

*boldii* on which Dr. Bowerbank made his observations, stating that the bark was smooth and the polypes of an oblong form as in *H. lusitanicum*. It is simply a specimen of the Japanese coral from which the bark has been stripped off, and then again artificially attached to the axis, the bark having lost its external granular coat in the process, so that only the smooth inner layer of the bark is shown. The external form of the polypes has been altered in the manipulation; and I am convinced, from the irregular form that they exhibit, that if the specimen were soaked in water the animal would assume its regular circular form, and be exactly like the animal of the other Japanese specimen. I have seen some others similarly artificially altered. They are very unlike the close, regular, oblong-shaped animal of *H. lusitanicum*; and I am convinced that if Dr. Bowerbank had seen the type specimen of the latter before he wrote his paper he would not have made such a mistake.

11. Observations on the Preserved Specimens and Skeletons of the *Rhinocerotidæ* in the Collection of the British Museum and Royal College of Surgeons, including the Descriptions of Three New Species. By Dr. J. E. GRAY, F.R.S., V.P.Z.S., &c.

The *Rhinocerotæ* of Asia and Africa are known by the conformation of their jaws. The African species are easily distinguished by the form of the head and of their nose-horns. The species of Asia, on the other hand, are very difficult to separate from each other by any external character, and are only to be characterized by the form of their skulls and the locality which they inhabit, each zoological district having a peculiar species; and very probably there are yet species to be described, as the Rhinoceroses of China, of Beloochistan, and other countries have not been examined by zoologists.

The British Museum contains a good series of preserved specimens of this family, and a large series of skeletons, skulls, and horns; and there is also a very rich collection of skulls from different localities in the Museum of the Royal College of Surgeons,—the two collections affording good materials for the revision of the species of this group. I have to thank the Council of the College of Surgeons, and Mr. Flower, the energetic Curator of their Museum, for their kindness in allowing me to examine the skulls in their collection.

In the British Museum there are specimens of five species, viz. one *R. unicornis* and two *R. javanicus* from Asia, and four specimens from Africa (viz. two *R. bicornis*, one *R. simus*, and one *R. keitloa*), the three latter species being the animals that were collected and preserved under the superintendence of Sir Andrew Smith.

The Indian species (*R. unicornis*) has been often figured from life, amongst others by Dr. Parsons, in the 'Phil. Trans.' 1742, 1743, t. 1, 2; *R. sumatranus* by Mr. Bell from life in the 'Philoso-

phical Transactions ;' and *R. javanicus*, by Dr. Horsfield ; and the two latter also by Solomon Müller, in his 'Verhandlung,' who gives good figures of the adult and young.

Three African species have been well figured by Dr. Andrew Smith, in his 'Illustrations of the Animals of South Africa,' and two of them by Capt. Cornwallis Harris, in his 'Portraits of the Wild Animals of South Africa,' t. 16 & 19 ; so that the external appearances of these animals are well known.

The osteology of the species has been well represented by Camper, by Pallas (in 'Nov. Com. Petrop.' 1777), by Cuvier (in the second volume of his 'Ossemens Fossiles'), and further illustrated in De Blainville's valuable 'Ostéographie.'

In the British Museum there are three skeletons and ten skulls of the Asiatic species, and four skulls of the African *Rhinocerotus*.

The osteological collection in the British Museum is quite a modern creation, and has been made under great difficulties and with very limited funds. The Trustees at first objected to have any skulls or other bones ; but it was proved to them that mammalia and other vertebrates could not be studied without a collection of skulls. The fact was, one of the Trustees, Sir R. Inglis, was also a Trustee of the Hunterian Collection (certainly offices that are not incompatible with each other ; for my uncle, Dr. E. W. Gray, one of my predecessors in my present office, was, on the purchase of the Hunterian Collection, named one of the Trustees) ; and he stated to me that he was urged to prevent the collection of osteological specimens in the British Museum, as being a rival and injurious to the collection at the College of Surgeons. The difficulty was to a great extent removed when Mr. Bryan Hodgson offered the Museum his very large collections of skins and skeletons from the Himalayas, which were to be accepted together or declined together. Since that time the collection has rapidly increased, and, though it was much depreciated by Professor Owen in his evidence before the Royal Commissioners on the affairs of the British Museum, was then, and I believe is now, the best-determined and largest osteological collection in Europe. As to the rivalry, if any exists, it is to the benefit of both collections, for it is conducive to the activity of the Curator of each ; but I have always felt, and the present Curator of the Museum of the College of Surgeons believes, that they are able greatly to assist each other. I only know that I take almost as much interest in the collection of the College as in that under my own care.

In the British Museum there is a skull belonging to the Indian one-horned type ; it is the skull of a young animal with premolars of the milk series and the first permanent grinder appearing. It is considerably larger than the skulls of the Indian species of the same age, and therefore indicates a species fully as large as that animal. The skull is so different from that species in its compressed form and proportion that there can be no doubt that it belongs to a very distinct species, which has not before been observed. There are also two skulls from Borneo, which belong to a distinct and hitherto undescribed species.

The Museum of the College of Surgeons contains two skeletons and thirteen skulls of the Asiatic and three skulls of the African *Rhinocerotus*. One of these skulls is very interesting; it belongs to the one-horned Indian group, and is much like that of *R. unicornis* in general characters. It is an adult skull, with all the permanent teeth; and it is so much smaller than the skull of the adult or even a half-grown animal of that species, that it indicates an animal not more than half, or perhaps one-third, of the size of the common Indian Rhinoceros.

There are generally one or more skulls of the animals of the genus to be seen in the larger local museums, as, for example, at Manchester, Leeds, and York. If these skulls could be collected together and compared, they would form a most interesting collection for study; unfortunately they are generally without any certain history as to habitat &c.

Cuvier, in his essay above quoted, has given an excellent *résumé* of the history of the former knowledge of the animals; and I have only to observe that he did not discover that the skull figured by Camper, which he copied (t. 2. f. 7) and regarded as the skull of the adult *Rhinoceros bicornis*, is the skull of the *Rhinoceros keitloa*. He mentions *R. simus* as a distinct species, from M. de Blainville's note on the animal (from Mr. Burchell's MS.) in the 'Journal de Physique.'

The horns of these animals attracted the attention of Dr. Parsons, who figured several of them in a paper in the 'Philosophical Transactions' for 1742 and 1743, among the rest the horns of some African species, which have, since Cuvier's time, been determined, chiefly by the form of the horn, to be distinct species. Some of these horns are still in the British Museum.

t. 3. f. 4, 5. *Rhinoceros bicornis*, in B. M.

t. 3. f. 6. *Rhinoceros simus*, in B. M.

t. 3. f. 7. *Rhinoceros oswellii*, in B. M.

t. 3. f. 8, 9. *Rhinoceros keitloa*?

In the British Museum and in the Museum of the College of Surgeons there is a large series of the horns of both the Asiatic and African species.

### Fam. 3. RHINOCEROTIDÆ.

Nose simple. Upper lip subprehensile, with one or two horns on the central line. Toes three or five, united into a broad clavate foot, each with a separate broad nail-like hoof. Teeth:—Incisors variable or wanting, C.  $\frac{1-1}{0-0}$ , P.M.  $\frac{4-4}{4-4}$ , M.  $\frac{3-3}{3-3}$ , = 28. Molar teeth with distinct roots.

*Rhinocerina*, Gray, Ann. Phil. 1825; Cat. Mamm. B. M. 186.

*Rhinocerotus*, Giebel, Säugeth. 191.

*Rhinoceratidæ*, Owen, Odont. 587; Schinz, Syn. Mamm. ii. 332, 1845.

*Rhinoceratina*, Bonap. Prodr. Mast. 11.

*Rhinocerosidæ*, Lesson, N. Tab. R. A. 1858.

## SYNOPSIS OF THE GENERA.

I. *The skin divided into shields by well-marked folds. Skull with the intermaxillary free, elongate; upper cutting-teeth long; nasal bones produced, conical. Asiatic Rhinocerotés.*

1. RHINOCEROS. Horn single, anterior. Lumbar- and neck-folds of the skin well developed. Part of the occipital bone, near the occipital condyle, and the condyles themselves prominent.

2. CERATORHINUS. Horns two, one behind the other. Lumbar and neck-folds of the skin rudimentary. Occipital end of the skull flat. Condyle not prominent.

II. *Skin uniform, not divided into shields. Horns two. Skull:—internasal cartilaginous; intermaxillary free, very small; upper cutting-teeth none; nasal bones broad, rounded. African Rhinocerotés.*

3. RHINASTER. Head short, compressed; upper lip with a central prominence. Skull short behind; occiput erect; nasal bones rounded in front; lower jaw thick in front; grinders small, in arched series.

4. CERATOTHERIUM. Head elongate, truncated; upper lip square. Skull elongate and produced behind; occiput erect, produced above; nasal bones broad, convex, truncated, and sharp-edged in front; lower jaw tapering in front; grinders large, in straight lines.

III. *Skin uniform, not divided into shields. Horn single. Skull:—internasal bony; nasal, internasal, and intermaxillary all united into one mass. Asia and Europe.*

5. CÆLODONTA.

I. THE ASIATIC RHINOCEROTES. *Skin divided into shields, separated by distinct folds. Nose-horn single, or with a small second hinder one; nasal bones produced, conical, acute; internasals cartilaginous; intermaxillary well developed, free; upper cutting-teeth two, compressed, well developed. Lower jaw attenuated in front, with a straight lower edge. Teeth 34:—I.  $\frac{1-1}{2-2}$ . C.  $\frac{0-0}{0-0}$ . P.M.  $\frac{4-4}{4-4}$ . M.  $\frac{3-3}{3-3}$ .*

*Rhinoceros* § 2, Giebel, 205.

*Rhinoceros*, Gray, List of Mamm. B. M. 1840.

*Rhinocéros munis de dents incisives*, Cuvier, Oss. Foss. ii. 89.

The British Museum has a series of skulls of the four Asiatic species, showing the form of the skull in the different ages of the animal, from the just born to the adult or senile state.

There is a considerable difference in the form of the skull between the species which has one and that which has two horns, especially in the form of the occipital end of the skull and in the size of the occipital condyles. The difference is well represented in Bell's figure of the skull of the Sumatran animal.

I at first had a difficulty in distinguishing the difference between the skulls of the Javan and Sumatran species; but this arose from the British Museum having received from the Leyden Museum, through M. Franks, a skeleton of the *Javan* species under the name of *R. sumatranus*. But when I received a skull of the two-horned species from Pegu, the mistake in the name of the skeleton was soon discovered.

Some of the specimens of skulls of *R. unicornis* and *R. javanicus* in the British Museum have the foramen in the front of the eye over the front and others over the hinder edge of the second premolar. In both the specimens of *R. sumatranus* it is over the back edge of the first premolar.

The first premolar in the three adult specimens of *R. unicornis* is smaller than the same tooth in *R. javanicus*, and appears to be earlier shed; for in two of the skulls it has entirely disappeared with the alveolus that contained it, and in the other one the tooth is there, but it is nearly rootless and the alveolus is nearly absorbed.

