NEW RECONSTRUCTIONS OF THE WOOLLY RHINOCEROS AND MERCK'S RHINOCEROS.

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FOUR species of rhinoceros are known to have been contemporaries of Palaeolithic man in Europe. Three of them belong to the genus of the Recent Sumatran Rhinoceros (*Dicerorhinus sumatrensis* (Cuv.)). These are *D. etruscus* (Falc.), *D. merckii* (Jäger), and *D. hemitoechus* (Falc.), whilst the best known species, the Woolly Rhinoceros (*Tichorhinus antiquitatis* (Blum.)), is the descendant of a different group and presumably of Asiatic origin *. The last-named species has been reconstructed many times. Attempts of this kind were, no doubt, stimulated by the prehistoric drawings of this species. Of the other three, no drawings have yet been identified.

THE WOOLLY RHINOCEROS.

Of the numerous reconstructions of the Woolly Rhinoceros, only a few have been executed with sufficient care to face scientific criticism. Of these, Abel's reconstruction (1922, p. 30, fig. 30) is based on the cave-drawing from Font-de-Gaume (fig. 1), in which the neck is short and

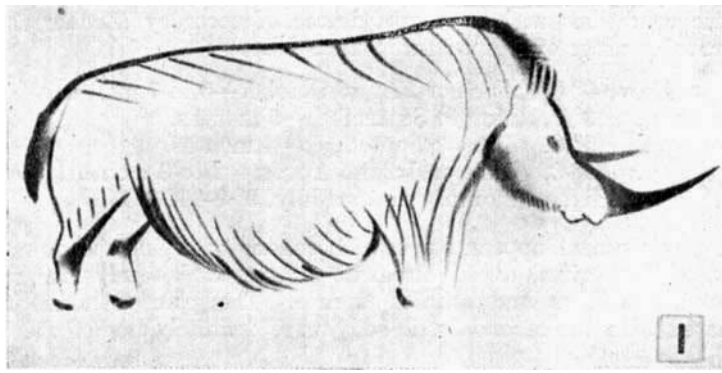

FIG. 1.—*Tichorhinus antiquitatis*, cave drawing, probably Aurignacian, from Font-de-Gaume, Les Eyzies, Dordogne, France. From Capitan and Breuil, 1910.

* On the classification of the Pleistocene rhinoceroses of Europe, see Wüst (1922); that of the recent species, Lydekker (1916).

surmounted by a hump. The position of the head in this cave-drawing suggested to Abel an analogy with the Recent White Rhinoceros (*Ceratotherium simus* (Burchell)), of Africa, which is well characterized by the inclined carriage of the head (Zeuner, 1934 *c*, p. 35). Charles R. Knight's reconstruction (1935, pp. 92–93) agrees in these respects with Abel's; it is distinguished chiefly in details of the coat of hair. The reconstruction by Hilzheimer (1924) deviates in several important points, such as shortness of the body, skin-folds and curvatures of the horn; they will be referred to later. Stach's sketch (in Nowak *et al.*, 1930, pl. 9, fig. 1) is based on the second Starunia specimen to be described presently.

Several specimens of *T. antiquitatis* have been found preserved with skin and flesh. Those coming from the land-ice of Siberia unfortunately suffered much damage on their long journey to St. Petersburg, and few body features have remained available for study (Brandt, 1849; Schrenck, 1880 *). More ample information concerning the soft parts of the body was obtained from the fore half of a young specimen found embedded in petroliferous silt at Starunia in the Polish Carpathians (Niezabitowski, 1912: *Wykopaliska Starunskie*, 1914). Encouraged by this discovery, the Polish Academy of Sciences started systematic excavations after the last war, and was rewarded with a complete female specimen, which provides a sound basis for the reconstruction of the species (Nowak, *et al.*, 1930). Since little is known outside Poland about this find, a few notes on environment and preservation may precede here the description of the specimen.

