

BURCHELL'S ORIGINAL SPECIMENS OF *RHINOCEROS SIMUS*

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[Accepted 12th December 1961]

(With 4 plates)

Burchell's surviving syntypical specimens of *Rhinoceros simus* are identified and described and one of them is designated the lectotype of the species. Evidence is submitted in support of the separate generic identity of the White rhinoceros, under the title *Ceratotherium simum* Gray.

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INTRODUCTION

The White or Square-lipped African rhinoceros (*Rhinoceros simus* Burchell: *Ceratotherium simum* Gray) was first encountered and recognised as a scientifically new form by William John Burchell (1782-1863) at Chué Springs in Bechuanaland on 16 October 1812. Its formal description was not however published until five years later (Burchell, 1817a), when an extremely brief, unillustrated and morphologically incomplete account of this new rhinoceros species was given, in the French language, in a somewhat obscure journal.

The details of Burchell's discovery, and an identification of the type locality of *Rhinoceros simus*, have appeared elsewhere (Cave, 1947) together with a list of all the rhinoceros material (whether of the White or the Black African species) collected by Burchell in Southern Africa. This material comprised various skulls, horns and teeth, some of which, together with representations of the living animal, were admirably delineated by Burchell in his unpublished field note-books, now preserved in the library of the University of the Witwatersrand in the custody of the Gubbins Trustees.

Neither in his original (1817a) description of his new rhinoceros species, nor in his later *Travels* (1822-24), did Burchell select from among his syntypical *Rhinoceros simus* material any one specimen to serve as the holotype of the species, and only a small proportion of this material was brought by him to England. Perhaps because of transport difficulties alone, no original skull or skeleton of *Rhinoceros simus* was brought out of Africa, the more portable specimens reaching England consisting solely of certain individual

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teeth, some horns and the horn-bearing (but hornless) epinasal skin from two animals.

The fate of this imported syntypical *R. simus* material is traceable. None of it, curiously, reached the British Museum, for none is mentioned in the *List* (Burchell 1817b) of Southern African zoological specimens donated in that year by Burchell to that institution, and the most thorough scrutiny of the Museum's records has failed to disclose the subsequent acquisition of any White rhinoceros material of Burchell's collecting.

The syntypical material was ultimately divided between the Museum of the Royal College of Surgeons of England and the Oxford University Museum.

THE ROYAL COLLEGE OF SURGEONS MUSEUM SPECIMENS

To the Royal College of Surgeons Museum, before 1853, Burchell personally presented four *Rhinoceros simus* specimens, viz. two teeth and two pairs of nasal horns. These were listed in Flower's *Catalogue* (1884) as follows, their accompanying "O.C." (=Old Catalogue) numbers having reference to Owen's earlier (1853) *Catalogue*:

"*Cat. No.*

2155 The calcified but unworn crown of a left upper molar attributed to this species. O.C.2959.

In the freedom of the extremities of the combing plates, which cut off no accessory valley, it most resembles *R. bicornis*.

2156 A much-worn tooth, said to be the posterior upper milk molar. O.C.2960.

2157 Anterior and posterior horns. O.C.2968.

The length of the front horn is 39 inches (99 cm.), its basal circumference being 26 inches (66 cm.).

2158A Anterior and posterior horns of young animal. O.C.2966."

All these specimens were totally destroyed by enemy action on 11 May 1941.

THE OXFORD UNIVERSITY MUSEUM SPECIMENS

To Oxford University Museum were presented by Miss Burchell, in April 1865, a number of her late father's African zoological specimens, which had been retained privately by him until his death in 1863, and which included the other moiety of his syntypical *Rhinoceros simus* material. Miss Burchell's donation (which forms the basis of this present notice) comprised eight White rhinoceros teeth (from two animals), certain rhinoceros and other horns and some pieces of mammalian skin of doubtful specific attribution.

The careful scrutiny of this material led ultimately to the conclusion that the eight individual teeth were alone identifiable with certainty as belonging to *R. simus* and were to be regarded as the sole extant syntypical specimens.