The two large lateral lower cutting-teeth have a sharply keeled inner edge; but the teeth often wear almost entirely away, so that this form is lost.

The grinders of the milk or first series have much larger and more equal folds on the outer side than those of the permanent set; in the latter the front fold is linear and near the front margin of the tooth.

The teeth in some specimens appear to be rather smaller than in others, but there is a difference in the comparative size of the teeth with regard to each other in the series.

The presence or absence of small central lower incisor-teeth seems to be liable to considerable variation. In one adult skull from India there are two incisor-teeth; and in another there are two holes, but they are crowded together and are closing up.

In three specimens of *R. javanicus* there are no central lower incisor teeth, nor space for them; between the two large ones in the two other skulls, which are from younger animals, the central lower incisor teeth are well developed and cylindrical, being much the largest in the smaller and younger specimen.

The lachrymal bone varies in the different species, and is very characteristic. In *R. javanicus* and *R. nasalis* it is large, roundish, nearly as wide as high. In *R. unicornis* and *R. stenocephalus* it is narrow, oblong, erect, about twice as high as wide. In *Ceratorhinus sumatranus* it is very large, rather irregular-shaped, forming a considerable part of the cheeks of the skull. It differs a little in size and form in the specimens of the same species, but retains its general and distinctive forms.

There is a considerable variation in the size and form of the cavity under the zygomatic arch in the skulls that appear to belong to the same species. Thus in the four specimens of *R. unicornis*, which are nearly adult, two of them have the cavity short and broad, and two long and narrow. The same may be observed in the skulls of *R. javanicus* and *R. nasalis*. The aperture is widest, compared with its length, in the oldest specimens. This may probably be a sexual distinction. One of the skulls with a short wide opening is known

to have belonged to a male. The size and form of the cavity is, no doubt, greatly influenced by the age of the animal. The masseter muscle becomes thicker and shorter as the animal increases in age, the transverse width of the skull under the muscles becoming less as the animal becomes more aged (see some measurements, showing the fact, under *R. javanicus*). The same is shown to be the case in the series of skulls of *R. unicornis*.

Mr. Edward Blyth has published a memoir on the living Asiatic species of Rhinoceros, with figures of some of the skulls in the Museum of the Society, which may be consulted with advantage (see *Journal of the Asiatic Society of Bengal*, xxxi. 1862, p. 151); but unfortunately I have not had the power of comparing the skulls with those in the London collections:—

*Rhinoceros indicus*: narrow type of skull, t. 1. f. 1, t. 2. f. 1.

*R. sondaicus*: broad type of skull, t. 1. f. 2, t. 2. f. 2, from the Bengal Sundarbans, and Tenasserim; t. 1. f. 3, t. 2. f. 3, aged, from Java.

*R. sumatranus*, t. 3. f. 1, 2, male; t. 3. f. 3, female.

*R. sumatranus*, Tavoy, t. 4. f. 1–4.

The figures are from photographs, and they show the form of the occiput in the three species, confirming the fact that the occiput of the two-horned species is always flat and erect.

## 1. RHINOCEROS.

Skin divided into distinct shields by deep folds. Lumbar fold well marked, and extending from the groin to the back. Horn one, short, conical. Upper lip with a central prominence. Skull:—forehead broad, flat, or only slightly rounded; the occipital end shelving from the occipital condyle to the occipital crest; the occipital condyles large, oblong, very prominent; lachrymal bone moderate.

The skulls of the larger number of species of this genus have the forehead and the upper surface of the nose flattened; this is seen in the living animal. But one species, of which there is only a single skull of a young animal in the British Museum, has the forehead and nose subcylindrical (that is, high on the central line and arched on the sides), as is the case with the Sumatran and the African Rhinocerotés. This character, I have no doubt, is equally visible in the living animal.

### A. Forehead and nose behind the horn flat.

Nose square on the sides above; nasal short. *R. javanicus*.

Nose shelving on the sides above; upper jaw slightly contracted before the grinders.

Nasal broad, elongate . . . . . *R. unicornis*.

Nasal narrow, short . . . . . *R. nasalis*.

Upper jaw much contracted before the grinders; nasal narrow, short . . . . . *R. floweri*.

### B. Forehead and nose subcylindrical, shelving on the sides above; nasal elongate . . . . . *R. stenocephalus*.

A. *The forehead and the nose behind the base of the horn flat, both in the living animal and skull.* Eurhinoceros.

\* *Upper jaw slightly contracted in front of the grinders.*

1. RHINOCEROS JAVANICUS. Javan Rhinoceros. B.M.

Skull broad; forehead behind the horn broad, flat, or slightly concave, obscurely keeled on the sides near base of horn; intermaxillary bone elongate, slender, straight, without any upper process; lachrymal bone roundish, nearly as wide as high; nasal bones not quite two-fifths of the entire length of the nose and crown.

*Rhinoceros javanicus*, F. Cuv. et Geoff. Mam. Lith.; Gray, Cat. Mamm. B. M.; Solom. Müller, Verh. t. 33, ♂ ♀.

*R. javanus*, Blainv. Ostéogr. t. 1 (skeleton), t. 2 (skull, adult and jun.), t. 7 (teeth).

*R. sondaicus* (*R. unicolorne de Java*), Cuvier, Oss. Foss. ii. 33, t. 14. f. 2 (skull), t. 17, 18 (skeleton); Raffles, Trans. Linn. Soc. xiii.; Horsf. Zool. Java, t. (animal); Blyth, Journ. Asiat. Soc. Bengal, xxxi. 1862, p. 151, t. 1. f. 2, 3, t. 2. f. 2, 3 (skull?).

*Hab.* Java. Skull of type from Mus. Leyden.

In the British Museum there are three skulls belonging to this species:—

1. A skeleton of an adult animal with a skull, purchased from the Leyden Museum, from Java.

2. An adult skull, received from the Zoological Society.

3. A skeleton with the skull of a half-grown animal, received from the Leyden Museum through M. Franks as *R. sumatranus*, from Sumatra. The skull agrees in all particulars, especially in the form of the occiput and the concavity and breadth of the forehead and nose, with the adult skull of *R. javanicus* from Java; so that there must have been some mistake in the name and habitat; perhaps the wrong skeleton was sent.

There is also an adult skull which has had the nasal bone cut off (722 *h*), which was received from the Zoological Society under the name of *R. unicornis*; but I have little doubt it is a *R. javanicus*, perhaps from Sir Stamford Raffles.

In the oldest skull (723 *d*) the aperture under the zygoma is 3 inches 7 lines wide in the widest part and 4 inches 9 lines long. In the adult skull 723 *a*, the aperture is 3 inches wide and 6 inches 1 line long. In the skull of the young specimen (723 *e*) the aperture is 2 inches 2 lines wide and 4 inches 7 lines long. The greater width is produced by the skull under the zygoma becoming so much narrower as the animal becomes aged. In 723 *d* this part is only 4 inches 7 lines, and in 723 *a* it is 5 inches 9 lines wide.

In the Museum of the Royal College of Surgeons there are *five* skulls that appear to belong to this species, but one or two of them are in a bad condition (nos. 2970 and 2971, the rest are not numbered).

Camper, who paid great attention to this species of Rhinoceros, in a letter to Pallas, printed in the 'Neue Nord. Beyträge' (vii. 249),

first pointed out that there were two Asiatic one-horned Rhinoceroses with upper incisors. His specimen, by the misfortunes of war, fell into the hands of Cuvier, and was described by him in the 'Ossemens Fossiles' (ii. 26). Cuvier regards the height of the occipital arch and the want of the apophysis on the upper edge of the intermaxillary as the chief character of the Javan species; but the apophysis is generally absent in the Indian species, it appears only to be found in the skulls of the very old males of that kind.

2. RHINOCEROS UNICORNIS. Indian Rhinoceros. B.M.

Skull:—forehead broad, flat, concave; nose behind the horn convex, subcylindrical, rounded at the sides; lachrymal oblique, longitudinal, oblong, rather four-sided; intermaxillary bones broad, thick, with a bony process on the middle of the upper edge; nasal bones short, broad, about two-fifths of the entire length of the nose and crown; zygomatic arch of the adult rather convex.

*Rhinoceros unicornis*, Linn. S. N. i. 104; Gray, List Mamm. B. M. 186; Gerrard, Cat. Bones B. M. 286; Cuvier, Oss. Foss. ii. t. 4. f. 1; Blainv. Ostéog. t. 2 (skull, adult).

*R. asiaticus*, Blumenb. Handb. 10, Abbild. t. 7 B.

*R. indicus*, Cuv. Mém. Mus. t. ; Oss. Foss. ii. 5, t. 1-4 (bones); F. Cuv. Mamm. Lithogr. t. ; Schinz, Syn. 333; Owen, Cat. Osteol. R. C. S. 513, nos. 2975 to 3074.

*Indian Rhinoceros*, Parsons, Phil. Trans. 1742-43, p. 525, t. 1, 2 (from life).

*Rhinoceros inermis*, Lesson, Cat.

*Hab.* India.

The skull figured by Cuvier and by De Blainville for the skull of *R. unicornis*, probably from the same skull in the Paris Museum, has a broad bony process on the middle of the upper edge of the intermaxillary bones. The skeleton and skull in the British Museum (722 g), from an adult male specimen that lived for several years in the Zoological Gardens, has this bony process well marked; so that it seems common in the species, if not a peculiar character of it.

Mr. Blyth thinks that "the adult *male Rhinoceros* that lived in the Zoological Gardens for several years, stated to have been captured in *Arakan*, was *R. sondaicus*." He proceeds, "The two Asiatic one-horned species, indeed, resemble each other a great deal more nearly in external appearance than the published figures of them would lead to suppose; certainly no sportsman or ordinary observer would distinguish them apart, unless attention had been specially called to the subject."—*Journ. Asiatic Soc. Bengal*, xxxi. 1862, p. 132. This explains how the species, now described for the first time, may have been overlooked.

In the British Museum there is the skeleton (722 g) with the skull of an adult animal that lived for several years in the Zoological Gardens, referred to by Mr. Blyth, and a skull from a just born animal, which was presented by Mr. Bryan Hodgson from Nepal.

There are in the British Museum other skulls which have been



received from various persons without any special habitat that can be relied on, which appear to belong to this species. They are all without the process on the upper edge of the large thick intermaxillary bones.

1. A fully adult skull (722 *d*), marked "India?".

2. An adult skull (722 *f*) that was purchased of a dealer, without any specified locality.

In the Museum of the Royal College of Surgeons there is the skeleton of an adult animal (no. 2969 *a*) that formerly had the long front horns of an African Elephant placed on its nasal bones, which Mr. Flower, the present Curator, has properly removed.

There are also skulls of half-grown or female animals, with the seventh grinder just showing itself, of this species (nos. 2975, 2976), with a large oblong erect lachrymal.