Environment of the Woolly Rhinoceros at Starunia.—Starunia lies near Stanislawow, in the foothills of the Carpathians, which were folded at the end of the Miocene and have since been subject to erosion and denudation. In Pleistocene times it was almost 30–40 miles distant from the Carpathian glaciers, and about 80 miles from the edge of the greatest glaciation of the Ukraine. The silt which contained the body also yielded an abundant flora and insect fauna of distinctly subarctic type (Szafran, 1934; Gams, 1934; Zeuner, 1934 *b*; Szafer, in Nowak, *et al.*, 1930). The insects in particular have made it possible to determine climatic conditions with a certain degree of accuracy (Zeuner, 1937); the probable range of temperature was as follows:—

Above 0° C. April or May to October—6 to 7 months.
„ 3° C. May to September—5 months.
„ 6° C. June to September—4 months.
„ 9° C. June or July to August—2 to 3 months.
Highest monthly mean: July, 9°·9–11°·8 C.

The environment appears to have been one of alpine meadows with plenty of *Vaccinium*, dwarf birch, *Dryas octopetala*, and some shrubs like alpine willows and stunted spruce. The plant remains found associated with the second fossil body were definitely not of the forest

* The specific identity of this specimen is uncertain. It was described as *D. merckii*, but Abel (1922) assigned it to *T. antiquitatis*, and Wüst (1922) to *D. hemitoechus*.

type *, but rather characteristic of the alpine zone near the limit of tree-growth. It was mostly low-growing, a point of some importance as will be seen later on.

The valley, clad with this type of vegetation, was watered by a small river. In addition, there was a number of springs of saline water associated with outflows of oil. Both saline water and oil impregnated the silt deposits of the flood-plain of the river. Since salt and oil tend to prevent freezing, it is conceivable that such spots attracted many animals in winter, quite apart from the general attractiveness of salt for ungulates.

The preservation of the body of the rhinoceros, however, does not suggest that a saline oil spring acted as a natural trap after the manner of Rancho La Brea, in California.

Preservation of the second body.—It was found lying on its back, in a severely contracted attitude (fig. 2). The left side of the body had large

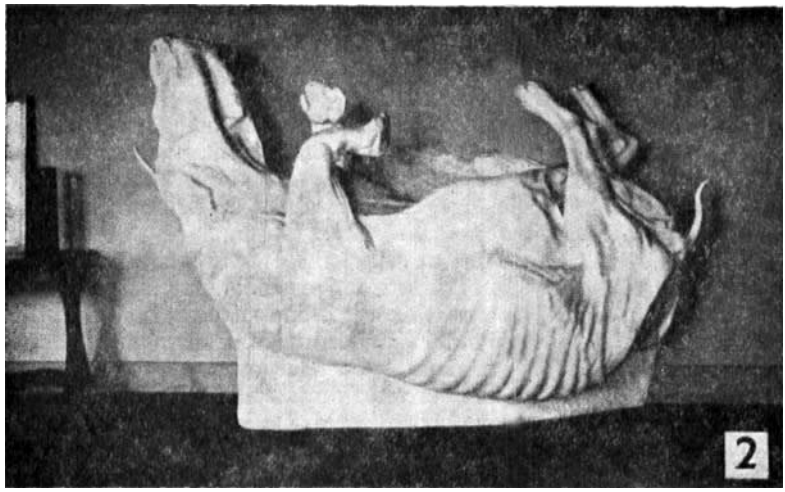

FIG. 2.—Plaster cast of the carcass of a female Woolly Rhinoceros found at Starunia near Stanislawow, exhibited in the Museum of the Polish Academy of Sciences, Cracow.

holes in the neck and the belly, and the internal parts were less well preserved than the skin and some of the muscles. Most of the intestines, and even some of the cervical vertebrae were missing, though some remnants of the former were found a few feet from the body. The cavity of the body was filled with silt. Stach (in Nowak, *et al.*, 1930) rightly emphasizes that some time must have elapsed after death,

* The flora and fauna found with the first body (1907) was temperate. The excavation of 1929, however, proved that the first body had been re-buried in an old shaft, presumably by peasants, together with modern refuse. Fauna and flora described in *Wykopaliska Staruńskie*, therefore, should be regarded as suspect.

before the final embedding in petroliferous and saline silt took place. It may be inferred that the specimen died from an accident in winter, that at some time it was attacked by carrion-feeders, and that the frozen body was transported to the place of fossilization by the river in spring (Zeuner, 1934 *a*). When the body had been embedded in the silt, salt prevented further decomposition and the oil excluded the air. In the course of time, the water contents of the tissues were replaced by oil, and shrinkage of the muscles resulted in the fragmentation of most of the bones. The hair lost its cohesion with the follicles in the skin, so that it remained in the silt when the excavators removed the body. The preparation of the skin for exhibition was a truly monumental task, and was carried out with the greatest skill and perseverance. Fig. 3 shows the specimen as it now appears in the Museum of the Polish Academy of Sciences in Cracow.

