In *Rh. Mercki* the anterior cingulum falls much more steeply than in *Rh. etruscus*. Mol. 2 in T.M. and M.M. must be classed with *Rh. etruscus* in this respect. Mol. 2 in S.M. shows the steep slope of a *Mercki* molar in its anterior cingulum.

In mol. 2 of *Rh. Mercki* the entrance to the medisinus, though wider than in mol. 1 and varying in width, always remains V-shaped. In the mol. 2 of *Rh. Mercki* from German localities I have not observed any exception. I *have*, however, seen one mol. 2 of *Rh. leptorhinus* OWEN from Grays Essex [Br. M. 20249] and three mol. 2 of *Rh. megarhinus* from Grays Essex [Br. M. 19841 a], in which the entrance to the medisinus is wide and more or less rounded. The abrupt fall of the front cingulum, the large size and the height of the outer wall (the dimensions of one of these molars are e.g. : length 62 mm., front breadth 73 mm., back breadth 62 mm., height of the second costa 64 mm.) leave, however, no doubt as to their belonging to *Rh. Mercki*. In mol. 2 of *Rh. etruscus* the entrance to the medisinus is wide and flat, or at least wide and rounded. In the mol. 2 of *Rh. etruscus* from Mosbach and Mauer this entrance is wide and flat. I have observed the same thing in mol. 2 of *Rh. etruscus* in Br. M. and even from the most divergent localities, viz. from Forest-Bed [33323 two specimens], Bologna [40803] and Trimmingham [M 6632]. Wide and rounded is the entrance to the medisinus in mol. 2 of *Rh. etruscus* from Malaga [40955], Pakefield [43480], and Rome [40815]. In mol. 2 from Pisa in Br. M. the medisinus is not wide, but neither is it V-shaped. As regards the shape of the entrance to the medisinus the mol. 2 in T.M. and M.M. with their wide, rounded entrance fall within the limits of variation of *Rh. etruscus*, while the mol. 2 in S.M. with its wide V-shaped entrance fall within those of *Rh. Mercki*.

The inner cingulum varies considerably in both species. Yet it is mostly more developed in *Rh. etruscus* than in *Rh. Mercki*. It is of no value as a distinctive character as regards the molars from Tegelen, as in particular in those in M.M. and S.M. the inner cingulum has a minimum development. The same remark applies to the vertical furrows of the protolophus. They have minimum development in the mol. 2 from Tegelen : a condition which occurs both in *Rh. etruscus* and in *Rh. Mercki*, and more particularly in the latter.

The outer surface mostly exhibits a more pronounced tumidity in the middle in *Rh. Mercki* than in *Rh. etruscus*. In this respect mol. 2 in T.M. corresponds to the description given by SCHROEDER (P. 29, p. 62) of the outer wall of *Rh. etruscus* from Mosbach, the tumidity in the middle of the outer surface in mol. 2 in M.M. being certainly no less clear than that of mol 2 of *Rh. Mercki* figured by SCHROEDER (P. 29 Taf. VII, Fig. 2). The outer surface of mol. 2 in S.M. is too much worn to render a comparison possible.

Like mol. 1 and mol. 3, mol. 2 in S.M. bears a very thick cement layer at the base of the outer wall. This is very often the case with the molars of *Rh. Mercki*, both from German and from English localities, whereas the molars of *Rh. etruscus*, by way of exception, at most show traces of a thin covering of cement. This is among others the case with the molars in T.M. The molars in M.M. show no trace of a covering of cement. I consider this thick coat of cement in the molars in S.M. of great importance for the determination chiefly on account of its frequency in the *Mercki* molars.

Mol. 3.

The last molar yields fewest specific differences. Also in hypsodont or subhypsodont dentitions the last molar approaches nearest to the brachyodont type.

It may, however, be said that the outer surface in *Rh. Mercki* is, in general, more regularly convex antero-posteriorly than in *Rh. etruscus*. This character I have observed in the last molars of *Rh. Mercki* of the most divergent localities. In *Rh. etruscus* the outer surface is often strikingly flat, sometimes also with a tumidity in the middle, which is however, not so pronounced as in *Rh. Mercki*. In this respect the last molars in T.M. and

M.M. resemble that of *Rh. etruscus*. Those of the dentition in S.M. present the *Mercki* condition. I have not come across another distinctive character, except in some cases the size of the molar.

SCHROEDER (P. 29, p. 66) gives the form of the posterior cingulum and the reduced postsinus as a distinguishing character between the two species. This may hold good for the last molars from Mosbach and other German localities, I cannot assign general validity to the form as distinctive character. In the last molars of *Rh. Mercki* and those of *Rh. etruscus* in Br. M. the shape of the postsinus and the posterior cingulum varies in the same way, i.e. from a clearly formed cup with a V-shaped posterior cingulum and two ascending ridges to a faint depression with a vaguely indicated posterior cingulum, even to a total absence of both, though a clearly marked pit with a clear posterior cingulum occurs more frequently in *Rh. etruscus* than in *Rh. Mercki*. (I have also observed the same variations in the development of the postsinus and the posterior cingulum in the recent *Rh. sondaicus*).

The peculiar shape of the postsinus and the posterior cingulum of mol. 3 in T.M. also occurs in *Rh. etruscus* from *Trimmingham* [Br. M.M. 6632]. That of mol. 3 in M.M. and S.M. is found in many *etruscus* specimens, but also in *Rh. leptorhinus* OWEN from Caverns Gower [Br. M. 40940].

Nor have I been able to find a difference in the shape of the medisinus between the two species. It is wide in both species and often rounded, and varies in this. Likewise the development of the inner cingulum cannot furnish a distinctive character.

COMPARISON OF THE UPPER MOLARS FROM TEGELEN WITH RHINOCEROS MOLARS FROM OTHER LOCALITIES WITH REGARD TO THEIR SIZE.

When comparing the *Rhinoceros* teeth with regard to their size it is not practical to start from the length of the complete series, nor from the length of the separate teeth. For when the animal grows older, the teeth press closer together, and they also become shorter [1]). I, therefore, take the breadth, and chiefly the front breadth of the teeth as basis of the comparison.

The molars (premolars and true molars) in T.M. are smaller than the corresponding *etruscus* molars in Br. M. from Malaga [40955], Pakefield [43480], Perolles, Forest-Bed [33323], Val d' Arno, Pisa, Florence [40813], Bologna [40803], Trimmingham [M 6632], smaller than the *etruscus* molars from Mauer and Mosbach (WURM).

Besides they are smaller than all *Mercki* — (*Mercki* JÄG., English *megarhinus* DE CHRISTOL and *leptorhinus* OWEN seu hemitoechus FALC.) — molars.

The molars (premolars and true molars) in M.M. are smaller than the corresponding *etruscus* molars in Br. M. from Malaga [40955], Pakefield [43480], Forest-Bed [33323], Bologna [40803], Trimmingham [M 6632].

They are about the same size as those from Perolles and Pisa. They are larger than those from Val d'Arno and Florence.

They fall within the variation limits of those from Mosbach and Mauer.

The molars (premolars and true molars) in S.M. are larger than all the corresponding *etruscus* molars mentioned here.

The molars (premolars and true molars) in S.M. are smaller than the following corresponding *Mercki* molars in Br. M. : All the *Rh. megarhinus* molars from Grays Essex and Ilford Essex, and the *Rh. leptorhinus* OWEN molars from Barrington [M 2518]. They are besides smaller than the *Mercki* molars from Kirchberg, Jerxheim, Weimar, Mosbach mentioned by SCHROEDER P. 29, p. 114, and Heggen (P. 30).

They have about the same size as those of *Rh. leptorhinus* OWEN from Ilford Essex (Brady coll. Br. M.) and *Rh. leptorh.* OWEN from Peckham (Br. M.) and *Rh. Mercki* from Mosbach mentioned by SCHROEDER P. 29, p. 108.

They are larger than all the other molars of *Rh. leptorhinus* OWEN in Br M. and of *Rh. Mercki* from Mosbach mentioned by SCHROEDER P. 29, p. 106 and of *Rh. Mercki* from Daxlanden (P. 29, p. 133).

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[1]) SCHROEDER (in a letter under date April 30st. 1926): "Die Erscheinung der besonderen Kürze und Breite der Praemolaren ist wohl eine Alterserscheinung; ich habe den Eindruck, dass sich im Alter die Zähne in einander pressen und die ganze Zahnreihe sich verkürzt."

CONCLUSIONS.

It appears from what precedes :

1. that *Rh. etruscus* and *Rh. Mercki* are species which have several characters in common as far as their upper dentition is concerned ;

2. that both species greatly vary in some characters of their upper dentition, each in the direction of the other species ;

3. that some characters vary independently of each other.

I will divide the *distinctive* characters of the upper dentition of the two species into primary and secondary distinctive characters.

The primary distinctive character I call the height of the teeth. Those of *Rh. etruscus* are considerably lower than those of *Rh. Mercki*. I have found that also the index of height of unworn molars varies in *Rh. Mercki*. I have, however, no data about unworn *etruscus* molars.

Secondary distinctive characters are such as : the slope of the anterior cingulum, the development of the inner cingulum of the premolars, the form of the entrance to the medisinus in premolars and molars, the height of the pass in the premolars, the cement covering etc., which are more or less connected with the primary character.

The determination of unworn or little worn teeth will on the whole not be very difficult. If they are, however, very much worn, the determination of a separate tooth may sometimes offer difficulties. A complete dentition, even though it should be much worn, will probably have preserved a sufficient number of secondary distinctive characters to render a determination possible. I say a sufficient number, for experience teaches that there are *etruscus* molars with some *Mercki* character or other, e.g. an *etruscus* premolar with a V-shaped pass or a *Mercki* premolar with a very strongly developed inner cingulum.

The determination of the upper dentition in T.M. does not present any difficulties : the small height of the outer wall of the teeth, the strong development and the horizontal position of the inner cingulum up to beyond the boundary between proto- and metalophus, the slight gradient of the anterior cingulum, the rounded passes in the premolars, and especially the wide, more or less rounded entrance to the medisinus in the molars, the folding of the outer surface, the flat outer wall of mol. 3, the almost total absence of a cement layer, and the small size of the teeth stamp this dentition undoubtedly as a genuine *Rh. etruscus* dentition.

The upper dentition of M.M. shows the following *etruscus* characters : the small height of the outer wall of the teeth (Index of height of the Maestricht pm. 1 117.5 against 147 in pm. 1 of *Rh. Mercki* from Heggen, though the latter is still slightly more worn away), the position of the inner cingulum in the premolars, the small gradient of the anterior cingulum, the rounded passes in the premolars, and the wide, more or less rounded entrance to the medisinus of the molars, the straight outer wall of mol. 3, the absence of a cement layer and the small size of the teeth. The upper dentition in M.M. undoubtedly belongs to *Rh. etruscus* FALC.

The great wear of the upper dentition in S.M. has caused many characters, among which the primary character, to disappear. The remaining ones do not point to *Rh. etruscus*, but to *Rh. Mercki*, viz. the exceedingly weak development of the inner cingulum in premolars and molars, the direction of this cingulum in the pm. 2 and 1, the great

gradient of the anterior cingulum, the V-shaped entrance to the medisinus of the molars, which, though comparatively wide in mol. 2, falls yet within the limits of variation of the *Mercki* forms studied by me, the curved outer surface in mol. 3, the thick cement covering of the outer wall of the molars, and the size of the separate teeth, which exceeds that of all *etruscus* forms.

In A.M. I compared the dentition of S.M. with the upper dentition of *Rh. Mercki* from Jerxheim, which is considered as an extreme *Mercki* form. The latter upper dentition is considerably larger and much less worn. As regards the other characters, the two dentitions bear such a striking resemblance to each other, that it seemed to me undeniable that the dentition in S.M. belongs to *Rh. Mercki* JÄG.

ARE RH. MERCKI JÄG. AND RH. ETRUSCUS FALC. AFTER ALL DIFFERENT SPECIES?

The English investigators: FALCONER, BOYD-DAWKINS, NEWTON, and others consider them different species. Likewise the German investigators, as SCHROEDER, WÜST, WURM. STROMER VON REICHENBACH seems to consider them as races of one species. BRANDT takes *Rh. etruscus* as a variety of *Rh. Mercki*. Of the Italian authors FORSYTH-MAIOR and SACCO are of opinion that *Rh. etruscus* is an independent species. PORTIS and SIMONELLI consider the two species as identical (cf. SCHROEDER, P. 29, p. 10—15).

My own opinion is that they are two different species. The structure of the upper molars show sufficient distinctions for me to base difference of species on these. The difference between the upper molars of *Rh. etruscus* FALC. and *Rh. Mercki* JÄG. is, in my opinion, greater than between those of *Rh. sondaicus* and *Rh. sumatrensis*. The upper molars of the recent *Rh. simus* and the Diluvial *Rh. antiquitatis* and the Pliocene *Rh. platyrhinus* FALC. from the Siwalikhills certainly present no greater differences. The comparatively great variation in *some* characters of the upper molars of *Rh. Mercki* and *Rh. etruscus*, which in some cases render the determination difficult, cannot be an objection to the assumption of specific difference between the two forms, for neither in *Rh. etruscus* nor in *Rh. Mercki* have I observed such a variation in the enamel folding of the grinding surface as in the upper molars of *Rh. antiquitatis*. The third true molar of the last-mentioned species presents a considerably wider range of variation with reference to the postsinus than that of the first-mentioned species. The variation of the postsinus of the last molar is, indeed, exactly the same in *Rh. sondaicus* as in *Rh. etruscus* and in *Rh. Mercki*. Accordingly, in the determination of the dentitions I have not taken into account this character mentioned by other authors as a criterion. Until we agree to combine recent brachyodont and hypsodont forms into one species, I think we shall have to consider *Rh. etruscus* and *Rh. Mercki* as two separate species.