All these skulls have thick intermaxillaries, and the front of the upper jaw, at the base of the intermaxillaries, is not suddenly contracted. In the three adult skulls it is 3 inches 9 lines wide; in the younger skull in the College of Surgeons (no. 2975) it is 3 inches 3 lines. The width of the diastema between the cutting-teeth and the front premolar is 2 inches 6 lines in all the specimens.

There is a stuffed specimen and a mounted skeleton of a young animal, just showing the horn, in the Free Museum at Liverpool, and the skull of a second of the same age. These two animals died on the voyage from Calcutta to Liverpool, were named *R. sondaicus* by Mr. Blyth, and preserved by Mr. Moore, the energetic Curator of that Museum. Mr. Blyth informs me there is a skeleton of *R. sondaicus* in the Anatomical Museum of Guy's Hospital, called *R. indicus*.

The Indian Rhinoceroses are long-lived. Mr. Blyth speaks of a pair that lived about forty-five years in captivity in Barrackpoore park: they were exactly alike in size and general appearance; they never bred; there is no difference in the horns or form of the skulls in the two sexes (Blyth, J. A. S. B. xxxi. 155).

The foetal skull of *R. unicornis* (no. 722 *D*) in the British Museum, received from Mr. Bryan Hodgson, is short; the brain-case is oblong, ovate, swollen, and convex behind; the nasal bones are about as long as they are broad at the hinder edge, transversely convex above in the middle of their length and in the deep central groove in front above; the nasal cavity is long, high, and wide; the nasal bones are three-eighths of the entire length to the occipital crest; the length of the skull from the nasal to the front of the orbit is two-fifths of the entire length to the occipital condyles. The intermaxillaries are well developed, rather thick and short; they each bear two blunt teeth, scarcely raised above the alveolus, the first on each side is much larger and thicker than the hinder one, which is small and conical. There are three grinders developed on each side, the second and third being rather more developed than the small front one. There appears to have been a fourth tooth on each side more or less developed; but it and the cavity have been lost. The palate is narrow and deeply concave, nearly of equal width, but the sides are less

erect and more expanded behind than in front; the front edge of the hinder nasal aperture is narrow, and rather in front of a line even with the hinder edge of the third grinder; the length of the palate from the front edge of the intermaxillaries is rather longer than from the end of the palate to the suture between the basal sphenoid and the basal occipital bone. The vomer is compressed, and forms a well-marked broad ridge, which is much higher in front, and divides the internal nostrils. The lower jaw has the incisors just developed, and slightly projecting beyond the alveolus; they are oblong, with a rather sharp edge on each side. There are cavities for four grinders on each side; the small first ones are lost; the second and third are equally developed, just projecting and with smooth enamel edges; and the fourth are being developed, the crown being sunk rather below the alveolar edge.

*Rhinoceros cucullatus* (Wagner, Schreb. Säugeth. vi. 317; Giebel, Säugeth. 202), described from a specimen in the Munich Museum, appears to be only a specimen of *R. unicornis*, with a second horn added by the preserver.

### 3. RHINOCEROS NASALIS. (Figs. 1, 2.) B.M.

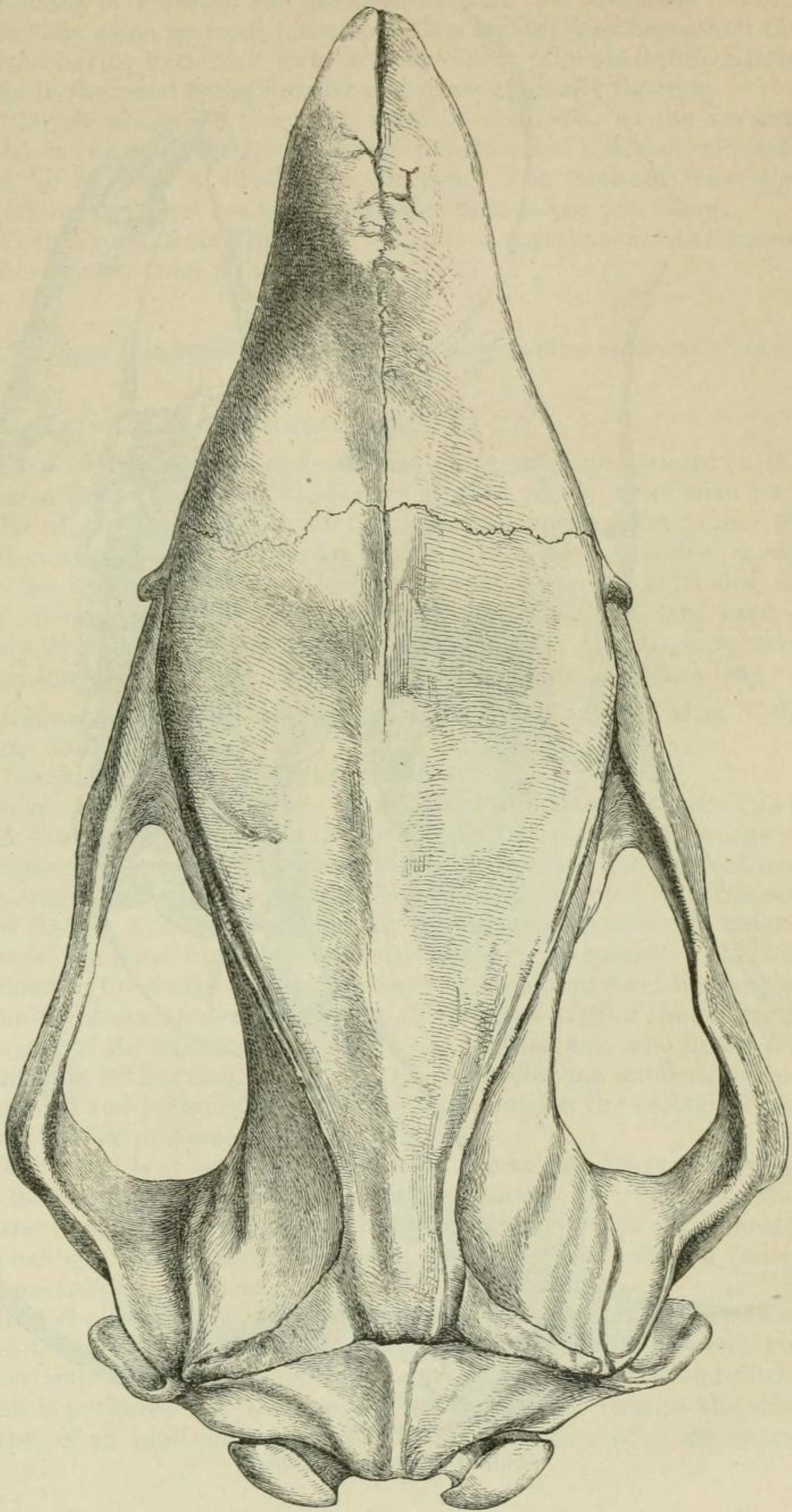
Skull elongate, the forehead and nose flat above, nose rounded on the sides in front; the nasal bones narrow, tapering, short, about two-fifths of the entire length of the skull from the nasal to the occipital crest; the zygomatic arch flat; lachrymal bone narrow, oblong, erect; the upper jaw only slightly contracted in front of the grinders ( $3\frac{1}{4}$  inches wide).

*Hab.* Borneo.

There are two not quite adult skulls in the British Museum (nos. 723*b* and 723*c*) which appear to belong to this species. They slightly differ from each other; but this may be sexual. They agree with *R. unicornis* in the flatness of the crown, forehead, and nose, and in the nose being rounded on the sides, and also in the slight contraction of the upper jaw in front of the grinders, and in the comparative flatness of the zygomatic arch. They chiefly differ from the skull of that species of the same age,—1, in the greater length of the skull; 2, in the breadth and flatness of the forehead; 3, in the line of the forehead not being so concave; 4, in the comparative slenderness and shortness of the nasal bones, they are only two-fifths of the entire length of the skull from the end of the nasal to the occipital crest, while in the skull of *R. unicornis*, nearly of the same age, in the College of Surgeons (no. 2975) the nasal bones are at least four-ninths of the entire length. The nasal bones are narrower and more tapering, being about once and one-half the length of the breadth of the base. The upper jaw behind the internasal is only slightly contracted. They are at once known from *R. javanicus* by the greater length and narrowness of the skull, and the rounded form of the upper part of the nose, but they agree with the non-adult skull of that species in the shortness of the nasal bones.

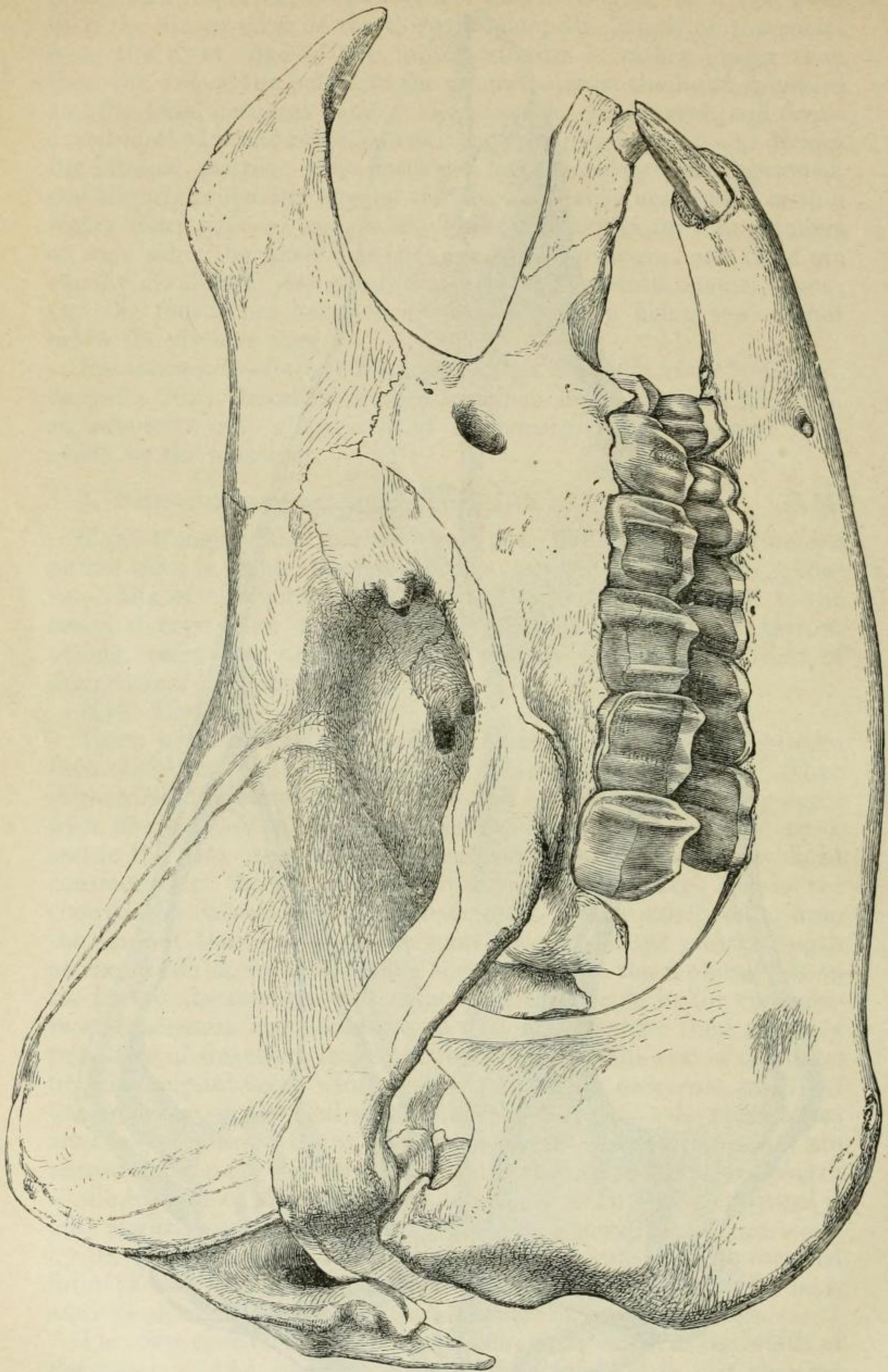
The two specimens rather vary from each other in the width of the nasal. 723*b* is a not quite adult animal; it is just showing

Fig. 1.