Sex, age and size.—The specimen is a female, full-grown or almost full-grown. Some of the differences which it exhibits in comparison with the Palaeolithic drawing from Font-de-Gaume, are probably due to its sex and comparative youth, since Stone Age draughtsmen are more likely to have chosen old bulls than young cows as their subjects. The skin, from the nose to the root of the tail, was 358 cm. long, to which 51 cm. have to be added for the tail.

This specimen has provided us with many morphological details and thus made it possible to settle disputed points. In the following paragraphs only those features are mentioned which have some bearing on the reconstruction. For others, and for a fuller description, the reader is referred to Stach (in Nowak, *et al.*, 1930).

Mouth.—The Font-de-Gaume drawing (fig. 1) shows a curiously short lower lip. Hilzheimer (1924) based far-reaching conclusions on this apparent feature of the Woolly Rhinoceros and thought that the species lived like the elk (*Alces alces*) in forests. In the Starunia female, however, the upper lip protrudes only moderately over the lower. Yet, Hilzheimer's interpretation, which is in part derived from the Font-de-Gaume drawing and in part from the relative shortness of the lower jaw, need not be entirely without foundation. It is conceivable that the strongly protruding upper lip was a character of old bulls which carried heavy horns and whose horn-base on the nasalia was correspondingly strong and large, pushing the upper lip into an extreme proximal position.

Both upper and lower lips of the Starunia female were straight, and the snout resembled that of the Recent White Rhinoceros. The pointed, prehensile extension of the upper lip of the other Recent species was absent. Now, the White Rhinoceros is the only living steppe species, and a straight-lipped mouth is well adapted to grass-feeding, whilst the prehensile upper lip serves for seizing twigs and foliage. The structure of the snout, therefore, renders it probable that *Tichorhinus* was a grass-feeder and not a woodland form.

Eye.—The eye lies 44·5 cm. from the tip of the nose and 21 cm. from the root of the ear. The opening measures only 4 cm. across. In view of the small scale of our reconstruction, details are of no importance, though it may be mentioned that even the smallest folds of the eye region were preserved.

Ear.—Only the right ear was preserved. It was damaged and had suffered from shrinkage. It was 24 cm. long, elliptical and apparently somewhat more slender than that of *C. simus*. Its exact shape is still uncertain.

Horns.—The horns of the Starunia female were missing, they were apparently dissolved by the oil in the silt. The specimen of 1907 had remnants of the horns in an obvious state of partial solution. From their size, considering the extreme youth of this specimen, it may be inferred that especially the nasal horn grew very rapidly. The Starunia female, therefore, may be supposed to have carried large horns, although it was not an old individual. The reconstructed horns given to it by the Cracow Museum authorities (fig. 3) conform to this view. In our re-

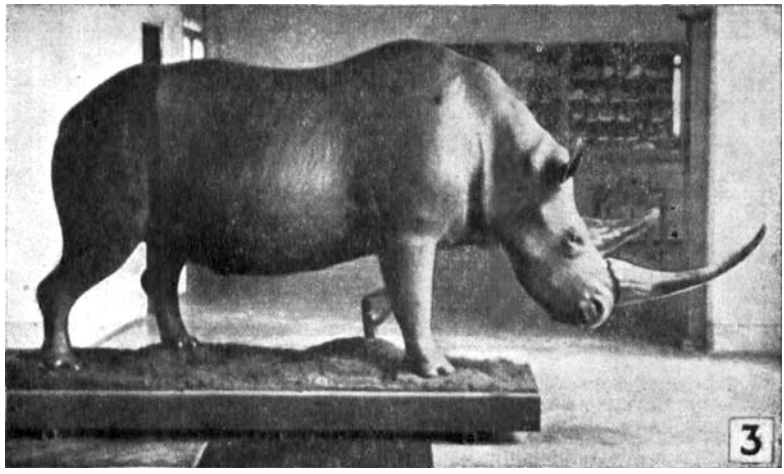

FIG. 3.—Mounted specimen. Polish Academy of Sciences, Cracow. Horns added.