Rh. etruscus is known from the Upper Pliocene and from the Pleistocene. I have not been able to detect a gradual development of the characters, nor of the size. The molars of *Rh. etruscus* from the Upper Pliocene of Malaga in Spain [Br. M. 40955] are larger than the resp. molars in M.M., those from the Upper Pliocene of Perolles (Puy-de-Dome) are about the same size, those from the Upper Pliocene of Val d'Arno are smaller. The dentition in T.M. and that in M.M. have been found in the same pit, viz. that of Canoy and Herfkens, and with great probability in the same layer. Nevertheless they differ not inconsiderably in size and in some characters. Among the upper molars from Mosbach and Mauer larger and smaller specimens are found than the corresponding molars in M.M., though these latter are geologically older. In some specific characters, as the direction of the cingulum, the form of the entrance to the medisinus in the molars, the teeth in T.M. and M.M. resemble the Pliocene forms from Malaga, Perolles, and Val d'Arno (Br. M.) less than the later *etruscus* from Mosbach. The same remark is applicable to the *Mercki* forms known to me. The large English *Mercki* molars have been found together with

the smaller *leptorhinus* OWEN molars at Crayford and Ilford. Up to now I have only observed a fairly great variation independent of the geological age.

The dentition in M.M. possesses characters pointing in the direction of *Rh. Mercki*, as the tendency to hypsodonty in the premolars, from which follows the high passes, the development of the inner cingulum which is insignificant for *Rh. etruscus*, the folding of the outer surface of the premolars, the less flat entrance to the medisinus in the molars. The upper molars of *Rh. etruscus* FALC. (figured P. 10, Pl. 25 fig. 5—7) of Pisa, plaster casts of which are found in Br. M., resemble *Rh. Mercki* more closely in the — as far as I can see — total absence of the inner cingulum in pm. 1, and the almost V-shaped entrance to the medisinus in mol. 2.

LOWER JAW IN T.M.

Rh. etruscus. Pl. V, fig. 3; Pl VI, fig 1.

T.M. possesses a left horizontal ramus of a lower jaw with the last five permanent molars in situ. Part of the symphysis is in existence. Of the right ramus only pm. 1, mol. 2, and mol. 3 have been found.

Dimensions (Dim. on pag. 51—54 are uniform with those of P. 33):	*Rh. etruscus* from Tegelen T.M.	*Rh. etruscus* L. M.	*Rh. etruscus* from Mosbach Mainz	*Rh. etruscus* from Mosbach B.M.	*Rh. etruscus* from Mauer (P. 33, p. 42)	*Rh. etruscus* from Mauer (P. 33, p. 42)	*Rh. etruscus* from Mauer (P. 33, p. 42)	*Rh. etruscus* Pisa
1. Length of series of teeth at base	ca 229	ca 225	245	242	221	227	262	220
2. Length of premolars	ca 101	—	99	104	96	96	119	—
3. Length of true molars	ca 129	—	140	138	128	129	143	—
4. Height of ramus before pm. 3	71	65	—	55	68	—	60	—
5. Height of ramus behind mol. 3	93	84	102	80	85	—	103	90
6. Breadth of ramus above, behind mol. 3	42	46	—	—	—	—	—	40.5
7. Breadth of ramus below, behind pm. 1	44	46	—	—	—	—	—	45

The symphysis is not more or less flat on the lower side, as with the ramus of *Rh. etruscus* in L.M., but convex from the left towards the right with a faint carina in the median, as in *Rh. etruscus* from Mosbach in B.M. On the outside there is still a faint indication of the beginning of the spatula-shaped broadening towards the front. Behind this lie two foramina mentalia, as in the ramus in L.M. Though the length of the whole series of teeth is about equal to that of the lower jaw in L.M., the ramus in T.M. is considerably higher at the back, but even more so in front. Moreover, that in T.M. is conspicuously narrower. In height and breadth of the ramus that in T.M. bears the closest resemblance to the lower jaw of *Rh. etruscus* of Pisa.

The lower jaw in T.M. belonged to an adult, but not very aged individual. Probably the piece belongs to the upper molars described before in the same museum. In none of the teeth are the discs of the crescents united. The left molars are all intact on the outside. On the inside the anterior part of the first crescent is absent in pm. 1, the whole first crescent in mol. 1. This is also the case with the right mol. 2.

Dimensions:	*Rh. etruscus* T.M. left	*Rh. etruscus* T.M. right	*Rh. etruscus* Mauer (P. 33, p. 43)	*Rh. etruscus* Mosbach (P. 27, p. 278)	*Rh. etruscus* Süssenborn (P. 27. p. 278)	*Rh. etruscus* T.M.
pm. 2. Length measured on inside, at base of crown	ca 33	—	31.5	29	34	—
pm. 2. Maximum breadth of posterior crescent measured at base of crown	24	—	29	24	24	—

Dimensions :		*Rh. etruscus* T.M. left	*Rh. etruscus* T.M. right	*Rh. etruscus* Mauer (P. 33, p. 43)	*Rh. etruscus* Mosbach (P. 27, p. 278)	*Rh. etruscus* Süssenborn (P. 27, p. 278)	*Rh. etrusc* L.M.
pm. 1	Length on inside (as above)	37	37	ca 32.5	31	36	—
	Breadth (as above)	28	28	ca 30	29	27	—
mol. 1	Length on inside (as above)	ca 38	—	38.5	36	ca 39	—
	Breadth (as above)	30	—	31	30	31	—
mol. 2	Length on inside (as above)	44	—	42	41	45.5	42
	Breadth (as above)	31	31	30	31	31	26
mol. 3	Length on inside (as above)	44	44	46	45	45	43
	Breadth (as above)	28	27.5	26	30	27.5	24

The dimensions of the separate teeth are almost the same as those of *Rh. etrusc* FALC. from Süssenborn Städt. Mus. Weimar (P. 27, p. 278). Also the height of the ja immediately behind mol. 3. The breadth at this place is, however, considerably less in t ramus in T.M. (42 mm. against 55 in that from Süssenborn).

All the teeth show a clear cingulum on the front and the back. In the premolars t outer cingulum is represented by some distinct tubercles in the middle of the outer surfa of the posterior crescent near the crown base. In the true molars it is represented by boldly pronounced, well defined ridge of enamel, which, as continuation of the anteri cingulum, extends for some distance obliquely downwards on the front part of the out surface of the anterior crescent. On the inner side the cingulum is only to be discerned pm. 1, and especially in mol. 2 as prolongation of the anterior cingulum. In mol. 2 and of *Rh. etruscus* in L.M. the outer cingulum is more strongly developed, and exten further towards the groove between the two crescents. Also in the teeth of *Rh. etrusc* from Mosbach the cingulum is more strongly developed, as also appears from Taf. X Fig. 1 in P. 29 (SCHROEDER). In the teeth of *Rh. etruscus* from Mauer the cingulum seer to be developed less than in those of T.M. (P. 33, p. 45).

In T.M. there is still a small box with fragments of *rhinoceros* lower molars from t pit belonging to Van Cleef brothers, Belfeld 1924. They are, however, too incomplete be described.

LOWER JAW IN S.M.

Rh. Mercki. Pl. V ; fig. 4 ; Pl. VI, fig. 2 and fig. 4.

The museum at Steyl possesses numerous fragments of a mandible belonging to t upper dentition described before.

Of the right half of the mandible the greater part of the horizontal ramus with t last five permanent molars is present. Of the ascending ramus only the front part with t processus coronoideus is left. Of the left half of the mandible the principal parts ha been found with all the teeth, so that we are able to form an idea of the whole.

Dimensions :	*Rh. Mercki* Tegelen S.M.	*Rh. etruscus* Tegelen T.M.	*Rh. etruscus* Mauer	*Rh. etruscus* Mosbach Mainz	*Rh. etruscus* Mosbach B.M.	*Rh. Mercki* Mosbach B.M.	*Rh. Mercki* Wiesbaden	*Rh. Mercki* Wiesbaden
1. Entire length of jaw from front of symphysis to posterior margin of ascending ramus. (Measured along base of crown)	ca 543*	—	494	545	515	—	—	—
2. Length of jaw from anterior alveolar margin of antepenultimate premolar (pm. 3) to posterior margin of ascending ramus	ca 477	—	418	—	425	494	531	465
3. Length of symphysis	—	—	104	125	95	—	—	—
4. Length from mol. 3 to posterior margin of ascending ramus	ca 223	—	196	190	183	222	251	180
5. Length of line of molars (at base of crowns)	ca 247	ca 229	221	245	242	282	275	282
6. Length of premolars	102	ca 101	96	99	104	123	—	—
7. Length of true molars	144	ca 129	128	140	138	157	—	—
8. Breadth of condyloid process	116	—	96	103	95	—	124	—
9. Height of jaw behind mol. 3	98	93	85	102	80	121	127	108
10. Breadth of jaw behind mol. 3	53	42	—	—	—	—	—	—
11. Breadth of jaw behind pm. 1	57	44	—	—	—	—	—	—

* The top of the symphysis is broken off.

The lower jaw of S.M. exceeds the largest specimen of *Rh. etruscus* from Mosbach in its principal dimensions, and as regards dimension 2 and 3 it falls within the variation range of *Rh. Mercki*. The symphysis is flatter on the under side than that in the mandible in T.M. The expansion to the front is comparatively much smaller than in *Rh. etruscus* from Mosbach (P. 29, Taf. XII, Fig. 1). The horizontal ramus is much larger and blunter than that in T.M.

In all the teeth the discs of the crescents are united. In mol. 1 nothing is to be seen now of a crescent shape. The teeth are pressed tightly together, and the roots project high above the bone. The two hollows of the crescents lie in general higher than in the teeth in T.M.

Dimensions :		*Rh. Mercki* Tegelen S.M. left	*Rh. Mercki* Tegelen S.M. right	*Rh. etruscus* Tegelen T.M. left	*Rh. etruscus* Mauer (P. 33, p. 43)	*Rh. etruscus* Mosbach (P. 27, p. 278)	*Rh. etruscus* Süssenborn (P. 27, p. 278)	*Rh. Mercki* Heggen	*Rh. Mercki* Taubach (P. 27, p. 278)	*Rh. Mercki* Taubach (P. 27, p. 278)	*Rh. Mercki* Rabutz (P. 27, p. 278)	*Rh. Mercki* Rabutz (P. 27, p. 278)
3	Length inside (at base of crown) . .	29	—	—	ca 26	25?	26	—	—	—	39	28
3	Breadth of posterior crescent (at base of crown) . .	19	—	—	24	19	20	—	—	—	29	21
2	Length inside . .	34	35	ca 33	31.5	29	34	—	39	—	44	33
2	Breadth (as above)	26.5	26	24	29	24	24	—	30	—	32	25

Dimensions :		*Rh. Mercki* Tegelen S.M.		*Rh. etruscus*				*Rh. Mercki*			
		left	right	Tegelen T.M. left	Mauer (P. 33, p. 43)	Mosbach (P. 27, p. 278)	Süssenborn (P. 27, p. 278)	Heggen	Taubach (P. 27, p. 278)	Taubach (P. 27, p. 278)	Rabutz (P. 27, p. 278)
pm. 1	Length outside (as above)	40	40	—	—	—	—	45	—	—	—
	Length inside (as above)	39	39	37	ca 32.5	31	36	—	43	—	49
	Breadth (as above)	31	30	28	ca 30	29	27	32	34	—	36
mol. 1	Length outside (as above)	—	44	—	—	—	—	48	—	—	—
	Length inside (as above)	—	46	ca 38	38.5	36	ca 39	—	49	—	53
	Breadth (as above)	—	35	30	31	30	31	36	—	—	37
mol. 2	Length outside (as above)	47	46	—	—	—	—	51	—	—	—
	Length inside (as above)	48	48	44	42	41	45.5	—	51	55	63
	Breadth (as above)	35	35	31	30	31	31	34	41	—	38
mol. 3	Length inside (as above)	52	51	44	46	45	45	—	61	64	—
	Breadth (as above)	—	30.5	28	26	30	27.5	—	35	37	—

The teeth of lower jaw in S.M. exceed in their dimensions all the *etruscus* low teeth known to me. Most *Mercki* teeth, however, are larger, though also the *Merc* teeth of the various localities vary greatly in size. As regards size they correspond mo closely with those of *Rh. Mercki* from Rabutz II. Pm. 3, pm. 2, pm. 1, and mol. 1 exce the corresponding teeth from Rabutz in size, whereas mol. 2 and 3 in S.M. are small than the corresponding teeth from Rabutz.

In all lower teeth in S.M. a minimum anterior cingulum is visible, which as a fai obliquely descending ridge of enamel is continued on the front edge of the outside. Th posterior cingulum is absent or it has at least disappeared. An inner cingulum is entire absent. The lower teeth in S.M., like the upper teeth are characterized by a very feeb cingulum development. In this respect they resemble the lower teeth of *Rh. Mercki* fro Mosbach described by SCHROEDER : P. 29, p. 120—121 : "Offenbar zeichnen sich d Unterkieferzähne des *Rh. Mercki* durch eine sehr geringe Entwicklung der Cingula v denen des *Rh. etruscus* aus" (SCHROEDER loc. cit. p. 121).

THE SKULL.

S.M. *Rh. Mercki.*

The Nasal Part.

