior

* But Cuvier observes that these differences (with the exception of those of the head and teeth) are of such little importance that he would not affirm of any of them that it might not exist as well between two individuals of *Rhin. Indicus* as between *Rhin. Indicus* and *Rhin. Africanus;* nor would he venture to found a specific character on one of them taken by itself.

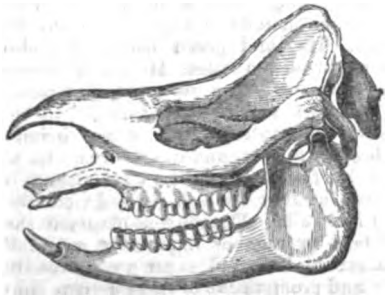
Digitized by Google

surface of the skull of *Rhinoceros Javanus* is wider than it is high: in *Rhinoceros Indicus* it is just the reverse; and the same difference exists in the dimensions of the occipital hole. Cuvier further observes that the upper contour of the occipital crest is notched in the cranium of the skull of *Rhinoceros Javanus* in the Paris collection, and convex in that of *Rhinoceros Indicus*. On examination of the lower surface, the incisive bones of the Javanese skeleton were



Teeth of Rhinoceros Javanus. (F. Cur.)

found by Cuvier to be narrower. The posterior notch of the palate was less deep, and advanced nearly opposite to the antepenultimate molar; the vomer was more visible externally in the internal nasal fossa; the pterygoid processes were less approximated at their base; the basilary region was shorter and wider, &c.; the ascending *rami* of the lower jaw and the coronoïd apophysis were much less, but in other respects the structure resembled that of *Rhinoceros Indicus*. Cuvier thought at first that the small external upper incisors did not exist, but the observations of MM. Diard and Duvaucel satisfied him that they did.



Skull of Rhinoceros Javanus.

Cuvier found the great upper incisors more delicate, so to speak, and situated more in parallel with each other than those of *Rhinoceros Indicus:* the lower incisors were in the form of a triangular pyramid, terminated forwards in a sharp point, with their lower edge rounded, and their upper surface worn by the friction of the upper incisors. Cuvier justly supposes that the difference between these great lower incisors, which were sharp and pyramidal, as he has well described them, in the Javanese species, and the truncated great lower incisor teeth of *Rhinoceros Indicus*, was the consequence of age only. The small intermediate incisors in the Javanese species were like those in *Rhinoceros Indicus*. There is not much difference between either the upper or the lower molar teeth of the two one-horned Asiatic species; but the scapula of the Javanese Rhinoceros is very different from that of *Rhinoceros Indicus;* for it is wider in the middle; it has the anterior edge rounded into a more convex arch; the salient angle of the spine has a much higher position, it is wider and, especially, longer, directed backwards on the plane of the bone, and so that its point answers to the posterior border. It is also much lower below, and the coracoïd tubercle is much larger than that of *Rhin. Indicus*. Cuvier further remarks that the *humerus* of *Rhin. Javanus* is distinguishable at the first glance by its bicipital obliquely hollowed canal, and other differences; the *ulna* is narrower below, and the olecranon is more elongated and directed more according to the axis of the bone: the *radius* exhibits but little difference. The bones of the *carpus* were found to resemble those of *Rhin. Indicus* more than those of *Rhin. Africanus;* with the exception of the unciform bone, which is higher in proportion. Cuvier found that the pelvis of *Rhin. Javanus* differed from that of the other species principally in having the external spine not forked. There is a slight difference in the femur, principally in what Cuvier terms the third trochanter, which is placed on the middle of its external side, is wide, curved forwards, but not ascending towards the great trochanter, which has no point to meet it. The notch or space formed by the two is not closed, in consequence, externally; but it is as large as in *Rhin. Indicus*. The lower head of the bone is widened backwards. Cuvier found the principal difference of the *tibia* to consist in its greater length and the depth of the anterior canal of the upper head of the bone. But the tarsal bones were found by Cuvier to exhibit very marked specific differences: the *astragalus*, below its anterior pulley, has an oval deep fossa which is wanting in the other species. The internal edge of the pulley is also shorter, and descends more obliquely forwards. The lower apophysis of the calcaneum is less stout in proportion. The cuboid bone is less elevated, and all the bones of the metatarsus are shorter, wider, and more flat; so that, as Cuvier remarks, the feet of this species must be shorter and wider in proportion than the others.

Before we close our short notice of the osteology of this genus, we must refer the reader to the *Catalogue of the Contents of the Museum of the Royal College of Surgeons in London*, part iii.; and to the Museum itself for a fine collection of the osseous parts and horns of these animals, Nos. 813 to 839 inclusive. Among them will be found a skeleton of the Sumatran Two-horned Rhinoceros (Sir Stamford Raffles), and the very skulls of that species which were figured by Bell (*Phil. Trans.*, vol. lxxxiii., pl. 2, 3, 4 (No. 1815). There are also good examples of *Rhin. Indicus* and a very fine skull of *Rhin. simus* from the collection of Mr. Delafons.

Digestive Organs.—The stomach of these animals is simple, their intestines very long and the cæcum very large. Sparrman, who dissected a Cape Two-horned Rhinoceros as well as his position and his Hottentot assistants would permit, remarks that the viscera most resemble those of a horse; though the stomach did not in the least resemble that of a horse, but rather that of a man or a hog. It was four feet in length and two feet in diameter; and to this viscus was annexed an intestinal tube twenty-eight feet in length and six inches in diameter: at three feet and a half from the bottom was a large cæcum, 'if,' says Sparrman, 'I may so call a viscus, which at its upper end was of the same width as the stomach, viz. two feet, and above twice the length, that is, eight feet and a half, and lay on the spine of the back, being attached to it at both ends, after which it was contracted into a rectum six inches in width and eighteen in length.' The liver was three feet and a half in breadth, but in depth (taken as if the animal were in a standing position) two feet and a half. It consisted of three larger and perfectly distinct globes, almost

Digitized by Google

equal in size, and of a small lobe besides, which projected to about a foot from the concave side of the liver, at the middle of its upper edge. There was no gall-bladder nor any trace of it. In this the structure of the Rhinoceros resembled that of the horse; though some have considered the large hepatic duct of the horse as a gall-bladder. The contents of the stomach, which was very much distended, were entirely without offensive smell, and perfectly fresh and sweet, consisting of masticated roots and small branches of trees, some of them as big as the end of a man's finger. There was evidence that the animal had also eaten a great quantity of succulent plants, among which Sparrman thought he recognised two or three which were harsh and prickly. 'The whole of this mass,' says he, 'diffused around a very strong and not disagreeable aromatic odour, which in a great measure took off the stench of the putrid viscera. Might it not be some peculiar herb, or, perhaps, the root only of an herb, with which I was entirely unacquainted, that produced the greatest part of the aromatic flavour? In the excrements of this animal, which were four inches in diameter, and in other respects resemble those of a horse, though they are of a much drier nature, there is usually seen a quantity of bark and fibres of trees, a circumstance that the hunters pay attention to; and by that means are able to distinguish it from the dung of the Hippopotamus, an animal that feeds only on grass. I thrust my hand into this creature's mouth, which was half open, and found the tongue perfectly soft, which is in direct contradiction to the common notion, viz. *quod lambendo trucidat.* I was likewise not a little astonished to find no fore-teeth in any of these carcasses of the Rhinoceros, although one of the three beasts seemed to be old; and, in fact, this animal has little room for fore-teeth, as the mouth goes off so sharp at the fore-part, that in that place it is only an inch and a half broad. Besides, it has no occasion for any teeth there, as the lips, like the skin, are of that extreme hardness, that it is able to clip off the tops of plants and shrubs with them, and that with so much the greater ease, as the under jaw goes within the upper; so that this species of Rhinoceros is probably capable of laying hold of its food with its lips and conveying it into the mouth, with the same ease and dexterity as Dr. Parsons observed in the common Rhinoceros on a similar occasion.' The spleen was hardly a foot broad, but full four feet long.

Circulating and Respiratory Organs.—The heart was a foot and a half in length and the breadth was not much less. The right lobe of the lungs had an incision in it (probably made by the Hottentots who exenterated the animal, or by the shot, which passed through the great blood-vessels of the lungs, and mortally wounded the animal), but was in other respects undivided and entire: it was two feet in length. The left lung was subdivided into two lobes, the smaller of which was next to the base of the heart.