construction, curvature and shape were taken from Siberian horns, of which a number are contained in the British Museum collection. Others were figured by Brandt (1880). In Hilzheimer's reconstruction, the upper third of the nasal horn is strongly curved backwards, as it often is in the much smaller Sumatran Rhinoceros. But, though fossil horns of *T. antiquitatis* from Siberia vary in shape, most have an even curvature which, therefore, has been adopted in the present reconstruction.

The base of the nasal horn is as much as 27 cm. long and 19·4 cm. wide. It is situated more proximally than in any of the Recent species, including *C. simus*. Thus, the horn must have slanted forwards considerably, as, indeed, is shown in the Font-de-Gaume and other drawings. The base of the second horn begins only 4 cm. behind the nasal one and is 19 cm. long and 16 cm. wide.

Neck-hump.—The Font-de-Gaume drawing shows a most pronounced hump on the neck, and the neck, as a whole, is relatively short. In both respects the Starunia female differs from the cave drawings.

The Font-de-Gaume drawing shows a single large hump extending from the shoulder-blade to the occiput. But Hilzheimer (1924), relying on the Recent African species, considered it more probable that a hump on the neck was separated from the usual eminence of the withers. A separate neck-hump is a conspicuous feature of bulls of the White Rhinoceros (see, for instance, photograph by P. C. R. Senhouse, in Zeuner, 1934 *c*, pl. 3, fig. 7). It may be sufficiently large to obscure to some extent the convexity of the withers. Admitting the same for bulls of *Tichorhinus*, the large hump shown in the Font-de-Gaume and other drawings may be regarded as a sexual character.

In the female from Starunia there is no conspicuous hump. Instead, four eminences, or minor humpings, are distinguished by Stach (compare fig. 3). The last, or hind-most, of these is the suprascapular eminence. The two nearest to the occiput may be regarded as strong skin-folds. The third, in front of the withers, is by far the largest and probably the equivalent of the large hump of the Font-de-Gaume drawing. Owing to the damaged condition of the neck, Stach was unable to ascertain whether fat tissue was contained in these folds.

The neck of the Starunia female appears long for a rhinoceros, partly because the large hump is absent (this makes it look more slender) and partly because it is stretched, the head being bent down, as in the act of grazing. Whether the neck was longer than shown in the Font-de-Gaume drawing if measured in relation to the head or body is difficult to decide, since one has to make some allowance for inaccuracy of proportions in the cave drawings.

Average carriage of the head.—In the mounted specimen the bent position of the head was retained, and the same has been done in the present reconstruction in order to follow the fossil specimen as closely as possible. The question of the average carriage of the head, therefore, does not arise in this particular reconstruction, though if we want to have an idea of how the Woolly Rhinoceros looked when standing quietly at ease (dozing in this position is a favoured habit of rhinoceroses), it is necessary to derive the average carriage of the head from the angular proportions of the skull and to compare the result of such analysis with the Palaeolithic drawings. This method will be described later, under *D. merckii* (p. 192), so that it suffices here to summarize the conclusions. *Tichorhinus* carried its head at a moderate angle, much like the living Black Rhinoceros (*Diceros bicornis* (L.)). This attitude is shown in a drawing of a couple of Woolly Rhinoceroses on a piece of slate from the Grotte des Trilobites (Yonne, Central France). The Font-de-Gaume drawing shows a steeper angle, which, of course, may well have been assumed, especially by specimens carrying large horns or in the posture of defence. But the reconstructions by Abel, Knight and Hilzheimer show the head at too steep an angle, a feature which was taken from the White Rhinoceros.