As such they were deemed worthy of particularization and record, and, since two individuals were represented odontologically, it was decided to select one of these teeth for designation as the lectotype of *Rhinoceros simus*.

The selected specimen is a right maxillary second molar tooth, chosen by reason of its frank morphological characters, its minimal degree of crown-attrition and its good state of preservation.

The non-skeletal Burchelliana include the following:

(1) A piece of mammal skin, labelled "Burchell Coll. No. Presented by Miss Burchell, Apr. 8, 1865. B.M.C." This is probably No. 1561 of the Old Catalogue. Its specific origin is impossible of determination: it appears not to be rhinoceros skin.

(2) A dorsal portion of the pneumatized nasal bones of a rhinoceros, with the overlying skin, showing the attachment areas of an anterior and a posterior horn but lacking both horns. The anterior horn-base is circular; the posterior is subtriangular and bears two labels, one of which is a rectangular blue label, 19 mm. \times 16 mm., with "1562" printed thereon in now-faded ink: the other is a rectangular white label, 29 mm. \times 13 mm., bearing the printed words "Burchell Collection". A modern orange label reads "O.C.1562. *Ceratotherium simus* (Burchell). Oxf. Univ. Mus. Presented by Miss Burchell, Apr. 8, 1865. B.M.C." The specific attribution of this specimen, though probably correct, cannot be substantiated on any present evidence. (Pl. 1, fig. 1).

(3) A dorsal portion of the pneumatized nasal bones of a rhinoceros, with the overlying skin, showing the attachment areas of (now wanting) anterior and posterior horns. The anterior horn-area bears a rectangular white label, 29 mm. \times 13 mm., with thereon "Burchell Collection" printed and boxed. Between the horn-areas is a rectangular blue label, 16 mm. \times 9 mm., marked "1563" in faded ink. A modern label reads "O.C.1563. Oxf. Univ. Mus. Presented by Miss Burchell, Apr. 8, 1865". There is no certain available evidence as to the specific provenance of this specimen (Pl. 1, fig. 2).

(4) The posterior horn of a rhinoceros and nine horn tips of a species of gnu. The former is eight and a half inches high and bears two small labels. The first of these, rectangular and blue, is marked "1573" in faded ink: the second is rectangular and white, and printed "Burchell Collection". This rhinoceros horn is undoubtedly that listed in the Old Catalogue as No. 1573. It cannot be assigned with any present certainty to *Ceratotherium*, nor can it be referred to items (2) and (3) above.

The eight syntypical odontological specimens have been critically assigned by Dr W. D. L. Ride to two animals (A and B), each represented by four individual teeth. Each of the specimens has been recently labelled "*Ceratotherium simus* (Burchell)" and has been marked "TYPE" in red ink.

Teeth attributed to Animal A

(1) *A left maxillary first molar.* The modern label reads "Oxford University Museum. Ref. No. 8218. O.C.1564. Loc: S. Africa. Coll.: W. J. Burchell". Recently incised "TYPE" in red ink (Pl. 2, fig. 3).

The ectoloph bears two labels on its buccal surface:

(a) a small rectangular faded blue label, 14 mm. \times 12 mm., with the figures "1564" thereon in faded ink

(b) a narrow rectangular white label, 52 mm. \times 12 mm., with "*Rhinoceros simus*" written thereon in faded ink.

(2) *A right maxillary fourth premolar*. The modern label reads "Oxford University Museum. Ref. No. 8219. O.C.1565. Loc: S. Africa. Coll: W. J. Burchell". Recently inscribed "TYPE" in red ink. (Pl. 2, fig. 4).

This tooth bears three old labels, as follows:

- (a) on the buccal aspect of its neck, a rectangular white label, 28 mm. × 13 mm., bearing the boxed words "Burchell Collection" in black printing
- (b) on its posterior aspect, a rectangular blue label, 14 mm. × 8 mm., with the barely discernible figures "1565" in faded ink
- (c) on the same aspect, the remains of a rectangular white label, originally some 30 mm. × 11 mm., with "Rh" written thereon in much faded ink.