Urinary System.—The kidneys were a foot and a half in diameter.

There are, we believe, in the museum of the Royal College of Surgeons many preparations of the soft parts of a *Rhinoceros Indicus* which belonged to Mr. Wombwell, and died at Canterbury in the beginning of the year 1838. We had been in hopes that this dissection, which was made by Professor Owen, would have been given to the scientific world as a pendant to the admirable 'Memoir on the Pearly Nautilus,' and in a similar shape.

Integuments and Horns.—The hide of the rhinoceros is perhaps as thick as, if not thicker than, that of any other pachydermatous animal. The horns, solid as they are apparently, consist actually of congregated parallel horny fibres. Fine examples of these horns, and of their gradual increase, will be found in the Museum of the College of Surgeons.

Asiatic Rhinoceroses.

Rhinoceros Indicus (*Rhinoceros Unicornis*, Linn.).

Specific Character and Description.—Dental Formula: see above. A single horn on the nose. Skin naked, very thick, of a dull deep purplish grey, marked with subelevated, rounded, and other inequalities, and remarkable for the deep folds which it forms behind and across the shoulders, and before and across the thighs, &c. There are a few stout, stiff, horny, and smooth hairs on the tail and on the ears.

We have seen that a one-horned rhinoceros, this species probably, was shown at Rome by Pompey: that it was well known in the time of Domitian appears from the following epigram (Martial, 'De Spectaculis Libellus,' *Ep.* ix.):*

> 'Præstitit exhibitus tota tibi, Cæsar, arena,
> Quæ non promisit prælia rhinoceros.
> O quam terribiles exarsit pronus in iras!
> Quantus erat cornu, cui pila taurus erat.'

The best early figure of *Rhinoceros Indicus* known to us is that of Bontius, which, though somewhat exaggerated by the draughtsman about the lip, and furnished with little claws instead of broad nails, gives in general a correct idea of the animal. Bontius states that he has seen the animal a thousand times, both in confinement and in its native wilds, and he states that he gives the figure to correct the error of those painters who have depicted the animal as 'scutatum et squamis obsitum.' He states the following anecdote of its fury when provoked:—A party on horseback had proceeded to a wood, when in a marshy place they came upon a rhinoceros and her young one. The mother, on seeing them, arose and drove her young one towards the wood, and when it stopped as if in sport, pushed it forward with her snout. One of the company, out of a bravado, rode up, and drawing his Japanese sword, cut at the hinder parts of the old one, but the blows did not penetrate, on account of the hide, and some whitish marks only appeared. The mother bore all patiently till her young one was safely hidden in the bushes and brushwood. Then the scene was changed. The irritated beast turned suddenly on her persecutor, whose life was saved by his frightened horse, which galloped back to the party followed by the infuriated rhinoceros overturning trees and everything in her way.

As soon as she saw the rest of the company, she attacked them, and they avoided her by getting behind two great trees, scarcely two feet apart, between which the rhinoceros in the blindness of her rage rushed, making them tremble like reeds. Whilst she was thus entangled, they used their fire-arms with fatal effect, and slew her. The rash man who attacked her by himself had a very narrow escape; for she turned short upon him with a horrible roar 'cum immani grunnitu et stridore,' and seized him by the boot, which fortunately for him was made of light stuff, and gave way. Had it not been for its tearing, 'actum de eo fuisset,' as Bontius says, in plain English it would have been all over with him. The same author, though so anxious to dissipate error, states, in a previous part of this chapter, *De Alcada sive Rhinocerote*, that when the animal has prostrated a man, it kills him by licking him with his rough tongue, and tears off both skin and flesh, even to the bones; 'hinc etiam,' he adds, 'spinis ac vepribus libentissimè vescitur,' and he quotes the lines,—

> 'Lingua virum occidit lambendo rhinocerotis,
> Aulica falsidici sic quoque lingua necat.'

It is to this most probably that Sparrman alludes above.

Pennant, who is decidedly of opinion that this species is the Unicorn of holy writ, and the Indian ass of Aristotle (p. 463), says that it loves shady forests, the neighbourhood of rivers, and marshy places; that it brings forth one young at a time, and is very solicitous about it; that it is quiet and inoffensive, but when provoked, furious, very swift, and very dangerous. 'I know a gentleman,' he continues, 'who had his belly ripped up by one, but survived the wound.' Pennant gives the name of this person.†

The rhinoceros described by Dr. Parsons came to London in 1739 from Bengal. It is stated that though but two years old, the expenses of his food and his voyage amounted to near 1000*l.* sterling. He had daily seven pounds of rice mixed with three pounds of sugar: this was divided into three portions. Hay and green herbs were also given to him, but he preferred the latter. He drank largely of water, taking a great quantity at a time, was peaceable when not hungry or provoked, and allowed himself to be handled. When however he wanted to eat, or was irritated by any person, he became unruly, and in both cases he was only to be appeased by food. When he was enraged, he sprang forward, reared himself up, and pushed violently with his head against the walls. Dr. Parsons observed these movements produced by rage or impatience, especially in the morning before his rice and sugar were brought to him. The vivacity and promptitude of these actions led the doctor to think that the animal was altogether unconquerable.

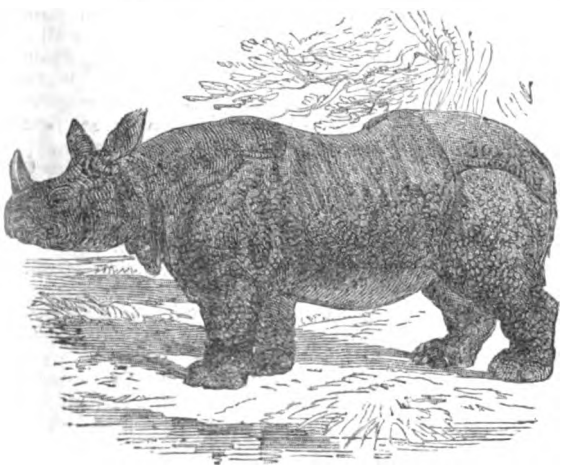
* See also lib. i., *Ep.* 4, xiv., p. 52, 53, &c.

† Charles Pigot, Esq., of Peploe, Shropshire, at that time in the India service.

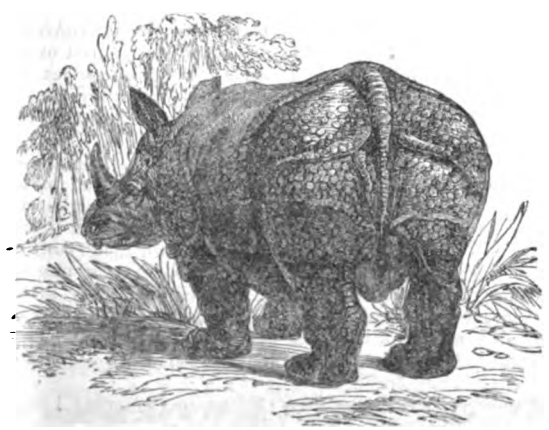
Digitized by Google

and that he could easily overtake any man who should offend him. Dr. Parsons also observed that this rhinoceros hearkened with a sort of continual attention to any noise; so that even if he was drowsy, employed in eating, or in satisfying other urgent wants, he started instantly, and gave attention till the noise had ceased. The *Rhinoceros Indicus* now in the Zoological Society's garden at the Regent's Park has been observed to listen with attention; and, when out, to be thrown into great excitement by the noise of the roller upon the contiguous gravel walk, charging down towards it, and rearing himself up against the fence with great violence.