Body.—Owing to shrinkage the ribs showed through the skin of the carcass. But the right-hand side of the body was so well preserved that no doubt remained about the complete absence of skin-folds, which are so characteristic of some of the Recent species. Hilzheimer, therefore, was mistaken in giving skin-folds to *Tichorhinus*.

The profile of the back shows both the lumbar and the sacral eminences which are so typical of rhinoceroses. The lumbar eminence is due to the high spinous processes of the lumbar vertebrae. Stach pointed out that Hilzheimer, in his reconstruction, placed the lumbar eminence too much forward, and that the body, as a whole, was appreciably longer than shown by him.

The lumbar and sacral eminences are hardly recognizable in the Font-de-Gaume drawing. I am inclined to think that they were obscured by the hair so conspicuously sketched on the back by the draughtsman of Font-de-Gaume.

Tail.—The tail is broad at the base, and the basal two-thirds are flattened, while the terminal third is circular. The tail acted as a lid for anus and vagina. Stach (in Nowak, *et al.*, 1930, p. 38) observed that the top and the sides were covered with hair, short near the base, longer towards the apex. 'The longest hair appeared however probably along the side edges of the tail, which caused the shaping of a sort of flat, fan-like tuft'. Thus, the tail appears to have differed from those of Recent rhinoceroses living in hot climates.

Legs.—The legs resemble those of the White Rhinoceros. There were no skin-folds. The hoofs had disappeared, presumably they were dissolved, but their positions were readily determined from the clearly preserved edges.

The Hair.—The coat of hair still presents some problems. *Tichorhinus* is commonly believed to have been woolly. This notion was in vogue already in the sixties of the last century, and therefore must have been derived from the only preserved carcass then known, that from the Wilui River (Eastern Siberia), of which the head, one fore-foot and one hind-foot were obtained by Pallas in 1773, dried in an oven and sent to St. Petersburg. Symonds (1868) says that *Tichorhinus* was protected 'by long wool and hair'. This pronouncement was objected to by Brandt (1870), who had studied the specimen in question. He pointed out that there was no wool, but only one kind of coarse, blackish hair which grew densely in tufts of about twenty, and was never more than about 1½ ins. long. But it is unlikely that Brandt ever saw the hair-coat of the body.

The Font-de-Gaume drawing shows a beard as well as a kind of mane, or at least denser hair on the back of the neck. The presence of the latter is confirmed by the Starunia female. Whether this mane was stiff and erect (as in the wild horse), or falling over (as in the domesticated horse), is not clear. Either interpretation can be derived from the drawing. In our reconstruction the second view is expressed, relying on the three or four long streaks of hair on the neck, and regarding the four thick, short lines of the ear region as hair falling over the forehead. But it must be remembered that the alternative of a stiff mane, as expressed by Knight, may well be deduced from the thickening and blurring of the outline of the neck as it approaches the head.

The coat of the body also has to be deduced from the Font-de-Gaume drawing. The hair found in the silt which surrounded the Starunia female is described as 'light and fine, tangled and gathered into small tufts, among which one finds occasionally darker and coarser hairs'

(Stach, in Nowak, *et al.*, 1930, p. 24). But its length is not given. Now the streaks which indicate the hair on the Font-de-Gaume drawing are remarkably long, and whatever they may represent otherwise, they cannot be reconciled with the view that the hair was short. It rather appears to have been long, growing in locks or tufts which fell over the body and partly concealed the outlines of the latter.

The tail had no tassel of coarse hair arranged in the plane of symmetry of the animal, but the longest hair appears to have grown on its sides (see above). The tail in the Font-de-Gaume drawing is in keeping with this view.

Thus, the new reconstruction (fig. 4) attempts to give an impression of a female specimen of moderate size, not of a strong bull (which has

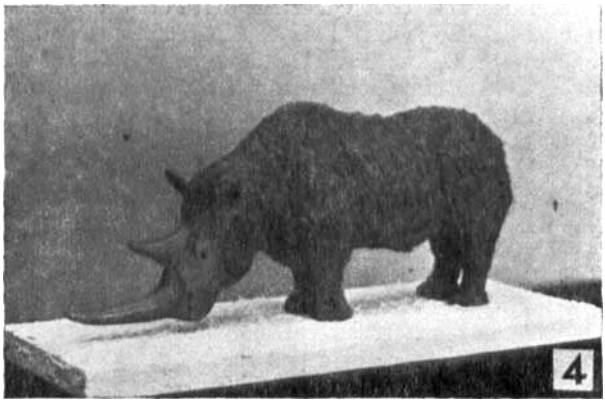

FIG. 4.—Reconstruction of the Woolly Rhinoceros, representing a young female, based on the Starunia specimen, by the author. British Museum (Natural History).