(3) *A left maxillary fourth premolar*. The modern label reads "Oxford University Museum. Ref. No. 8220. O.C.1567. Loc: S. Africa. Coll: W. J. Burchell". Recently inscribed "TYPE" in red ink. (Pl. 2, fig. 5).

This tooth bears on the buccal surface of its ectoloph two old labels, as follows:

- (a) a rectangular blue label, 30 mm. × 8 mm., with the figures "1567" in faded ink
- (b) a rectangular white label, 51 mm. × 12 mm., with "Rhinoceros simus" ink-written thereon.

(4) *A right maxillary second molar*. The modern label reads "Oxford University Museum. Ref. No. 8221. O.C.1568. Loc: S. Africa. Coll: W. J. Burchell". Recently inscribed "TYPE" in red ink. (Pl. 3, fig. 6.)

On its buccal surface this tooth bears two old labels—

- (a) a damaged rectangular and faded blue label, approximately 12 mm. × 7 mm., ink-inscribed with the figures "1568"
- (b) the remains of a rectangular white label 52 mm. × 10 mm., hand-written in ink "R[hinoceros simus]". The inscription is now obliterated, save for the initial letter of the generic name.

Because of its excellent state of preservation and its characteristic morphology, this tooth is hereby designated the lectotype of *Rhinoceros simus* Burchell.

Teeth attributed to Animal B

(1) *A left maxillary second molar*. The modern label reads "Oxford University Museum. Ref. No. 8222. O.C.1566. Loc: S. Africa. Coll: W. J. Burchell". Recently inscribed "TYPE" in red ink. (Pl. 3, fig. 7.)

The buccal aspect of the ectoloph bears a rectangular blue label, 13 mm. × 6.5 mm., marked in figures "1566" in faded ink.

(2) *A mandibular left third molar*. The modern label reads "Oxford University Museum. Ref. No. 8223. O.C. 1569. Loc: S. Africa. Coll: W. J. Burchell". Recently inscribed "TYPE" in red ink. (Pl. 4, fig. 8).

The buccal surface bears two labels, viz :

- (a) a rectangular faded blue label, 13 mm. \times 7 mm., with " 1579 " discernible thereon
- (b) a rectangular white label, 56 mm. \times 11 mm., with written thereon in ink " Rhinoceros simus ".

(3) *A mandibular right first molar.* The modern label reads " Oxford University Museum. Ref. No. 8224. O.C.1570. Loc : S. Africa. Coll : W. J. Burchell ". Recently inscribed " TYPE " in red ink. (Pl. 4, fig. 9.)

This tooth lacks the anterior root. On its buccal aspect, above the roots, it carries the remains of a rectangular blue label (originally some 13 mm. \times 8 mm.) bearing the figures " 1570 ".

(4) *A mandibular left first molar.* The modern label reads " Oxford University Museum. Ref. No. 8225. O.C.1571. Loc : S. Africa. Coll : W. J. Burchell ". Recently inscribed " TYPE " in red ink. (Pl. 4, fig. 10).

The tips of the anterior and the posterior roots are broken. The tooth bears on its buccal surface the remains of a rectangular blue label (originally some 13 mm. \times 8 mm.) from which all inscription has faded : on the same aspect and adjacent to the occlusal surface are the pencilled figures " 1571 ".

The blue labels bearing catalogue numbers and the printed white labels are clearly Museum labels, applied to the specimens upon registration. The white labels handwritten in ink " Rhinoceros simus " are possibly Burchell's original labels.

TAXONOMIC CONSIDERATIONS

The scientific appellation of the White rhinoceros has undergone inevitable modification at the hands of taxonomists since its discoverer, Burchell, named it *Rhinoceros simus* in 1817, and at the present day authoritative opinion appears to be still somewhat uncertain as to whether this form is to be assigned generic or merely specific rank. Evidence is submitted below in support of entitlement to generic status.

