

## PALEONTOLOGY

### DICERORHINUS HEMITOECHUS FALC. IN THE NETHERLANDS

BY

H. LOOSE

(Communicated by Prof. I. M. VAN DER VLERK at the meeting of September 24, 1960)

During sand dredging operations in the Zwarte Water, near Westerveld (province of Overijssel), a rhinoceros skull was found in May '58.

It had the general form of *Coelodonta antiquitatis*, with some important differential characteristics. These all pointed to *Dicerorhinus hemitoechus* Falc., a species not yet recorded from the Netherlands.

Of this well preserved skull (a few, not very important, fragments and the mandible are missing) a summary description, followed by some general remarks on the species, is given here.

(See fig. 2-5). The nostrils extend farther backwards than in *C. antiquitatis*. While in that species the posterior border lies approximately between  $P^3$  and  $P^4$ , in this skull the nostrils end above the posterior rim of  $P^4$ .

The rugosity of the nasal horn base is considerable. The frontal horn base is seen in lateral view by a slight curve of the frontals only.

While *C. antiquitatis* is known for its complete bony nasal septum, in this skull the bony septum is incomplete in the middle. There are traces of a cartilaginous part where the bony septum ends.

The zygomatic arch shows a double bend. The maxillar part extends in a straight line to the rear; the jugal turns up and backward at an angle of  $30^\circ$ ; at the glenoid fossa, the arch runs downward toward the median sagittal plane.

The articular plane on the anterior rim of the glenoid fossa is 11.5 cm wide, measured perpendicular to the m.s. plane. In two skulls of *C. antiquitatis* values of 9.5 and 10 cm were found.

Behind the fossa there is a well developed postglenoidal processus, forming the anterior rim of the auditory meatus (a triangle pointing downward with one angle), the paroccipital processus providing the posterior rim.

The parietals are deeply constricted by the cristae temporales (minimum width 3.4 cm; in skulls of *C. antiquitatis* 7.5-12 cm).

The occipital crest is not as wide as the base of the skull. This causes the occipital view of the skull to be a trapezium. In *C. antiquitatis* this part is a rectangle.

The occipital crest of this skull is 16.5 cm wide, in *C. antiquitatis* about 23 cm.



In the occipital crest of *C. antiquitatis* a median fossa is an exception, sometimes there is a median protuberance. The present skull has a marked median fossa.

The foramen magnum has the shape of an ellipse, with its shorter axis in the median sagittal plane. In *C. antiquitatis* the foramen is higher, with the shape of an ovoid or triangle. This is caused in part by a difference in the orientation of the foramen magnum. In the skull from the Zwarte Water the angle between the vertical axis of the foramen magnum and the roof of the mouth is  $119^\circ$ . In *C. antiquitatis* (ZEUNER, 1934, 19 ind.) the maximum was  $107^\circ$ , the median  $95^\circ$ , the minimum  $83^\circ$ .

In 1822 CUVIER described a rhinoceros skull *without* bony nasal septum under the name *Rh. leptorhinus*. De CHRISTOL thought (an opinion entirely founded on reproductions of drawings of the type specimen) that a complete bony septum had been present. Therefore he described the skull without septum, found in 1835 near Montpellier (dép. Hérault), under the name *Rh. megarhinus*.

In 1846 OWEN described part of a skull from Clacton-on-Sea (Essex) *with* septum as identical with *Rh. leptorhinus* Cuv., thereby endorsing the judgement of DE CHRISTOL. Finally FALCONER in 1860 created the species *Rh. hemitoechus* for the Clacton skull and some others with an incomplete bony septum, after showing the impossibility of maintaining the name *Rh. leptorhinus*, given by CUVIER to a skull *without* septum.

The species, described by JÄGER originally in 1839 as *Rh. kirchbergensis* and subsequently in 1841 as *Rh. Merckii*, is rejected by FALCONER as founded on insufficient data ( $^2M$ ,  $M^3$ , 1 lower molar) and provisionally identified as belonging to *Rh. megarhinus*.

Now confusion is complete. Only one species remains well defined, despite frequent changes in the name of the genus: *Coelodonta antiquitatis* Blum. Much has been published on the other pleistocene species in the century after FALCONER, with usually every author taking the opposite view of his predecessor.