Skull of *Rhinoceros nasalis*.

Fig. 2.

Skull of *Rhinoceros nasalis*.

the last or seventh grinder, but it wants the intermaxillaries. It was purchased of a dealer, and has been marked "*R. sondaicus*, Cuvier, Java," by some previous possessor. The habitat may depend on the person having decided it to be *R. sondaicus*. The skull differs from 723*c* in the nasal being broader and more gradually tapering.

723*c* is nearly in the same state of dentition, as the seventh molar is just appearing. This was purchased of a dealer, who said that he received it direct from Borneo. The forehead, nose, and especially the nasal bones are narrower than in the preceding.

These skulls, from their size, indicate a species about the size or rather smaller than *R. unicornis*.

\*\* *Upper jaw much contracted and very narrow in front of the grinders.*

#### 4. RHINOCEROS FLOWERI. (Figs. 3, 4.)

Skull:—the forehead and nose flat above, the nose rounded on the sides in front; the nasal bones very slender, rather more than two-fifths of the entire length of the nose and crown; the zygomatic arch convex, arched outwards, having a very large roundish cavity for the temporal muscles; lachrymal bone elongate, expanded on the cheeks; the upper jaw suddenly contracted and very narrow (only  $2\frac{1}{2}$  inches wide) in front of the grinders; the diastema very long, longer than in the adult *R. unicornis*, being  $2\frac{3}{4}$  inches long.

*Rhinoceros sumatrensis*, Owen, Cat. Osteol. Prep. Mus. Coll. Surg. 506, no. 2934.

*Tennu*, Raffles, Linn. Trans. xiii. 164.

*Hab.* Sumatra (*Raffles*). Skull, Mus. Coll. Surgeons, no. 2934.

A skull of this species is in the Museum of the Royal College of Surgeons, described by Professor Owen as above cited, who calls it the cranium of a male Sumatran Rhinoceros (presented by Sir Stamford Raffles, P.Z.S.), observing that "the cranium offers no indication of the short hinder horn of this two-horned species." It is so distinct in form and size that I have no doubt of its belonging to a most distinct species. I propose to designate it after the energetic Curator of the Museum of the College of Surgeons, who in the few years that he has had charge of the collection has wonderfully improved it and increased its usefulness, not only to the zoological student, but for professional studies.

The skull is at once known from all the others I have examined by the convex prominent form of the zygomatics, and the contraction of the front of the upper jaw behind the cutting-teeth. It indicates a small species, not more than half the size of the common Indian Rhinoceros (*R. unicornis*).

The skull no. 2934 is that of an adult animal with all its permanent teeth. It was named *R. sumatrensis* by Professor Owen: but it certainly is not a skull of that species; for the occipital end of the skull is projected and the condyle produced, and, though the skull is that of an adult animal, there is no mark of the root of the second

Fig. 3.

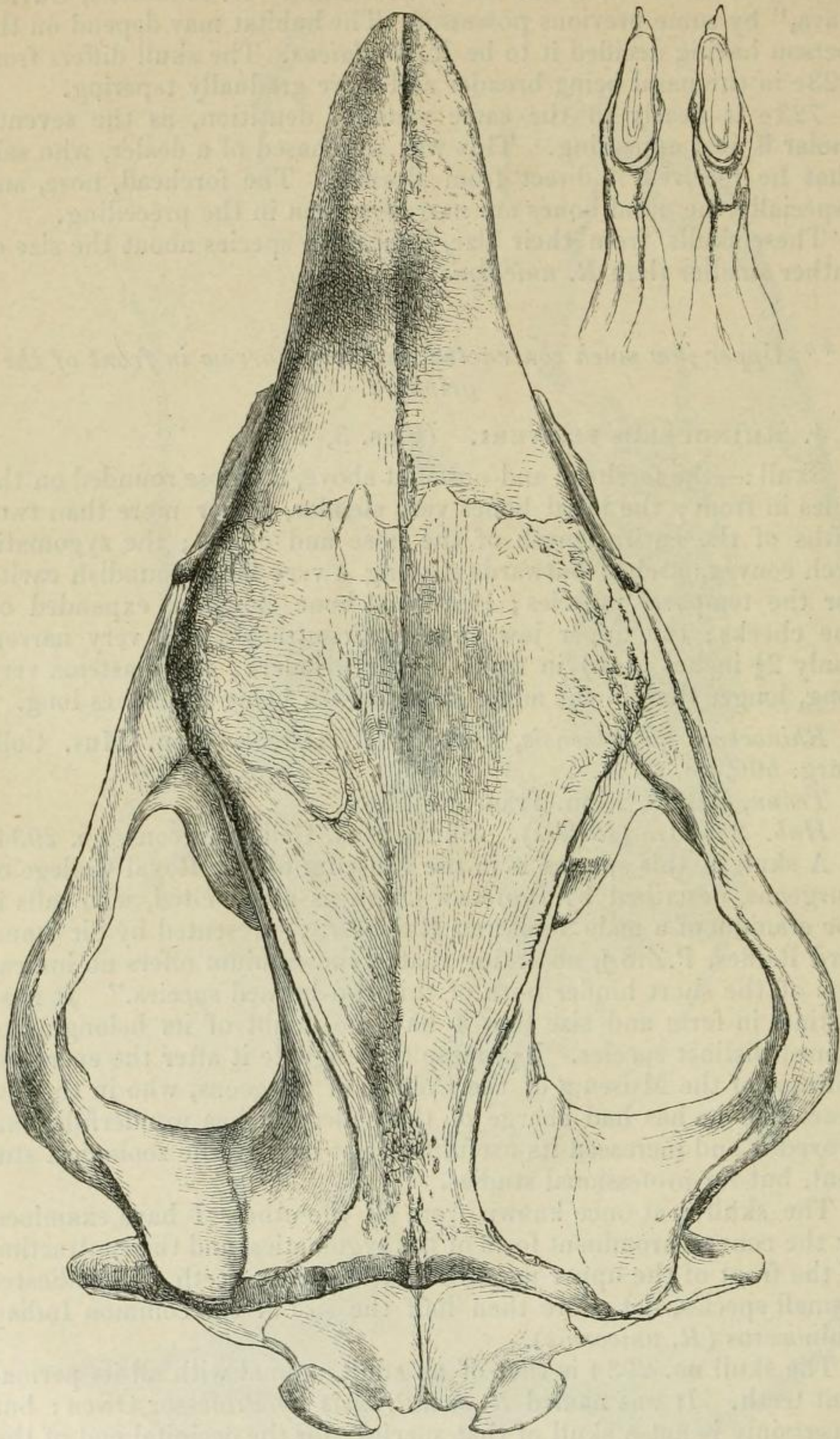
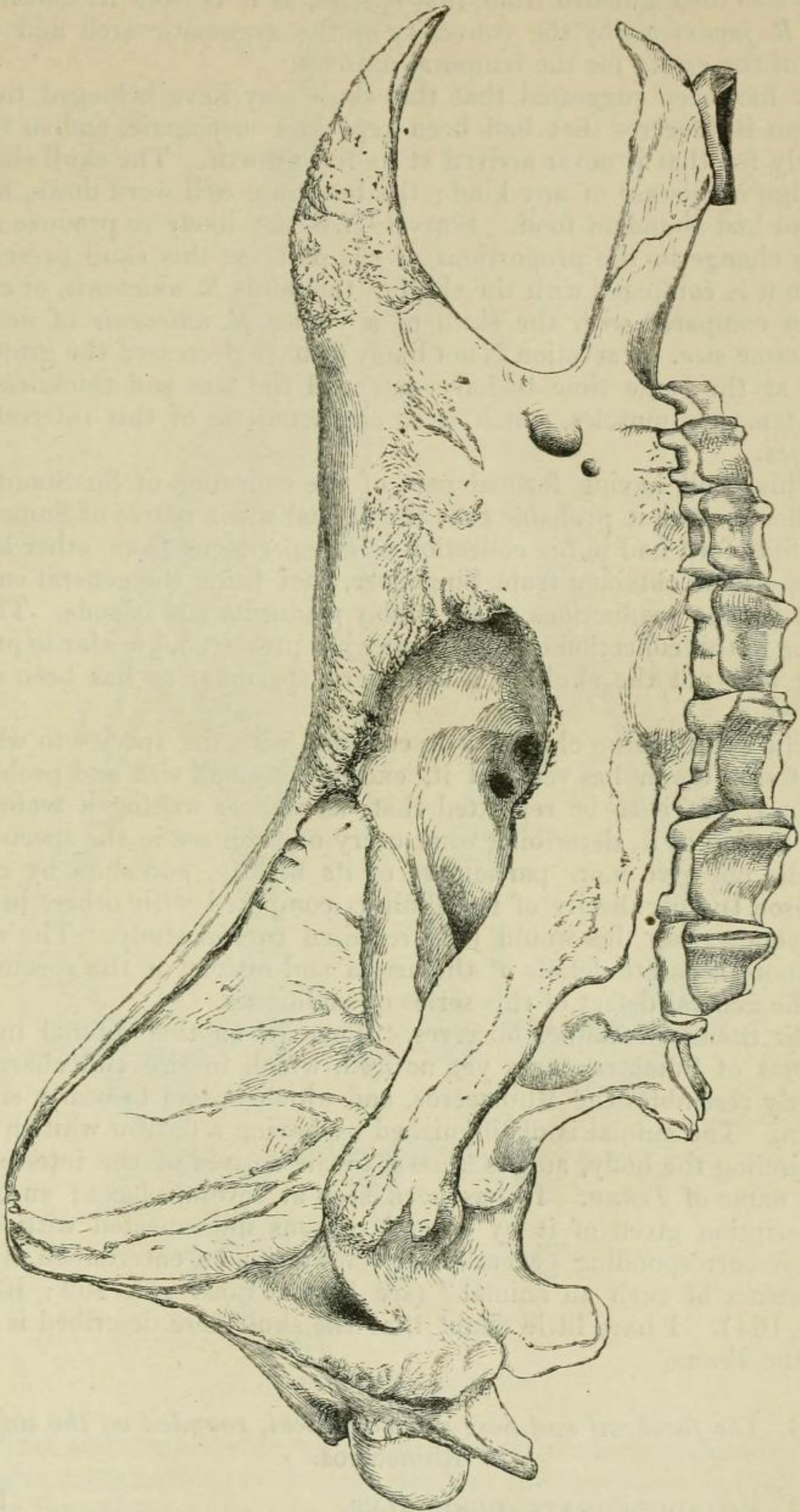
Skull of *Rhinoceros floweri*.