A century or more ago all the five extant forms of " horn-nosed " perissodactyla were considered to be but the five species of the single genus *Rhinoceros*. (These were the Indian, Javan and Sumatran forms from Asia and the so-called White and Black forms from Africa, whose vernacular names remain still advantageous as unequivocal and convenient terms of reference). This simple nomenclatorial scheme was adopted by Flower & Lydekker (1891), Holland (1901), Sclater (1903), Gibbons (1904) and Beddard (1923) and was that employed by S. S. Flower (1929) in the 10th (centenary) edition of the *List* of vertebrate animals exhibited in the Gardens of the Zoological Society of London. In this scheme the White rhinoceros retained its original designation of *Rhinoceros simus*, the northern " race " of the form being named *R. simus cottoni* by Lydekker (1908), who was followed therein by Trouessart (1909) and Berger (1910).

Meantime, however, increasingly detailed consideration of the available morphological characters of the extant Rhinocerotidae had led inevitably to reassessment of the taxonomic status of the constituent forms, with a corresponding elevation of former species to generic rank, to conflicting views anent the mutual relationships of these newly erected genera and to such unfortunate episodes as the creation of spurious (and rapidly discarded) species, e.g. *Rhinoceros lasiotis* Selater for the Sumatran rhinoceros and *Rhinoceros keitloa* A. Smith for the Black rhinoceros, based on wholly insufficient evidence.

Rhinoceros was reduced to a single genus with two species, *R. unicornis* for the Indian, and *R. sondaicus* for the Javan, rhinoceros, whilst *Dicerorhinus* or *Didermocerus* became the generic name of the Sumatran rhinoceros. Nomenclatorial uniformity was, however, less readily attained in connexion with the African rhinoceroses, both sympatrical two-horned forms, in which well developed nasal horns replace the greatly reduced, abortive or absent incisor teeth as the offensive-defensive armamentarium, and each of which is seemingly more closely related to the other than to any of the Asiatic forms. Considerable dubiety however attended the resolution of the exact taxonomic nature of this relationship, the essential problem being the allocation of generic or of merely specific status to the White rhinoceros, a problem by no means even yet resolved to the universal satisfaction.

Thus Gray (1867) proposed the new generic name *Ceratotherium* for the White rhinoceros, his type specimen being a skull (B.M.(N.H.) No. 1003a) figured by him in his *Handlist* (1873, Pl. XXI). This new name gained increasingly general acceptance and was duly adopted by Heller (1913), Pocock (1944) and Simpson (1945), Gray's (1821) generic name *Diceros* being meanwhile retained for the Black rhinoceros.

Oldfield Thomas (1900, 1901) however regarded the two African rhinoceroses as but species of the single genus *Diceros*, as did Lydekker (1916), and so termed the White rhinoceros *Diceros simus*. Following Thomas, Roosevelt (1910) referred to the northern "race" as *Diceros simus cottoni*.

In their reclassification of Southern African mammals, Ellerman, Morrison-Scott & Hayman (1953) admitted a single genus only (*Diceros*) for the African rhinoceroses. They regarded the differences between *Ceratotherium* and *Diceros* as being of subgeneric value only, so that, for them, the White rhinoceros is *Diceros (Ceratotherium) simus*.

Grassé (1955), however, gave the White rhinoceros distinct generic rank under the title *Ceratorhinus simum*.

According therefore to the most reliable taxonomic authorities the White rhinoceros may be regarded as

- either (1) a species of a genus (i.e. of *Rhinoceros* or of *Diceros*)
- or (2) a subgenus of a genus (i.e. of *Diceros*)
- or (3) an independent genus (i.e. *Ceratotherium* or *Ceratorhinus*)

But, since the invocation of subgeneric dignity implies a ranking superior to the merely specific, the essential taxonomic issue is whether the White rhinoceros, on the basis of present morphological knowledge, is most fittingly to be accorded specific or generic status.