In this battle of systematics, *Rh. leptorhinus* and *Rh. megarhinus* appear as rather vague and loosely defined names of doubtful value. Most of the heavy fighting has been (and in some countries still is) over the question: are *hemitoechus* and *kirchbergensis* separate species?

Complete, well preserved skulls are rare. The efforts to differentiate the species *D. etruscus*–*hemitoechus*–*kirchbergensis* are therefore mostly based on differences in dentition. The fact that this is extremely difficult for *D. hemitoechus* and *D. kirchbergensis* is no proof that these species are actually one. When the complete skulls are compared, all evidence is to the contrary <sup>1)</sup>.

F. ZEUNER has shown <sup>2)</sup> a connection between anatomy of the skull

<sup>1)</sup> STAESCHE '41.

<sup>2)</sup> ZEUNER '34.



and ecology in the Rhinocerotidae. To this end certain standard measurements were treated statistically.

Owing to lack of material ZEUNER was unable to apply his method to *D. hemitoechus*. In the present publication, measurements according to ZEUNER (and an additional dimension) are given for 8 crania of *D. hemitoechus* (6 in the British Museum, Natural History, the skull from the Zwarte Water and the cranium from the Stuttgart Staatl. Museum für Naturkunde).

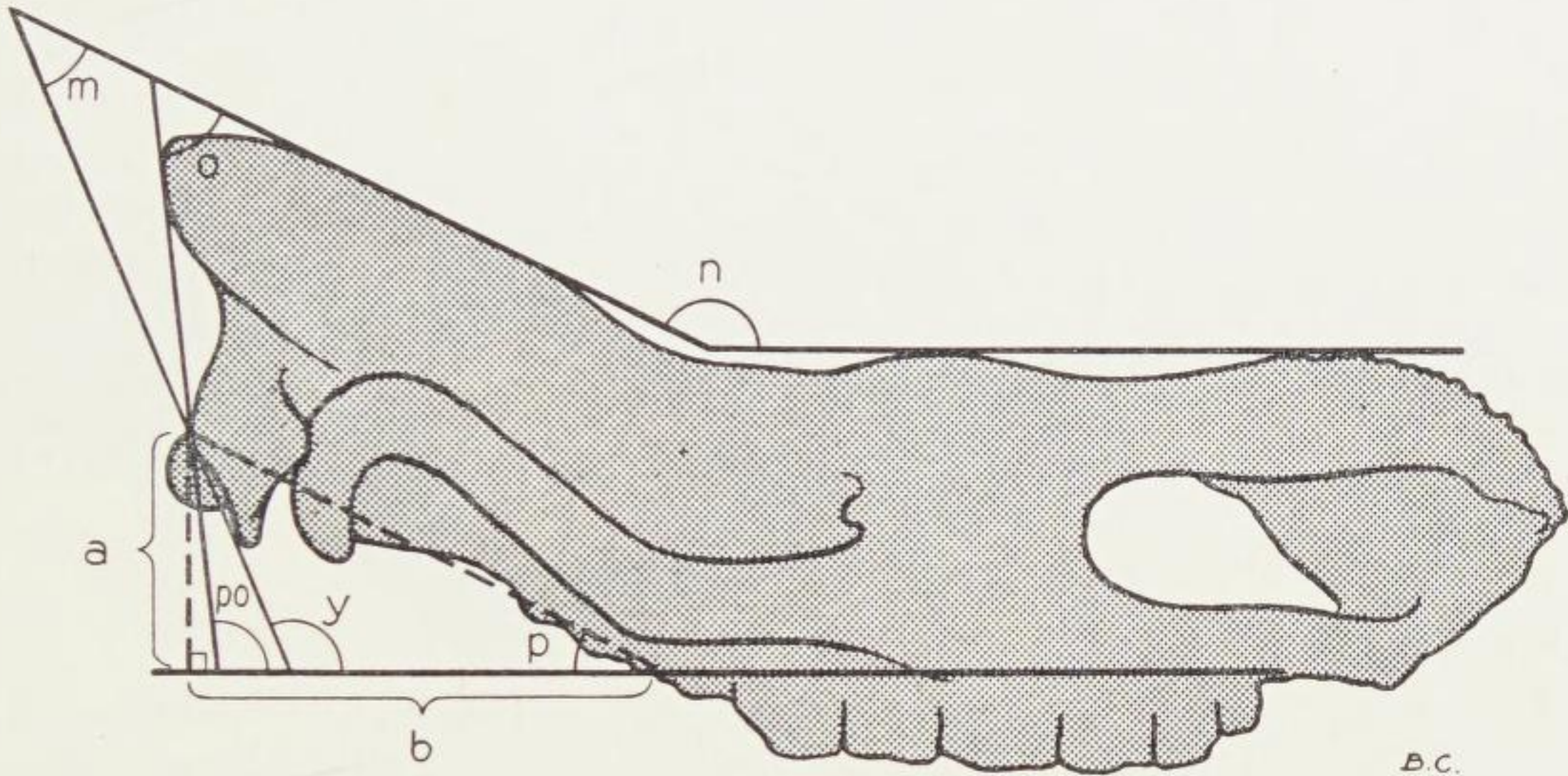


Fig. 1

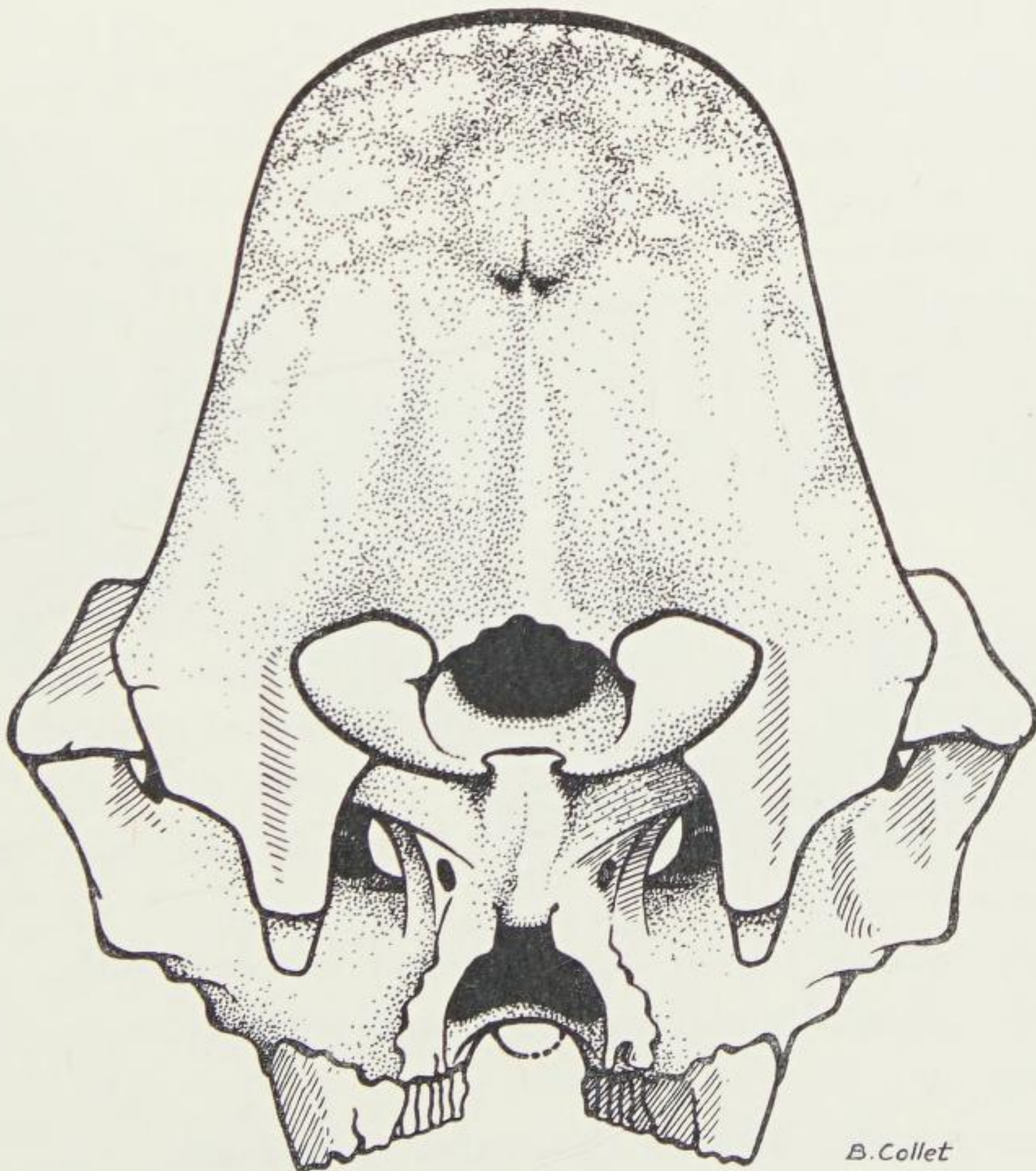


Fig. 2. Leiden No. 93302 occipital view.