The rhinoceros brought to this country in 1790 is the subject of an interesting account by Mr. Bingley, in his 'Animal Biography.' When it arrived it was about five years old, was tolerably tractable, would walk about at its keeper's command, and allowed the visitors to pat his back and sides. He was allowed twenty-eight pounds of clover, about the same quantity of ship-biscuit, and a great quantity of greens daily. Twice or thrice a-day five pails of water were given to him. The vessel out of which he drank contained about three pails, and each time as the animal drank the vessel was filled up. He never ceased his draught till the vessel was exhausted. He was fond of sweet wines, and it is stated that he would drink three or four bottles in a few hours. If he saw any person with fruit or any favourite food, he appeared anxious for it, and then uttered a sound something like the bleating of a calf. This animal died of inflammation arising from slipping the joint of one of his fore-legs. It is recorded that the incisions made through his skin, on the first attempts to relieve him, were invariably found to be healed in twenty-four hours. His death happened near Portsmouth, and the stench was so great that the mayor ordered the body to be immediately buried, which was done on Southsea Common. There it lay for about a fortnight, when it was dug up again to preserve the skin and the most valuable of the bones; but the persons employed were nearly overpowered by the effluvia.



Rhinoceros Indicus.



Rhinoceros Indicus.

The renowned combats between the Elephant and Rhinoceros handed down to us from the antients are generally considered to be tinged with fable, but there is no doubt that contentions do occur between them in a state of nature. Soon after the arrival of the Rhinoceros now in the Regent's Park, he contrived to get into the apartment of the old Elephant, but there was no proof of any actual hostility. At present they are the best friends in the world, and it is amusing to see how quiet the Rhinoceros will stand whilst his great friend scrubs his back with his trunk, and occasionally gratifies himself by a sly pull at his tail to make the Rhinoceros turn his head, if his attention is taken off by visitors.

Locality, Food, &c.—This species inhabits the East Indies, especially beyond the Ganges. It is recorded as having been found in Bengal, Siam, and Cochin-China. Shady forests, the neighbourhood of rivers, and marshy places are favourite localities. Their ordinary food consists of herbage and the branches of trees. The flesh is said to be not unpalatable. Our figure is taken from the living animal in the garden of the Zoological Society, but the horn is taken from a perfect specimen; for the animal, though a fine one, and in excellent general health, has ever since its arrival, and from the first growth of the horn, constantly employed itself in rubbing it down, so as to prevent its proper increase.

Rhinoceros Javanus, Cuv.

Specific Character.—One-horned; folds of the neck ob solete; scutules of the skin angled at the margin, concave in the middle, and furnished with a few short bristles margin of the ears and under side of the tail hairy.

Description.—Dr. Horsfield, who had an opportunity during his residence at Surakarta, the capital of the Javanese empire, to examine an individual taken during infancy and kept in confinement, or rather in a state of domestication, gives a good figure of it, observing that the drawing from which the plate is taken, though deficient in some points that the skilful pencil of Mr. Daniell would have supplied from the living animal, exhibits, with scrupulous accuracy, its form and proportions. In 1817 this individual measured nine feet in length, and was four feet three inches high at the rump; and Dr. Horsfield remarks, that the Rhinoceros figured by M. F. Cuvier (of which a reduced copy is given below), brought to Europe from the British possessions in India, was higher in proportion to its length, and its form was more unwieldy, the entire length being seven feet, and the height four feet ten inches. The head of the animal seen by Dr. Horsfield was strongly attenuated to the muzzle, and had a triangular form; the flexible lip was considerably lengthened, and the sides of the head were marked with protuberances or scutula, resembling those on the body, but no great roughnesses or folds were apparent. The marks of distinction afforded by the folds of the external covering were less evident than those afforded by the form of the body and the attenuated head; but the folds on the whole appeared less rough or prominent than in *Rhinoceros Indicus;* those of the neck were comparatively smaller; and the posterior fold, which had an oblique direction towards the spine, was less extended. The thick covering of Dr. Horsfield's animal was divided on the surface into small tubercles or polygonous scutula; and a few short bristly hairs rose from a slight depression in the centre. The ears were bordered with a series of long stiff bristles, closely arranged; and a similar series of bristles also extended along the tail, underneath, through its whole length.

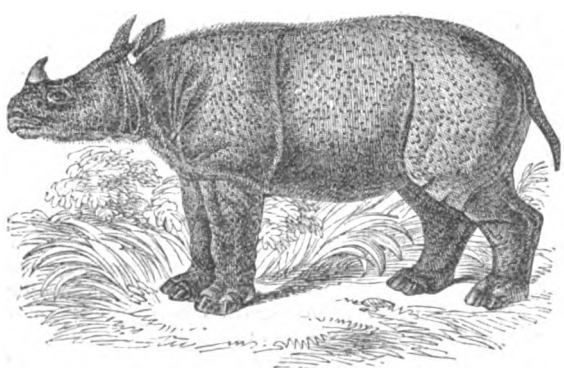
Locality, Habits, Manners, &c.—Gregarious in many parts. Dr. Horsfield states that it is not limited to a particular region or climate, but that its range extends from the level of the ocean to the summit of the mountains of considerable elevation. Dr. Horsfield noticed it at Tangung, near the confines of the Southern Ocean, in the districts of the native princes, and on the summit of the high peaks of the Priangan regencies, but it prefers high situations. 'It is not,' adds Dr. Horsfield, 'generally distributed, but is tolerably numerous in circumscribed spots distant from the dwellings of man and covered with a profuse vegetation. On the whole it is more abundant in the western than in the eastern districts of the island. Its retreats are discovered by deeply excavated passages which it forms along the declivities of mountains and hills. I found these occasionally of great depth and extent. In its manners the Rhinoceros of Java is comparatively mild,

Digitized by Google

It is not unfrequently met in the wilds by Europeans and by natives. No instance of its showing a disposition to make an attack has come to my knowledge. Being the largest animal in Java, its passions are not roused, as in many parts of India, by contentions with the elephant. It is rarely seen in a domestic state, but is occasionally decoyed into pits and destroyed. Our animal rambles chiefly at night, and often occasions serious injury to the plantations of coffee and pepper, which are laid out in the fertile districts selected for its retreats. The horns and skin are employed for medicinal purposes by the natives.'

The domesticated individual above alluded to by Dr. Horsfield was taken while very young, in the forests of the province of Keddu, and was conveyed to the residency at Magellan, in the year 1815 or 1816. By kind treatment it soon became domesticated to such a degree, that it permitted itself to be carried, in a large vehicle resembling a cart, to the capital of Surakarta. 'I saw it,' says the Doctor, 'during its conveyance, and found it perfectly mild and tractable. At Surakarta it was confined in the large area or square which bounds the entrance to the royal residence. A deep ditch, about three feet wide, limited its range, and for several years it never attempted to pass it. It was perfectly reconciled to its confinement, and never exhibited any symptoms of uneasiness or rage, although, on its first arrival, harassed in various ways by a large proportion of the inhabitants of a populous capital, whose curiosity induced them to inspect the stranger of the forest. Branches of trees, shrubs, and various twining plants were abundantly provided for its food; of these the species of *Cissus* and the small twigs of a native fig-tree were preferred. But plantains were the most favourite food, and the abundant manner in which it was supplied with these by the numerous visitors tended greatly to make the animal mild and sociable. It allowed itself to be examined and handled freely, and the more daring of the visitors sometimes mounted on its back. It required copious supplies of water, and, when not taking food, or intentionally roused by the natives, it generally placed itself in the large excavations which its movements soon caused in the soft earth that covered the allotted space. Having considerably increased in size, the ditch of three feet in breadth was insufficient for confining it, but, leaving the inclosure, it frequently passed to the dwellings of the natives, destroying the plantations of fruit-trees and culinary vegetables which always surround them. It likewise terrified those natives that accidentally met with it, and who were unacquainted with its appearance and habits. But it showed no ill-natured disposition, and readily allowed itself to be driven back to the inclosure, like a Buffalo. The excessive excavations which it made by continually wallowing in the mire, and the accumulation of putrefying vegetable matter, in process of time became offensive at the entrance of the palace, and its removal was ordered by the emperor to a small village near the confines of the capital, where, in the year 1821, it was accidentally drowned in a rivulet.' (*Zoological Researches in Java.*)

This species is the *Wurak* of the Javanese, and *Badak* of the Malays and of the inhabitants of the western parts of Java. (Horsfield, *Ibid.*)



Rhinoceros Javanus. (F. Cuvier.)