been aimed at in earlier reconstructions). It adheres closely to the data derived from the second Starunia specimen, except for the horns and the hair. Other individuals of *Tichorhinus* are bound to have been larger, and the bulls in particular are likely to have differed in the possession of a large neck-hump.

MERCK'S RHINOCEROS.

Merck's Rhinoceros was the temperate counterpart of the Woolly Rhinoceros in the Upper Pleistocene. It has not been found in deposits of a thoroughly cold climate and is most frequent in deposits of a decidedly temperate character, especially those which are slightly warmer than the present. It is highly probable that the form called *Rhinoceros megarhinus* in Britain is synonymous with *Dicerorhinus merckii* (Jaeger) *. The lineage of this species appears to go back to the Pliocene, the ancestral

* This was suggested by Falconer (1868, vol. II, p. 398), who identified teeth from Grays Thurrock with Jaeger's type specimens from Kirchberg. This view was subsequently established by Schroeder (1903, p. 92 ff.).

form being *D. etruscus* (Falc.), which is generally regarded as a distinct species. In the middle and upper Pleistocene, *Dicerorhinus hemitoechus* (Falc.) occurs, but of this species we can say no more at present than that it was probably a grassland form, both of temperate and cool climates.

The attempt to reconstruct *D. merckii* (fig. 5) has to be based on much scantier material than was available for *T. antiquitatis*. There are no Palaeolithic drawings, and not even a complete skeleton. A skeleton is available, however, of the ancestral form, *D. etruscus* (Toula, 1902). Fortunately, skulls and portions of skulls are comparatively numerous; eighteen of *D. etruscus* and six of *D. merckii* have been studied by the present author.

Objections may be raised to using material of *D. etruscus* in this context. I should point out, therefore, that this earlier form has merely been consulted in order to establish which characters are common to it and *D. merckii*. Apart from the known differences in the dentition, no clear-cut differences have been found in the skull. The alleged absence

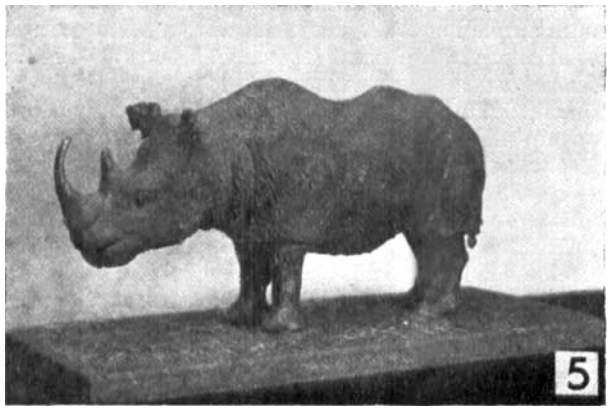

FIG. 5.—Reconstruction of *Dicerorhinus merckii*, by the author. British Museum (Natural History).

of the nasal septum in *D. merckii* is a myth. The septum is quite often present, but Wüst (1922) found, and my material completely confirmed it, that the fusion of the septum with the nasalia did not take place until the individual had reached a considerable age. It is possible that in *D. etruscus* the fusion occurred a little earlier, so that evidence for it is found on the underside of the nasalia in *D. etruscus* more often than in *D. merckii*. Had the nasal septum been absent in *D. merckii*, one might have been justified in inferring a very weak development of the horns. Even in the Recent *D. sumatrensis* some ossification of the septum may be observed, although the horns are small. The larger septum of *D. merckii* would suggest correspondingly larger horns. On the other hand, the nasalia of this species are narrower than those of *Tichorhinus*. This limits the size of the anterior horn base and therefore of the horn also.