	<i>Coelodonta antiquitatis</i> Blum.					<i>D. hemitoechus</i> Falc.					<i>D. kirchbergensis</i> Jäg.				
	min.	med.	max.	arithm. mean	number of spec.	min.	med.	max.	arithm. mean	number of spec.	min.	med.	max.	arithm. mean	number of spec.
l	540	700	780		29	630	655	725	672	5	630	670	740		3
st	0	0	14	1	32	0	10	60	24	7	10	11	14	12	5
o	42	54	65	53	35	47	53	56	52	7	70	77.5	83	77	4
i	42	54	65	54	37	47	53	56	52	7	68	76	83	75	5
n	143	154	163	154	29	145	154	160	153	6	147	152	155	151	3
p	18	24.5	31	25	18	22		23.8		2	21	27	28	26	4
po	80	98	117	100	19	90		93		2	67	67	72	69	3
y	83	95	107	95	19	110	118	120	116.6	5	82	95.5	109	95.5	4
m	40	53	80	55	34	28	37	44	37	6	41	55	66	54	5
x	-14	-1.5	+27	+1	32	-21	-14	-9	-14.6	6	-42	-17.5	-13	-22.5	4
z	75	88	120	92.6	12	34	49	60	47.75	8					

The measurements for *Coelodonta* and *D. kirchbergensis* have been taken from ZEUNER '34. At the extreme right are the values for the skull from the Zwarte Water

### Abbreviations

l, st and z have been measured in mm, all others in degrees. All measurements, except z, have been taken in the median sagittal plane. The m.s.p. is not mentioned in the definitions, to keep them as simple as possible. (See also fig. 1).

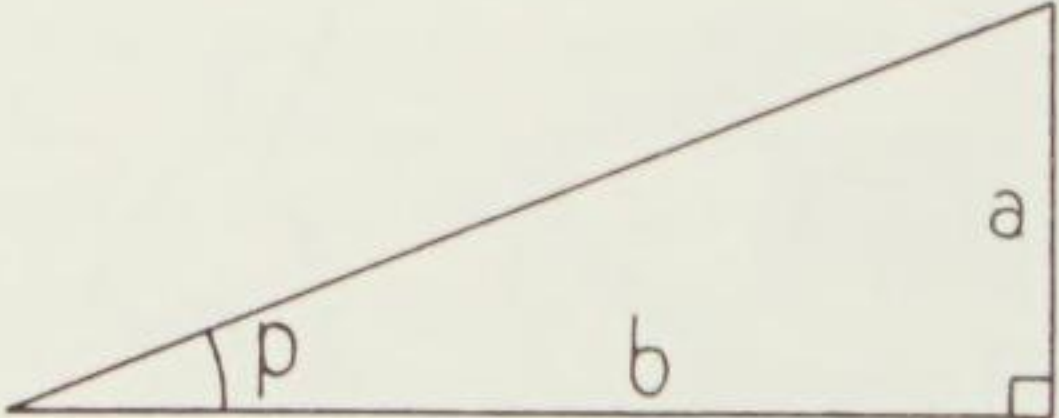
l Distance rhinion-basion (length from tip of nasals to lower margin of foramen magnum). As the development of the occipital crest varies for species, age and sex, the basal length of the skull has been taken as standard.

st Incision in the middle of the occipital crest.

o Angle between opisthion+occipital crest and the parietals.

i Angle between parietals and hindmost point of the occipitals.

n Angle between parietals and tangent of hornbases.

p  a = height opisthion-extended roof of mouth  
b = distance aboral end of roof of mouth-intersection with a.

po Angle between opisthocranion+opisthion and roof of mouth (aborally extended).

y Angle between basion+opisthion and roof of mouth.

m Angle between basion+opisthion and parietals.

x  $x = m - o$

z Minimal width between the cristae temporales.