VII, fig. 1 and 2 ; Pl. VIII, fig. 3.

the fused nasalia a fragment of a length of 90 mm. has been
ıe median groove is 13 mm. long. I find no indications that
mplete. The nasal part of *Rh. hundsheimensis* (TOULA : P. 31,
milar short median groove. In the skull of *Rh. sondaicus* the
ıt $^1/_3$ of the length of the nasalia, in *Rh. sumatrensis* about $^2/_5$.
This groove also occurs in *Rh. etruscus* FALC. (P. 10, p. 357), and in *Rh. Mercki* (P. 7, Taf. XXXVII). In *Rh. antiquitatis* it should rather be designated as a very narrow central longitudinal ridge. Of the outer margin of the left nasal four fragments of a breadth of 40 to 45 mm. have been found (Pl. VII, fig. 2), which fit on to each other. This enables us to measure the breadth of the nasal part, where the median groove ends. The breadth there is from 106 to 110 mm. ; in *Rh. sondaicus* 72 mm. Towards the back the breadth increases rapidly ; so that a width of 160 mm., measured by BRANDT (P. 12, p. 81) on a skull of *Rh. Mercki* JÄG from Irkutzk, is certainly also reached by that from Tegelen. The outer surface of the left nasale shows a tumidity, which runs parallel to the outer margin and terminates about 110 mm. behind the end of the groove. It does not seem improbable to me that on the nasal disc two lateral parts, clearly marked at the back, could be distinguished. The blood vessels, which proceed from the outer margin to the middle, have left only faint impressions. The surface of the nasalia exhibits no high, rough rugosities, as is the case with the comparing skull of *Rh. sumatrensis*. The condition is more like that of *Rh. sondaicus* : a rough surface with small, low rugosities. I have, indeed, also found a triangular fragment with larger rugosities (Pl. VIII, fig. 3), but I have not succeeded in locating it with any degree of certainty. Behind the median groove the nasal bone is more or less flat, it is only little inclined to either side. The lower surface of the nasalia very clearly shows the base of a vertical bony nasal septum, which is continued to the tip (Pl. VII, fig. 1b). Also *Rh. sumatrensis* shows a tendency to ossification of the septum, but there this ossification starts from bony lamellae covering the insides of the nasalia. Here the septum is a part of the fused nasalia themselves. How far it continues backwards, cannot be decided with certainty, as the bone has been broken off. There are indications that the base is from 85 to 90 mm. long. For it seems probable to me that the surface of fracture between the lower side of the nasalia and the septum still ends on the fragment itself. If this is true, the condition resembles that in *Rh. Mercki* from Daxland P. 7, Taf. XXXV. On either side of the septum runs a wide rounded groove becoming narrower to the front. The outer border of the nasalia is thin.

The Roof of the Skull.

Pl. VII, fig. 4 and 6.

Of the skull-roof two larger fragments remain. The broad fragment comes from the middle of the cranium and comprises a large posterior part of the right frontale to the

base of the frontal horn with a narrow strip of the left frontale. On Pl. VII, fig. 4 the median region is visible, though only vaguely. On the right behind it the border of the side surface of the skull is seen. The median region is convex from left to right, but very slightly concave from front to back. The frontale on the righthand side is almost flat. There are large diploëcells on the inside of the bone. On the median on the front side the whole is 30 mm. thick.

The second piece (Pl. VII, fig. 6) shows the sincipital contraction between the fossae temporales. I do not venture to decide whether the two fragments fit on to each other. The outer surface exhibits three distinct ridges : a median one, which spreads fanlike to the back, and two lateral ones forming the boundary of the temporal fossae. The two lateral ridges diverge both forward and backward. The median one and the right lateral one have their continuation on the first-mentioned piece. The smallest distance between the lateral ridges (measured between the outer edges) is 25 mm. The skull of *Rh. etruscus* in the Museum of Florence (P. 10, Pl. 26, fig. 1) is much broader at this place, the three ridges being also absent. The skulls of *Rh. hemitoechus* FALC. from Clacton (P. 10, Pl. 15, fig. 3), of *Rh. Mercki* JÄG. from Irkutzk (P. 12, Taf. 1, Fig. 1), of *Rh. Mercki* Museum Pisa (P. 12, Taf. VI, Fig. 1) and of *Rh. leptorhinus* OWEN from Grays Essex [Br. M. 5113] likewise show the three ridges.

The Temporal Part.

Pl. VII, fig. 3 ; Pl. VIII, fig. 2.

A large part of the left os temporale is preserved (Pl. VIII, fig. 2). The mastoideum is fused with the processus postglenoidalis, the projecting part of which is broken off. In the comparing skull of *Rh. sondaicus* this fusion is complete, in that in S.M. a fissure still clearly marks the boundary of the two bones. In *Rh. sondaicus* the base of the processus zygomaticus narrows the meatus auditorius, this is not the case with the fragment of skull in S.M. The tube is lined in front and at the back by a sharp ridge, i.e. the crista temporalis and the linea nuchalis. This is also the case with *Rh. sondaicus*, but in that in S.M. the linea of the mastoideum does not extend so far downward. The two ridges converge upwards. I have found a detached fragment of bone, which appears to be the continuation of the large piece upwards. The two ridges meet without uniting, running side by side for some distance. This fragment is too small and the attachment too uncertain to enable me to draw conclusions about the slope of the occiput. The squama temporalis is less deep with reference to the crista temporalis in the specimen in S.M. than in *Rh. sondaicus*. From concave it seems soon to become convex more to the front, the squama before the meatus auditorius being markedly concave in *Rh. sondaicus*.

Also the corner-end both of the right and of the left zygomatic arch is extant. That of the left arch bears the lateral end of the articular eminence (Pl. VII, fig. 3b). At the corner, the zygomatic process is 70.5 mm. broad against 69.5 mm. in *Rh. sondaicus*. The outer surface (Pl. VII, fig. 3a) is less rough than in *Rh. sondaicus*.

The Occipital Part.

Pl. VII, fig 5 ; Pl. VIII, fig. 2 and 4.

Of the occipital crest the lefthand upper part has been preserved (Pl. VII, fig. 5). The crest there is thick and rounded, and bends gradually downwards. The bone exhibits part of the occipital plane with a rough surface for the insertion of a nuchal muscle. This surface of insertion is also to be seen in *Rh. sondaicus*, but there it is longer and narrower, which is also the case, though in a smaller degree, with *Rh. sumatrensis*. The angle which

this surface forms with the parietal bone is about equal to that in *Rh. sumatrensis*. In *Rh. sondaicus* the condition is different. The crest itself is there sharp-edged and the parietale in front of it very concave, so that the angle is difficult to measure. The curvature of the crest presents much resemblance to that of the skull of *Rh. Mercki* from Irkutzk (P. 12, Taf. II, Fig. 28). It appears, however, from the numerous individual variations in this respect in *Rh. antiquitatis* (P. 12, Taf. XVII) that no great systematic value should be attached to this character.

The two condyli occipitales (Pl. VIII, fig. 4) have been preserved. The most damaged, the left part, fits on to the piece with the meatus auditorius discussed before. It appears from this that the position of the condyli is about the same as that in *Rh. sondaicus*. They are also similar in form. The length of the right condylus, measured in the middle, is 68 mm., as in *Rh. sondaicus*. The total width on the side of the foramen magnum is 57 mm. against 52 mm. in *Rh. sondaicus*. The joining piece between the condyli is wanting.

The Base of the Skull.

Pl. VIII, fig. 1.

Of the base of the skull, part of the corpus of the os sphenoidale with an erect part of the left processus pterygoideus has been found (Pl. VIII, fig. 1). The medial half of the wall of the canalis alaris is still visible, so likewise the canalis pterygoideus (Vidii) between the corpus and the processus pterygoideus. At the place where this canal passes into a shallow groove proceeding to the foramen lacerum, the corpus is 21 mm. broad, against about 16 mm. in *Rh. sondaicus*.

Besides, also a fragment of the horizontal part of the left palatinum with the foramen palatinum maius has been preserved. In form it resembles the corresponding bone in *Rh. sumatrensis* more closely than that in *Rh. sondaicus*. It is only more heavily built.

Among the detached pieces in S.M. there are also two maxillary fragments. The larger shows the alveoli of the left upper premolar 3 (penultimate), the smaller those of the right upper premolar 3. I cannot give the dimensions, but they are considerably larger than in the corresponding parts in *Rh. sondaicus*.

I have further glued together three smaller fragments which belong together and form part of the left maxilla and lie close beside the last two molars. The rough under side of the os zygomaticum, which serves for insertion of muscles, with a short prolongation on the upper jaw itself makes the whole easily recognisable. This rough surface for the attachment of muscles is longer and broader than in *Rh. sondaicus* and *Rh. sumatrensis*. Two similar fragments have also been found of the right upper jaw.

Of the left and right os zygomaticum 2 fragments (Pl. VII, fig. 7 and 8) have been found, the broadened upper side of which forms the bottom of the orbit. This broadened part is narrower and more convex from the inside towards the outside than in *Rh. sondaicus* and *Rh. sumatrensis*.

In conclusion I have still to mention the ossa incisiva, which have both been partly preserved. In cross-section they are about triangular. The outer surface is convex from above downward. The under side is slightly concave. The boundary between them shows a groove broadening towards the front. The inner surface is strongly concave, and possesses a longitudinal groove medially. The extreme medial border is broken off. There is no trace to be seen of rudimentary upper incisors or their alveoli. Unfortunately the tip is lost, hence nothing can be said about their connection with the septum.

COLUMNA VERTEBRALIS.

Atlas.

T. M. *Rh. etruscus*. Pl. VIII, fig. 5.

S. M. *Rh. Mercki*. Pl. VIII, fig. 6.

In the Teglian Clay two atlases have been found. The former is preserved in T. M. and is intact for the greater part. Only the edges of the diapophyses are broken off. Hence nothing can be said with any certainty about the shape of the diapophyses. Besides, the ventral part in front of the tuberculum ventrale is slightly damaged, and probably also the tuberculum ventrale itself. The whole has been glued togerther out of separate pieces, and missing parts have been supplemented with plaster.

The second atlas is preserved in the S. M. The diapophyses are badly damaged, especially the left one. For the rest it is for the greater part intact, only the ventral surface is damaged in the middle. The whole is glued together out of four fragments.

Dimensions (cf. P. 28) :	Tegelen S.M.	Tegelen T.M.	*Rh. hundsh.*	*Rh. ant.* BRANDT	*Rh. megarhinus* SIMON.	*Rh. etruscus* Dusino
1. Maximum width of facies articulares craniales	155	134	150,5	151.2	159	—
2. Maximum width of facies articulares caudales	162	—	153	185	—	—
3. Maximum distance between facies articulares craniales and caudales	121.5	106	118	116	112.5	—
4. Distance of foramina alaria	156.5	138	161	160	156	(144)
5. Distance of foramina intervertebralia	57.5	56.5	80.5	67	60	(71)
6. Height of foramen vertebrale (front)	60	50	—	—	—	—
7. Maximum breadth of foramen vertebrale (front)	57	52	—	—	—	—
8. Distance between inner borders of facies articulares craniales (dors.)	44	45	57	—	—	—
9. Distance of facies articulares craniales (vent.)	18	20	25	—	—	—
10. Length of arcus dorsalis	63	64	60	66	—	—
11. Length of arcus ventralis	—	44	—	—	—	—
2 : 1	1.045	—	1.01	1.22	1.06	
1 : 3	1.27	1.26	1.27	1.30	1.29	
1 : 4	0.99	0.97	0.93	0.96	1.02	
4 : 5	2.72	2.44	2.00	2.40	2.60	(2.03)
6 : 7	1.05	0.96				

The atlas in S. M. differs in several points from that in T. M. It is considerably larger. As, however, appears from the ratio 1: 3, the general shape of the body is the same. The

ratio 2 : 1 cannot be determined with certainty in the atlas in T. M. A possible difference from that in S.M. can, however, at any rate not be large. In this proportion the species mentioned in the table agree pretty well. Only *Rh. antiquitatis* made an exception.

In the atlas in T.M. the left foramen alare is closed in front. The right one is open. In that in S.M. both foramina are open. In this respect the atlas in S.M. corresponds to that of *Rh. antiquitatis* (P. 12, Taf. VI, Fig. 5), and to that of *Rh. hemitoechus* from Gibraltar (BUSK : On the Ancient or Quaternary Fauna. Trans. Zoöl. Soc. X, p. 95, Pl. 18, Fig. 1 and 2 according to STROMER VON REICHENBACH : P. 25), and to that of *Rh. megarhinus* from Monte Giogo (P. 23, p. 101, Taf. XI (II), Fig. 4). In the atlas of *Rh. hundsh.* the foramen alare is closed both on the right and on the left. (P. 28, p. 26, Taf. V, Fig. 1 *a. b.* and *c.*). STROMER VON REICHENBACH describes (P. 25, p. 77) a fragment of an atlas of *Rh. etruscus* preserved in the L.M. It is a fragment of the left half. The foramen alare is completely closed in front. According to the author this is also the case with the atlas of *Rh. etruscus* from Dusino.

The foramina intervertebralia lie comparatively much closer together in the atlas in S.M. than in that in T.M. In this respect especially the atlas of *Rh. hundsheimensis* diverges widely.

In the atlas in T.M. the foramen vertebrale is more broad than long on the front side, whereas in the atlas in S.M. the height exceeds the width (6 : 7). This is owing to the fact that in the atlas in T.M. the facies articulares craniales lie farther apart, and the underside of the arcus dorsalis is less arched. For the rest the shape of the foramen vertebrale is almost the same. In *Rh. antiquitatis* (P. 12, Taf. VI, Fig. 6) the foramen vertebrale seems more pointed on the dorsal side, which gives it a more pentagonal form, seen from the front. In the atlas of *Rh. hundsh.* the facies articulares craniales lie further from each other than in our specimens, in consequence of which also the foramen vertebrale assumes a somewhat different form. *In Rh. megarhinus* SIMONELLI (P. 23, loc. cit.) the foramen vertebrale has a sharply defined triangular form. On (P. 12) Taf. XI, Fig. 1 and 2 BRANDT reproduces an atlas which he assigns to *Rh. Mercki*. The shape of the foramen vertebrale closely resembles that of the atlas in S.M. Also in other respects this atlas is very similar to that of S.M. In the atlas in S.M. the foramen vertebrale is narrowed on both sides by a prominent tubercle. This is also the case with *Rh. hundsh.* and *Rh. Mercki* in P. 12, the atlas in T.M. only exhibiting traces of it.