Fig. 4.



*Rhinoceros floweri.*

horn, which is always well marked in the adult skull of that species. It is also distinguished from that species, as it is from *R. unicornis* and *R. javanicus*, by the convexity of the zygomatic arch and the size of the cavity for the temporal muscles.

It has been suggested that this skull may have belonged to an Indian Rhinoceros that had been kept in a menagerie, and so very poorly fed that it never arrived at its full growth. The skull shows no sign of disease of any kind; the teeth are well worn down, as if it had had abundant food. Starvation is not likely to produce any such change in the proportions of the parts as this skull presents, when it is compared with the skull of the adult *R. unicornis*, or even when compared with the skull of a young *R. unicornis* of nearly the same size. Starvation is not likely to have decreased the growth, and at the same time to have extended the size and thickness of the temporal muscles, which is so characteristic of this interesting species.

This skull having formed part of the collection of Sir Stamford Raffles renders it probable that the animal was a native of Sumatra. Sir Stamford had in his collection a few specimens from other localities—some obtained from Singapore, that being the general entreport for the productions of the Malay peninsula and islands. There being in this collection only the upper jaw preserved, goes far to prove that it is not the skull of a menagerie specimen as has been suggested.

The skull has no character in common with the species to which Professor Owen has referred it, except its small size and probable habitat. It is to be regretted that, as well as writing a technical description of it, describing what every one can see in the specimen, he did not give more particulars of its history, and show by comparison the peculiarity of the skull as compared with others in the collection; but this would have required careful study. The want of more accurate details of the origin and history of the specimens is the general defect of this series of catalogues.

Sir Stamford Raffles observes, "There is another animal in the forests of Sumatra never yet noticed, which in size and character nearly resembles the Rhinoceros, and which is said to bear a single horn. The animal is distinguished by having a narrow whitish belt encircling the body, and is known to the natives of the interior by the name of *Tennu*. It has been seen at several places; and, the description given of it by several persons unconnected with each other corresponding generally, no doubt can be entertained of the existence of such an animal" (see Linn. Trans. xiii. 269; Blyth, *l. c.* 164). I have little doubt that the skull here described is that of the *Tennu*.

B. *The forehead and nose subcylindrical, rounded on the sides.*  
Rhinoceros.

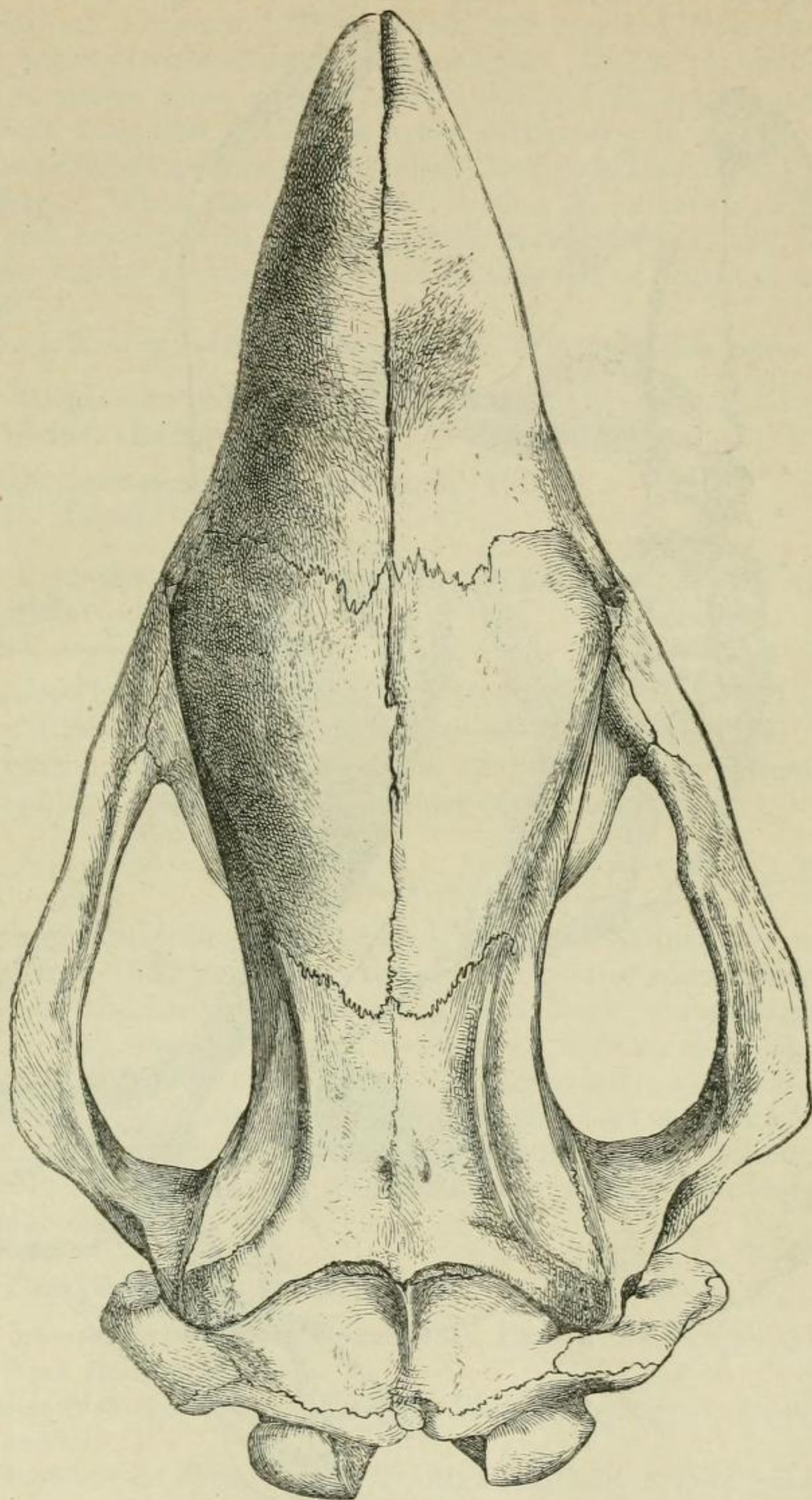
5. RHINOCEROS STENOCEPHALUS.

B.M.

Skull (half-grown) like that of *R. unicornis* of the same age, but

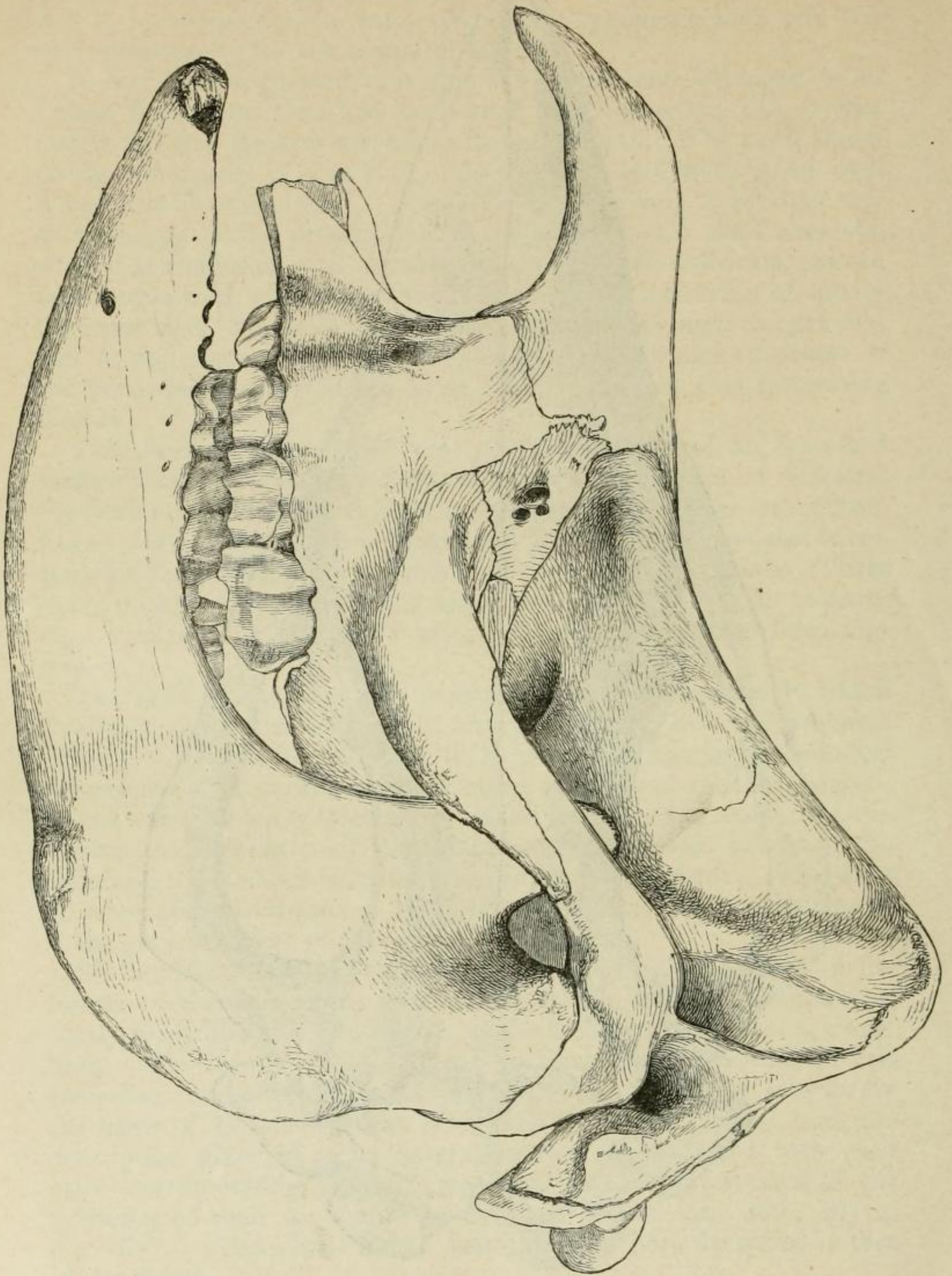


Fig. 5.