In the reconstruction, these points have been borne in mind, while the shape of the horns has been taken from *D. sumatrensis*.

Another supposed difference between *D. merckii* and *etruscus* is the angle between the plane of the horn-bases and the portion of the cranium rising to the occipital crest. Forsyth Major (1874, p. 113) considers it as very flat, approaching 180° in *D. etruscus* and much steeper in *D. merckii* (Major says *D. hemitoechus*, but Schroeder, 1903, p. 11, takes this to mean *D. merckii*). Apart from the ambiguity introduced by the existence of the third species, *D. hemitoechus* (often misidentified), it is possible that this angle *is* flatter in Pliocene specimens of *etruscus*. My own measurements, which included only three Pliocene specimens, did not confirm it. The extreme values and the mean of *etruscus* and *merckii* are almost identical, though it should be noted that nine out of twelve specimens of *D. etruscus* were Lower Pleistocene. This, together with other measurements of angles, suggests that there was little, if any, difference in the outlines of the skulls of Pleistocene *D. etruscus* and *D. merckii*.

It is possible that the nasal horn-base was somewhat wider in Pleistocene *etruscus* specimens than in *D. merckii* (Zeuner, 1934 *c*, p. 68). If confirmed on more ample material, this character would be corroborated by the earlier ossification of the nasal septum in *D. etruscus*, indicating that in this species the nasal horn was larger.

It was Toula (1902) who first recognized and carefully established the close relationship of *D. etruscus* with both *D. megarhinus*=*merckii* and with the Recent *D. sumatrensis*. Osborn (1900) already regarded this living species as the most primitive of all. It is a forest form with many peculiar characters which separate it from the other modern two-horned species. As *D. merckii* has proved to be congeneric with *D. sumatrensis* on osteological evidence, it may justly be claimed to have resembled this living species more closely than any other, except, of course, in features which osteological evidence shows to have differed. This, at least, provides a tentative basis for the reconstruction. The following characters have been assigned to *D. merckii* on the ground of its close affinity to the Recent *D. sumatrensis* :—Proportions of body, outline of the back, folds of the skin, skin structure, hairiness, shape of ears.

In agreement with the Sumatran Rhinoceros, the neck-hump is assumed to have been absent in *D. merckii*, though it is conceivable that a slight hump, or thickening, was present as, for instance, in the Black Rhinoceros. Conspicuous skin-plates edged by deep folds cover the humeri and femora. The upper lip is assumed to have been of the pointed type possessed by all Recent species except the pure grass-feeder, *C. simus*.

Average carriage of head.—In rhinoceroses the average carriage of the head determines to a large extent the appearance of a species. It varies greatly in accordance with feeding habits, as has been shown by means of a semi-statistical treatment of the Recent species, based on measurements of angles defining the positions of the facial part of the skull and the cranium, relative to each other and to the occipital foramen (Zeuner, 1934 *c*). This analysis of over 200 skulls is summarized in fig. 6. It shows the outlines of skulls, all arranged on the vertical axis of the occipital foramen. The dotted lines in *a*, *b* and *c* represent *Diceros*

bicornis, the Black Rhinoceros, which is a denizen of the bush-steppe feeding on leaves as well as on grass. In fig. 6 *a*, *Rhinoceros unicornis* L. is shown, a virgin forest species which feeds exclusively on foliage. In