In the atlas in S.M. the arcus dorsalis is shorter than that in the atlas in T.M. owing to the former being more deeply constricted in the middle from the front backward. The tuberculum dorsale has, in the atlas in T.M., the shape of a smoothly rounded knob, whereas in that in S.M. it is higher and ends in a point. In this respect this latter somewhat resembles that of *Rh. antiquitatis* in P. 12. In *Rh. hundsheimensis* (P. 28, loc. cit.) the tuberculum dorsale is hollowed out in the middle, and on the right and on the left of it there is a protuberance. The tuberculum ventrale is damaged in both specimens from Tegelen, so that this point must be left out of consideration.

Axis.

S.M. *Rh. Mercki*. Pl. IX, fig. 1.

The axis glued together from two fragments, is very incomplete. Of the corpus the back part is missing for the greater part. Of the fossa vertebrae (= concave articular surface for the third cervical vertebra) only a small part is left, which through its slanting position suggests great depth. At its top the processus odontoideus has a half-spherical protuberance pointing obliquely upwards, under which the two articular surfaces for the atlas join. These extend obliquely backward, but are broken off at the back. Compared with the two corresponding articular surfaces of the atlas in T.M. they are very broad. The diapo-

physes are broken off, only on the right the base with the foramen transversarium is left, which points obliquely inward and backward. When the fragment is given the same position as the axis of *Rh. antiquitatis* reproduced on Taf. VI, Fig. 8 of P. 12, the foramen transversarium is seen to project half above the articular surface for the atlas, whereas in *Rh. antiquitatis* it lies hidden behind it. Evidently it lies in our specimen somewhat higher than in *Rh. antiquitatis*. In Fig. 3, 4, and 5 of Taf. XI BRANDT (P. 12) gives the reproductions of an axis, which he ascribes with some hesitation to *Rh. Mercki*. It might possibly belong to *Elasmotherium*. PORTIS says in P. 14, p. 149. "Was die Abbildungen der gleichen Wirbel bei BRANDT (Taf. XI, Fig. 1—11) betrifft, so sehe ich alle diese als nicht der Gattung *Rhinoceros* angehörig an, mich BRANDT's Meinung anschliessend, dass sie der Gattung *Elasmotherium* angehören." On p. 90. BRANDT (P. 12) says about this epistropheus : "Anstatt eines Gefäszkanales findet sich eine breite Furche". In this point the specimen in S.M. differs, therefore, from the axis described by BRANDT, as also from that of *Rh. sondaicus* in the collection of the Zoological Gardens in Amsterdam.

PORTIS says in his Osteologie (P. 14) p. 149 : "Vergleichen wir die Wirbel von Taubach mit denen des Skelets von *Rhin. antiquitatis* in München, so sehen wir, dass die Querfortsätze des Epistropheus des *Rhin. Merckii* viel weniger entwikkelt sind, dasz der sie durchbohrende Kanal viel grösser ist (und deshalb dünnere Wände vorhanden sind) und mehr nach oben liegt." In this our specimen agrees with that of *Rh. Mercki* from Taubach ; but yet it seems to me that in Fig. 5*b*, Taf. XIX of PORTIS (P. 14) the foramen transversarium lies higher than in the axis in S.M. held in the same position. Moreover, also the half-spherical extremity of the processus odontoideus lies higher. The two articular surfaces for the atlas unite in our specimen immediately under the half-spherical extremity, while it appears from Fig. 5*b* of PORTIS that the corresponding surfaces in *Rh. Mercki* from Taubach join considerably lower, on account of which the processus odontoideus is much blunter at its end. PORTIS does not give any measurements, but from Fig. 5*b* I can calculate the length corresponding to the greatest length of the vertebra in S.M. at ± 142 mm., this measurement being 123 mm. in the last mentioned.

In P. 28, p. 127 TOULA gives as greatest length "unten gemessen mit dem Processus odontoideus" for *Rh. hundsch.* 117 mm., for *Rh. megarh.* SIMONELLI 112 mm., and for *Rh. sumatrensis* 101 mm. The base of the fossa vertebrae is missing in our specimen. Hence I have been obliged to measure higher and more on one side. From a comparison with the axis of *Rh. sondaicus* and also of the reproduction by TOULA P. 28, Taf. V, Fig. 2*c* it appears clearly that the measurement 123 mm. given by me does not represent the greatest length, so that we may state with certainty that our specimen is longer than that from Hundsheim. In our specimen the breadth of the foramen vertebrale is 36 mm. against 35 in *Rh. hundsh.*, and 48 in *Rh. megarhinus* SIMONELLI. As distance of the foramina transversaria TOULA gives 93 mm. for *Rh. hundsh.*, about 72 mm. for *Rh. megarhinus* SIM. In the axis in S.M. half of that measurement taken in front is 44 mm., at the back 30 mm., the distance would, therefore, be resp. 88 and 60 mm., accordingly in any case less than in *Rh. hundsh.* On p. 28 (P. 28) TOULA says : "Der Processus odontoideus ist vorne verbreitet", which also appears from the reproduction given by him Fig. 2 *b* of Taf.V. Fig. 2*c* of Taf. V gives the side-view of the axis from Hundsheim, and it also appears from this that the base of the protuberance at the end of the processus odontoideus is not the foremost point, which *is* the case in our specimen. It also seems to me that the front entrance of the foramen transversarium lies higher in *Rh. hundsh.* It may, accordingly be said that the axis of S.M., in comparison with that of *Rh. hundsh.*, has, with a greater length, a smaller distance of the foramina transversaria, and a ± equal width of the foramen vertebrale. Besides, they differ in some morphological characters mentioned before.

On account of the incompleteness of the specimen in S.M. a further description and comparison do not seem possible to me.

In the same collection in S.M. I also found a left postzygapophysis of an axis, probably belonging to the one described before. The inferior part is broken off. The articular surface is pretty convex, and seems to have had a quadrangular shape with rounded angles. Also the greater part of the processus spinosus has been found. The upper side is 111.5 mm. long against 93.5 mm. in *Rh. hundsheimensis*. With the processus odontoideus and its front articular surfaces this axis fits into the atlas in S.M. described before.

Vertebra Cervicalis III.

S.M. *Rh. Mercki*. Pl. IX, fig. 2.

M.M. *Rh. Mercki* ? *etruscus* ? Pl. IX, fig. 3.

There exist 2 specimens of the 3rd vertebra cervicalis. One of them is found in S.M. The back of the corpus is missing, likewise the processus spinosus. On both sides the base of the diapophyses with the foramen transversarium is preserved. The right postzygapophysis is lost. The left postzygapophysis of the axis fits into the left praezygapophysis of the third vertebra cervicalis.

The other specimen is preserved in M.M. The corpus itself is intact. Of the arcus and the diapophyses only the base remains. The left foramen transversarium is intact. As appears from the measurements of the caput vertebrae the 3rd vertebra cervicalis in M.M. is somewhat larger than that in S.M. The form of the caput vertebrae is, however, the same, as also appears from the ratio of the length to the maximum breadth. For both I have besides calculated the ratio of the length of the caput to the whole breadth of the base of the left arcus (the under side of the diapophysis inclusive). This ratio measured from the figures is 1.44 in that in M.M., 1.435 in that in S.M. The width of the foramen vertebrale is 28 mm. in that in S.M., 27 mm. in that in M.M. It was, however, not possible to measure that in M.M. at the greatest width. Measured at the same place as that in M.M., i.e. more towards the base, the breadth of that in S.M. is 26 mm. The side-views of the two vertebrae resemble each other so closely, that there is no doubt that we have two 3rd vertebrae cervicales before us.

Dimensions (Dimensions of the vertebrae are uniform with those of P. 28) :	Tegelen S.M. cerv. III	Tegelen M.M. cerv. III	*Rh. hundsheimensis* P. 28 cerv. III	*Rh. megarh.* (SIMON. P. 28 cerv. III
1. Length of corpus vertebrae	—	73 (T.63)*	55	60
2. Length of arcus under processus spinosus	44	—	43	—
3. Height of foramen vertebrale	30 (front) 31 (middle)	—	30	ca 34
4. Breadth of foramen vertebrale ..	28	27	35	ca 51
5. Distance of extremities of diapophyses	—	—	181	—
6. Maximum distance of postzygapophyses	87	—	78	ca 90
7. Length of collum of diapophyses..	—	—	39	—
8. Breadth of fossa vertebrae	—	59	48	60
9. Height of fossa vertebrae	—	70	60	66
10. Height of caput vertebrae	67	70	61	—
11. Maximum breadth of caput vertebrae	45.6	50.5	—	—
12. Distance of foramina transversaria (measured at the back)	51.6	52.4	63	—

A comparison of the two vertebrae cervicales with the figures which PORTIS (P. 14, Taf. XIX) gives of the 3rd vertebra cervicalis of *Rh. Mercki* from Taubach, brings to light important differences. In Fig. 6 (loc. cit.) the foramen transversarium lies considerably lower with regard to the little dint on the caput, than in the Teglian specimens. PORTIS says (P. 14, p. 150): "Die anderen Halswirbel des *Rhin. Mercki* lassen sich von den gleichen des *Rhin. antiquitatis* (in München) unterscheiden, da sie... und die Querfortsätze am Wirbelkörper etwas weiter oben ansetzen, als bei *Rhin. antiquitatis*". This latter is the case even to a greater degree with the vertebrae from Tegelen. The height of the foramen transversarium in Fig. 6a of PORTIS is considerably smaller than the breadth of the lefthand base of the arcus. In our specimen we have the very reverse. Moreover, the caput in Fig. 6a PORTIS has the form of a rectangle with rounded corners, the caput of the specimens from Tegelen being smaller and egg-shaped. The foramen vertebrale in the latter is rounder, whereas it is more pointed at the top. in *Rh. Mercki* from Taubach. Also the back and the profile show distinct differences. That of *Rh. Mercki* from Taubach has a thicker and clumsier shape.

In his "Recherches sur les ossemens fossiles" Atlas I, Pl. 46, Fig. 9 CUVIER gives a reproduction of a cervical vertebra III ascribed by BRANDT (P. 12, p. 20) to *Rh. antiquitatis*. If this is really a 3rd vertebra cervicalis, as CUVIER writes (it presents the grea test resemblance to the 6th cervical vertebra in S.M.) the differences are very striking, indeed. The diapophysis lies much lower, and is broader than in our specimens. The caput is oval, instead of egg-shaped, the foramen transversarium is small. For the dimensions of the caput CUVIER (loc. cit. p. 146) gives 99 mm. length and 81 mm. breadth. The vertebra of *Rh. antiquitatis* is, therefore, much larger and more boldly developed. In Fig. 3 and 4 (P. 12) BRANDT gives reproductions of a vertebra cervicalis of *Rh antiquitatis*, which he is also inclined to take for a third. At first sight the great differences are already obvious, so that details may be omitted. This also applies to *Rh. megarhinus* of SIMONELLI.

The 3rd vertebra cervicalis of *Rh. hundsheimensis* is smaller than the two specimens from Tegelen. The foramen vertebrale is more broad than high in that of *Rh. hundsh.*, more high than broad in that in S.M. The caput is blunter at the base in that from Hundsheim than in that of our specimens. The fossa vertebrae is not so oval as that of the vertebra in M.M. The base of the arcus is broader on both sides than in those from Tegelen, owing to which the foramen transversarium also looks smaller. Besides it seems to me that the foramen transversarium is inserted slightly lower in that of *Rh. hundsheimensis* than in the vertebrae from Tegelen. (* cf. p. 63 last three lines)

Vertebra Cervicalis IV.

S.M. *Rh. Mercki*. Pl. IX, fig. 4.

The fourth vertebra cervicalis in S.M. I have glued together from six fragments. The corpus is undamaged for the greater part. The arcus is without the processus spinosus and the upper parts of the postzygapophyses. The diapophyses are broken off close to the base, the foramen transversarium can, however, still be measured.

Dimensions :	Tegelen S.M. cerv. IV	Hundsh. cerv. IV
1. Length of corpus vertebrae	70 (59 TOULA)	55
2. Length of arcus under processus spinosus	41.5	—
3. Height of foramen vertebrale (middle)	31	—
4. Breadth of foramen vertebrale	28	—

Dimensions :	Tegelen S.M. cerv. IV	Hundsh. cerv. IV
5. Distance of extremities of diapophyses	—	168
6. Maximum distance of postzygapophyses	—	92.5
7. Length of collum of diapophyses	—	—
8. Breadth of fossa vertebrae	62.5	—
9. Height of fossa vertebrae	at least 70	—
10. Height of caput vertebrae	65.5	62
11. Maximum breadth of caput vertebrae	47	—
12. Distance of foramina transversaria (measured at the back)	51.5	61.5

An accurate comparison of this cerv. IV with the cerv. III in S.M. and of both with the cerv. III and IV of *Rh. sondaicus* brings to light a number of smaller and greater differences, which, I think, enable me to locate the two vertebrae with certainty.

In cerv. IV the front side of the processus spinosus lies less far backwards than in cerv. III. The angle at which the praezygapophyses meet, is less acute. The length of the arcus (hence the roof of the foramen vertebrale) is smaller. The articular surfaces of the praezygapophyses are not so round and not concave, but flat. The angle between the praezygapophysis and the upper side of the corpus is less acute, on the other hand the angle between a postzygapophysis and the corpus is more acute. The length of the praezygapophyses is greater. The foramen transversarium is larger, and lies somewhat lower. The diapophysis is slightly heavier, and is inserted lower. We also meet with all these differences in *Rh. sondaicus* between cerv. III and IV. Moreover it appears that the loose postzygapophysis of the axis fits into the concave praezygapophysis of cerv. III, and the postzygapophysis of cerv. III into the praezygapophysis of cerv. IV.