*Rhinoceros stenocephalus.*

narrower and compressed : the forehead is narrow and subcylindrical ; the nose much narrower and more slender ; the nose is semicylindrical at the base of the horn ; the nasal bones narrow, gradually tapering in front, more than twice the length of the width at the base of the

Fig. 6.

*Rhinoceros stenocephalus.*

nasal, more than four-fifths of the length of the forehead from the internasal suture to the occipital crest; lachrymal narrow, oblong, erect, about twice as high as wide.

*Hab.* Asia.

There is a single skull of a half-grown animal of this species in the British Museum (722 e), which was received from the Zoological Society, without any special habitat. In the roundness of the nose it shows some affinity to the skull of *R. sumatrensis*; it is different from that species in many particulars, in the prominence of the occipital portion of the skull, and especially of the occipital condyles. When placed by the side of a *R. unicornis* of the same size and condition of teeth it stands rather higher, and is immediately known by the length and slenderness of the nose and nasal bones.

The following fossil species probably belong to this genus:—

1. RHINOCEROS LEPTORHINUS, Cuvier, Oss. Foss. ii. 71, t. 9, 10, 11; Blainv. Ostéogr. t.

*Rhinoceros cuvieri*, Desm. Mamm. 402.

*Hab.* Fossil.

2. RHINOCEROS INCISIVUS, Cuvier, Oss. Foss. ii. 89, t. 6. f. 9, 10; Blainv. Ostéogr. 1.

*Hab.* —?

Cuvier (Oss. Foss. ii. 71, t. 9. f. 7) figures a fossil skull of a species of this genus from a drawing made at Milan by M. Adolphe Brongniart. See also an imperfect skull figured by Blainville (Ostéographie, t. 14, figure at left upper corner of the plate).

## 2. CERATORHINUS.

Skin divided into shields by deep folds, the lumbar fold rudimentary, short, only occupying the middle of the space between the groin and the back. Horns two: front longer, curved backwards; hinder small, conical. Skull:—forehead narrow, flat; the upper part of the nose on each side of the horns narrow, rounded, sub-cylindrical; the occipital region erect, the part near the condyles rather concave, the occipital condyle short, broad, oblong, placed obliquely inferior, scarcely prominent; lachrymal bone very large, irregular-shaped.

1. CERATORHINUS SUMATRANUS.

B.M.

*R. bicornis de Sumatra*, Cuvier, Oss. Foss. ii. 27, t. 4, iii. 42, t. 78. f. 8 (from Bell, skull).

*Rhinoceros sumatrensis*, Cuvier; Blainv. Ostéogr. t. 2 (skull ♀), t. 7 (teeth).

*Rhinocéros de Java*, F. Cuvier, Mam. Lithog. t. (not good).

*Sumatran Rhinoceros*, W. Bell, Phil. Trans. 1793, p. 3, t. 2, 3, 4; Home, Phil. Trans. 1821, p. 270, t. 21, 22.

*Rhinoceros sumatranus*, Raffles, Linn. Trans. xiii. 268; Blainv. Ostéogr. t. (skull); Gerrard, Cat. Bones B. M. 282; Müller, Verhand. t. 35 (old and young); Blyth, P. Z. S. 1861, p. 306, 1862, p. 1; Journ. Asiat. Soc. Bengal, xxxi. 1862, p. 151, t. 3. f. 1, 2, 3.

*Rhinoceros crossii*, Gray, P. Z. S. 1854, p. 270 fig. (horns); Gerard, Cat. Bones B. M. 282.

*Hab.* Sumatra (Bell); Tavoy, near Siamese frontier (Blyth); Pegu (Theobald, B. M.).

There are two skulls of this species in the British Museum:—  
1. Adult, with a roughness on the forehead and nose made by the roots of the horns, from Pegu. 2. A skull of a two-thirds-grown animal, with the seventh grinder just appearing; it has the forehead and nose smooth. This was received from the Zoological Society, and is probably from Sir Stamford Raffles's collection from Sumatra.

The horn in the British Museum named *R. crossii*, I have no doubt, from the figure that Mr. Blyth gives of the skull (Journ. Asiat. Soc. Bengal, 1862, t. 4), he is right in referring to this species.

When I described this horn I was told by several persons that it was only the horn of an African *Rhinoceros* that had been artificially prepared and bent back after being boiled; but the colour and structure of the horn showed that that could not be the case, and that it was the horn of a *Rhinoceros* which I had not before seen.

In the Museum of the Royal College of Surgeons there is a beautiful skeleton (no. 2938) of this species, received from Sir Stamford Raffles. There are also three skulls of adult or nearly adult age,—viz. nos. 2935, 2936, and 2938; the latter is cut open longitudinally to show the brain-cavity. From the roughness on the forehead in the adult skull, the hinder horn must be situated further back in this species than in the African *Rhinoceros*; the centre of the roughness is over the orbit. One of the skulls shows a rudimentary canine on one side of the upper jaw, placed in the front edge of the intermaxillary suture; this animal was just obtaining its first permanent molar.

The skull figured by Bell, and copied by Cuvier, represents the erect form of the occipital plane, as also does De Blainville's figure of the skull of a female. Mr. Blyth, who has seen these animals alive, thinks the horn that I provisionally described as *R. crossii* is the horn of an adult male *C. sumatranus*. He says that the horns of the females are smaller than those of the males—observing, at the same time, that there is no difference in size in the horns of the two sexes of *R. unicornis* of India. In Bell's figure of the skull the intermaxillaries are represented as curved downwards. This may have been an individual peculiarity; they are more or less bent down obliquely in the skulls I have seen, but always straight.

The *Rhinoceros de Java* of M. F. Cuvier (Mamm. Lithogr.) is only a better figure of the *R. sumatrensis*.

M. Cuvier, in the first edition of the 'Règne Animal,' says the *Rhinoceros de Java* is smaller than the *R. sumatranus*; but in the second edition he refers to his brother's figures in the 'Mamm. Lithogr.,' and alters his description; so that both *R. sumatrensis* and *R. javanensis* are established on the Sumatran *Rhinoceros*.

This species is erroneously called by Jardine, in the 'Naturalist's Library,' "*R. sumatrensis, the Lesser one-horned Rhinoceros.*"

The horns of the Rhinoceros are exceedingly difficult to procure; they are eagerly bought up at high prices by the Chinamen, who not only value them as medicine, but carve them into very elegant ornaments (Blyth, *l. c.* 158).

## 2. CERATORHINUS MONSPELLIANUS.

*R. de Montpellier*, Marcel de Serres.

*R. monspellianus*, Blainv.

*Rhinoceros megarhinus*, De Cristol; Gervais, Zool. et Paléont. Franç. ii. 43, iii. t. 2.

*Fossil*, Hérault, France.

This species chiefly differs from *R. sumatranus* in the nose behind the base of the front horn being prolonged and subcylindrical. This species has been mixed up with *R. tichorhinus* (see Gervais, *l. c.*).

The AFRICAN RHINOCEROTES. *The skin uniform, without any strong fold, except at the junction between the head and body. Nose with two horns, one behind the other, front longest. Skull:—occiput and condyles not produced. Nasal bones free, produced, broad, rounded in front. Intermaxillaries rudimentary, very small. Upper cutting-teeth none. Lower jaw arched below, thick. Teeth 28:—I.  $\frac{0-0}{0-0}$ . C.  $\frac{0-0}{0-0}$ . P.M.  $\frac{4-4}{4-4}$ . M.  $\frac{3-3}{3-3}$ .*

*Rhinaster*, Gray, List Mamm. B. M. 1840; Gerrard, Cat. Bones B. M. 281.

I am not aware that any adult African Rhinoceros has been seen living in this country; and the external appearance of the species is chiefly known by the excellent figures given by Dr. Andrew Smith, in his 'Illustrations of the Zoology of South Africa,' who figures *Rhinoceros bicornis*, *R. simus*, and *R. keitloa*. The specimens of these three species, which he collected and had stuffed by M. Verreaux under his own superintendence, are in the British Museum.

There are two well-marked forms of these animals, characterized by the shape of the head and skull. The first (or short, blunt-headed, narrow-nosed group) includes two, and the second (or long-headed, broad, square-nosed group) includes one well-marked species, and probably another distinguished by the form of the horns, of which only the horns are known.

There is a not quite adult skull of *R. bicornis*, and two adult skulls and two very young skulls of *R. simus*, in the British Museum; but the skull of *R. keitloa* is only known from the description and figure of Camper. Cuvier figured two of these skulls, but considered them the adult and young of the same species. Unfortunately, *R. oswellii* is only known from the horns; I am not aware that any skin or bones of the species have been brought to Europe. There is a large number of the horns of each of the species in the Museum collection; and they were known to Parsons, who figured them in the

'Philosophical Transactions' for 1742 and 1743; and the specimens which he figured are now in the British Museum.

There is considerable divergence of opinion among travellers respecting the horns of the African *Rhinocerotus*. Sir Andrew Smith observes, "I do not think that the horns of the same species of African Rhinoceroses are subject to any great variations in respect to relative length."—*A. Smith*.

Capt. Cornwallis Harris, on the contrary, after describing the horns of *C. bicornis* as unequal, says "the horns are sometimes nearly of the same length." Further on he observes "that sometimes accident or disease renders the front horn the shortest of the two." Perhaps Capt. Harris had not such a good knowledge of species as Sir Andrew Smith.

"The relative length of the horns varies a little in different individuals of *R. bicornis*; 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."—*A. Smith*.

"In *R. keitloa* the young have horns of equal length."—*A. Smith*.

### 3. RHINASTER. Black Rhinoceros.

Head short, high; forehead convex; nose rounded in front. Upper lip with a central conical process. Horns two, unequal. Skin smooth, not divided into shields by plaits. Skull short, high; the portion of the skull behind the hinder edge of the last or seventh grinder not so long as the portion in front of it, the occiput erect, the upper margin only slightly produced over it; forehead concave, shelving; nasal bones on the sides convex, subspherical above, rounded in front. Tooth-line curved, bent up at each end. Lower jaw thick in front. Shoulder with a more or less developed hunch.

"Living in herds; a 'browser,' feeding on leaves and young shoots of trees. It frequents forest and bush country, avoiding grassy plains."—*Kirk, P. Z. S.* 1864, p. 655.

A. *Horns cylindrical, conical, front recurved, hinder short; head short and high, swollen in front; upper lip subtruncate; shoulder-hump rudimentary.* Rhinaster.

#### 1. RHINASTER BICORNIS. Bovili. B.M.

Horns unequal, cylindrical at the base, and conical, blunt, the hinder smaller, front recurved; shoulder-hunch rudimentary, neck-grooves well marked. "Pale brown;" upper lip truncated, scarcely produced in the centre.

*Rhinoceros horn*, Parsons, Phil. Trans. 1742, 1743, t. 3. f. 3, 4.

*Rhinoceros bicornis*, Linn. S. N. i. 104; Sparrm. K. Vet. Akad. Handl. 1778, t. 9; A. Smith, Ill. Z. S. Africa, t. 2.