Marsden, in his 'History of Sumatra,' states that the Rhinoceros, *Badak*, both that with a single horn and that with a double horn, are natives of the woods (quære tamen). He adds that he does 'not know anything to warrant the tales told of the mutual antipathy and the desperate encounters of these two enormous beasts.' The horn, he adds, is esteemed an antidote against poison, and on that account formed into drinking-cups.

The animal from which the figure was taken was a female. The horn had been worn down by use, and the deficiency is supplied, in the cut, from Dr. Horsfield's figure. M. F. Cuvier says that the upper incisors are four in the young, two in each intermaxillary, very much approximated to each other: they are then small and nearly cylindrical; they soon fall and are not replaced in adults except by two teeth, 'longues d'arrière en avant, minces de dehors en dedans, sortant à peine des gencives, dont le tranchant est mousse et arrondi, et qui sont opposées à la partie antérieure des longues incisives inférieures.'

Rhinoceros Sumatrensis, Cuv. (*Rhinoceros Sumatranus*, Raffles).

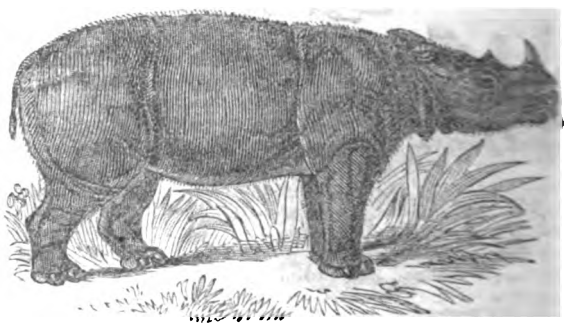
Specific Character.—Four great incisors, as in the two preceding species, but hardly any folds on the skin, which is hairy; a second horn behind the ordinary one.

The first satisfactory indication of the existence of this species occurs in Pennant, who imagined that the two-horned species of Sumatra was identical with *Rhinoceros bicornis*, the only African species then known. He quotes the following remark of Mr. Charles Miller, who was long resident in Sumatra:—'I never saw but two of the two-horned Rhinoceros; but I believe they are not uncommon in the island, but are very shy, which is the reason they are but seldom seen. I was once within twenty yards of one. It had not any appearance of folds or plaits on the skin, and had a similar horn resembling the greater, and, like that, a little turned inward. The figure given by Dr. Sparrman is a faithful resemblance of that I saw.'

Description.—Hide rugose, covered with scattered stiff brown hairs; folds on the shoulders and croup but slightly marked; the skin generally rather delicate and nearly without folds; head rather elongated: eyes small and brown: upper lip pointed and curved downwards; ears small and pointed, fringed with black short hairs; first horn bent backwards, second smooth and pyramidal, placed a little in front of the eyes.

The first figure was published by Mr. William Bell in 1793.

Locality, Sumatra.



Rhinoceros Sumatrensis. (F. Cuvier.)

African Rhinoceroses.

Till a comparatively late period the *Rhinoceros bicornis* of Linnæus (*Rhin. Africanus*, Cuv.) was the only African species distinctly known. The opportunities enjoyed by Dr. Andrew Smith, and of which he has availed himself so much to the advancement of zoology, enabled him to add a third, *Rhinoceros Keitloa*, to the species first recorded and then described by Mr. Burchell.

We have seen that in the Sumatran two-horned Rhinoceros the folds of the skin are hardly perceptible; in the African Rhinoceros there are none on the body; so that the presence of two horns in this genus seems to be a condition of the form coexistent with a smooth hide comparatively without folds. Taking into consideration the differences of the dentition, which are striking as far as the incisors are concerned, the two horns, and the smoothness of the hide; we think that this genus might be conveniently divided into two groups or subgenera: 1, the one-horned; and 2, the two-horned.

Rhinoceros Africanus, Cuv. (*Rhinoceros bicornis*, Linn.)

Specific Character.—Pale yellow brown; horns unequal in length; neck surrounded with a furrow at the setting

Digitized by Google

on of the head; eyes brown. Length 10 feet 11 inches. (Smith.)

Description.—Pale yellowish-brown, with tints of purple upon the sides of the head and muzzle; the groins flesh-coloured; eyes dark brown; the horns livid-brown clouded with green; the hairs on the tip of the tail and the margins of the ears deep black.

Head rather deep in proportion to its length, which gives it an appearance of clumsiness beyond either of the other South-African species; the anterior horn directly over the extremity of the nose, the first half nearly perpendicular, the last half slightly curved backwards; the posterior horn conical, and often exhibiting an appearance as if the point of a smaller sized cone had been fixed upon the section of a larger one, which observation to a certain extent might also be applied to the front horn; towards the bases both are rough, and more or less distinctly fibrous; towards the points hard, smooth, and finely polished. Eyes small, the skin surrounding them, as well as that in front of the ears and on the muzzle and the upper and lower lips, deeply cut by narrow wrinkles; the extremity of the upper lip is scarcely produced. The neck is thick, short, and at its junction with the head encircled by a deep furrow formed in the skin; the shoulder with a rudimentary hunch; the body round and heavy, limbs rather shorter in proportion than in *Rhin. Keitloa*. Tail flattened towards the extremity, elsewhere somewhat cylindrical: the upper and lower edges near the tip fringed with thick wiry hair. The surface of the skin rather rougher than in *Rhin. Keitloa*, owing to its being intersected by a great number of wrinkles. The relative lengths of the horns vary a little in different individuals, but the hindermost one in both sexes is invariably much the shortest, and in young specimens it is scarcely visible when the other is several inches in length. In *Rhin. Keitloa* the young have both horns of equal length. (Smith.)

Locality, Habits, Food, Chace, &c.—Sparrman, in his description, exposes the errors of Buffon regarding both this species and *Rhin. Indicus*; especially the opinion that the copulation of the latter takes place *croupe à croupe*. His poetical fancies too touching the impenetrable nature of the skin are freely and justly dealt with by the same learned Swede, who ordered one of his Hottentots to make a trial of this with his hassagai on one of those which had been shot. Though this weapon was far from being in good order, and had no other sharpness than that it had received from the forge, the Hottentot, at the distance of five or six paces, not only pierced with it the thick hide of the animal, but buried it half a foot deep in its body.

Dr. Smith remarks that the present species, under the name of *Rhinoster*, has been familiarly known to the colonists of the Cape of Good Hope ever since 1652. In that year, when the Dutch first formed their settlement on the shores of Table Bay, this animal, he observes, was a regular inhabitant of the thickets which clothed the lower slopes of Table Mountain. 'The abandonment of those spots by this animal as a measure of safety,' says Dr. Smith in continuation, 'probably constituted the commencement of a forced migration, which has continued to extend ever since, and which has led not only to the disappearance of the species from the districts within the present colonial limits, but also in a great measure to its removal from countries beyond those limits, as far as hunters sufficiently armed are accustomed to resort. If a system such as has hitherto prevailed continues to exist, and the larger animals persevere in flying to avoid the effects of fire-arms, the time may arrive when the various species which formerly may have been scattered, each in a peculiar locality of a large continent, will be huddled together; and indeed an advance towards that period is in progress, as may be inferred from the concentration which is at present taking place in the interior of South Africa.

'Though many of the individuals which inhabited the countries where now not a single Rhinoceros is to be seen, were doubtless destroyed, yet it is equally certain that many others escaped, and thereby assisted in adding to the accumulation which is in progress in other localities. Until lately the present was the only species of the genus which was known to be receding from its native country, but of late another has been led to a like course; and the *Rhinoceros simus*, which but a few years ago was common in the neighbourhood of Latakoe, has, since the more general introduction of fire-arms into that country, almost entirely ceased to approach within a hundred miles of it. From a consideration of the various facts which we have collected in relation to the species now under consideration, and which we shall detail more at length elsewhere, we feel disposed to regard it to a certain extent as a prisoner in the country it now inhabits, and are inclined to believe the southern extremity of the continent and the country along the western coast towards Benguela to have once formed its favourite residence.'