We see from the measurements that the foramen vertebrale has the same dimensions as that in cerv. III. The caput has become relatively broader. For cerv. III the ratio is 1.46, for cerv. IV 1.40. The two surfaces which together form the ventral side of the corpus, make a less acute angle in cerv. IV.

In Fig. 5 and 6 BRANDT (P. 12, Taf. IX) gives copies of the reproductions which CUVIER (P. 1, Pl. 52, Fig. 11 and 12) gives of cerv. IV of *Rh. antiquitatis*. The diapophyses are inserted lower, the foramina transversaria smaller, the fossa vertebrae relatively broader, than in the specimen in S. M. The foramen vertebrale is broader and tapers towards the top. The side-view of the caput departs greatly from that in our specimen.

PORTIS (P. 14, Taf. XIX, Fig. *7a*, *b*, and *c*) gives reproductions of cerv. IV of *Rh. Mercki* from Taubach. They show that the vertebra of *Rh. Mercki* from Taubach is broader and stouter. The caput is considerably broader and more rounded oblong, it being egg-shaped in our specimen. The diapophysis with the foramen transversarium is inserted lower, the latter itself being smaller. The foramen vertebrale has its greatest dimension breadthwise, the height being the largest dimension in our specimen.

In *Rh. hundsh.* P. 28, Taf. V, Fig. *4a* and *4b* TOULA gives reproductions of cerv. IV of the *Rhinoceros* mentioned, from which it appears that the foramen vertebrale is much more broad than high, it being more high than broad in our specimen. Besides the radix arcus seems broader and more strongly developed to me than in the vertebra in S.M. How TOULA has measured the length of the corpus, is not entirely clear to me. From his measurements on the vertebrae thoracales I feel myself justified in inferring that he measured this length from the upper border of the fossa vertebrae to the upper border of the

caput. I have included the caput in my measurement, thus arriving at a length of 70 mm.; without the caput at a length of 59 mm., accordingly the length in our specimen is in any case greater. We see also from the other dimensions that the vertebra in S.M. is larger than that of *Rh. hundsheimensis*.

Vertebra Cervicalis V.

M.M. *Rh. Mercki* ? *etruscus* ? Pl. IX, fig. 5.

The M.M. possesses still another vertebra, which at first I took for a cerv. IV. The corpus is intact for the greater part, but arcus and diapophyses are broken off at the base. Only of the lefthand foramen transversarium the dimensions can be measured.

Dimensions :	Tegelen S.M. cerv. III	Tegelen M.M. cerv. III	Tegelen S.M. cerv. IV	Tegelen M.M. cerv. V	Hundsh. cerv. V
1. Length of corpus vertebrae	—	73.5 (63 TOULA)	70 (59 TOULA)	70 (56 TOULA)	56
2. Length of arcus under processus spinosus	44	—	41.5	—	—
3. Height of foramen vertebrale	31	—	31	—	—
4. Breadth of foramen vertebrale	28	27	28	at least 27	—
5. Distance of extremities of diapophyses	—	—	—	—	—
6. Maximum distance of postzygapophyses	87	—	—	—	99
7. Length of collum of diapophyses	—	—	—	—	—
8. Breadth of fossa vertebrae	—	59	62.5	63	62
9. Height of fossa vertebrae	—	70	at least 70	67	65
10. Height of caput vertebrae	66.7	70	65.5	64.8	61
11. Maximum breadth of caput vertebrae	45.6	50.5	47	52.4	—
12. Distance of foramina transversaria	51.6	52.4	51.5	—	68
10 : 11	1.46	1.38	1.40	1.23	
9 : 8	—	1.186	1.12 at least	1.063	1.05

The question is whether this second vertebra in M.M. is cerv. IV or cerv. V. The differences with cerv. III of M.M. are apparent. The corpus is shorter. The diapophyses and the foramen transversarium are inserted lower. This latter is larger. The caput is shorter and broader, the fossa rounder, etc. From this and by comparison with P. 28, Taf. V, Fig. 4*a* and b I thought I could conclude that it was probably cerv. IV. Now, however, that I have cerv. IV of S.M. and all the vertebrae cervicales of *Rh. sondaicus* for comparison, I recognise this Maestricht vertebra as cerv. V, and this for the following reasons:

The proportion of height and breadth of the caput of cerv. III of S.M. is 1.46, of IV in S.M. 1.40, of III M.M. 1.38, of the Maestricht cerv. in question 1.23. From cerv. II to

VI the breadth of the caput in *Rh. sondaicus* increases gradually, but the difference between 1.38 and 1.23 seems too great for successive vertebrae.

Moreover, in *Rh. sondaicus* the breadth of the fossa gradually increases in breadth. The proportion between height and breadth is for cerv. III in M.M. 1.186, for IV in S.M. at least 1.12, for the vertebrae in question 1.063. Here too, the jump from 1.186 to 1.063 seems too great, especially when cerv. IV in S.M. with 1.12 is compared.

From the measurements of the caput it might be concluded that III in M.M. is larger than III in S.M , while the length of the corpus of the vertebra in question taken as cerv. IV would be smaller than that of cerv. IV in S.M.

Now that I can compare the vertebrae themselves, I have obtained perfect certainty. The vertebra in question is clearly between IV in S.M. and VI in S.M.

Cerv. V of *Rh. hundsh.* seems to be somewhat smaller than that in M.M. The proportions of height and breadth of the fossa are about the same for them.

In P. 14, Taf. XIX, Fig. 8*a*, *b*, and *c* PORTIS gives reproductions of the cerv. V of *Rh. Mercki* from Taubach. The caput is more egg-shaped in the Maestricht specimen, not so broad at the top and the base. The fossa is rounder. The foramen transversarium is larger and is placed higher at the corpus. The diapophyses are less heavy. Also the profile of the caput is not bent so gradually. The vertebra as a whole is more delicately formed.

Vertebra Cervicalis VI.

S.M. *Rh. Mercki*. Pl. IX, fig. 6.

The corpus is intact at the front side. The fossa is lost for the geater part. The diapophyses are absent down to the base. Only the left foramen transversarium is perfectly intact. Of the arcus the praezygapophyses are missing for the greater part, and the processus spinosus quite. I have succeeded in gluing together the postzygapophyses out of three fragments.

Dimensions :	Tegelen S.M. cerv. III	Tegelen S.M. cerv. IV	Tegelen S.M. cerv. VI	Hundsh. cerv. VI
1. Length of corpus vertebrae	—	70 (T. 59)	70 (T. 59)	56
2. Length of arcus under processus spinosus	44	41.5	ca 39	—
3. Height of foramen vertebrale	31 (middle)	31 (middle)	33 (middle) 30 (front)	—
4. Breadth of foramen vertebrale	28 (middle)	28 (middle)	32.5 (middle) 32 (front)	—
5. Distance of extremities of diapophyses	—	—	—	—
6. Maximum distance of postzygapophyses	87	—	91.5	103.5
7. Length of collum of diapophyses	—	—	—	—
8. Breadth of fossa vertebrae	—	62.5	ca 64	61
9. Height of fossa vertebrae	—	at least 70	—	59
10. Height of caput vertebrae	66.7	65.5	63	ca 58
11. Maximum breadth of caput vertebrae	45.6	47	48	—
12. Distance of foramina transversaria	51.6	51.5	66	67
10 : 11	1.46	1.40	1.31	—

The differences with the cerv. IV in S.M. are striking. The angle at which the praezygapophyses meet, is much more obtuse, and the point where they meet in the arcus lies much more to the front. Also the angle at which the postzygapophyses meet, is more obtuse. The angle formed by the lower border of the postzygapophyses and the axis of the corpus, is much greater than in cerv. IV. The foramen vertebrale seen from the front, is more broad than high, the very reverse of that of cerv. IV. Towards the back it becomes much wider (about 42) and higher (about 42). The caput has become blunter : shorter and more strongly developed. The diapophyses approach the underside of the caput. The foramen transversarium is larger and placed lower. The two planes of the ventral side of the corpus meet at a very obtuse angle. The build on the whole is more massive, clumsier. The differences of this vertebra with cerv. IV in S.M. are so great that the vertebrae cannot immediately succeed each other. There is no doubt but we have a cerv. VI before us.

It appears from the measurements given that cerv. VI from Hundsheim has a somewhat shorter body, but the arcus has grown to a greater breadth. The postzygapophyses are further apart, and their articular surfaces do not rise up so steeply. The foramen vertebrale is relatively broader. It might further be inferred from Fig. 23 on p. 30 of P. 28 that in cerv. VI from Hundsheim the foramen transversarium is situated somewhat higher than in that from Tegelen, and that the angle which the front side of the caput forms with the upper side is somewhat greater than 90° in the vertebra from Hundsheim, and in that from Tegelen somewhat less than 90°.

In P. 14, Taf. XIX Portis gives no reproduction of cerv. VI of *Rh. Mercki* from Taubach. It is clearly seen from (P. 14), Fig. 6, 7, and 8 resp. of cerv. III, IV and V that the diapophyses are inserted much lower in *Rh. Mercki* from Taubach than those of *Rh. Mercki* from Tegelen. In cerv. V of *Rh. Mercki* from Taubach the condition of cerv. VI from Tegelen is already exceeded.

Vertebra Cervicalis VII.

S.M. *Rh. Mercki*. Pl. IX, fig. 7.

The seventh vertebra cervicalis is easily recognised by the two articular surfaces of the first pair of costae. The greater part of the corpus is undamaged, so that the form of the caput and of the fossa for the caput of vertebra thoracalis I is clearly to be distinguished. Of the arcus the two praezygapophyses are present. The processus spinosus is entirely missing, likewise the right postzygapophysis, the left partly. The middle anterior part of the arcus is present in the form of a detached triangular fragment. The diapophyses are broken off. The whole is glued together out of six fragments.

Dimensions :	Tegelen S.M. cerv. VII	Hundsh. cerv. VII
1. Length of corpus vertebrae	66 (T. 47)	55
2. Length of arcus under processus spinosus	—	—
3. Height of foramen vertebrale	ca 34	—
4. Breadth of foramen vertebrale	ca 34	—
5. Distance of extremities of diapophyses	—	102
6. Maximum distance of postzygapophyses	—	—
7. Length of collum of diapophyses	—	—
8. Breadth of fossa vertebrae	ca 65	63
9. Height of fossa vertebrae	ca 59	54.5
10. Height of caput vertebrae	ca 64.5	59
11. Maximum breadth of caput vertebrae	50	—

With its caput and its praezygapophyses cerv. VII perfectly fits into the fossa and the articular surfaces of the postzygapophyses of the cerv. VI. The caput is somewhat higher and broader than that of cerv. VI. Nor is its shape oval as in VI, but pointed egg-shaped. The diapophyses are again inserted higher, which is caused by the absence of the foramina transversaria. I do not hazard to pronounce an opinion on the form of the foramen vertebrale, because the corpus is so badly damaged at the insertion-place of the right base of the arcus that I cannot ascertain the exact locus of the latter piece. The corpus is considerably shorter than in cerv. VI. The direction of the articular surfaces of the praezygapophyses is pretty steep. The fossa vertebrae has the peculiar pentagonal shape of the caput of vert. thor. I. The two articular surfaces for the first pair of costae are placed low and obliquely on either side of the fossa. On the ventral side of the corpus the carina is faintly expressed, two large ridges, broadening towards the back, running on either side.

The cerv. VII of *Rh. hundsh.* has a greater length of the corpus measured at the top, which is remarkable, because the other vertebrae are smaller than those from Tegelen. Measured at the height of a fovea costalis, the length is about the same. The difference will, therefore, have to be ascribed only to a greater shortening of the corpus under the arcus in the Teglian vertebra. The fossa of the vertebra from Hundsheim is relatively broader. It may, further, be safely assumed that the form of the foramen vertebrale is not extended broadwise in the vertebra from Tegelen, as it is in that from Hundsheim.

Figures of cerv. VII of *Rh. Mercki* from Taubach are given by Portis in P. 14, Taf. XIX, Fig. 9 *a*, *b*, and *c*. The caput, the arcus, the foramen vertebrale, and the fossa are broader, which gives this vertebra an appearance of greater clumsiness, than that from Tegelen.

Vertebra Thoracalis I.

S.M. *Rh. Mercki*. Pl. IX, fig. 8.

I have glued thor. I together out of eight fragments. The back of the corpus is entirely missing. I have, indeed, found three more pieces with fragments of the fossa and parts of the articular surfaces for the capitulum of the second pair of costae, but I cannot locate them with any degree of probability. Accordingly I have given up any idea of location and reproduction. Of the arcus a large part can be restored. Yet I do not venture to pretend that I have completely succeeded. It appears from Pl. IX, fig. 8*a* that the right part may possibly be attached too low, but the greatly damaged surfaces of fracture of the corpus, and the loose fragments render a correct attachment impossible. Besides, the right and the left diapophysis are not perfectly symmetrical. The reproduction given is only meant to give some idea of the form of thor. I. The processus spinosus is entirely missing. The articular surface of the praezygapophysis fits into that of the postzygapophysis of cerv. VII and the caput into the fossa of cerv. VII.