*Rhinocéros bicorne du Cap*, part., Giebel, 200; Cuvier, Oss. Foss. ii. 29, t. 4. f. 7, t. 16. f. 10; Blainv. Ostéogr. Onguligrades, t. 3, 4 (skull &c.).

*R. africanus*, Desm. Mamm. 400; Harris, Portraits of Wild Animals of S. A. 81, t. 11 (horns at p. 85); Duvernoy, Arch. du Mus. vii. t. 8.

*R. brucei*, Blainv.

*R. niger*, Schinz, Syn. Mamm. 335.

*Rhinaster bicornis*, Gray; Gerrard, Cat. Bones B. M. 282.

In the British Museum there is the skull of a nearly adult animal.

In the Museum of the Royal College of Surgeons is a very fine skull of an adult of this species (no. 2941), and the upper jaw covered with skin (no. 2942) and with the two horns attached to it. The horns are both circular at the base, and regular, conical, and blunt at the tip.

Schinz, who compiled a Monograph of this genus, in his Synopsis named a species *R. niger*, after Capt. Alexander's description of the *Black Rhinoceros* in his 'Travels into the Interior of South Africa.'

B. *Nose rounded in front; upper lip acute in the middle. Skull:— face short—that is, from front of orbit to nasal, not so long as from same point to occipital condyle; nasal rounded in front.*  
Keitloa.

2. RHINASTER KEITLOA. The Keitloa or Ketloa. B.M.

Upper lip with a central prominence, acute; horns elongate, hinder compressed, sharp-edged, often as long as the front one, front one rather compressed, recurved; shoulder without any hunch; skin pale yellow brown; skull short; face short from front edge of the orbit to the end of the nasal, not so long as from the front edge of orbit to occipital condyle.

Var. 1. *Keitloa*. The horns of nearly equal length; the hinder compressed, sharp-edged before and behind; the front one rather compressed, broad and flat in front.

*Rhinoceros horn*, Parsons, Phil. Trans. lvi. 32, t. 2. f. 8, 9. B.M.

*Rhinoceros ketloa* or *keitloa*, A. Smith, Cat. S. A. Mus. p. 7, 1837; Illust. Zool. S. A. t. 1; Schinz, Syn. Mam. 337.

*Rhinaster keitloa*, Gray, List Mamm. B. M.; Gerrard, Cat. Bones B. M.

Var. 2. *camperi*. The horns both compressed and sharp-edged in front and behind, the front one twice as long as the hinder; upper lip with acute central prominence.

*Rhinoceros bicornis capensis*, P. Camper, Act. Petrop. 1777, ii. 193, t. 3, 4, 5, 6 (copied Blumenbach, Abbild. t. 7. f. a).

*Rhinoceros bicornis* (adult), Cuvier, Oss. Foss. ii. t. 4. f. 5 (skull copied from Camper).

*Rhinoceros* —, Sparrman, Voy. ii. t. 3.

*R. camperi*, Schinz, Syn. Mamm. ii. 335; Monogr. t. 1.

*Black Rhinoceros*, Baker, Albert Nyanza, ii. 275; Nile Tributaries, fig. at p. 365 (head and horns).

*Hab.* South Africa (*Dr. A. Smith's type in B. M.*).

I have not seen the skull of this species, nor do I know any specimen existing in museums, unless the one described by Camper still exists.

“The length of the head of *R. keitloa*, in proportion to the depth, is very different from that of *R. bicornis*. Upper lip distinctly produced; inside of the thigh black. The horns are of equal length and development in the young animal.”—*A. Smith*.

This species is peculiar for the length of the hinder horn; but Schinz describes the front horn as very long, and the hinder short, conical.

Peter Camper, in ‘Act. Petrop.’ (1777, part 2, p. 193), described the head of a two-horned Rhinoceros which he received from the Cape of Good Hope. He figures the head and the skull in great detail. The upper lip has a distinct central process, or prehensile lobe; and the horns are both compressed and sharp-edged before and behind, the front one is the longest and regularly curved, the hinder well developed and elongate. The end of the nose of the head and skull is rounded and not square, and the nasal bones are not truncate, as in the skulls of *R. simus* in the British Museum. I believe Camper’s to be the first description of *R. keitloa* of Dr. A. Smith.

Schinz gave the name of *R. camperi* to a species which he says is *R. bicornis* of authors, and which is figured by A. Smith under that name in the ‘Illustrations of South Africa;’ but he describes the front horn as very long and recurved, and the hinder horn as small, triquetrous, *compressed*; while the hinder horn of *R. bicornis* is always conical, subcylindrical, with a circular base. Schinz’s *R. camperi* appears to be a compilation from the figures of Sir A. Smith’s *R. bicornis* and Camper’s description and figure of the head of *R. keitloa*.

P. Camper, in giving the figures of this species, properly made the drawings like a diagram, without attending to the rules of perspective, so that the compass can be applied to any part. He gives a particular name to these figures, and calls them Catograph.

In Camper’s figure the length from the back edge of the seventh molar to the front edge of the small intermaxillary is considerably greater than the distance behind the hinder edge of the last molar to the occipital condyle. In De Blainville’s figure of *R. simus*, and in the two specimens in the British Museum, the length from the hinder edge of the seventh molar to the front edge of the small intermaxillary is rather less, or about the length behind the hinder edge of the seventh molar to the outer part of the occipital condyle.

The *Keitloa* is recognized as a species distinct from *R. bicornis* by the tribes of natives; they have a different name for the two species.

If Cuvier had had a series of the skulls of *R. bicornis*, or had seen a preserved specimen of the two animals, he would never have thought that the skull figured by Camper was the adult of *R. bicornis*. The skulls of the different species alter very little in form during the growth of the animal, when they have passed the very youngest, nearly foetal, state.



## 4. CERATOTHERIUM.

Head elongate, produced behind; forehead flat; nose very broad, square at the end; upper lip bovine, rounded. Horns two, very unequal, hinder small. Skin smooth, not divided into shields. Shoulder with a well-marked hunch. Skull elongate; the portion of the skull behind the hinder edge of the last or seventh grinder as long as the one in front of it; occiput erect, the upper margin much produced behind the condyle; forehead concave; nose straight, rounded; nasal bones very broad, convex above, truncated, with a sharp edge in front; lower jaw thick, tapering in front; molars large; teeth-line straight.

The skull of the very young animal has a very convex, nearly hemispherical prominence on the nasals, and is broad and rounded in front; but the prolongation of the hinder part of the skull is shown in the foetal skull in which the milk-grinders are only just appearing, the proportion of the hinder and anterior portion being nearly the same as in the adult skulls; the occiput is erect, without any marked projecting crest.

“The first animal that disappears before firearms.”—*Kirk*, *P. Z. S.* 1864, p. 655.

“Gentle and a ‘grazer;’ living in open plains, feeding on grass.”—*A. Smith*.

## 1. CERATOTHERIUM SIMUM. Mahoohoo. B.M.

The front horn very long, slender, subcylindrical, recurved; hinder very small, conical; nose broad, high, square. “Pale grey brown; shoulder, buttocks, and belly darker.” The face of the skull from the front edge of the orbit longer than the portion of the skull behind this place.

*Rhinoceros horn*, Parsons, *Phil. Trans.* 1742, 1743, t. 3. f. 6 (front horn).

*Rhinoceros simus*, Burchell; Blainv. *Journ. de Phys.* lxxi. 163, t. (head, horns bad); Cuvier, *Oss. Foss.* ii. 28; Burchell, *Travels*, ii. 75; A. Smith, *Zool. S. A.* t. 19 (animal); *Cat. S. A. Mus.* 9, 1837; Blainv. *Ostéogr. Onguligrades*, t. 4 (skull &c.); Duvernoy, *Arch. du Mus.* vii. t. 2, 3 (skull), t. 8 (skull, junior); Sclater, *P. Z. S.* 1864, p. 100.

*R. burchellii*, Desm. *Mamm.* 401.

*R. simus* (*Chicore*), A. Smith, *Rep.* 68, 1836; Harris, *Sports in S. Africa*, p. 371.

*R. camus*, Ham. Smith; Griffith, *A. K.* v. 746.

*Rhinaster simus*, Gray, *List Mam. B. M.* 1840; Gerrard, *Cat. Bones B. M.* 282.

? *Rhinoceros gordonii*, Blainv.

*The Square-nosed or White Rhinoceros* (*R. simus*), Harris, *Portraits of Wild Animals of S. A.* 97, t. 19 (horns at p. 101).

*White Rhinoceros or Witte Rhinaster*, Colonists, Cape G. H.

*Chickore* or *Mohoohoo*, Bukeiana and Matabite.

*Hab.* South Africa (*Burchell*; *Dr. A. Smith, type spec. B. M.*); Central Africa (*Kirk*).

There is a well stuffed young specimen of this species in the British Museum, and two skulls of adult and two of very young animals.

In the Museum of the Royal College of Surgeons is a very fine adult skull of this species (no. 2960 *a*) with the two horns attached to the skin. It was obtained from Mr. Gordon Cumming's collection. It is 35 inches long from the end of the nasal to the occipital crest. The front horn is very long, slender, straight, and recurved; the front edge of the horn is worn by the animal rubbing it on the ground.

De Blainville obtained, when he was in London, from Mr. Burchell the drawing of the head of this species (engraved in the 'Journ. de Physique'); but the horns were added after it passed out of Burchell's hands, and are not the horns of the species.

In the British Museum there are two skulls of very young animals of this species that were received with the adult skulls in the collection; the milk-grinders are being formed, but could only just have been seen through the gums. The skulls are elongate, subcylindrical, and have a rounded nose, with a large nearly hemispherical prominence near the end of the upper surface for the support of the front horn. The grinders are very large compared with the size of the skulls, and occupy a great part of the cavity of the mouth; the hinder one is placed in the centre of the length of the underside of the skull from the nose to the condyles. The larger of these young skulls (1003 *b*) is very like the smaller one, but there is a fourth grinder being developed behind the third one; it is not elevated above the edge of the alveolus, and has no smooth enamelled edge. The small first grinder is only very little more developed than in the smaller skull. The line of grinders occupies  $6\frac{1}{2}$  inches. The intermaxillary bones are deficient. The palate ends, as in the smaller skull, in a line even with the back edge of the third grinder. The hinder part of the skull has lengthened more rapidly than the part in front of the edge of the palate. The nasal is slightly longer compared with the length of the skull than in the smaller specimen; they are  $4\frac{1}{6}$  inches long, the entire length being very nearly 14 inches—that is to say, nearly three-tenths of the entire length. The front of the nasal is more dilated on the sides, and becoming broader and more truncated as in the adult skulls.

The lower jaw of this specimen is considerably longer than the other; and there is little difference in the state of the teeth, except that the second and third grinders on each side are higher out of the gums, rather more worn on the edge, and the first and fourth grinders are rather more developed and larger, the first on the two sides not being quite equally developed, but one more exposed than the other.