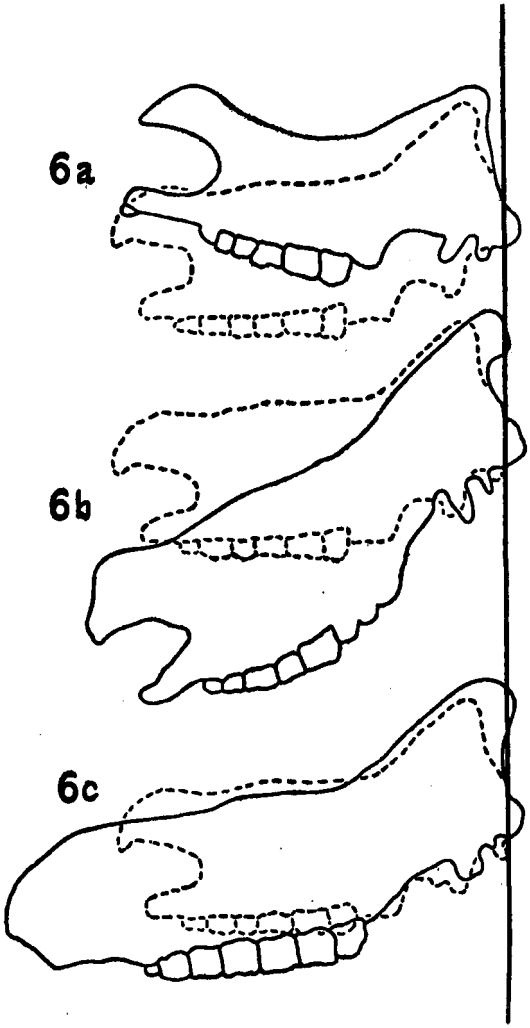

FIG. 6.—Outlines of skulls of rhinoceroses, all arranged on the vertical axis of the occipital foramen. Dotted line: *Diceros bicornis*. 6 A: *Rhinoceros unicornis*. 6 *b*: *Ceratotherium simus*. 6 *c*: *Tichorhinus antiquitatis*.

accordance with this habit the facial portion of the skull is raised. In contrast to this condition the pure steppe species, *Ceratotherium simus* (fig. 6 *b*), has a greatly lowered face; its skull is, so to speak, stretched

towards the source of the food *. Thus, the rhinoceroses of the forests are found to have their heads pointing more or less forwards, those of the bush-steppe somewhat inclined downwards, and those of the grass-steppe strongly so. There is sufficient evidence for this rule to be regarded as generally applicable. It allows us to argue from the Recent forms to the fossil ones, to obtain information about their way of carrying the head, and incidentally about the environment in which they were living.

As to the Woolly Rhinoceros, we meet with a very peculiar combination of angular proportions in the skull. As shown in fig. 6 *c*, the amount of downward bending of the face is moderate. It is higher than in the bush-steppe species, *D. bicornis*, yet less extreme than in the steppe species, *C. simus*. But an inspection of the angles between the palate and the occipital plane, between the palate and the vertical axis of the occipital foramen, and between the occipital plane and the parietal plane of the forehead reveals that the skull was adapted to a severe stretching of the neck. Head and neck appear to have been brought into a line in the process of feeding, and the food must have been very low-growing. When in the position of rest the head of *Tichorhinus* may have formed with the body an angle only slightly steeper than seen in the Black Rhinoceros, though the great length of its skull would have made it look very different.

As to Merck's Rhinoceros, all angles prove to be similar to those of the Black Rhinoceros. From this it may be inferred that the average carriage of the head was much the same as in this Recent species, and this feature has been expressed in our reconstruction. *D. etruscus* agrees in this respect entirely with *D. merckii*, though both differ in certain other respects from the Recent *D. sumatrensis* (see Zeuner, 1934 *c*, pp. 32 and 59).

The hair.—The Sumatran Rhinoceros is the only living one possessing an appreciable amount of hair all over the body. It is admittedly loose, like a haze over the skin, but in view of the tropical forest habitat of the species, its presence is most readily interpreted as an ancestral character. It is highly probable, therefore, that its congener, *D. merckii*, considering the rougher climate in which it lived, was equipped with a fairly dense coat of hair. How long and how conspicuous it was cannot be ascertained. In the reconstruction a moderate and relatively short coat of hair has been indicated.

The tail of *D. sumatrensis* has a laterally compressed tassel, and the same has been given to *D. merckii*.

Conclusion.

These two models of rhinoceroses are the second couple of a series made by the present author with the assistance of Miss I. Gedye of the University of London Institute of Archaeology (see Proc. Linn. Soc. CLV. p. 245). Their scale is half-an-inch to the foot, or 1/24th of natural size. They have been acquired by the British Museum (Natural History), where they are exhibited in the Geological Department.

* Dr. F. C. Fraser kindly informs me that an exhibit in the British Museum (Natural History) demonstrating similar, but very slight differences in the horses, was in all probability constructed by Lydekker. It is now kept in the Osteological Room.

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