Dimensions :	Tegelen S.M. thor. I	Hundsh. thor. I
1. Length of corpus vertebrae	—	54
2. Length of arcus under processus spinosus	—	—
3. Height of foramen vertebrale	—	—
4. Breadth of foramen vertebrale	—	—
5. Maximum distance of diapophyses	ca 160	146
6. Breadth of fossa vertebrae	—	—
7. Height of fossa vertebrae	—	—

Dimensions :	Tegelen S.M. thor. I	Hundsh. thor. I
8. Height of caput vertebrae	54.4	—
9. Maximum breadth of caput vertebrae	53	—
10. Maximum breadth of fovea costalis cranialis	ca 28	—
11. Length of fovea costalis caudalis	—	—
12. Breadth of fovea costalis caudalis	—	—
13. Length of fovea transversaria	ca 35	—
14. Breadth of fovea transversaria	16	—

On page 33 of P. 28, TOULA gives as 2nd dimension (here 5th) "Entfernung der Ränder der Gelenkflächen für die Capituli der Wirbel", for thor. I 146 mm. This measure seems too large to me. I suppose that TOULA must have meant: "Entfernung der Ränder der Gelenkflächen für die tubercula costae." In this case this dimension is about 14 mm. less than that in thor. I from Tegelen.

The thor. I is easy to recognise, because the praezygapophyses, as regards shape, resemble those of the vertebrae cervicales. The outer surface of the diapophyses bends again towards the outside at its transition into the praezygapophyses, so that the latter get a vertical position. Consequently the articular surfaces which they bear, lie higher and more lateral to the foramen vertebrale than in the other vertebrae thoracales. The interval between the praezygapophyses is 121 mm. in thor. I of *Rh. hundsh.* I suppose that TOULA means the distance of the outer walls. If so this distance is 105 to 110 mm. in our specimen. The articular surfaces of the praezygapophyses form an acute angle. The foveae costales craniales lie on the side of the caput, but very much ventrally. I cannot give the exact measure, but the maximum breadth is at any rate not much less than 20 mm. as against 10 mm. in *Rh. hundsh.* The foveae transversariae for the first costa is bean-shaped : 16 mm. broad and about 35 mm. long.

As in cerv. VII, the ventral side of the corpus exhibits beside the scarcely developed carina, two ridges. "Der Wirbelkörper des ersten Brustwirbels ist (in *Rh. hundsh.*) 53 mm. hoch und 54 mm. breit". Again it is not quite clear to me, how (from where to where) TOULA has measured. The measurements of the caput of our specimen are more or less the same. The articular surfaces of the postzygapophyses are far apart, though in a less degree than in the vertebrae cervicales. They do not form an acute, but a very obtuse angle. They stand erect at an angle of $\pm$ 45°. Unfortunately TOULA does not give a figure of the vertebrae thoricales. For this reason and also on account of the not very lucid description an accurate comparison with our specimen is not possible.

In P. 14, Taf. XIX, Fig. 10 *a*, *b*, and *c* PORTIS gives a figure of thor. I of *Rh. Mercki* from Weimar in the Museum of Göttingen. The vertebra is much larger than that in S.M. I measure the maximum distance of the diapophyses from Fig. 2 (loc. cit.). It is about 188 mm. there as against about 146 mm. in our specimen. The shape of the foramen vertebrale is in *Rh. Mercki* from Weimar more triangular, the base of the praezygapophyses is much broader. The angle which the articular surfaces of the postzygapophyses form with each other, is much more acute, hence they are directed more outward.

On p. 150 loc. cit. PORTIS says : "Der erste Rückenwirbel von *Rhin. Merckii* von Weimar zeigt, mit dem entsprechenden Wirbel von *Rhin. antiquitatis* verglichen, Folgendes : an der Unterfläche des Wirbelkörpers ist die Carina viel weniger stark." Our specimen, too, shows a feebly developed carina. "Die Querfortsätze befinden sich weiter vorn, die schiefen Fortsätze weiter hinten." The same thing also refers to thor. I in S.M. In this respect it, therefore, agrees with thor. I of *Rh. Mercki* from Weimar, and differs from that of *Rh. antiquitatis*.

BRANDT does not describe a thor. I of *Rh. antiquitatis*.

Vertebra Thoracalis II.

S.M. *Rh. Mercki.* Pl. X, fig. 1.

The corpus is intact for the greater part. The right diapophysis has been found and glued to the corpus, also the back half of the base of the right half of the arcus. The left praezygapophysis is also present, the surfaces of fracture have evidently been damaged too much afterwards to render a correct attachment possible. All the rest is missing.

Dimensions :	Tegelen S.M. thor. II	Hundsh. thor. II
1. Length of corpus vertebrae	72 (T. 65)	57
2. Length of arcus under processus spinosus	—	—
3. Height of foramen vertebrale	—	—
4. Breadth of foramen vertebrale	—	—
5. Maximum distance of diapophyses	ca 152	134
6. Breadth of fossa vertebrae	55	—
7. Height of fossa vertebrae	51	—
8. Height of caput vertebrae	ca 50	—
9. Maximum breadth of caput vertebrae	57.6	—
10. Maximum breadth of fovea costalis cranialis	28	—
11. Length of fovea costalis caudalis	29	—
12. Breadth of fovea costalis caudalis	19	—
13. Length of fovea transversaria	ca 24.6	—
14. Breadth of fovea transversaria	15	—

As thor. I lacks the fossa for thor. II, I could not verify by fitting whether the determination of the latter vertebra is correct. The loose left praezygapophysis of thor. II, which I have recognised as such by comparison with that of thor. II of *Rh. sondaicus*, fits however, perfectly with its peculiar articular surface into that of the left postzygapophysis of thor. I.

The foveae costales are inserted somewhat higher than in thor. I. The foveae transversariae have still about the same position as in thor. I. The ventral side of the corpus is still flatter than in thor. I. The carina is very little developed. On either side of it there lies a ridge spread out like a fan, but at a greater distance than in thor. I. Somewhat closer to the carina there are on either side some rough rugosities. The principal difference with thor. I consists in this that the praezygapophyses in thor. II are no longer vertical, but form an acute angle with each other, so that their articular surfaces lie close together. Besides, form and position of these articular surfaces are entirely different from those in thor. I. The caput is lower and broader. The thickness of the corpus behind the caput is at least 5 mm. less than in thor. I.

On p. 33 of P. 28 TOULA gives as 1st dimension of the vertebrae thoracalis "Länge des Wirbelkörpers von den Rändern der Gelenkflächen gemessen." It is not perfectly clear to me what measure TOULA means. I suppose that he has measured the corpus from the upper border of the caput to the upper edge of the fossa. I myself have measured the caput at the top from the upper border of the fossa to the most projecting point of the caput. Hence the difference. According to TOULA's measure the length is in thor. II in S.M. 65 as against 57 mm. in *Rh. hundsh.* If my view about the 2nd dimension of *Toula* p. 33 loc. cit. is correct, the breadth in our specimen is about 152 as a gainst 134 in *Rh. hundsh.* If TOULA should really mean by the breadth "die Entfernung der Ränder der Gelenkflächen für die *Capituli*", our specimen would have a breadth of 106 at the back,

and 99 mm. in front. TOULA does not give any figures. All the same I believe that the first interpretation is the correct one, and consequently our specimen would be longer and broader. The ratio of these dimensions is in thor. II in S.M. 2.34 as against 2.35 in *Rh. hundsh.* Hence about the same. A comparison with thor. II of *Rh. Mercki* and *Rh. antiquitatis* is not possible to me on account of the few data given by PORTIS and BRANDT.

Vertebra Thoracalis III.

S.M. *Rh. Mercki*. Pl. X, fig. 2.

As the figures show, this vertebra is almost entirely undamaged. The processus spinosus glued together out of 3 fragments, belongs without any doubt to this vertebra. Thor. III fits perfectly into thor. II.

Dimensions :	Tegelen S.M. thor. III	Hundsh. thor. III
1. Length corpus vertebrae	73 (T. 66)	58
2. Length of arcus under processus spinosus	53 (measured in the middle)	—
3. Height of foramen vertebrale	front 23 middle 28 back 22	—
4. Breadth of foramen vertebrale	33	—
5. Maximum distance of diapophyses	154	134
6. Breadth of fossa vertebrae	ca 63	—
7. Height of fossa vertebrae	53	—
8. Height of caput vertebrae	53	—
9. Maximum breadth of caput vertebrae	55.4	—
10. Maximum breadth of fovea costalis cranialis	31	—
11. Length of fovea costalis caudalis	30.5	—
12. Breadth of fovea costalis caudalis	20	—
13. Length of fovea transversaria	25	—
14. Breadth of fovea transversaria	15	—

The foveae costales are inserted higher than in thor. II. The foveae transversariae are slightly raised from the horizontal position. The caput is higher and narrower, it has, however, still the peculiar pentagonal shape. The full breadth of the corpus with the diapophyses amounts to some mm. more than in thor II. The ventral side is less flat, more concave from the front backward, and the carina more clearly marked. The praezygapophyses are short, arcus and diapophyses merge in consequence gradually into each other. The articular surfaces of the praezygapophyses lie very close together, and form almost one surface, which slopes downwards towards the front. The foramen vertebrale is semicircular in cross-section and lower at the front and the back than in the middle. The fossa vertebrae is broader and higher than in thor II. The corpus itself is thicker. At the upper border of the articular surfaces of the postzygapophyses the processus spinosus is 41 mm. thick, and its breadth there is about 60 mm.

Thor. III in S.M. is larger than that from Hundsheim. The ratio between breadth and length is 2.33 in thor. III in S.M., and 2.31 in that from Hundsheim, hence about equal.

PORTIS does not mention a thor. III of *Rh. Mercki* from Taubach.

BRANDT (P. 12, p. 23) gives too few particulars of thor. III of *Rh. antiquitatis* to make a comparison with that in S.M. possible. According to GIEBEL quoted by BRANDT p. 23 "soll an die vorderen Rippengelenkflächen oben in einer scharfen Kante, unter einem fast rechten Winkel, eine halfkreisformige Gelenkfläche stoszen, welche den lebenden Nashörnern fehlt." This articular surface is also found in thor. III and IV in S.M. Similar accessory articular surfaces occur above the foveae costales caudales in thor. II and III. Thor. IV has such an accessory articular surface only in front. Thor. V possesses it neither in front nor at the back.

SCHROEDER mentions on p. 219 of P. 30 the presence of such accessory articular surfaces in *Rh. antiquitatis* from Pösneck : "Die vordere costale Gelenkfläche des Dors. II besitzt diese akzessorische Fläche nicht. Dagegen haben Dors. III and Dors. IV vorn und hinten diese Fläche und Dors. V nur vorn." Accordingly *Rh. antiquitatis* from Pösneck bears these accessory articular surfaces at one vertebra more than *Rh. Mercki* in S.M.

According to SCHROEDER (loc. cit.) is: "das Auftreten der akzessorischen Gelenkflächen aber bei den fossilen Arten nicht konstant. Ein Wirbel von Rixdorf, der nur Dors. III oder Dors. IV sein kann, zeigt keine Spur davon ; dieser gehört einem ausgewachsenen Tiere an, so dasz der Gedanke nahe liegt, obige Eigentümlickkeit hänge mit dem jugendlichen Alter der Tiere zusammen." The latter does not seem right to me. The thorough wear of the dentition of the individual, to which the vertebrae in S.M. belong, suggests more than middle age.

Such accessory articular surfaces SCHROEDER (loc. cit. p. 222) also finds in the vertebrae of *Rh. Mercki* from Heggen in thor. III, IV, and V ; in consequence of adhering stone-mass he could only verify the presence of such a surface in front in thor. VI. The vertebrae from Heggen belonged to a not yet quite adult individual.

Vertebra Thoracalis IV.

S.M. *Rh. Mercki*. Pl. X, fig. 3.

The corpus is intact for the greater part. The right diapophysis is present. The left is missing. The whole is glued together out of six fragments. This vertebra fits into thor. III.

Dimensions :	Tegelen S.M. thor. IV	Hundsh. thor. IV
1. Length of corpus vertebrae	70 (T. 64)	58
2. Length of arcus under processus spinosus	—	—
3. Height of foramen vertebrale	—	—
4. Breadth of foramen vertebrale	ca 33	—
5. Maximum distance of diapophyses	ca 143	131
6. Breadth of fossa vertebrae	64	—
7. Height of fossa vertebrae	58	—
8. Height of caput vertebrae	ca 53	—
9. Maximum breadth of caput vertebrae	ca 60	—
10. Maximum breadth of fovea costalis cranialis	32	—
11. Length of fovea costalis caudalis	32	—
12. Breadth of fovea costalis caudalis	22.5	—
13. Length of fovea transversaria	26.5	—
14. Breadth of fovea transversaria	21.4	—

The foveae costales are inserted higher than in thor. III. The craniales have their maximum breadth dorso-ventrally, whereas in thor. II the maximum breadth is from

side to side, and in thor, III an intermediate position is occupied. The foveae transversariae point still more to the outside, than in thor. III. They are also inserted higher than in thor. III, as likewise those in thor. III are again inserted higher than in thor. II. The caput is not higher, but it is broader than in thor. III. The breadth of the corpus with the diapophyses is about 11 mm. less than in thor. III. The ventral side of the corpus exhibits a distinct carina, where the two ventral planes meet at a less obtuse angle than in thor. III. These surfaces themselves are less rough. Seen from the front the corpus with the diapophyses has the shape of a triangle, with its base upwards. The vertex is very obtuse in thor. II, less obtuse in thor. III, and still less in thor. IV. In thor. III the dorsal surface of the corpus shows a deep depression, which is less pronounced in thor. II, and is almost entirely absent in thor. IV.

Thor. IV in S.M. is larger than thor. IV of *Rh. hundsh.* TOULA gives 58 mm. as length of the corpus, that in S.M. being 64 mm. long, measured in the same way. The whole breadth is 131 mm. in thor. IV from Hundsheim as against about 143 mm. in our specimen.

A comparison with thor. IV of *Rh. Mercki* from Taubach and of *Rh. antiquitatis* is not possible to me for want of data.

