French (i.e., about 4ft. 1 English), while Harris gives 4ft. 6, but Harris's dimensions are generally exaggerated.

Distribution.-The quagga, now without doubt extinct, former! $y$ ranged over the plains of the Orange Free State and the northein and central parts of the Colouy; apparenily it never extended north of the Vaal River or east of the Kei; it wes very numerous still in the days of Harris and Gordon Cumming, and apparently soon aiter that became rare in the Colony, where it probably was finally ex. terminated about 1860; Bryden states that the last survivors in the Colony of which he has definite information, were shot at or near Tygerberg in the Aberdeen district in 1858. There is no doubt that they survived a good many years later in the Orange Free State (probably till 1878 at least), but it is diffecult to obtain any accurate information on the subject, as in so many cases this and Burchell's zebra are confused together, especially as they were both known under the name of quagga.

The last living quagga in the Zoological Gardens in London mas one presented by Sir George Grey in 155S; it survived for six years, dying in June 1864, and it is now mounted for exhibition in the British Museum; a very young foal, preserred in the South African Museum, came from Benufort West, and mas presented by Mr. A. Dale before 1862, when M r. Layard's catalogue was publisbed. Other specimens of this now extinct form can be seen in the Ediu. burgh and Tring Museums, in England, and in the Paris, Berlin, Frankfort, Mainz, Basle and Berne Museums on the continent.

History and Habits.-As in so many other cases our carliest authentic knowledge of this animal is due to Colonel Gordon's sketches and descriptions transmitted to Allacand, and subsequently reprinted by Buffon.

Before that, however, a living specimen belonging to the Prince of Wales ras figured by Edwards in 1751 as the female of the mountain zebra, and the spacies is also noted by Masson, the botanist, who travolled through the country in 1772; Gmelin's name was lounded on Edivards' figure. Among modern authors the best account of this interesting species is to be found in Bryden's works.

Like Burchell's zebra the quagga was essentially an animal oi the plains, associatiog in herds of twenty to thirty individuals, nud almost always accompanied by black wildebeest and ostrich, though in the Free State, where both it and Burchells zebra were found, they were never known to mix.

Cuvier states that one observed by him in captivity was not fierce but somerwhat "méchant" and obstinate, and that on occasions it would use its heels and teeth. A Mr. Sheriff Parkins drove a pair of quaggas at one time early in the century in a phacton, and was often seen in Hyde Park.

## Family RHINOCEROTIDAE.

## Genus RHINOCEROS,

Type.
Rhinoceros, Limacus, Syst. Nat. 12th ed. i, 104 (1766)...R. unicornis.
Atelodus, Pomel, Cat. Vert. Foss. bassin supericur de
la Loire, p. 78 (18:53)...
..R. elatus.
Rhinaster, Gray, Proc. Zool. Soc. 1867, p. 1,024............. bicornis. Ceratotherium, Gray, Proc. Zool. Soc. 1867, p. 1,027...R. simus.


Fig. 75.-Skull of Rhinoceros simus (f nat. sizo).
This genus contains all the still surviving representatives of the family, and the following are the distinguishing characters.

Animals of large sizo and of very clumsy build with naked bodies, hairs being found only on the cars and lail; eyes very
small ; horns composed of a solid mass of epidermic cells, somewhat resembling hairs, but growing from a cluster of free dermic papillae instead of as in true bairs from a sunken follicle; the horns are not in any way attached to the underlying skull, no: does any bony matter take part in their composition; they are one or two in number, and of a more or less conical shape springing from the median line of the skull.


Fig. 76.-Ceft posterior upper premolar of Ihinoceros simus (f nat. size).

Limbs stout and of moderato length with three well developed toos, ench provided with a brond rounded hoof. Skull of large size, elevated posteriorly into a transverse occipital crest ; temporal and orbital fossac confluent with no post-orbital process or bar separating them; nasal bones large and stout, co-ossified together and separated from the premaxillae by a wide fissure.

Dentition i. $\frac{2+t a 0}{2 \tan }$ c. $\frac{9}{1200} \mathrm{pm} .4 \mathrm{~m} . \frac{3}{3}=28$ to 38 ; incisors and canines variable in number, often absent, premolars and molars in a continuous series, and resembling one another in general plan, except that the anterior one is considerably smaller and often deciduous; upper molars with a straight outer edge and a doubly incurved inner edge, so as to form two transverse ridges mith a deep valley betreen; ridges of the lower molars crescentic in shape.