Obviously, any assessment of taxonomic status (specific, generic or other) is dependent ultimately upon a personal evaluation of certain selected criteria, which, in the present state of knowledge, can rarely, if ever, be totally representative of an animal's morphological constitution. Inevitably, therefore, interpretation of the significance of the criteria propounded for consideration must differ among authors and variant classificatory schemata ensue in consequence, while continuous and increasingly meticulous study of new or of more abundant material must enforce the periodic revision of all such schemata.

In what follows the White rhinoceros will, for the sake of convenience, be referred to as *Ceratotherium* and the Black rhinoceros as *Diceros*.

That a number of morphological characters link *Ceratotherium* and *Diceros* in closer affinity than obtains between either one of them and any Asiatic form has been long recognized: it is expressed taxonomically in Flower's (1876, 1891) "atelodine group" and in Pocock's (1944) subfamily, the Dicerotinae. (Somewhat inexplicably Simpson (1945) combines *Ceratotherium*, *Diceros* and *Dicerorhinus* (= *Didermocerus*) in a single subfamily, his Dicerorhininae). Notwithstanding such affinity, significant morphological differences exist between *Ceratotherium* and *Diceros*, which constitute the basis of the separation of these two forms at (according to individual opinion) specific, subgeneric or generic level. Some of these differences, indicated synoptically in the accompanying Table, may be noticed here.

In external characters, *Ceratotherium* is unique among the Rhinocerotidae. The head and neck are slanted at an acute angle to the vertical axis of the forelimb, the mouth remaining at ground level both during rest and during normal progression. The dorsal body-contour reflects this distinctive cranio-cervical posture, as also the succeeding hump over the withers, the relatively short thoracic concavity and the well separated presacral and sacral prominences. The rima oris is transversely elongate and the upper lip non-prehensile: the nostrils are relatively far apart: the eye is situated posterior to a vertical dropped through the back of the posterior horn base: costal grooving is minimal or absent.

In *Diceros*, on the other hand, the cranio-cervical angulation is closer to the horizontal than to the vertical: a cervical hump is wanting: the mid-back concavity is long, the presacral and sacral prominences are approximated: the upper lip is prehensile: the eye is vertically level with the back of the posterior horn and costal grooving is emphatic.

The *Ceratotherium* cranium is uniquely dolicocephalic among extant rhinoceroses: the occipital region projects far posterior to the condylar region, so that the planum occipitale slants upwards and backwards at an angle of 30 to 40 degrees from the Frankfort plane. In *Diceros*, there is not only considerably less posterior prolongation of the occiput, but also a contradistinctive slant of the planum occipitale directly upwards or even upwards and forwards from the Frankfort plane.

In *Ceratotherium* the lacrimal tubercle (variable in *Diceros*) is always a single bony prominence and the lacrimal fossa is always bounded posteriorly by an osseous bridge, a feature inconstant in *Diceros*. The infraorbital foramen is invariably single in *Ceratotherium*, but variable and commonly multiple in

Diceros : the post-vomerine projection of the palatine is considerable in *Ceratotherium* but greatly reduced in *Diceros* : the *Ceratotherium* foramen ovale is separated from the foramen lacerum by a conjoint osseous bar compounded

Character	Table 1	
	<i>Ceratotherium</i>	<i>Diceros</i>
<i>External</i>		
upper lip	non-prehensile	prehensile
cervical hump	present	absent
eye/p. horn relation	eye behind horn	eye level with horn
costal grooving	absent	marked
mid-dorsal concavity	short	long
presacral and sacral eminences	apart	close
<i>Skeletal</i>		
constitution presacral eminence	spines T.15, 16, 17 only	spines last 2T+L.1
constitution sacral prominence	post. sup. iliac spines + enlarged tips sacral spines	ilia + sacral spines
anticlinal vertebra	penult. thoracic	none
no. thor.-lumbar vertebrae	22	23
no. rib-bearing vertebrae	18	20
no. caudal vertebrae	less than 22	22 at least
cranium, shape	dolicocephalic	brachycephalic
post. projection occiput	maximal	minimal
slant of planum occipitale	postero-inferior	vertical or antero-superior
bony bridge to lacrimal fossa	constant	inconstant
adult nasal bones, tips	greatly expanded	minimally expanded
infraorbital foramen	single	variable (1-3)
post-vomerine palatine	large, quadrangular	narrow, pointed
foramen ovale	temporo-sphenoidal	intrasphenoidal
mandible, mental portion	depressed, spatulate	narrow, compressed
incisors	absent (if ever present, lost soon after birth)	present in young, and may persist
cheek teeth : crochet-crista union	general	rare
cheek teeth : inter-cuspal valleys	cement-filled	widely open