I also reckon a broken-off processus spinosus with large postzygapophysis-articular surfaces, 40.5 mm. thick as the upper border of these articular surfaces, to belong to thor. IV.

Vertebra Thoracalis V.

S.M. *Rh. Mercki*. Pl. X, fig. 4.

The corpus is undamaged for the greater part. The diapophyses and the praezygapophyses are present. The postzygapophyses and the processus spinosus are missing. The whole is glued together out of seven fragments. This vertebra fits into the preceding one.

Dimensions :	Tegelen S.M. thor. V	Hundsh. thor V
1. Length of corpus vertebrae	71 (T. 64)	57.5
2. Length of arcus under processus spinosus	—	—
3. Height of foramen vertebrale	ca 18 (front)	—
4. Breadth of foramen vertebrale	ca 35	—
5. Maximum distance of diapophyses	ca 143	125
6. Breadth of fossa vertebrae	65 to 66	—
7. Height of fossa vertebrae	59.5	—
8. Height of caput vertebrae	57	—
9. Maximum breadth of caput vertebrae	63.5	—
10. Maximum breadth of fovea costalis cranialis	32	—
11. Length of fovea costalis caudalis	31	—
12. Breadth of fovea costalis caudalis	21.5	—
13. Length of fovea transversaria	27	—
14. Breadth of fovea transversaria	26	—

The foveae costales are inserted considerably higher than those in thor. IV. In this respect the difference between thor. IV and V is greater than between thor. III and IV. The craniales have their maximum breadth obliquely to the outside. The foveae transversariae point still more to the outside than in thor. IV. They are no longer oblong of

form, but more round ; and besides they are inserted somewhat higher. The caput is higher and broader. The pentagonal form has become vaguer, still more so than in thor. IV. The breadth of the corpus with the diapophyses is about equal, perhaps somewhat less. The carina on the ventral side projects slightly more than in thor. IV. The angle at which the two ventral surfaces meet, is much less obtuse than in thor. IV. In this respect, too, the difference between thor. IV and V is greater than between thor. III and IV. The surfaces themselves show no rugosities. Seen from the front the corpus with the diapophyses presents the isosceles triangular shape, but the vertex is more acute and the sides are longer. The dorsal surface of the corpus is like that of thor. IV. In cross-section the foramen vertebrale is oval with the longest axis broadwise. It is considerably lower than in thor. III.

I also reckon as belonging to thor. V a broken-off processus spinosus with small postzygapophysis-articular surfaces, 40 mm. thick and at the base 55 mm. broad.

Thor. V in S.M. is longer and broader than thor. V from Hundsheim. The ratio of these two dimensions is in both about 2.2 ; they may be considered as equal.

BRANDT and PORTIS do not mention a thor. V resp. of *Rh. antiquitatis* nor of *Rh. Mercki* from Taubach.

Vertebra Thoracalis VI.

S.M. *Rh. Mercki*. Pl. X, fig. 5.

This vertebra is almost entirely preserved. At the back the righthand lower corner is missing. Also the extremity of the right diapophysis is absent. After the photograph had been taken, I found still part of the processus spinosus, the top, however, is still missing. The whole is put together out of five joined fragments. This vertebra fits into the preceding one.

Dimensions :	Tegelen S.M. thor. VI	Hundsh. thor. VI
1. Length of corpus vertebrae	69 (T. 60)	55
2. Length of arcus under processus spinosus	ca 57	—
3. Height of foramen vertebrale	19 (front) 23 (middle) 20 (back)	—
4. Breadth of foramen vertebrale	33	—
5. Maximum distance of diapophyses	ca 132	ca 110
6. Breadth of fossa vertebrae	ca 63	—
7. Height of fossa vertebrae	59 to 60	—
8. Height of caput vertebrae	59	—
9. Maximum breadth of caput vertebrae	62	—
10. Maximum breadth of fovea costalis cranialis	31	—
11. Length of fovea costalis caudalis	26	—
12. Breadth of fovea costalis caudalis	21	—
13. Length of fovea transversaria	27	—
14. Breadth of fovea transversaria	19	—

The foveae costales are inserted higher than in thor. V. This is particularly apparent at the back part. Both in front and at the back they are smaller than in thor. V. The foveae transversariae approach the vertical position. They are also situated somewhat

higher and more to the back than in thor. V. The caput is round. The full breadth of the vertebra is at least 10 mm. less than in thor. V. The two ventral surfaces of the corpus meet at about a right angle. The triangle which the front view of the vertebra always shows, has, therefore, a shorter base and a sharper vertex. The dorsal surface of the corpus is like that of thor. V. On the righthand lateral surface of the corpus a trace is for the first time to be seen of that peculiar smooth groove which the following vertebrae exhibit. The processus spinosus lacks the top. The preserved part is 191 mm. long, 38 mm. thick, and 57 mm. broad.

Thor. VI in S.M. is somewhat larger than thor. VI from Hundsheim. Also the processus spinosus seems to be higher in our specimen. TOULA states about 190 mm. for the height in thor. VI from Hundsheim, and the incomplete processus spinosus of thor. VI in S.M. is already 191 mm. high, and this measured from the upper borders of the articular surfaces of the postzygapophyses.

Vertebra Thoracalis VII.

S.M. *Rh. Mercki.* Pl. X, fig. 6.

The corpus is damaged on the righthand side both in front and at the back. Arcus and diapophyses are present, though damaged. The processus spinosus is lost. The whole has been glued together out of eleven fragments. This vertebra fits into thor. VI.

Dimensions :	Tegelen S.M. thor. VII	Hundsh. thor. VII
1. Length of corpus vertebrae	70.5 (T. 62)	51
2. Length of arcus under processus spinosus	?	—
3. Height of foramen vertebrale	20 (front) 26 (middle)	—
4. Breadth of foramen vertebrale	33	—
5. Maximum distance of diapophyses	ca 122	122
6. Breadth of fossa vertebrae	ca 62	—
7. Height of fossa vertebrae	58 to 59	—
8. Height of caput vertebrae	58	—
9. Maximum breadth of caput vertebrae	ca 60	—
10. Maximum breadth of fovea costalis cranialis	ca 29	—
11. Length of fovea costalis caudalis	23	—
12. Breadth of fovea costalis caudalis	22	—
13. Length of fovea transversaria	25.5	—
14. Breadth of fovea transversaria	22	—

The foveae costales are placed clearly higher than in thor. VI. They are also smaller. The foveae transversariae are rounder and point slightly more to the front. The caput is not so round as in thor. VI, but flatter dorsally and more pointed ventrally. The total breadth of the corpus with the diapophyses is at least 10 mm. less than that in thor. VI. The two ventral surfaces meet at an acute angle. The dorsal surface of the corpus is like that of thor. VI. The foramen vertebrale is not broader, but it is higher than in thor. VI. It is remarkable that the arcus under the processus spinosus is considerably longer, in consequence of which the articular surfaces of the postzygapophyses project far backward. The position of the articular surfaces of the praezygapophyses is almost horizontal.

Thor. VII from Hundsheim is somewhat less long with equal breadth.

Vertebra Thoracalis VIII.

S.M. *Rh. Mercki.* Pl. XI. fig. 1.

This vertebra is almost complete. At the back the corpus is slightly damaged, and the processus spinosus, glued together out of three fragments, lacks the top. This vertebra fits into the preceding one.

Dimensions :	Tegelen S.M. thor. VIII	Hundsh. thor. VIII
1. Length of corpus vertebrae	70 (T. 62)	50
2. Length of arcus under processus spinosus	ca 60	—
3. Height of foramen vertebrale	21 (front) 25 (middle 23 (back)	—
4. Breadth of foramen vertebrale	33	—
5. Maximum distance of diapophyses	119	116
6. Breadth of fossa vertebrae	60	—
7. Height of fossa vertebrae	54	—
8. Height of caput vertebrae	55	—
9. Maximum breadth of caput vertebrae	59	—
10. Maximum breadth of fovea costalis cranialis	25	—
11. Length of fovea costalis caudalis	23	—
12. Breadth of fovea costalis caudalis	21	—
13. Length of fovea transversiara	24	—
14. Breadth of fovea transversaria	21	—

The differences between thor. VIII and thor. VII are not so striking. On close examination it is, however, seen that the foveae costales reach somewhat higher on the corpus. The caput is some mm. smaller ; it has the same shape as in thor. VII, but more pronounced. The full breadth of the vertebra is 119 as against 122 mm. of thor. VII. The angle of the ventral surfaces is markedly more acute, both surfaces show the peculiar groove, which we already mentioned for thor. VI and VII. The foramen vertebrale has the same breadth as in thor. VII. The height is 1 mm. less, which may be attributed to a not quite accurate joining of the fragments forming the arcus in thor. VII, through which the foramen vertebrale becomes a little too high.

The incomplete processus spinosus measured from the upper borders of the articular surfaces of the postzygapophyses, is 168 mm. long, about 52 mm. broad, and 30 mm. thick.

Thor. VIII of *Rh. hundsh.* is somewhat smaller. TOULA does not give the height of the processus spinosus of thor. VIII. That of thor. VII from Hundsheim is 166 and that of thor. IX 124 mm. That of thor. VIII lies, accordingly, between 166 and 124 mm. If TOULA means the same thing by height as we denote by length, it follows that the processus spinosi of the vertebrae in S.M. are higher than those from Hundsheim. Besides it should be borne in mind that the upper edge of the postzygapophyses lies considerably higher than that of the praezygapophyses, so that the length of the Teglian specimen measured from there, is more than 200 mm.

Vertebra Thoracalis IX.

S.M. *Rh. Mercki.* Pl. X, fig. 7.

The corpus is pretty well undamaged. The extremity of the right diapophysis with the fovea transversaria is missing. The arcus is incomplete, and there is no processus spinosus. After this vertebra had been photographed, the left postzygapophysis consisting of two fragments, was found. The left arcus has thus been glued together out of four fragments. This vertebra fits into the preceding one.

Dimensions :	Tegelen S.M. thor. IX	Hundsh. thor. IX
1. Length of corpus vertebrae	72 (T. 62)	51
2. Length of arcus under processus spinosus	—	—
3. Height of foramen vertebrale	26 (middle)	—
4. Breadth of foramen vertebrale	33	—
5. Maximum distance of diapophyses	ca 112	ca 110
6. Breadth of fossa vertebrae	58	—
7. Height of fossa vertebrae	52	—
8. Height of caput vertebrae	53	—
9. Maximum breadth of caput vertebrae	56	—
10. Maximum breadth of fovea costalis cranialis	26	—
11. Length of fovea costalis caudalis	—	—
12. Breadth of fovea costalis caudalis	20	—
13. Length of fovea transversaria	23	—
14. Breadth of fovea transversaria	—	—

The foveae costales are clearly inserted higher than those in thor. VIII. The caput is somewhat smaller, but has more or less the same form. The total breadth is about 7 mm. less. The angle of the ventral surfaces is more acute. The foramen vertebrale is as broad, but 1 mm. higher than that of thor. VIII.

Thor. IX from Hundsh. is somewhat less long with equal breadth.

Thor. V B, VI B, and VII B (S.M.).

In the Centralblatt f. Min. etc. (Jahrgang 1921, No. 21, p. 664—669) STEPH. RICHARZ writes : "Im Frühjahr 1920 fand nun der junge Herr Andreas Denessen von Tegelen in der Grube seines Vaters ein gut erhaltenes *Rhinoceros*, welcher er in dankenswerter Weise der natur-historischen Sammlung des Missionshauses und Gymnasiums Steyl bei Tegelen überliesz. Der Fundort, Egypten genannt, liegt von der obengenannten Grube (von Canoy, Herfkens & Co. in der Jammerdaalschen Heide) gut 5 minuten gegen WSW 70 m östlich davon fand man im selben Niveau noch andere Teile des *Rhinoceros*. Trotz des weiten Abstandes scheint es sich doch um Reste desselben Individuums zu handlen". This latter seems very doubtful to me, on the ground of three vertebrae which will now be discussed.

These three vertebrae are the worst damaged of all the vertebrae in S.M. Of all three there is not much more left than the corpus, and this very badly damaged. The capita have been preserved best. Fortunately all three still possess foveae costales, or at least traces of them, which renders a determination possible.

The foveae costales point to vertebrae thoracales. The height of their insertion and the angle at which the two ventral surfaces meet, indicate that they are among the first

seven. According to the decreasing value of these angles they are laid in succession. In this succession they fit well into each other, another succession yielding less favourable results. We may, therefore, assume that they immediately succeed each other in this order, unless other characteristics should be in conflict with this. The angle of the ventral surfaces of the 1st comes nearest to the thor. V already discussed. The place of the rest of the left fovea costalis cranialis is not in contradiction with this. As regards the angle of the ventral surfaces and the foveae costales, the 2nd vertebra agrees most closely with thor. VI discussed before, the 3rd vertebra corresponding most with thor. VII. It is noteworthy that in this 3rd the smooth groove occurs in both ventral surfaces. All this renders it probable that we have here thor. V, VI, and VII before us, which we shall designate with B to distinguish them from the vertebrae already discussed. From the fact that in the collection of S.M. there occur 2 thor. V, VI, and VII, it appears sufficiently that RICHARZ's opinion is erroneous. Also another circumstance confirms me in my opinion that these 3 vertebrae have not been found in the same place as the others : all the other vertebrae I have been able to make more complete by collecting loose fragments, I have not once succeeded in this with the B-group. In their incompleteness they resemble each other so much, that they can at once be singled out from the other so much completer vertebrae.

Dimensions :	V B	VI B	VII B	V A	VI A	VII A
1*a*. Length of corpus vertebrae	72	70	72	71	69	70.5
1*b*. Length of corpus vertebrae (TOULA measurement)	ca 64	ca 63	ca 63	64	60	62
2. Thickness of corpus (measured in middle)	46	48	47	47	49	49

COMPARISON OF THE VERTEBRAE THORACALES IN S.M. WITH THOSE OF RH. MERCKI FROM HEGGEN AND RH. ANTIQUITATIS FROM PÖSZNECK.