The existing species of the genus are confined to Southern Asia and Africa, and fall naturally into three groups, often considered by zoologists to be worthy of generic separation. These are -
(1) Rhinocerotine group, containing the two one-horned rhinoceroses found in soutbern India, Burma and the larger Malayan Islands.
(2) Ceratorhine group, comprising the two double-horned species from Assam, Burma, and the Malayin countries.
(3) Atelodine group, containing the two-horned rhinoceroses, found only in Africa, distinguished by their comparatively smooth skin, by their thick rounded and truncated nasal bones, and by the absence of incisors and canine teeth in the adults.

In the midale and later portions of the Tertiary epochs rbinoceroses were spread over the rest of the Old World, even within the arctic and subarctic regions, where roamed the woolly rhinoceros (li. antiquitatis), considered to be closely allied to the white rhinoceros; hitherto no fossil species have been found in South Africa.

## Kicy of the South African Species.

A. Larger; with a struight upper lip ........................
B. Smaller ; the upper lips provided with amedian prolongation or proboscis
I. Licornis, p. 803.
90. Rhinoceros simus. The White or Square-lipped Reinoceros.

Rhinoceros simus, Burchell, Bull. Soc. Philom. Paris, p. 96 (1817); A. Smith, S. Afr. Quntt. Joum. ii, p. 179 (1834) ; id. Illustr. Zool. S. Afr. Mamm. pl. xix (1839) Drtmmond, Proc. Zool. Soc. 1876, p. 100 ; Buckley. Proc. Zool. Soc. 1876, p. 280; Selous, Proc. Zool. Soc. 1881, p. T25 [rlistribution]; P. L. Stlater, Proc. Zool. Soc. 1886, p. 1.13, pl. xvi. fig. 1 [comparison of two species] ; Milluis, Iroc. Zool. Soc. 183:, p. 614 ; Coryndon, Proc. Zool. Soc. 1804, p. 329, pl. xviii.
Rhinoceros oswellii, Crmy, I'roc. Zool. Soc. 1853, p. 46 [fig. of homs]. Ceratotherium simum, Gray, Proc. Zool. Soc. 1867. p. 1027.
Latematcre.-larsons, Phil. Trans. (1743) pl. iii, fig. 6, horn figured; Barrow (1801), i, p. 205, supposed occurrence in Namaqualand ; Campbell (1S22) p. 294, figures hend of one shot at "Mashow" in Bechumaland; Burchell (1832), ii, p. 75, allusion to discovery; Harris (1835) pp. 148, 163, 211, notes on habits and shooting on the Marico and Limpopo Rivers; Harris (1840), figured on pl. xix; Dehirorgue (1547). i, p. 36. Zululanl ; Cumming (1855), i, pp. 2 4S', B3s, account of habits and shooting in 1844, with phate of female and young: Andersson (1856), p. 387, recog. nises and distinguishes the two species, and gives account of habits and distribution; Livingstone (1857), p. 71, notes the straight-horned variety near Lake Sgami; Baldwin (186:), pp. 1?8, 189, in Amatongaland and Marico in 1556 and 1537 ; Grout (1S63), p. 295, Zulu name; Baines (1564). p. 394, gives a deseription and mensurements of an example killed near Lake Nami; Sclous (1881), p. 81, me on its activity in hill comntry; Selous (1803), 1. 158 accomit of shooting specimen the head of which is now in
the Sonth African Museum; Nicolls and Eglington (1892). p. 64, pl. ix, fig. 33, note on approaching extinction ; Bryden (1593), p. 490, on past and present distribution; Iydekker (1803), p. 389, description and notes; Owwell in Badminton Big Game, (1894) i. p. 43, notes on the varieties of the wiste rhinoceros; Ward (1596), p. 2SS, hom measurements; Bryden
 habit and history.

Vemactar Nimbs...-Witte Rhenoster of Dutch hunters; Cimkomb, of Zulus Grout); Uinhofo of Matabele (Selous) : Mahohu (Smith) ; Chuknen (Seloust of Bechuanas; Kuabnoba of Bechuanas (Bryden) applied to the variety with the anterior straight horn.