Sparrman's account of the contents of the stomach of the individual which he dissected indicates the food on which the animal had lived. Dr. Smith states that, like the *Keitloa*, this species feeds upon brushwood and the smaller branches of dwarf trees, from which circumstance it is invariably found frequenting wooded districts, and in those situations its course may often be traced by the mutilations of the bushes. 'As it feeds but slowly,' says Dr. Smith, 'and besides passes much of its time in idleness, it must be regarded as a very moderate eater, and considering that it appears to be fastidious in the choice of its food, it is fortunate for its comfort that it does not require more nourishment. Of the many shrubs which exist in the locality in which it resides, few comparatively appear formed for its choice, as it is to be seen approaching many and leaving them again without either injuring a branch or plucking a leaf. This evident nicety in the selection of its aliment makes it difficult to imagine how so many large animals as are sometimes congregated together within a very limited space can find sufficient for their consumption. Even admitting that the reproduction of the parts which the rhinoceros may devour takes place with uncommon rapidity in the climates they inhabit, and consequently the shrubs are comparatively soon in a condition to supply another meal; yet, nevertheless, if these animals consumed in proportion to their bulk, they would of necessity be forced to be less particular in the choice of their food.'

Sparrman tells us that the Hottentot or Caffre hunters were accustomed to steal both upon the elephant and the rhinoceros while they were asleep, and wound them in different places at the same time. After this they followed the traces of the animal for one or more days, till it dropped down with weakness, or died of its wounds. Generally however, according to their own account, they poisoned one or two of their darts immediately before they attacked an animal of this size; in which case they had no occasion to wait so many days as they otherwise would, before their prey fell into their hands. A farmer told Sparrman that he had seen an elephant in this manner wounded and dead within twenty-four hours.

Rhinoceros Bicornis, Female and Young. (Smith.)

Rhinoceros Keitloa (Smith).

Specific Character.—Pale brownish yellow; the two horns subequal in length, the anterior one cylindrical, the posterior one compressed; anterior part of the upper lip produced and acuminate. Length, body and head, 11 feet and 1½ inches. Height, 5 feet.

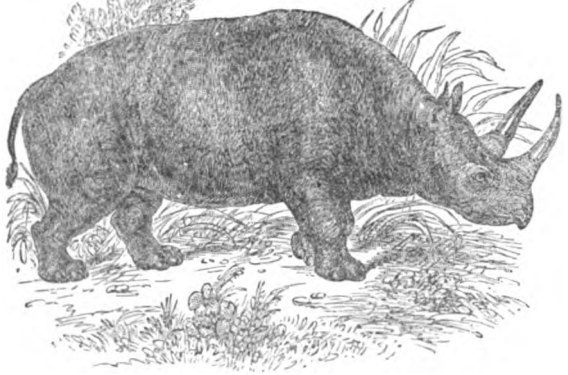
Description.—Pale brownish yellow, the brown most distinct upon the head; the inner sides of the extremities towards the body and the groins somewhat flesh-coloured; the inner sides of the knee joint, and the hinder part of the thighs immediately above the joints pale livid black. Eyes dark brown. Horns dark greenish brown.

Figure nearly that of *Rhinoceros bicornis*. Skin destitute of hair, rough and slightly irregular, the surface ex-

Digitized by Google

hibiting a reticulated appearance, arising from the number of waved or angular fissures by which it is everywhere impressed, but more particularly upon the shoulders and outer surfaces of the hinder extremities. The lower portion of the neck is marked by several wide vertical furrows which admit of the head being turned to either side with greater facility; several of a much smaller size also occur towards the extremity of the muzzle and around the eyes, so as to admit of the upper lip and the eyelids being moved with greater freedom. Head moderately slender; the eyes very small, and sunk in their orbits; the nostrils situated near to the extremity of the muzzle, somewhat oval and rather opaque in relation to the axis of the head. Anterior horn nearly cylindrical, the basal half directed forwards, the distal half slightly curved backwards; the posterior horn towards its base nearly cylindrical, with the distal two-thirds naturally compressed, and having the hindermost edge thinnest. Ears somewhat acuminated, edged with short hairs towards their tips. Legs rather short, knee-joints very large; scarcely any hunch on the shoulders; the neck rather long. Tail cylindrical till within a few inches of the extremity, then naturally compressed and margined above and below by strong short and wiry hair. (Smith.)

Dr. Smith remarks that the only species yet known with which the present could be confounded is the *Rhinoceros bicornis* of authors. There are however, he observes, many and marked differences between them, of which the following are a few of the external and more palpable ones. In *Rhinoceros Keitloa* the two horns are of equal or nearly equal length; in *Rhinoceros Africanus* the posterior in neither sex is ever much beyond a third of the length of the anterior horn; the length of the head in proportion to the depth is very different in the two. The neck of *Rhinoceros Keitloa* is much longer than that of the other, and the position and character of the cuticular furrows destined to facilitate the lateral motions of the head are very different. Besides these, Dr. Smith states that many other diagnostic characters might be instanced; such as the black mark on the inside of the thigh of the *Keitloa*, the distinctly produced tip of the upper lip; and the comparatively few wrinkles on the snout and parts around the eyes.



Rhinoceros Keitloa, Male. (Smith.)

Locality, Habits, &c.—Dr. Smith thinks that it may with propriety be inferred that the *Keitloa* has not, for many years at least, been in the habit of generally extending its range higher than about 25° S. lat. He remarks that we have sufficient evidence that individuals of this species have approached Latakoo, or rather the country some sixty miles to the north of it, in the fact that Mr. Burchell, 'whose merits as a traveller can be best appreciated by those who follow him in the same field, is at present in possession of the horns of an individual which was killed by his hunters.' Dr. Smith further states that the natives at and around Latakoo are only acquainted with two species, viz. *Borili* (*Rhinoceros bicornis* of authors) and *Mohoohoo* (*Rhinoceros simus*, Burch.); and those who were in the employ of the expedition declared, when they first saw the *Keitloa*, that it was not an animal of their country; and at once enlarged upon the points in which it differed from *Borili*. During the discussion an intelligent Moharotsi, who was well acquainted with the animal, approached, called it by its name, and referred Dr. Smith to districts where specimens were found in abundance. As he stated it happened, though everywhere the species appeared rare when compared with the others; and after several months' wanderings it was remarked that only sixty-eight individuals had been seen, eight of which, in one herd (two of them not more than half grown), were disturbed, when feeding near to the banks of a river which the party were descending, by Dr. Smith himself. According to the evidence of the natives given to Dr. Smith, the *Keitloa* is of a very savage disposition, on which account it is more feared than *Borili*, which is also deemed ferocious.

The food of this species consists of small shrubs, or the more delicate branches of brushwood, in collecting which Dr. Smith observes, the prolongation of the anterior extremity of the upper lip proves a useful assistant.

Rhinoceros simus, Burch.

Specific Character.—Pale grey brown, tinged with yellow brown; margins of the ears towards the tips, and tail both above and below at the extremity clothed with stiff black hairs; mouth ox-like; two horns, the anterior one much the longest; eyes yellowish brown. Length, body and head, 12 feet one inch. Height, at the shoulder, 5 feet 7 inches.

Description.—Pale broccoli-brown, shoulders, buttocks and belly shaded with brownish purple; hair edging the ears and tip of the tail inferiorly and superiorly black; eyes yellowish brown; horns and hoofs intermediate between broccoli and wood brown; the hoofs darkest.

Figure massive. Head longer, but more delicate in proportion, than in the other African species; face concave, forehead prominent and gibbous. Ears rather long, ovate and pointed, their edges towards the tips margined with rigid hair. Neck longer in proportion than in the other African species, with three well-marked wrinkles on the nape, two of which continue visible almost to the throat. Shoulders elevated into a convex massive hunch; line of the back slightly undulated. Legs stout, and the joints strongly developed and clumsy. Tail vertically compressed at the point, and above and below fringed with short wiry bristles. Horns situated close to the anterior extremity of the head, the foremost directly over the point of the nose, and the second immediately behind it; the first very long, tapered to a point, and slightly curved, the concavity backwards; the second is short, conical, and obtuse at the point. Nose truncated, and mouth shaped like that of an ox, the upper lip perfectly square, and without the least indication of a rudimentary proboscis. Nostrils rather small, opening laterally.