Table of Dimensions: p. 80—81. Table of Proportions: p. 82—83.

In P. 30 SCHROEDER gives a short description and numerous measurements of thor. III to thor. IX (inclusive) of *Rh. Mercki* from Heggen. He compares them with the corresponding vertebrae of *Rh. antiquitatis* BLUM. from Pösneck.

When reading the description of the separate vertebrae of *Rh. Mercki* from Heggen one is struck with the close resemblance with those in S.M.

The outline of the corpus of thor. III is more broad than high both in *Rh. Mercki* from Heggen and in the *Rhinoceros* from Tegelen (S.M.), in *Rh. antiquitatis* more high than broad, a consequence of the slight development of the ventral carina in the two first-mentioned. The diapophyses suddenly broaden hatchet-shaped towards the outside in *Rh. antiquitatis*, which is the case neither in *Rh. Mercki* from Heggen nor in the *Rhinoceros* from Tegelen (S.M.). Also the position of the praezygapophyses is the same in the *Rhinoceros* from Tegelen and in *Rh. Mercki* from Heggen, viz. projecting forwards outside the diapophyses.

The corpus of thor. IV is more broad than high also in the *Rhinoceros* from Tegelen. The foveae transversariae have the same shape. On the upper surface of the diapophysis there runs a ridge for a ligament about in the middle from the front backwards, which ridge is higher more to the front. This applies also to the *Rhinoceros* from Tegelen (S.M.) in contrast with *Rh. antiquitatis*, where this ridge is close to the zygapophyses.

The outline of the caput of thor. V is a trapezium in *Rh. Mercki*. In thor. V in S.M. it is more rounded. In thor. V B in S.M. it somewhat resembles a trapezium through the crumbling off of the edge. The ligament ridge of thor. V in S.M. is like that of thor. V of *Rh. Mercki*. Thor. V in S.M. has accessory articular surfaces neither in front nor at the back. This constitutes a difference from *Rh. Mercki*.

The outline of the caput of thor. VI from Heggen is perfectly rounded on the lower side. The ventral side of the vertebra gets more pointed, and already in thor. VII it reaches the typical form of the middle vertebrae thoracales. This also applies to the vertebrae in S.M.

It appears clearly from the dimensions and proportions given that the *Rhinoceros* from Tegelen (S.M.) bears closer resemblance to *Rh. Mercki* from Heggen than to *Rh. antiquitatis* from Pösneck. On the whole the absolute measurements of the vertebrae from Heggen are slightly larger than those of the vertebrae from Tegelen (S.M.). Unfortunately some important measurements of length are wanting in SCHROEDER'S records, so that only measurement 3 and 4 can be used for a comparison. For the determination of the proportions in thor. III only measurement 4 has been employed, because it is not clear between what points measurement 3 should be taken in this case. From the list of dimensions the conclusion may be drawn that thor. III in S.M. is smaller than thor. III from Heggen, and larger than thor. III from Pösneck. It appears from the proportions 4 : 7, 4 : 8, 4 : 9, and 4 : 12 that the length — breadth proportion of the corpus in *Rh. Mercki* from Heggen and in the *Rhinoceros* from Tegelen (S..M.) is about the same. Also the length-height ratio is the same (4 : 15). There is some difference in the form of the foveae costales craniales, which finds expression in the ratios 4 : 11, 4 : 28 and 4 : 30.

In thor. IV the ratio 3 : 4 in *Rh. Mercki* from Heggen and the *Rhinoceros* from Tegelen (S.M.) is about the same. Hence we take them both as measure of length. The length-breadth proportion of the corpus is also again almost equal in them. Unfortunately the length-height proportion and the total breadth cannot be compared for want of data in *Rh. Mercki* from Heggen.

In thor. V I have not used measurement 4 as basis for the length-breadth ratio, because measurement 4 in this vertebra in S.M. is larger than measurement 4 of the two other species, this measurement being smaller in all the other vertebrae. It appears from the proportion 3 : 7 and 3 : 8 that the length-breadth proportions of the corpus are almost or quite equal in the *Rhinoceros* from Tegelen (S.M.) and *Rh. Mercki* from Heggen. The length-total breadth proportion (3 : 13) is almost the same for all three species. The height of the corpus is somewhat greater in the *Rhinoceros* from Tegelen (S.M.).

In thor. VI I have not taken measurement 2 as basis for the length-breadth relation, because also this measurement is difficult to determine with certainty. In the ratio 4 : 13 *Rh. Mercki* from Heggen and the *Rhinoceros* from Tegelen are somewhat closer to each other than *Rh. Mercki* from Heggen and *Rh. antiquitatis* from Pösneck. They might possibly even agree more closely still, if the value 13 could be determined more accurately in the first two species. The height of the corpus is somewhat greater (4 : 15) in the *Rhinoceros* from Tegelen (S.M.).

The length-breadth proportions of thor. VII are about equal for *Rh. Mercki* from Heggen and the *Rhinoceros* from Tegelen (S.M.). There are no data of height of the Heggen vertebra.

In thor. VIII and particularly in thor. IX the length-breadth and the length-height proportions are almost identical.

I do not venture to give the breadth-height proportion of the foramen vertebrale, because the value 14 given by me is uncertain. (Where exactly has SCHROEDER taken his measurement ?) Nevertheless I get the impression that this proportion will not differ much in the two species.

After these considerations the question rises whether the compared vertebrae of *Rh. Mercki* from Heggen and the *Rhinoceros* from Tegelen (S.M.) would justify us in concluding to a difference of species. In my opinion this is not the case, especially when the uncertainty of many measurements and the possible individual variations are taken into account.

DIMENSIONES VERTEBRAE THORACALES

(cf. P. 30, p. 220—221).

P = *Rh. antiquitatis* from Pösneck
H = *Rh. Mercki* from Heggen
T = *Rh. Mercki* from Tegelen (S.M.)

	thor. III		thor. IV			thor. V			thor. VI			thor. VII		thor. VIII		thor. IX	
	H	T	P	H	T	P	H	T	P	H	T	H	T	H	T	H	T
Relations of length:																	
1. Length of corpus measured from middle of caput to middle of fossa vertebrae	—	66	62	—	63	60	—	60	58	—	59	—	62	—	62	—	62
2. Length of corpus measured at superior surface	—	66	59	—	63	58	—	63	56	57	59	—	62	—	62	—	62
3. Length of corpus measured at inferior surface	62	55	62	63	ca 57	56	58	ca 56	56	—	56	62	58	59	56	61	56
4. Distance between middle of fovea costalis cranialis and middle of fovea costalis caudalis	37	36	35	37	ca 33	30	32	34	28	37	32	39	35	42	39	44	40
5. Distance between anterior and posterior accessory articular surface (from middle to middle)	—	67	57	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Maximum length of diapophysis (from front to back)	43	40	38	39	40	36	37	ca 38	38	32	35	—	32	—	32	—	ca 33
Relations of breadth:																	
7. Maximum breadth of corpus vertebrae	57	55.4	53	59	ca 60	59	65	63.5	65	—	62	63	ca 60	64	59	—	57
8. Maximum breadth of fossa vertebrae	65	± 63	—	65	64	71	67	ca 65	76	—	ca 63	—	ca 62	—	60	65	58
9. Maximum breadth of fossa vertebrae inclusive foveae costales caudales	121	110	ca 110	126	ca 116	122	ca 124	ca 109	115	—	99	—	ca 96	—	ca 91	—	ca 84
10. Distance between foveae transversariae (from middle to middle)	—	133	125	—	—	120	137	125	ca 130	—	—	—	ca 114	—	105	—	—
11. Distance between foveae costales craniales (from middle to middle)	81	70	80	86	ca 77	84	92	77	77	—	ca 70	73	65	68	59	—	ca 59
12. Distance between foveae costales caudales (from middle to middle)	91	ca 84	83	92	ca 88	89	91	84	84	—	76	76	ca 69	—	67	—	ca 64
13. Maximum breadth of vertebra	—	154	151	—	ca 143	150	155	ca 143	150	ca 175	ca 132	ca 144	ca 122	—	118	—	ca 112
14. Breadth of foramen vertebrale in front	45	ca 41	42	—	—	42	43	ca 40	44	—	40	—	38	46	40	—	—
Relations of height:																	
15. Height of corpus in front	ca 54	53	57	—	53	56	56	57	—	58	59	—	58	59	55	—	53
16. Height of corpus behind	—	56	58	—	58	58	—	59.5	61	—	ca 59	—	59	—	56	60	55
17. Height of foramen vertebrale in front	27	23	25	—	—	25	—	ca 18	26	—	19	—	20	25	21	—	—
Relations of articular surfaces:																	
18. Maximum breadth of fovea costalis cranialis	25	27.5	22	30	26	35	33	32	27	26	26	27	23	25	20	25	19
19. Maximum height of fovea costalis cranialis	37	31	30	37	32	36	39	30	36	33	31	33	27	32	25	—	26
20. Maximum breadth of anterior accessory articular surface	26	15	22	—	12.5	22	27	—	—	22	—	—	—	—	—	—	—
21. Maximum height of anterior accessory articular surface	20	15	13	—	12	13	20	—	—	17	—	—	—	—	—	—	—
22. Maximum breadth of fovea costalis caudalis	—	20	22	29	22.5	27	25	21	26	24	21	—	21	—	21	—	20
23. Maximum height of fovea costalis caudalis	—	30.5	40	40	32	36	36	31	31	32	26	32	23	25	23	—	—
24. Maximum breadth of posterior accessory articular surface	—	16	20	29	—	—	—	—	—	—	—	—	—	—	—	—	—
25. Maximum height of posterior accessory articular surface	—	14	13	18	—	—	—	—	—	—	—	—	—	—	—	—	—
26. Maximum breadth of fovea transversaria	28	26	26	32	26.5	29	32	27	27	28	26	24	26	24	22	20	23
27. Maximum height of fovea transversaria	19	15	30	23	21.4	26	24	25	26	26	19	20	20	18	24	16	17
28. Distance between remotest points of fovea transversaria and fovea costalis cranialis	65	55	60	66	ca 58	59	66	60	64	68	59	68	57	67	57	67	56
29. Distance between nearest points of fovea transversaria and fovea costalis cranialis	10	11.5	4	9	10	0	8	4	2	10	9	14	9	19	11	21	15
30. Distance between fovea transversaria and fovea costalis (from middle to middle)	40	32.5	31	36	33	28	37	31	35	40	33	42	33	44	35	46	34

PROPORTIONS

thor. III	thor. IV	thor. V	thor. VI	thor. VII	thor. VIII	thor. IX
	3 : 4 { P 1.77 H 1.70 T 1.70		4 { P 2 H 1.54 T 1.84	3 : 4 { P — H 1.59 T 1.65	3 : 4 { P — H 1.40 T 1.43	3 : 4 { P — H 1.40 T 1.40
4 : 7 { P 0.65 H 0.65 T 0.65	3 : 7 { P 1.77 H 1.06 T ca 0.95	4 : 7 { P 1 H 0.62 T 0.55	3 : 7 { P	3 : 7 { P — H 0.98 T 0.96	4 : 7 { P — H 0.62 T 0.58	3 : 7 { P — H 0.92 T 0.94	4 : 7 { P — H c.65 T 0.66	
4 : 8 { P 0.62 H 0.57 T 0.57	3 : 8 { P — H 0.97 T ca 0.90	4 : 8 { P — H 0.57 T 0.52	3 : 8 { P H T					3 : 8 { P — H 0.94 T 0.94
4 : 9 { P 0.36 H 0.30 T 0.32	3 : 9 { P 0.56 H 0.50 T 0.50	4 : 9 { P 0.31 H 0.30 T 0.30	3 : 9 { P H T					
			3 : 10 { P H T					
4 : 11 { P 0.47 H 0.45 T 0.51	3 : 11 { P 0.77 H 0.73 T 0.75	4 : 11 { P 0.43 H 0.43 T 0.43	3 : 11 { P H T	3 : 11 { P — H 0.85 T 0.89	4 : 11 { P — H 0.53 T 0.53	3 : 11 { P — H 0.86 T 0.94	4 : 11 { P — H 0.61 T 0.66	
4 : 12 { P 0.48 H 0.40 T 0.42	3 : 12 { P 0.74 H 0.68 T 0.65	4 : 12 { P 0.43 H 0.40 T 0.40	3 : 12 { P H T	3 : 12 { P — H 0.81 T 0.87	4 : 12 { P — H 0.51 T 0.507			
			3 : 13 { P H T	13 { P 0.25 H 0.21 T 0.24	3 : 13 { P — H 0.43 T 0.48	4 : 13 { P — H 0.27 T 0.28		
4 : 15 { P 0.61 H 0.68 T 0.68			3 : 15 { P H T	15 { P — H 0.63 T 0.54		3 : 15 { P — H 1. T 1.05		
						14 : 17 { P — H 1.84 T 1.90		3 : 16 { P — H 1.01 T 1.01
4 : 28 { P 0.61 H 0.57 T 0.65	3 : 28 { P 1.03 H 0.95 T 0.98	4 : 28 { P 0.58 H 0.56 T 0.57	3 : 28 { P H T	28 { P 0.43 H 0.54 T 0.54		3 : 28 { P — H 0.88 T 0.98	4 : 28 { P — H 0.62 T 0.68	3 : 28 { P — H 0.91 T 1.
4 : 30 { P 1.09 H 0.92 T 1.10			3 : 30 { P H T	30 { P 0.80 H 0.92 T 0.97		3 : 30 { P — H 1.34 T 1.11	4 : 30 { P — H 0.62 T 0.66	3 : 30 { P — H 1.32 T 1.64