Description.-Larger than the other species, in fact the largest of all land-animals after the elophant, hairless, except for a fringe along the edge of the ear and for the tail bristles; colour not per. ceptibly lighter than the other species, being a slaty grey black; head very long and massive; upper lip straight all round with no trace of a proboscis; nostril an elongated slit parallel to the mouth; ears longer and more pointed than in the other specics, springing from a closed cylinder about three inches long; tail much as in R. bicurnis, but with only the last quarter provided with wiry bristles.

Female rather smaller than the male, and with two mammae.
The anterior horn is situated on the nasal bones, it is usually longer and more slender than in the other species and curved gently backwards, the upper part of the front being usually partially dattened by friction against the ground; the posterior horn is as a rule short, straight, conical and somewhat laterally flattened; both horns, however, vary a good deal in length and direction, and exnmples with the anterior horn straight and directed forwards were formerly separated as a distinct species. The skull (see fig. $75, \mathrm{p} .297$ ), is altogether larger than in the other species, and the portion behind the orbit is drawn out, so that the angle formed at the occipital crest between the parietal and occipital regions is a very acute one; the front portion, too, of the mandible is much more depressed and spatulated.

Dimensions.-Of a mounted male ; head and body 13 ft .1 ; tail 260 ; height at shoulder $6 \mathrm{ft} .1 \cdot 5$; Selous gives 6 ft .6 for an individual measured by him ; ear from notch 9.0 ; ear to nose-tip 350 ; a skull of a male measures $30 \%$ in extreme length from the occipital crest to the tips of the nasals, $27 \cdot 0$ from the condyle to the premaxillae, and $13 \cdot 4$ in the gratest width.

The horns of the mounted example measure 35.0 and 7.0 respectively, the largest single horn recorded, $62 \cdot \tilde{0}$, was obtaimed by the late Roualeyn Gordon Cumming, and is now in the posses. sion of Colonel W. Gordon Cumming; a pair belonging to Mr. Selous measures $37 \cdot 4$ and 17.8 respectively.

History and Yariation.-Tho square-lipped rhinoceros was met with first of all by Burchell, during his stay in Bechumaland, though only incidentally alluded to in his account of his journey. In his paper in the Journal of the Philomathic Society of Paris, he speaks of meeting with it first at about the 26 ch degree of south latitude, but gives no exact details.

Campbell, ono of the early Bechuanaland missionaries, also figures the head of an example brought to him when at Kuruman; the figure is an excecdingly grotesque one, though obviously intended for this species.

Subsequently Harris, Cumming, Andersson and Baldwin, shot very large numbers, until about ten years ago it became exceedingly rare. We owe the greater part of our knowledge of the labits of this now nearly extinct species to Selous, to whom, too, the credit belongs, of having shown, without doubt, that there are only two distinct species of rhinoceros in South Africa. A curious variety considered by Gray to be a distiuct species, and named by him Rhinoccros oswellii, is distinguished by possessing a straight anterior horn projecting forward at an acute angle, but this is now acknowledged to be merely an accidental variation.

Distribution.-The square-lipped rhinoceros has never been found south of the Orange River or north of the Zambesi; it was first discovered by Burchell in Bechuanaland, but even in Smith's time (1835), it was driven northwards from the Kuruman neighbourhood, and during the seventies and carly eighties, it was practically externinated in Ngamiland, Matabeleland and Mashonaland, where it had fommerly been exceedingly common. The male head preserved in the South African Museum was obtained by Mr. Selous in 1882, between the Bembesi mad Sobakwi Rivers, halfway between Bulawayo and Salisbury; Coryndon states that fifteen were shot in Matabelcland in 1886, and he himself shot an old female in 1892, and two males in 1893, the two latter being now in the British and Tring Museums; finally in 1890, Mr. Arthur Eyre shot a fine male north of the Ayrshire mine near Mazoe, in north. east Mashonaland; this specimen was purchased by Mr. Rhodes and presented by him to the South African Muscum, where the mounted skin and skeleton are now exhibited.

There are still said to be a few surviving in Zululand, where they are very strictly presorved, and whero, perhaps, they may have a chance of increasing if proper precautions are observed, but even of these, six are said to have been killed in 1894, one of which is now exhibited in the Pretoria Muscum.

An imperfect skull is preserved in the South African Museum, which was dug out of the black peaty soil at a depth of eight feet, about twelve miles from the Vaal River in the Kimberley district in 1893 ; this is the southernmost locality yet recorded.