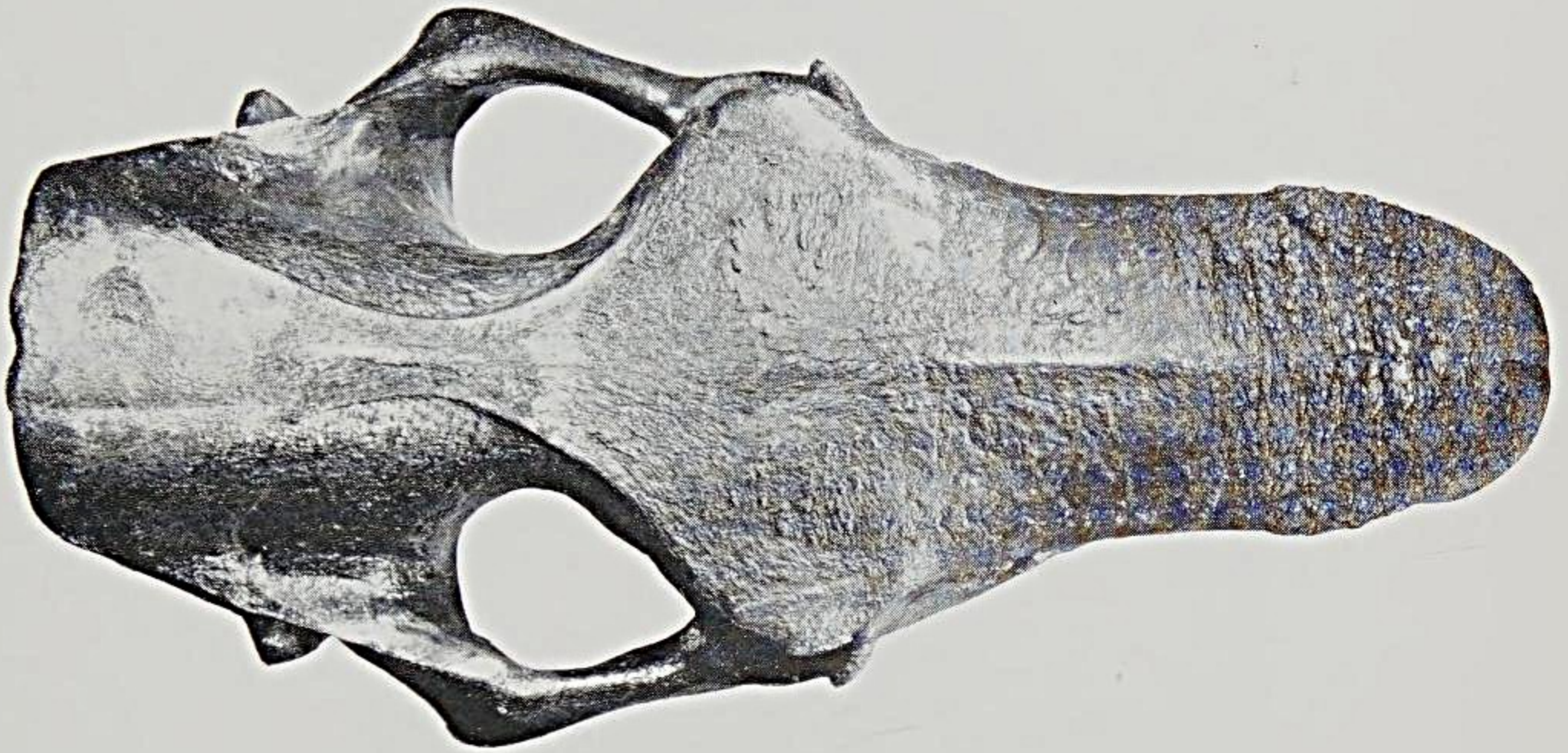


Fig. 3. Leiden No. 93302 vertical view.



Fig. 4. Leiden No. 93302 lateral view.





Fig. 5. Leiden No. 93302 basal view.