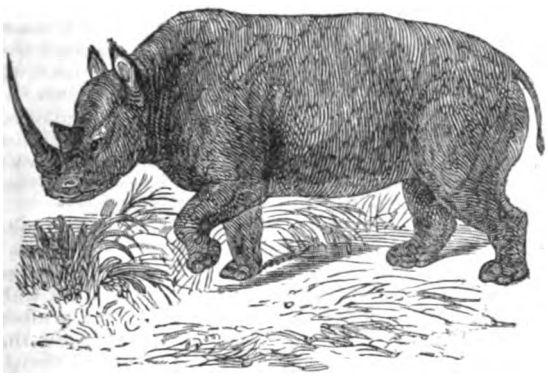
Female, coloured like the male: horns, though less powerful, generally longer than his, except the anterior one (Smith.)

'Mohoohoo, the name of this species among the Bechuanas,' says Dr. Smith, 'is considered by them to be one of the original animals of their country, and to have issued from the same cave out of which their own forefathers proceeded: in this respect they make a difference between it and *Keitloa*, with whose origin they do not profess to be acquainted. Too much attention cannot be paid to the traditions of savages: what in them often appears calculated only to excite ridicule, may, properly considered, be often made to furnish the most valuable information. Thus, for instance, by attending to what has been termed a useless tradition, we get to know, not merely that the Bechuanas believe the founders of their own nation and the animals of their country originally escaped from a large cave, but also facts of interest touching the geographical distribution of animals, inasmuch as we may rest satisfied, after being aware of the prevalence of the tradition referred to, that all the animals we find in their country, to whose progenitors the afore-mentioned birth-place is not assigned, have immigrated thither since the tradition became current. Every portion however of such traditions must not be literally received, else we shall find travellers who may hereafter visit South Africa propagating errors not less detrimental to the progress of true science than those which were circulated by Kolben, one of the first Cape historians, whose indiscreet credulity led him to relate most extraordinary fictions, *inter alias* one relative to the powers the Rhinoceros exercised over his horns, powers which, had he ever examined into the manner in which these bodies were connected with the parts around and below them, would have been too clearly imaginary to have warranted even the greatest lover of the marvellous in believing him.'

Locality, Food, Habits.—Mr. Burchell, who added so

Digitized by Google

much to our knowledge of the zoology of Africa, found, when he was in Latakoo, this species common there; and the natives told Dr. Smith that it was not unfrequently found even farther to the southward. The last-named author however tells us that it has almost ceased to exist, even in the situations where its discoverer met it; and the Doctor observes that this is accounted for by the danger to which it is exposed being now much increased from the general introduction of fire-arms among the Bechuanas. He also remarks that the form of the mouth at once suggests the kind of food upon which the animal probably subsists; and an examination of the contents of the stomach, principally grass, confirmed the inference. 'Localities abounding in grass are therefore the haunts of the Mohoohoo, and to enjoy them throughout the year, he is necessitated to lead a more wandering life than the two species already figured.'



Rhinoceros simus. (Smith.)

We have here collected, we believe, all the species of this interesting genus actually known. But the same author from whom we have so largely quoted, and to whom those interested in African zoology are so largely indebted, indicates others.

'While in the neighbourhood of the tropic,' writes Dr. Smith, 'we heard of two other species of the genus, which exist still farther to the northward; but, unfortunately, could not obtain any very circumstantial evidence concerning them, as the persons who had seen them were only on a visit in the country they inhabit. One of them was stated to approximate to the *Keitloa*; the other was described as very different to any species previously seen by them, and to have only one long horn towards the forehead. Now, though descriptions of objects by such persons are often inaccurate, from the circumstance of their not having been favourably situated for making correct observations, as well as from a deficiency of language calculated to convey the information they actually possess, I have always remarked that even a hasty examination seemed to supply the savage with more accurate notions of the general characters of animals than it did the civilised man, and therefore I do not despair of species such as they mentioned being yet discovered. It is in regard to the species with the single horn that we experience the greatest hesitation in receiving their evidence as credible; and therefore it is agreeable to have it corroborated by the testimony of a man from a very different part of the country, as obtained and published by a missionary of great research who resided a long time in Madagascar.' Dr. Smith then quotes the following passage, previously observing that the individual who furnished Mr. Freeman with the account of the Ndzoo-dzoo was a native of the country northward of the Mozambique; and that if we admit certain portions of the descriptions to be tainted with errors, we can recognise in the remainder the genuine habits of a Rhinoceros, and probably one of the species with which Dr. Smith's informants were slightly acquainted.

'It appears,' observes Mr. Freeman, 'that the Ndzoo-dzoo is by *no means rare* in Makooa. It is about the *size of a horse*, extremely *fleet* and *strong*. It has *one single horn* projecting from its forehead, from twenty-four to thirty inches in length. This is flexible when the animal is asleep; it can be curled like the trunk of the elephant, but becomes perfectly firm and hard when the animal is excited, and especially when pursuing an enemy. Its disposition is extremely *fierce*, and it universally *attacks* man if it sees him. The usual method of escape adopted by the natives is to climb up a dense and high tree, so as to avoid, if possible, being seen. If the animal misses his sight of the fugitive, he immediately gallops off to his haunt, from whence it may be inferred that he is not endowed with the power of a keen scent. Should he however espy his object in the tree, woe to the unfortunate native; he begins to *butt with his horns*, strikes and penetrates the tree, and continues piercing it till it falls, when his victim seldom escapes being gored to death. Unless the tree is of a large girth, he never fails in breaking it down. Having killed his victim, he leaves him without devouring the carcass. The male only is provided with the horn. The female has not anything of the kind.' (*South African Christian Recorder*, vol. i.) This is sufficiently romantic for Sinbad himself; but still, if we strip the description of its fabulous fringes, we see no reason for objecting to Dr. Smith's opinion as to the animal really meant.

With respect to the other Rhinoceros which was said to exhibit a resemblance to the *Keitloa*, Dr. Smith thinks that it may probably be found to belong to a species which has its principal habitat in Northern Africa, a conclusion to which he was led from an examination of a pair of horns in the Museum of the College of Surgeons obtained in Abyssinia by Mr. Salt. These horns differ considerably from those of *Rhinoceros bicornis*; and, in form, approach those of *Rhinoceros Keitloa*. Dr. Smith further observes that another pair of horns, probably of the same species, is preserved, according to Sparrman,* in the cabinet of the Royal Academy of Sciences, the foremost of which is twenty-two inches in length, and the hindmost sixteen: the distance between them is barely two inches. Different again from these and from all Rhinoceroses Dr. Smith had seen, are two contained in the British Museum, and obtained by Major Denham during his journey in North Africa; and Dr. Smith is of opinion that if they do not prove to have belonged to young individuals of *Rhinoceros simus*, they must be referred to a species not yet characterised: they are of a lighter colour than any horns which Dr. Smith had had an opportunity of examining, and, along with a peculiarly corneous aspect, they have a considerable degree of semi-transparency. The horns of *Rhinoceros simus* possess more of this character than any others yet known, which circumstance, together with the fact of which Dr. Smith had been informed by Professor Owen, namely, that clubs of Rhinoceros horn about three feet in length had been obtained from Western Africa (kingdom of Dahomy), would, in Dr. Smith's opinion, lead to a supposition that either the species discovered by Burchell, or one with certain of its characters, inhabits North Africa.†

'Now,' says Dr. Smith in conclusion, 'though I am not prepared to maintain that the horns of each individual of the same species of Rhinoceros are found to be uniform, as regards size and form, or even that the relative lengths of the first and second horns are constant in different animals, yet from what I have observed in the South African species, I do not think we are justified in believing the horns of the same species to be subject to any great variations in respect to relative length. When the Rhinoceros of Abyssinia shall have been minutely examined, it will probably be found to be distinct from the *Rhinoceros bicornis*, Linn., and be identical with the animal stated, by the natives who communicated with us near the tropic of Capricorn, to be like the *Keitloa*. The other species of which they spoke will possibly be identical with the Ndzoo-dzoo and a nondescript: while the one, from which were obtained the horns referred to as in the British Museum, may prove either a *Rhinoceros simus*, or a third undescribed species.' (*Illustrations of the Zoology of South Africa.*)

There are in the British Museum stuffed specimens of the three African species above recorded: they were purchased at the sale of the African Museum.