It is quite possible that this species, or one closely allied to it, may eventually be discovered in Somaliland, but hitherto no authentic accounts or specimens have reached Europe.

Habits.-The square-monthed rhinoceros is found in open country, and is particularly fond of the wide grassy valloys so frequently met with on the high veld of Matabele and Mashonaland; as a rule they are solitary, or found associating in small parties of two or three individuals, though there may have been a good many in the neighbourhoorl; Harris, for instance, speaks of seeing eighty in one day. They feed at night, or in the cooler part of the morning and evening, spending the day in sleep as often as not in the open veld under the shade of some solitary tree, but sometimes concenled in thick bush; when thus found asleep they are awakened with great difficulty and can be appronched near enough to be photographed; they are vary fond of wallowing in pools and plastering themselves all over with clay and mud; like many of the other large thin-haired animuls they are constantly accompanied by rhinoceros birds (Buphaya), which feed on the ticks and other parasites lodged on the skin of their host, and give timely warning of any approaching danger; when the rhinoceros is disturbed, and makes off, the birds Ay overhead calling and scolding all the time. The pace of the rhinoceros is fairly good considering its bulk; its swift trot will easily surpass man's power but it is, of course, no match for a horse ; when it moves, the head is carried very low so that the horn is almost parallel to the ground, and should a mother have a young call it always precedes her, being guided by the tip of ber horn gently pressing on its rump; the food of this species, in contradistinction to the other, consists, entirely of grass of which it consumes enormous quantities. It drinks very regularly about midnight, and is never a great distance from water. It has a curious habit of always depositing its excre. ment at the same place where it aceumulates in enormous masses ;
when these have reached an inconvenient height it sometimes demolishes the mass with its horn, moreover, owing to the nature of the food, the animal can always be identified by the composition of the excrement.

Little is known about the breeding habits of this species, the males are said to fight with one another very fiercely at certain times of the year, and only one young one is produced at a birth, the mother, too, exbibits great affection towards her offspring.

The square-mouthed rhinoceros is always spoken of as a most mild and inoffeosive creature, very sluggish and unsuspicious; its sight is very bad, though scent and hearing seem to be acute; this no doubt is so, and necounts to a great extent for its almost total extermination, but at the same time it has been known to charge ; Oswell, Livingstone's companion had his horse transfixed under him by an enraged individual, though Oswell himself escaped with only $a$ severe shaking.

Selous states that between August and March this animal is in a very good condition, and that the meat is then excellent.

## 91. Rhinoceros bicornis. The Comaron or Black Rhinoceros.

- Rhinoceros unicomis var. bicomis, Linnacus, Syst. Nat. 12th ed. ; 1. 104 (1760).

Hhinoceros bicomis. (imelin, Syst. Nat. i, p. 57 (1788): Thunberg Ncm. Acad. Petersb. iii, p. 830 (1811) ; A. Smilh, Illustr. Zool. S. Afr. Mamm. pl. ii (1838); Layarl, Cat. Memm. S. Afr. Mus. p. 61 (1861) ; 1'. L. Seluter, Proc. Zool. Soc. 1868, p. 529: pl. sli; Drum. mond, Proc. Zool. Soc. 1876, p. 100 ; Flower, I'roc. Zool. Soc. 1876, p. 455 [revision] ; P. L. Sclater, Trans. Zool. Soc. ix, p. 655, pl. xcix, also fig. 7, 8, 9 [heads of 3 vars] (1876); Selots, Proc. Zool. Soc. 1881, p. 725, pl. lxii [homs] ; 1'. L. Scluter. Proc. Zool. Soc. 1886. p. 143, pl. xvi, fig. 2 ; Flower, Proc. Zool. Soc. 1889 p. 448 [woodeut of 3 horned speciment.
Thinoceros africanus. (i. Cuvier, Reigne Anim. 1st ed. p. 240 (1817); Smuts, E'num. Mamm. Cap. p. 61 (1832) ; A. Smith. S. Afr. Quart. Journ. ii, p. 179 (1834).
Rhinoceros keitloa, A. Smith, App. Report Exped. Explor. S. Afr. p. 44 (1836) ; ill. Illustr. Zool. S. Afr. Mamm. pl. i (1S39); Buckley. Proc. Zool. Soc. 1876, p. 280 [listribution].
Rhinaster bicornis et keitlon, (irey, Proc. Zool. Soc. 1867, pp. 1024-5.
literatult..-Tachard (1688) p. Do, account of, with illustration; Kolben (1731), ii, p, 101, a recognisuble description of the black rhinoceros;