The smaller specimen (1003 *c*) has three grinders appearing; the smallest front one is least developed, hardly raised above the alveoli, and not showing any smooth enamel; the second and third grinders are nearly equally developed, the ridges being high and edged with enamel, the rest of the teeth are minutely rugulose; the hinder edge of the third grinder is on a line even with the front edge of the

hinder nasal opening. The skull is 12 inches from the intermaxillary to the convexity of the condyle; the teeth-line is  $4\frac{1}{8}$  inches long. The facial portion (that is, the skull from the front of the intermaxillary to the front edge of the internal nostril) is only two-fifths of the entire length; it is the same length as from the front edge of the internal nostril to the suture between the basisphenoid and the basioccipital bone. Length from intermaxillary to front edge of internal nostril or end of palate 4 inches 7 lines, from end of palate to convexity of occipital condyle  $7\frac{1}{2}$  inches. The intermaxillary of one side is lost; the other has a narrow lower edge, not showing any appearance of cutting-teeth. The nearly hemispherical prominence on the nose is hollow, with thin even parietes; the cavity extends far back, and is open behind. The face, from end of nasal to the front edge of the orbit, is shorter than the part of the skull behind it, being from front end of nasal to front edge of orbit 5 inches 4 lines, from front edge of orbit to occipital crest 7 inches 2 lines. Nasal bones short and broad, being about two-sevenths of the entire length of the skull to the occipital crest.

The lower jaw shows four grinders and a cavity behind the fourth; the second and third grinders are most developed, raised above the alveolus, and furnished with a smooth enamel edge; the first small grinder is just showing, as is also the case with the fourth grinder, which is rather more developed than the front one; neither of these teeth is raised above the edge of the alveolus. The front edges marked with two or three series of small circular pits; but no cutting-teeth are visible.

In the Free Museum at Liverpool is the head of a large specimen, collected by Mr. Burke in Lord Derby's exploring party. The skin of the head is stuffed, and the skull kept separate.

An adult skull without the lower jaw is in the Museum of the London Missionary Society in Bloomfield Street, London, E.C., that was obtained by the Rev. John Campbell.

The Rev. John Campbell gives a figure of the head of this animal before the skin was removed in his work entitled 'Travels in South Africa, Second Mission' (2 vols. 8vo, London, 1822), where it is called the "head of a Unicorn killed near the City of Mashow" (plate at p. 294 of the second volume). The artist has added a regular series of nearly equal-sized square teeth all along both jaws.

This figure is copied in Froriep's 'Notizen' for 1822, at vol. ii. p. 98; and a notice of the skull is given at p. 152 of vol. i. of the same journal.

## 2. CERATOTHERIUM OSWELLII. Kobaaba. B.M. (horn).

The front horn very long, thick at the base, bent back and then forward at the end, the front of the tip worn flat.

*Très-grande corne de Rhinocéros*, Buffon, N. H. x. t. 8. f. 5.

*Rhinoceros horn*, Parsons, Phil. Trans. 1742, 1743, t. 3. f. 6.

*Rhinoceros oswellii*, Gray, P. Z. S. 1853, p. 46, f. (horn); Ann. and Mag. N. H. xv. 145.

*Rhinoceros oswellii*, Andersson, Lake Ngami, p. 386, f. (head), p. 388, f. (horn).

*Kobaaba*, Baines, Land and Water, July 28, 1866, f.

*Hab.* South Africa.

I have not seen the skull of this species, and I do not believe there is one in any European Museum.

Camper probably knew *R. oswellii*. He observes, "Cornu anterius A D in hoc specimene incurvum adeo fuit ut alterum E F H, tamquam inutile reddiderit. Verum non ita in omnibus; possideo alterius cranii partem, cujus cornu anterius rectum, et antrorsum inclinatum est."—*Camper*, l. c. 186.

Mr. Baines gave a fœtus of the *Kobaaba* to the Royal College of Surgeons (killed 3rd of June, 1862). He has shown me a series of drawings of the recently killed *Kobaaba*. One group represents the *R. simus* and *R. oswellii* side by side. The horns of the two are very different in appearance.

Mr. Baines says Mr. Chapman was informed by the natives that they had never seen a young *Kobaaba* = *R. oswellii*. Mr. Baines says that it is possible that the horn, being worn away at the end by the constant friction on the front as it passes through the bushes, may bend forward in the older specimens. The Kaffirs make the horns of the cattle bend by scraping them on the sides towards which they wish them to turn.

Schinz gives the name of *niger* to the Rhinoceros horn figured by Andersson; but he describes it as curved back, in the same words as he described the horns of the other African species.

Camper compares the labial process to a finger, and says it is not unlike the lobe at the end of the trunk of the Elephant.

See M. F. Fresnel's "Sur l'existence d'une espèce unicomne de Rhinocéros dans la partie tropicale de l'Afrique" (Comptes Rendus, xxvi. 1848, p. 281). See also A. Smith's 'Illust. Zool. S. A.' t. 1, where he says the natives mention a one-horned African species.

III. *Skin smooth, even. Skull —? Internasal bony, short; the nasal, internasal, and the intermaxillaries united into one mass. Asia and Europe, fossil.*

#### 5. CÆLODONTA.

Nose with two horns. Skull elongate; face rather produced; nasal bones broad, rounded in front; cutting-teeth none; intermaxillaries very short; internasal bony, uniting the nasals, the intermaxillary, and maxillæ into one mass. Asia, Europe, Africa.

*Rhinocéros à narines cloisonnées*, Cuvier, Oss. Foss. ii. 64.

*Cælodonta*, Brown, 1831.

## CÆLODONTA PALLASII.

*Rhinoceros*, Pallas, Acta Acad. Petrop. 1777, ii. 210, t. 9; Nov. Com. Petrop. xiii. 447, t. 9, 10.

*Rhinoceros tichorinus*, Cuvier, Oss. Foss. ii. 64, t. 7. f. 1 (skull), t. 8, 9, 11, 14 (bones); Blainv. Ostéogr. t. 13 (from Pallas).

*R. pallasii*, Desm. Mam. 402.

*R. antiquitatis*, Blainv.

*Rhinocéros de Sibérie*, Cuv. Ann. Mus. xii. 19, t. 1, 3, 4.

*Hab.* Siberia, in the ice; Fossil, Himalaya &c.

The following measurements are given in inches and lines, taken by a pair of callipers; so they are a straight line (or chord) from point to point indicated, and not a line over or along the surface. I believe they are sufficient for all zoological purposes; but it is the fashion of some zoologists and comparative anatomists to give measurements with three, and sometimes even four places of decimals, this arising from their taking a metre, about 39 inches, for the *unit*, which requires one decimal place for any measured or part of a measured inch or space under 39 inches, two for any similar measurement under 4 inches, and three for any under 5 lines. Others, to avoid this evil, write of 20 or 130 *mm.* (millimetres); but this is as inconvenient, as the latter *unit* is as much too small as the other is too large.

On pointing out this evil to a naturalist, who has published long tables with such measurements, he replied, did it not look very scientific? I fear, unfortunately, there is a desire to mystify general readers, and a quackery in natural history as in other less ennobling studies.

I have never yet met with a naturalist, even German or French, that could show me the size of a bone marked in the French metrical system; few cannot do this with considerable accuracy when marked in inches or feet. The having a measurement of well-known different lengths, as yards, feet, inches, or lines, which bear a relation to some parts of our own bodies, is a great advantage not found in the metrical system.

	<i>R. javanicus.</i>				<i>R. unicornis.</i>				<i>R. floweri.</i>	<i>R. nasalis.</i>		<i>R. stenoccephalus.</i>		<i>R. sumatranus.</i>		<i>R. bicornis.</i>	<i>R. sinus.</i>				<i>R. keitloa.</i>
	723 a.	723 d.	723 e.	722 f.	722 g.	722 h.	722 i.	722 j.	2934.	723 b.	723 c.	722 e.	1461 a.	1461 b.	1365 a.	1003 c.	1003 d.	1003 a.	1003 b.	Camper's figure.	
Length from end of nasal to centre of occipital condyles..	24 9	24 3	18 0	26 3	26 0	21 0	22 0	22 0	22 0	23 6	22 3	21 3	21 6	19 3	21 ?	12 0	14 9	29 9	28 9	27 0	
Length from end of nasal to occipital crest .....	21 0	20 3	15 9	23 0	24 6	23 9	18 6	19 3	19 3	20 9	19 3	18 9	21 0	18 6	19 6	11 0	14 0	31 3	28 3	28 6	
Length from end of nasal to front of orbit .....	11 0	10 3	7 6	11 6	11 9	9 3	9 3	9 3	9 9	10 0	9 0	9 0	10 9	9 6	8 9	5 3	6 6	14 6	14 0	10 3	
Length from end of nasal to condylar cavity.....	20 3	20 3	15 6	22 3	22 3	18 0	19 0	19 0	19 0	19 9	17 6	17 6	17 9	16 9	17 6	9 6	11 9	22 6	22 3	22 3	
Length of teeth-line of grinders..	9 9	10 3	7 0	11 0	10 6	11 0	7 9	9 6	9 6	10 3	7 6	7 6	8 3	7 6	9 0	4 6	7 0	12 3	..	14 0	
Length of nasal, centre .....	..	..	6 9	..	..	8 3	..	..	..	8 0	7 6	8 6	..	7 3	6 0	3 0	4 3	..	..	..	
Length of lower jaw to upper parts of angle .....	17 9	18 6	14 9	20 3	20 6	20 3	17 3	..	..	17 9	17 0	17 3	..	15 3	17 6	9 9	11 9	21 0	22 0	22 0	
Height of skull and lower jaw from angle to occipital crest..	17 9	16 6	12 3	20 6	21 0	20 6	16 0	..	..	16 0	14 6	16 0	..	13 3	15 9	8 0	9 0	24 6	21 3	21 3	
Height of ramus of lower jaw to condyle.....	8 9	9 0	6 6	11 0	11 3	8 9	..	..	..	9 0	7 3	9 0	..	6 9	7 6	3 3	3 6	11 6	11 3	10 0	
Width of occipital end .....	11 6	11 9	8 9	11 6	12 0	11 0	8 9	10 6	10 6	10 6	9 0	8 9	7 9	7 3	9 0	5 0	5 9	10 6	10 0	9 0	
Width of hinder part of zygomatic arch.....	14 0	13 9	10 6	16 0	15 9	14 6	12 3	13 6	13 6	13 6	9 6	11 9	11 3	10 6	12 3	6 9	..	13 0	13 6	14 3	
Width of wide part of forehead over orbits.....	8 9	7 9	6 0	8 9	9 3	8 3	7 0	7 3	7 3	7 0	6 3	6 3	6 3	5 3	7 3	4 0	..	10 9	11 6	6 6	
Width of nose at base of nasal opening.....	4 6	4 9	3 6	5 6	5 0	4 6	4 6	3 6	3 6	4 6	4 3	4 0	4 6	4 0	5 0	3 3	..	6 6	6 6	6 6	

The measurements are from the nasal bones; the intermaxillaries are sometimes wanting. The measurements have been made by Mr. Edward Gerrard. The measurements of the skull of *R. keitloa* are from the skull given in Camper's plates.