

Palaeontology. — “*New Findings of Pliocene and Pleistocene Mammals in Noord Brabant, and their Geological Significance*”.

By I. SWEMLE and Prof. L. RUTTEN. (Communicated by Prof. G. A. F. MOLENGRAAFF).

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In the past year the Geological Institute of Utrecht obtained, partly through mediation of the Geological Survey, partly from the Government Bureau for Watersupply, some remains of fossil mammals originating from the southern and the western part of Noord-Brabant, one of the southern provinces of Holland, a district which up to the present has yielded very little in this respect. As we know, representatives of the young-diluvial fauna have been found in some localities of Noord Brabant, e.g. *Bos primigenius* Boj. near Den Bosch, *Elephas primigenius* Blumenb. near Acht, *Rhinoceros antiquitatis* Blum., in Hollandsch Diep. It is noteworthy, however, that in two places, near Oosterhout in the northwest, and near Westerhoven in the south of the province, remains have been recognized of a pliocene fauna, viz. *Elephas meridionalis* Nesti, and *Rhinoceros etruscus* Falc¹⁾.

Now, part of the remains, detected last year, have been derived from the zone between Oosterhout and Westerhoven. Three findings of mammals, belonging to the young diluvial fauna occurred in the vicinity of Esbeek S. S. E. of Tilburg, viz. a molar from *Elephas primigenius* Blum., found by Mr. SISSINGH on the premises of the clay-pit to the north of Esbeek, under a deposit of loam at a depth of three meters; three molars from *Rhinoceros antiquitatis* Blum., unearthed from a depth of 2½ m. in peat-bearing layers of clay, during the construction of the lock in the Wilhelmina Canal near Diessen, when the canal was being dug, and a molar from *Equus Caballus* L., found during the construction of the same canal to the east of the Diessen-lock at a depth of 3½ M.²⁾.

The above fossils are not highly remarkable in themselves. The Molar from *Elephas primigenius* is a M III, sup. sin., on which

¹⁾ L. RUTTEN. Die Diluvialen Säugetiere der Niederlande, 1909.

²⁾ Far more eastward, viz. near Breugel on the Dommel, a fragment of a horn of *Bos Primigenius* Boj. was found, with which the Utrecht Geol. Inst. was presented last year.

— $19\frac{1}{2}$ x are still visible on $215 \times 100 \times 160$ mm.¹⁾ The extremely thin lamellae and the slight thickness of the enamel prove conclusively that the tooth is to be referred to *El. primigenius*; it is remarkable however, that the enamel bands are finely folded which occurs only rarely in *El. primigenius*. The remains of *Rhinoceros antiquitatis* are three successive teeth, of one set of the right lower-jaw, viz. P 3, M 1, and M 2. They are but little worn down and have therefore belonged to a young animal; they must undoubtedly be referred to *Rh. antiquitatis*; the very thick enamel, the distinct striae of the enamel bands, the deep depressions and the trifling convexity of the teeth, all point in the same direction, while for the rest the teeth are almost quite similar to a set pictured by J. BRANDT²⁾. The tooth from *Equis caballus* is also a M of the lower-jaw.

From Oosterhout, however, where already previously teeth and bones from *Elephas meridionalis* Nesti³⁾ had been found in a superficial layer of loam, in a locality not precisely indicated, remains of bones and fragments of teeth were also sent to us, that belonged to this species. They were met with at a depth of 34,75 M. below Amsterdam-level in the first of five borings executed for the Water-company of Western Noord-Brabant. The wells are situated to the left of the road from Breda to Oosterhout on the Vråggel moor.

The bones from the well cannot be further determined, but a fragment of a tooth, most likely the posterior part of a M. 1 sup. sin. is distinctly indicative of *Elephas meridionalis*. It presents 3 x with a length of $7\frac{1}{2}$ and a breadth of 8-9 centims, while the height minus the root is about 8 cm. The fragment was not chewed down, but was sawn, in order to get an opportunity of studying its structure.

Indicative of *El. meridionalis* are: 1° the extraordinary thickness of the lamellae, which appears already from the lamellae-formula; 2° the extreme thickness of the enamel (up to 4 mm); 3° the large breadth and the small height of the tooth; 4° the way in which the chewing-figures originate, namely through fusion of the four annuli (see figure).