Camper, Act. Petrop. for 1777 , pt. 2 (1780), p. 193, pls. w.wiii, description of skull sent to author by Governor Baron van Plettenberg; Sparman in Swedish Academy Transactions (1778), p. 307, gives a description of individuads met with by him; Buffon (1782), Suppl. vi, p. 78, pl. vi, aceount copied from Allamand; Sparman (1795), ii, pp. 97, 104, pl. iii, account of specimen obtained by him at Commadagga in Somerset East; Lichtenstein (1812), i. 1p. 9S, 344 , met with rhinoceros in Calvinia and on the little Fis River in 18034; Burchell (1824), ii, p. 72, met two in Britstown and gives notes on their habits; Stecdman (1595), $\mathbf{i}$ p 69 , mentions the occurence of a specimen on the Great Fish liver nbout 1826; Harris (183s1, ple. 8.4
 Orange Free State; Harris (1840), figured on pl. xwi ; Methuen (18.4s). p. 135, 163 , account of the two species and their habits; Cumming (1sin), i, p. 249 , met his first rhinoceros at the head waters of the Marico river in western Trams rial; Andersson (1856), p. 385, account of two species with distribution and habits; Livingstone (1897), p. E6, notes that ther ar ulways found near water ; Holl (1857), p. 7, on habits, distribution and dis. tinction; Grout (1863), p. 295, gives the Zulu mane; Drummond (1875), pi 72, devotes a chapter to the shooting and natural history; Theal (1888), $\mathrm{i}, \mathrm{j}$. 65, records the presence of shinoceroses close to Cape Town in wan Rielueck's time [1658], p. 291, gives an account of the upsetting of Simon van der Stel's coach near Piquetbers in 1685, by an individual; Bryden (18s9). p. 2s6, discusses their extinction in Cape Colony; Nicolls and Fglington (1592),
 present distribution; Lydelker (1893), p. 356 , description and figurc Sclous ( 15931, p. 45, measurements of an individual shot near the Chobe Iiver ; Oswell and Jackson (1594), pp. 45 and 251 in " Jadminton Jig Game Shooting" reminisecnces of shooting; Fixby (1.896), p. 5.j0. mative names and distribution in Enstern Transwanl Ward (1896), p. 2st, horn measuretuents;
 habits; Kirby (1599a), p. $8 \overline{0}$, range and habits in South drrica.

Tersacclar Names.- Phenoster or Zwart Rl: noster of ihe Duteh hunters; Cpejani of the Zulus (Grout) and Swazis (Kirler) ; Ciupergin of the Matabele (Selous): Upelepe of the Basutos (Tiirby); Borele of the Bechuanas (Smith). The variety in which the posterior hom is as long o: longer than the anterior horn is called Feitloa by the Bechwanas (Smith) and Shaugainea by the Matabele (Selous).

Description.-Hairless, except for a fringe along the margins of the ears and on cither side of the extremity of the tail; skin almost smooth and rery thick; general colour slaty grey, not noticeably darker than the other species; head comparatively short; upper lip with a very distinct median prolongation forming a kind of rudimentary proboscis; nostrils somewhat oval, not clongated; eye very small; ears somewhat funnel-shaped with rounded tips, the
margins clothed with a fringe of black hair; limbs solid and massive, each with three broad nail-like hoofs; tail reaching about three quarters of the way to the hocks with a double line of bristles on the posterior two-thirds.

Anterior horn rising from the nasal bones, rounded at the base, where it is often rough and frayed out, so to speak, above becoming laterally flattened and greatly curved backwards, usually exceeding the posterior horn in length ; this latter is situated on the frontal bones just above the cye and is usually straight and conical and much inferior in development to the anterior one; but both the horns vary very considerably in shape and size. The skull is much shorter than that of $R$. simus and the angle formed by the parictal and occipital surfaces at the crest is much more nearly a right angle; the front part of the mandible too, is not nearly so depressed and spatulated as in $R$. simus.