In Captain Harris's *Wild Sports of Southern Africa*, the reader will find lively descriptions of the chace and habits of these animals. Their flesh is not unpleasant food. Sparrman had a piece of one of the animals shot by his party broiled immediately: it tasted in a great measure like pork, but, in his opinion, was much coarser.

Fossil Rhinoceroses.

The Fossil Rhinoceroses hitherto discovered may be divided into three groups—1, those with a true or bony *sep-*

* 'Voyage to the Cape of Good Hope,' 4to., vol. ii., p. 100.

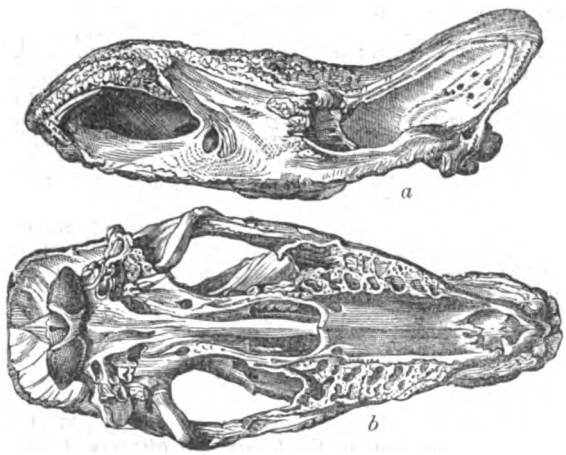
† A Rhinoceros horn wrought for a walking-staff, and so as to make it appear like the horn of 'a *real* unicorn,' was sent to this country by the king of Dahomy: it was, we believe, gorgeously fitted up and sent back to the king.

Digitized by Google

tum narium; 2, those without a bony septum; and 3, those with incisor teeth.

The greater portion of remains found in Northern and Central Europe and Asia belong to the first group; those found in Italy belong to the second.

The skulls of the Rhinoceroses belonging to the first group exhibit an essential difference when compared with those of the living species. Those of the former are longer and narrower in proportion; the width between the orbits is less; the bones of the nose are more elongated; the disk on which the anterior horn was seated is an oblong ellipse, whilst in *Rhinoceros bicornis* it is a demisphere. An analogous elongation exists in the place where the second horn was situated, whence Cuvier concludes that the horns of the Rhinoceros with a bony *septum narium* were very much compressed laterally. The same great zoologist remarks that in *Rhinoceros bicornis* or *Africanus* (Cape Rhinoceros) the occipital crest is nearly over the occipital condyles, and the posterior surface of the occiput is nearly perpendicular to the axis of the head. In *Rhinoceros Javanus* this surface is inclined forwards, which renders the distance from the nose to the crest shorter than that from the nose to the condyle in a proportion of 19 to 25; and it is much the same in *Rhinoceros Sumatrensis*. In *Rhinoceros Indicus* this forward inclination is still more remarkable, although the difference of the two lines is less in the proportion of 21 to 25, on account of the extreme height of this occipital surface. In all the fossil skulls, on the contrary, the occipital surface is strongly inclined backwards, and the distance from the nose to the crest much longer than that from the nose to the condyles. It would seem, says Cuvier in continuation, that in some fossil individuals the two horns did not touch each other; but in one from the neighbourhood of Rugby, which Cuvier saw in the Radcliffe Library at Oxford, and of which Mrs. Buckland made a drawing for his work, he is of opinion that the horns touched, for the disks on which they were seated are confounded together in one rugose surface.

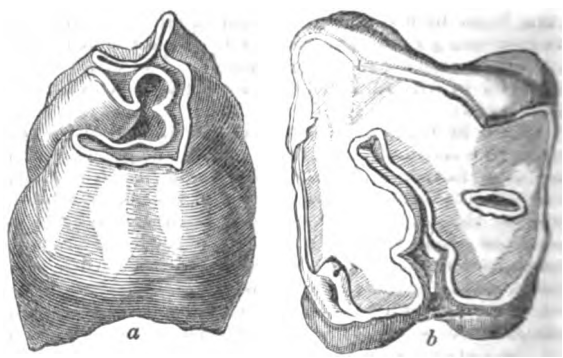


Skull of Fossil Rhinoceros. (Cuv.*) *a*, profile: *b*, seen from below.

But, besides the difference of form of the disks, there is, observes Cuvier, on the middle of the anterior one a longitudinal projecting ridge, whilst in *Rhinoceros bicornis* there is a furrow which becomes very deep forwards. Far, too, from having the anterior apophysis of the superior maxillary bone short, and the intermaxillary bones very small, as in *Rhin. bicornis*, the fossil two-horned rhinoceros with the bony septum has those parts extremely long and strong, longer even than in any of the other rhinoceroses; which renders the length of its nasal notch more considerable; in fact, a fourth of the whole length. In the young *Rhin. bicornis* it only makes a sixth, and in the adult a seventh; in the two-horned Sumatran species and the one-horned Javanese species, it is less than a fourth; and in the *Rhinoceros Indicus* rather less than a fifth. This same fossil, remarks Cuvier in continuation, has at the upper border of the incisive bone a prominence, which neither exists in *Rhinoceros bicornis*, nor in *Rhin. Sumatrensis*, nor in *Rhin. Javanus*. It exists only in *Rhin. Indicus*, which differs so much in all other respects from the fossil. the most important character of the fossil rhinoceros

* a skull from Siberia, given by Dr Buckland to the Paris Museum.

is the form of the nasal bones and their junction with the incisive bones; and it is in this part distinguished not only from the other rhinoceroses, but from all other known animals. The point of the nasal bones, instead of terminating in the air at a certain distance above the incisive bones, descends without thinning off in front of the nasal notches, and, after being divided into three projecting tubercles, is joined by a rather more delicate portion to the spot where the incisive bones unite, and themselves form two other tubercles. All four of these bones are so well soldered together, that only one suture is perceptible, even at an advanced age. The suture which distinguishes the intermaxillary from the maxillary bone is not visible. This solid construction was, observes Cuvier, no doubt destined for the support of the horn, and affords evidence that this fossil rhinoceros had larger and stronger ones than those of the present day, and a consequently increased power of using them. Behind this junction of nasal bones with the incisive bones commences a bony septum, which separates the two nostrils, and which is directed backwards in order to its junction with the *vomer*. In youth this septum appears to have been only cartilaginous; but as the animal advanced in age it became bony, and at last was soldered to the vomer, thus forming one bony continuation. No living rhinoceros yet discovered has this bony septum, the result of which is that the incisive holes are separated from each other, whilst in the living species they are confounded into one vast opening. The length of the nasal notch seems to have been the cause of the backward position of the eye, which had a more posterior situation in this rhinoceros than in the others. The notch of the posterior nostrils is much wider: it does not terminate in a point forwards, but is there nearly squared. The palate is narrower and more elongated in proportion.



a, Crown of a sixth molar, but little worn, of a fossil Rhinoceros. *b*, Molar of a fossil Rhinoceros, much worn, seen from above.

The skulls of the group of fossil rhinoceroses which have no bony *septum narium* much resemble that of *Rhinoceros bicornis*. As compared with the cranium of the ordinary fossil rhinoceros which has the bony septum, the cerebral part of the skull is less prolonged and less thrown backwards; the orbit is placed above the fifth molar; the nasal bones terminate in a free point, and are not attached to the intermaxillary bones by a vertical septum; the intermaxillaries are much less prolonged and of a different conformation, offering none of the characters which render the other fossil skulls of this genus so remarkable. But though the skulls without the bony septum approach more to that of the *Rhin. bicornis* than of any other living species, there are notwithstanding several differences. The bones of the nose in the last-mentioned fossils are delicate, straight, and pointed; whilst those of *Rhin. bicornis* are very thick and convex; the intermaxillaries of the fossil are much larger than those of *R. bicornis*, and the zygomatic arch is shorter and more convex towards the top; moreover there is a deeper depression between the part which supports the second horn and that which elevates itself to form the occipital crest.