Not only do we recognize in this fragment all the characteristics of *El. meridionalis*, but those characteristics even become prominent in the extraordinary thickness of the lamellae and the enamel.

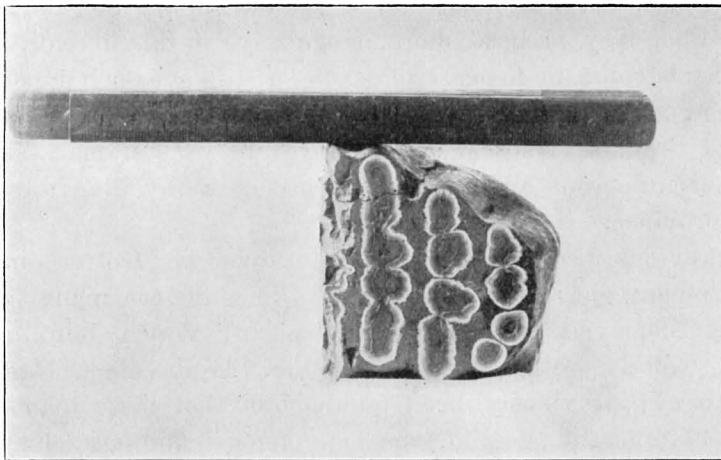
Dr. J. STEENHUIS kindly wrote us that the Geological Survey

¹⁾ H. POHLIG. Nova Acta Acad. Car. Leop. 53, p. 251.

²⁾ J. BRANDT. Mém. Acad. St. Pétersbourg. 1849. T. XI.

³⁾ L. RUTTEN. Die Diluvialen Säugetiere der Niederlande. 1909.

parallelized the part of the bore in which the tooth-fragment had been found, with the clay of Tegelen, which may be referred to the youngest pliocene or the oldest pleistocene. The tooth-fragment



corroborates this parallelism, for of late *Elephas meridionalis* has also been found near Tegelen ¹⁾.

From the fact that the previous discoveries of *El. meridionalis* were made near Oosterhout in a loam-quarry, near the surface, it may be concluded that in this part of Noord Brabant the pliocene rises locally to the surface. In the Annexes 11 and 13 of the "Final Report of the Government Exploration of Minerals", a fault running N. 40° W is marked West of Tilburg, which, however, in Annex 11 is drawn 2 KM. farther to the east than in Annex 13. To the north-east of this fault the soil has considerably subsided, as indicated on the sketch map; to the south-east the subsidence is less marked. When mapping the finding-places of the pliocene or the old pleistocene fauna (Westerhoven and Oosterhout), it will be noted that they fall to the east of the fault, as indicated in Annex 13, while Westerhoven would also lie within the trough, when assuming the course of the fault as marked in Annex 11. It is clear, however, that the pliocene can be expected near the surface only in the least subsided region, so that it is certain that the above-named fault — marked on the map only as a "suspected" fault — must be shifted more eastward. In that case, however, the locality of *El. primigenius* near Esbeek falls certainly to the west

¹⁾ S. RICHARZ. Centralbl. f. Miner. Geol. u. Pal. 1921 p. 664—669; id. Stadt Gottes 1921/22. Heft III.

of the fault, and that of *Rh. antiquitatis* and *Eg. callabus* does so most probably, i. e. in the least subsided region. Two possibilities are then to be considered: in the first place near Diessen and Esbeek more recent diluvium may have overlapped the denuded pliocene and secondly the fault postulated in the above as a straight line, may proceed more irregularly, so that in reality Esbeek and Diessen come to lie east of it. — At all events it appears from the foregoing that the young fossil mammalian remains in this part of Noord Brabant, whose geology may give us still many surprises, are rather numerous and may be of use in unravelling the tectonic of this province.

The previous discoveries near Westerhoven and Oosterhout as well as the recent ones near Esbeek and Diessen were made in superficial or nearly superficial loam deposits, which but for fossil findings, would surely be referred to the "Argiles de la Campine ¹⁾". It has already previously been pointed out that these loam-deposits may be of different ages; the palaeontological findings lend support to this hypothesis.

¹⁾ J. LORIE. Bull. Soc. Belge de Géol. XXI. 1907 p. 532—576.