As in the other species there are no incisors or canines in either jaw, though indistinct marks of the sockets can be seen; moreover, the premaxillae are much reduced, and consist only of two small nodules of bone at the tips of the maxillae.

Dimensions.-From a mounted specimen; head and body 10 ft . 2 ; tail 28.0 ; height at shoulder 5 ft .0 .5 ; length of ears 7.5 ; from ear opening to nose-tip 25.0 ; length of a skull from the tip of the nasals to the occipital crest $22 \cdot 5$; from premaxillac to occipital condyle 22.5 ; extreme breadth 12.5 . Average horns measure, the anterior from 18 to 20 in , and the posterior from 7 to 8 in . respectively. Ward notices a hend from Zululand, of which the anterior horn reached $41 \cdot 5$, while the posterior was only 10 ; while in another case the anterior was $32 \cdot 5$, and the posterior 19.0 , these are the longest recorded anterior and posterior horns.

History and Xariations.-This species became known at the time of the first settlement at the Cape in 1653; it is frequently mentioned in van Riebeck's diary, and apparently at that time, was common enough on the slopes of Table Mountain and on the Cape Flats; a further incident corroborating this is, that the coach in which Simon van der Stel, the Governor, was proceeding northwards, on a journey to Namaqualand in 1685, was upset in the neighbourhood of Piquetberg, by the charge of a rbinoceros, and the Governor himself had a narrow escape. Tachard, who spent some few weeks at the Cape at the same time (1685), and Kolben who wrote about fifty years later, both caricature the rhinoceros shamefully in their representations, but the latter gives a very
amusing description of the animal, in which many iables are mingled with truth; finally, the rhinoceros emerges from myth through the observations of Colonel Gordon transmitted to Allamand, and of Sparman whose researches were made on a freshly killed individun! in what is now the Somerset East divis:on of the Colony.

A variety which appears to be only an accidental one, in which the posterior horn is equal to, or excoeds the antorior one, was long considered a distinct species under the name of $I$. keillot; that every gradation between the relative size of the two horus is found in nature, and that the distinction is not of specific value, was first proved by Selous in his paper above quoted.

Occasionally, a curious triple-horned variety has been found, one such is described by Flower (op.c.) from near Mount Liilima-njaro in East Africa, in which the third horn forms an unsymmetrical triangular elevation about $5 \underline{1}$ inches high in the medin line of the lower part of the forchead.

Distribution.-The common rhinoceros was formerly widespread throughout the whole of South Africa, though now it has been driven out of all the more accessible districts. At the end of the last century it was still common along the south coast of the Colony, Colonel Gorlou shot one on the Gamka River, in what is now Oudtshoorn and Sparrman obtained his specimen near the junction of the Fish rivers in Somerset East; according to Ha!l the last one in the Colony, an old male, was shot in 1853, on the Coega River, close to Port Elizabeth, while in the Orange Free State the last recorded was killed in 1842, at Rhenoster Kop, jus: south of the Vaal River in the Kroonstad district.

In Harris and Cumming's time (1838-45), rhinoceroses were sill quite common in Bechuanaland, but now they are extinct both there and probably also in Rhodesia. In fact at the present time Zulu. land, the Lydenburg district (where in few are preserved) the BeiraZambesi country and perhaps Ovampoland, seem to bo their last hannts south of the Zambesi; beyond our limits the common rhinoceros extends through Nyasaland and liast Africa, where in some parts it is extremely abundant to the Upper Nile basin aud to Somaliland.

The South African Museum possesses a mounted head and skull obtained in Mashonaland in $188 \pm$ by Mr. Selous, and a comple: mounted specimen and skeleton obtained ten years later, also in Mashonaland by Mr. W. Harvey Brown.

Habits.-The common rhinoceros frequents bush covered country more than the open grass-lands, and is often found in rocky stony districts; it is generally solitary, being of a morose and unsociable disposition, though of course occasionally associating in small family parties; the rhinoceros birds (Buphaga and Textor) are usually in attendance. Like the other species it is nocturnal in its habits, eating and drinking during the night and spending the day in sleop, sometimes in dense thorny thickets, sometimes under tho shade of a solitary tree or a large rock in the open plains, generally resting with its stern up wind; in dull cloudy weather, it may occasionally be seen feeding during the daytime, but this is not of common occurrence. The only sounds to which it gives vent appear to be grunts and snorts of rage ; when disturbed it makes off in any direction, usually down wind, but after a short way gradually wheels round up wind, its pace being fairly good, better than that of the square-mouthed species; when moving along it holds its head high up, and if a calf is present it follows its mother instead of preceding it.