of overlapping temporal and sphenoidal processes, whereas in *Diceros* this foramen is wholly and invariably intra-alisphenoidal. The free ends of the nasals of the adult are slightly expanded laterally in *Diceros*, but maximally so in *Ceratotherium*.

The mandibular mental region is depressed and spatulate in *Ceratotherium*, but narrow and compressed in *Diceros*. The incisor teeth of *Ceratotherium* are functionally absent: should any such teeth appear during ontogeny, they are lost soon after birth. On the contrary, reduced incisors commonly develop in *Diceros* and are generally to be encountered in the young skull: though these teeth tend to be lost they may nevertheless persist into adult life. In other words, incisor tooth reduction is more absolute in *Ceratotherium* than in *Diceros*. The cheek teeth of the two forms present the most profound differences of constitution, the outstanding difference being the widely open valleys present between the cusps of *Diceros* teeth and the completely cement-filled corresponding valleys (fossettes) characteristic of *Ceratotherium* cheek teeth. So dramatic a contrast of dental configuration has induced Heller (1913) to regard the odontological differences between *Ceratotherium* and *Diceros* as of the same order as those dental characters which distinguish the Equidae from the Bovidae.

In the *Ceratotherium* axial skeleton the thoraco-lumbar vertebrae number 22, the rib-bearing vertebrae 18 and the caudals less than 22. (Corresponding *Diceros* figures are 23, 20, 22). Thus, among the Rhinocerotidae *Ceratotherium* (in common with *Didermocerus*) possesses the least, and *Diceros* the greatest, number of rib-bearing vertebrae. The constitution of the sacral prominence differs in the two forms: in *Ceratotherium* it comprises the posterior superior iliac spines plus the expanded tips of the sacral vertebral spines, whilst in *Diceros* it is a level bony platform comprising the ilia and the sacral spines. An anti-clinical vertebra—the penultimate thoracic—is present in *Ceratotherium*, but none such occurs in *Diceros* (nor in any other extant rhinoceros).

Thus by reason of the distinctiveness of such morphological characters as its external form, mouth parts, dentition, cranial and costo-vertebral anatomy, *Ceratotherium* proclaims itself a highly specialized rhinocerine form and probably the most specialized extant member of the Rhinocerotidae. The characters briefly noted above which distinguish *Ceratotherium* from *Diceros* may appear to some to possess no more than specific value. Yet they would seem to be as taxonomically significant as those characters which, by almost universal consent, are deemed sufficient to warrant the separation of *Loxodonta* and *Elephas* as independent and valid genera. It is submitted therefore that, until more ample knowledge becomes available concerning the detailed morphology of the Black and of the White rhinoceros, they justify the continued recognition of the White rhinoceros as a distinct and authentic genus under the accepted scientific name *Ceratotherium simum* Gray.

ACKNOWLEDGMENTS

Grateful acknowledgment is hereby tendered to Dr John R. Baker, Dr A. J. Cain and Dr R. Tilleard-Cole for their generous interest and valued assistance in tracing the whereabouts of the Oxford Burchelliana (securely bestowed during the recent war years), to Dr W. D. L. Ride for the ultimate identification of these specimens, to Professor Sir Alister Hardy, for the ready loan of the syntypes for detailed personal study, to Dr A. Tindell Hopwood for his

assistance therein, and to Dr F. C. Fraser for much patient searching of British Museum archives.

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