- l Of the 3 species *Coelodonta antiquitatis* is the largest. *D. kirchbergensis* is slightly larger than *D. hemitoechus*. This conclusion is confirmed by dental evidence given by STAESCHE '41.
- st Mostly absent in *Coelodonta*, often replaced by a protuberance. No such protuberance has been found in the *hemitoechus* skulls examined. According to DUERST 1926, p. 143, protuberances and crests indicate tangential insertion of tendon on bone, incisions and fossae an insertion perpendicular to the bone.
- o, i Always identical in *D. hemitoechus*. In *Coelodonta* and *D. kirchbergensis* irregularities in the relief of the occipitals sometimes occur.
- n No significant differences between the three species.
- y The angle  $y$  in *D. hemitoechus* was found to be considerable, even when no exact measurements were possible.

The figures for $y$ are:	Leiden	93302	119
	Brit. Mus.	20013	120
		27836	—
		45205	110
		M5113	—
		40946	—
		45206	118
	Stuttgart	16938	116

STAESCHE '41 p. 115 had already seen the divergence of  $y$ . As he had only the Stuttgart skull at his disposal, he could not decide between a fortuitous aberration and a typical characteristic. The fact that in all skulls of *D. hemitoechus* the angle  $y$  was rather large, must decide for the latter.

*D. hemitoechus* and *Coelodonta antiquitatis* were animals of the open country, getting their food mainly by grazing, also by browsing on small shrubs. In *Coelodonta*, when grazing, the skull was held in a direct line with the cervical vertebrae, all pointing in a straight line to the ground (ZEUNER '34). A reconstruction of *D. hemitoechus* should correspond with the white rhino, *Ceratotherium simum* Burch., holding its neck approximately horizontal when at rest, the head pointing to the ground.

- m, x Because of the large values for  $y$ ,  $m$  is small. This is seen even better with  $x$  ( $=m-o$ ). ZEUNER has measured values between +27 and -14 for *Coelodonta*. In *D. hemitoechus* all measurements were negative.
- z In *Coelodonta*  $z$  varies between 72 and 120, in *D. hemitoechus* between 34 and 60.



The material of the genus *Dicerorhinus* used in this study may not be very impressive in number. Yet a few conclusions are warranted.

If we disregard the form of the occiput and the dentition, the best characteristic of *Dicerorhinus hemitoechus Falc.* is *y*. Also, *m* would be useful, but *m*-max. is already slightly higher than *m*-min. for *Coelodonta* or *D. kirchbergensis*. Both *m* and *y* reflect the exceptional angle between foramen magnum and rest of the skull.

#### *Acknowledgements*

I am extremely thankful to:  
 the Director of the Rijksmuseum van Geologie en Mineralogie, Leiden, for entrusting me with the description of this new acquisition;  
 Dr A. J. SUTCLIFFE of the British Museum (Natural History) and Dr K. D. ADAM of the Staatliche Museum für Naturkunde, Stuttgart, for their permission to study the *Dicerorhinus* skulls in their care;  
 the "Stichting Het Moolengraaff-fonds" for providing a part of the funds for this publication;  
 Mr B. F. M. COLLET of the Rijksmuseum van Geologie for making the photographs and the drawings.

*Rijksmuseum van Geologie en  
 Mineralogie, Leiden*

#### LITERATURE

- DUERST, U., Vergleichende Untersuchungsmethoden am Skelett bei Säugern  
 Abderhalden, Hdb. d. biol. Arbeitsmethoden VII, 2 Berlin u. Wien (1926).  
 FALCONER, H., Palaeontological Memoirs II 1868.  
 FREUDENBERG, W., Die Säugetiere des älteren Quartärs von Mittel Europa etc.  
 Geol. u. Pal. Abh. N.F. 12, 4/5.  
 LYDEKKER, R., Catalogue of fossil mammals in the British Museum (Nat. Hist.)  
 III, 119-123 (1886).  
 SCHROEDER, H., Über *Rhinoceros mercki* und seine nord- und mittel-deutschen  
 Fundstellen Abh. Preuss. Geol. Landesanstalt N.F. 124 (1930).  
 STAESCHE, K., Nashörner der Gattung *Dicerorhinus* aus dem Diluvium Württembergs  
 Abh. Reichstelle für Bodenforschung N.F. 200 (1941).  
 WUST, E., Beiträge zur Kenntnis der diluvialen Nashörner Europas Centralbl. f.  
 Min. etc. (1922).  
 ZEUNER, F., Beziehung zwischen Schädelform und Lebensweise bei Nashörnern,  
 Ber. der Naturf. Ges. zu Freiburg im Br. (1934).