The lower jaws of the fossil rhinoceroses do not offer less differences between each other than those of the skulls of the respective species. Those of Siberia are remarkable for the narrowed prominence of their anterior part in front of the first molars: at the extremity of this prominence Pallas thought that he detected the remains of the alveoli of incisors. In this character these jaws resemble the one-

Digitized by Google

horned rhinoceros, where the part before the molars is only a little wider. On the contrary, the most common of the Tuscan lower jaws have their molars brought very near to their point, which is short and not prolonged into a prominence; in which respect they entirely approach *Rhin. bicornis*. They also approached it in all the parts which Cuvier was able to compare, as in the roundness of the lower parts of the branches, the position and size of the holes, and the obliquity of the coronoid apophysis, more than the one-horned rhinoceroses. Differences which our limits forbid us to point out in detail, and which the student will find well followed in the *Ossemens Fossiles*, exist in the rest of the skeletons of the fossil species as compared with the living ones, and even with each other.

The fossil rhinoceroses furnished with incisor teeth were much smaller than any known species, living or fossil.

The following fossil species have been recorded:—*Rhinoceros tichorinus*, Cuv.; *Rhinoceros incisivus*, Cuv.; *Rhinoceros leptorhinus*, Cuv.; *Rhinoceros minutus*, Cuv.; *Rhinoceros elatus*, Croiz. and Job.; *Rhinoceros pachyrhinus*, Cuv.; *Rhinoceros hypselorhinus*, Kaup.; *Rhinoceros Goldfusii*, Kaup.; *Rhinoceros leptodon*, Kaup.*

Geological Position.—Remains of this genus occur in the tertiary series of beds (Miocene and Pliocene periods of Lyell; in the strata of the last-named period they are most abundant). They are extensively found in the gravel, the bone caverns, and osseous breccia. In 'Reliquiæ Diluvianæ,' Dr. Buckland states that the facts developed in the cave at Kirkdale demonstrate that there was a long succession of years in which the Elephant, Rhinoceros, and Hippopotamus had been the prey of Hyænas, which, like themselves, inhabited England in the period immediately preceding the formation of the diluvial gravel. 'If they inhabited this country,' says Dr. Buckland, in continuation, 'it follows as a corollary, that they also inhabited all those other regions of the northern hemisphere in which similar bones have been found under precisely the same circumstances, not mineralized, but simply in the state of grave bones imbedded in loam, or clay, or gravel, over great part of northern Europe, as well as North America and Siberia.' The entire Rhinoceros found in the frozen soil at Wiluji, or Vilhoui, in Siberia, recorded by Pallas, was a most striking discovery, and, followed as it was by the detection of an Elephant in a mass of ice on the shores of the North Sea [ELEPHANT, vol. ix., p. 353], aroused the minds of men to a consideration of the causes which might have produced such effects. Dr. Buckland thus comments on the state of the climate in which these extinct species may have lived:—'It is the opinion of Cuvier, on the one hand, that as some of the fossil animals differ from existing species of the genera to which they belong, it is probable that they had a constitution adapted to endure the rigours of a northern winter; and this opinion derives support from the Siberian elephant's carcass, discovered with all its flesh entire, in the ice of Tungusia, and its skin partially covered by long hair and wool; and from the hairy Rhinoceros found in 1771, in the same country, in the frozen gravel of Vilhoui, having its flesh and skin still perfect, and of which the head and feet are now preserved at St. Petersburgh, together with the skeleton of the elephant above alluded to, and a large quantity of its wool; to which Cuvier adds the further fact, that there are genera of existing animals, *e. g.* the fox tribe, which have species adapted to the extreme both of polar and tropical climates. On the other hand it is contended that the abundant occurrence of fossil crocodiles and tortoises, and of vegetables and shells (*e. g.* the *Nautilus*) nearly allied in structure and character to those which are now peculiar to hot climates in the secondary strata, as well as in the diluvium of high northern latitudes, renders it more probable that the climate was warm in which these animals lived and died, than that any change of constitution and habit should have taken place in so many animal and vegetable genera, the existing members of which are rarely found, except in the warmer regions of the present earth. To this argument I would add a still greater objection, arising from the difficulty of maintaining such animals as those we are considering amid the rigours of a polar winter; and this difficulty cannot be solved by supposing them to have migrated periodically, like the Musk-Ox and Rein-Deer of Melville Island; for in the case of Crocodiles and Tortoises extensive emigration is almost impossible, and not less so to such an unwieldy animal as the Hippopotamus when out of the water. It is equally difficult to imagine that they could have passed their winters in lakes and rivers frozen up with ice; and though the Elephant and Rhinoceros, if clothed in wool, may have fed themselves on branches of trees and brushwood during the extreme severities of winter, still I see not how even these were to be obtained in the frozen regions of Siberia, which at present produce little more than moss and lichens, which during great part of the year are buried under impenetrable ice and snow; yet it is in these regions of extreme cold, on the utmost verge of the now habitable world, that the bones of elephants are found occasionally crowded in heaps along the shores of the icy sea from Archangel to Behring's Straits, forming whole islands composed of bones and mud at the mouth of the Lena, and encased in icebergs, from which they are melted out by the solar heat of their short summer, along the coast of Tungusia, in sufficient numbers to form an important article of commerce.' Dr. Buckland then observes that he is, in the work quoted ('Reliquiæ Diluvianæ') concerned only to establish two important facts;—first, that there has been a recent and general* inundation of the globe; and, secondly, that the animals whose remains are found interred in the wreck of that inundation were natives of high north latitudes, and not drifted to their present place from equatorial regions by the waters that caused their destruction. 'One thing however is nearly certain,' adds Dr. Buckland, 'viz. that if any change of climate has taken place, it took place suddenly; for how otherwise could the elephant's carcass found entire in ice at the mouth of the Lena have been preserved from putrefaction till it was frozen up with the waters of the then existing ocean? Nor is it less probable that this change was contemporaneous with and produced by the same cause which brought on the inundation. What this cause was, whether a change in the earth's axis, or the near approach of a comet, or any other cause or combination of causes purely astronomical, is a question the discussion of which is foreign to the object of this memoir.'

The distribution over the earth's surface of the remains of this genus is very wide. Almost every bone-cavern in England, Germany, and France contained them. They occur in the Epplesheim sand, in the bone breccia at Nice, and at Gibraltar. Mr. Crawfurd collected them on the left bank of the Irawadi, 250 miles below Ava; and Captain Cautley found them in great abundance in the Sewalik mountains, at the southern foot of the Himalayas. [ELEPHANT, vol. ix., p. 354.]

RHINOCU'RUS. [FORAMINIFERA, vol. x., p. 348.]

RHINOLOPHI'NA. [CHEIROPTERA, vol. vii., p. 23.]

RHINO'LOPHUS. [CHEIROPTERA, vol. vii., p. 23.]

RHI'NOPHIS, Wagler's name for a genus of Serpents with a pointed conical muzzle, the tip of the tail enveloped in an oval horny shield, and the eyes hidden. Mr. Swainson arranges it as a subgenus of *Typhlops*, in the family *Amphisbænidæ*.

RHINOPI'RUS, Merrem's name for a genus of Serpents, *Erpeton* of Lacépède. [ERPETON.]

RHIO is a Dutch colony, established in 1817, on the island of Bintang, which lies opposite Cape Romania, one of the promontories with which the Malay peninsula terminates on the south. The island of Bintang is a little larger than that of Singapore, and contains about 300 square miles. It is however more fertile, and produces much terra japonica; above 4000 tons are annually exported. Much pepper is also grown. After Java, Malacca, and the other Dutch colonies had been restored to the Dutch, the Dutch government intended to make themselves masters of the commerce of the Indian Archipelago, and with that view took possession of the town of Rhio, where they built a fortress; but the foundation of the town of Singapore and the rapid growth of that British colony has frustrated their design: yet Rhio is a thriving place. It is visited by the Bughis and other Malay vessels from the adjacent islands, and by the Siamese, though they prefer going to Singapore, where their commodities fetch a better price and are more easily saleable. The town and fortress of Rhio are built at the entrance of a wide inlet, called the bay of Tanjong Pinang. The harbour is good and safe, but at its entrance there are many small rocky islands, which render the navi

* The *Calodonta* of Brown is a fossil rhinoceros, in all probability *Rhinoceros tichorinus*.

* See the works of Lyell, Phillips, and other geologists, and the article on GEOLOGY in this work, vol. xi., p. 129.

Digitized by Google