Palaeontology. — *"Contributions to our Knowledge of the Palaeontology of the Netherlands".* II. *"On the Fauna of the Phosphatic Deposits in Twente. (Lower Oligocene)"* By O. POSTHUMUS. (Communicated by Prof. J. F. VAN BEMMELEN).

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In examining a collection of fossils, derived from the phosphatic-nodulus-bearing deposits of the localities Ootmarsum and Rossum (between Oldenzaal and Denekamp) I came upon the following formations:

Coeloma balticum SCHLÜTER, Zeitschrift der deutschen Geol. Ges. Bd. 31, 1879, p. 604, Pl. XVIII; one specimen.

Myliobates toliapicus L. AGASSIZ, Recherches sur des Poissons fossiles, vol. 3, 1843, p. 321, tab. 47, fig. 15—20; loose toothplates.

Carcharodon angustidens L. AGASSIZ, Recherches etc., vol. 3, 1843, p. 255, tab. fig. 20—25, tab. 30, fig. 3; teeth.

Notidanus primigenius L. AGASSIZ, Recherches etc., vol. 3, 1843, p. 218, tab. 27, fig. 4—8, 13—17; teeth.

Oxyrhina Desori (L. AGASSIZ) SISMONDA, Memoria della Reale. Accademia delle Science de Torino, 2d series, t. X, 1849, p. 44, tab. II, fig. 7—16; teeth.

Oxyrhina Desori L. SISMONDA mut. flandrica, M. LERICHE, Mémoires du Musée Royal d'histoire naturelle de Belgique, T. 5, p. 280, fig. 87; vertebrae.

Odontaspis cuspidata L. AGASSIZ, Recherches etc., vol. 3, 1843, p. 294, tab. 37, fig. 43—49; teeth.

Otodus obliquus L. AGASSIZ, Recherches etc., vol. 3, 1843, p. 267, tab. 31, tab. 36, fig. 22—27; teeth.

Lamna spec., vertebrae.

Phyllodus polyodus L. AGASSIZ, Recherches etc., vol. 2, 1843, p. 240, tab. 69a, fig. 6, 7;

And in addition some fragments of bone, presumably from Cetacea.

The phosphatic deposits are disposed in the profile as follows [1]):

"Underlying the Middle-Oligocene Septarian clay are ..... pale-green, very fine glauconite sands, probably referable to Lower-Oligocene, but seeming to belong to the Middle-Oligocene. At the basis of these sands a very typical conglomerate layer of loosened phosphorite nodules and shark's teeth appears, as may be found e. g. in the eocene quarries at the southern base of Lonnekerberg in the neighbourhood of Rossum, between Oldenzaal and Denekamp, and in the hills north of Ootmarsum". The phosphatic deposits

[1]) Eindverslag van de Rijksopsporing van Delfstoffen. Amsterdam, 1918, p. 114.

therefore may be estimated to be of Lower-Oligocene date; at all events they must have been formed at the commencement of the Oligocene transgression.

These formations are best compared with the Oligocene phosphatic deposits of the North-German Plain, of which those from Helmstedt have become familiar to us through the researches of VON KOENEN and H. B. GEINITZ [1]). It appears that all the fossils found in Twente, except Oxyrphina Desori, are also to be found near Helmstedt, which proves that the two deposits are equivalent.

This induces me to put forward some remarks about the formation of phosphatic nodules. Most authors advocate the view that the more or less rounded shape of these bodies is to be attributed to transportation, which view is adhered to by recent observers, as shown by the "Eindrapport" from which we just now quoted a passage. We contend that the nodules, in many cases, are not rounded, but more or less irregular, nay, as STARING [2]) observes, they often seem to be made up of two or more rounded nodules. The shark's teeth are in many cases enclosed in an approximately rounded phosphatic nodule: the portion that is sticking out, however, is not worn off at all, which fact clashes with the presumable genesis. H. B. GEINITZ assumed the transport of the nodules to have taken place in the Recent Tertiary and based this view on the fact of their presence in the layers of Myliobates and of Lamna cuspidata, which he had examined, and which up to that time had been recognized only in the Pliocene. Now, this cannot apply to the Overijsel phosphatic deposits, in which these remains have also been met with, because the younger deposits of the Oligocene also occur here. The palaeontological argument that the rounded shape is attributable to rolling cannot be sustained. We are bound to assume that after the formations of the phosphate-concretions, the position of the deposits remained unaltered, which conception has been supported already by Dr. W. P. A. JONKER [3]) on other grounds.

I wish to conclude by gratefully acknowledging my indebtedness to Mr. J. BERNINK, Director of the Museum "Natura Docet" at Denekamp, for granting me access to the fossils collected by him.

[1]) H. B. GEINITZ, Die sogenannten Koproliethenlager von Helmstedt, Büddenstedt und Schleweke bei Harzburg. Abhandlungen der Naturwiss. Geselschaft „Isis" in Dresden. 1883, p. 3–14.

H. B. GEINITZ, Ueber neue Funde in den Phosphatlagern von Helmstedt, Büddenstedt und Schleweke. Isis, 1883, p. 37—46.

[2]) W. H. C. STARING, De bodem van Nederland. 2e deel. Haarlem, 1860, p. 195.

[3]) W. P. A. JONKER, Het ontstaan van phosphorieten. Handelingen van het 17e Natuur- en Geneeskundig Congres, 1920, p. 94—96.