Its food consists entirely of the leaves, twigs, and sometimes the roots of certain buskes and shrubs, never of grass, and their excrement which they scatler about with their horns and never allow to accumulate, is dark coloured and full of twigs and chips; they drink in the evening and at dawn, often wallowing at the latter time.

During certain seasons the males fight with one another, but little is known about details of their breeding habits; probably ouly one calf is born at a time.

The scent and hearing of the rhinoceros is very keen but its eyesight is exceedingly poor; in disposition it is morose and solitary with coarse aud uncouth manner, great irascibility, unbounded curiosity and sivgular nervous excitability; it is subject to paroxysms of fury when it tears up tho ground in great furrows with its homs, and behaves generally in a most whimsical mamer.

Much has been written by the carlier writers about the danger of meddling with rhinoceroses, and it is generally stated that they will charge without provocation; Mr. Selous, however, does not consider them to be nearly so dangerous as usually represented, and states that only on one occasion was he ever charged without any reason, and further, he believes that many of the stories are due to the fact that the eyesight of the animal being very poor, it makes mad rushes in one particular direction with the object of escaping,
not of charging ; there can be no doubt, however, that many fatal accidents have occurred through charges of the black rhinoceros, whether pre-meditated or accidental, and that great care should be exercised in approaching either an untouched or wounded animal.

## Suborder HYRACOIDEA.

## Family PROCAVIIDAE.

This suborder contains a single family of somewhat obscure affinities, and is confined to Africa and the south western corner of Asia. Owing to the fact that the members of this group show considerable external resemblance to the rodents, they woro by the earlier naturalists placed in that order; the first author who carefully examined their internal structure and dental characters was Baron George Cuvier, who believed that they were really most closely allied to the Perrisodactyle Ungulates, and should be placed near Rhinoceros. Subsequent further investigations by Milne Edwards and Huxley, went to disprove this very close relationship, and demonstrated that they really occupied a very isolated position with a general affinity only to the Ungulates. Nor has palaeontology hitherto thrown much light on the origin of this interesting group, though recently a number of fossil forms from the cretaceous beds of the Argentine have been described by Ameghino,* which may be expected later on to clear up the mystery of the relationships of this suborder to the other Ungulates.

The following are the more important characters of the Suborder and Family.

Small or modente-sized animals with practically no tail, with the three middle toes of the fore foot about equally developed, the outer or fifth much smaller, and the inner or hallux a mere rudiment; the hind foot with three well developed toes, the fifth being quite rudimentary and the first absent altogether; all the toes end in broad, flat, short nails, except the second digit of the hind foot, the last ungunl phalanx of which is deeply cleft at the tip aud bears i long curved claw; the dorsal vertebrae are numerous, twentycight to thirty, of which twenty-one to twenty-two bear ribs; as in other Ungulates there are no clavicles.

Dentition i. ㅅ, c. $\frac{0}{6}$, pm. $\frac{4}{4}$, m. $\mathrm{g}_{\mathrm{g}}=34$ : upper incisors long and

[^0]curved growing from persistent pulps like those of rodents, not flattened and chisel-shaped but prismatic in section and pointed, with no enamel coating on their binder surfaces, lower incisors straight and somewhat procumbent, awl or gouge-shaped; a considerable space separates the incisors from the cheek teeth; these, both premolars and molars are all contiguous, the anterior tooth being small and generally single-rooted and dropping out in adult skulls; the molar pattern resembles that of the horses and


Fig. 77.-Shull, side view, and left hall of palate of Procavia capensis.
rhinoceroses; in the upper jaw each tooth has an outer longitudinal and two transverse ridges with a valley between, and in the lower jaw each tooth has a double crescent.

Other special anatomical characters are as follows :-Stomach horse-like; on the intestine some way below the ordinary sacculated caecum usually present in mammals, a pair of large conical-pointed caeca are found quite unique in the mammalian class; no gall bladder to the liver; brain ungulate-like; testes abdominal; placenta zonary.


[^0]:    - Ameghino Bol. Inst. Geogr. Argent. XYIII. (1397).

