

In the open ground which extends between the top of Glen Docherty and the western edge of Ben Fin, the old floor is traced with some difficulty; but on reaching the latter point, it is seen with all the usual characters recognizable in the more western areas.

(To be concluded in our next Number.)

## NOTICES OF MEMOIRS.

CONSIDÉRATIONS GÉOLOGIQUES SUR L'ORIGINE DU ZAND-DILUVIUM,  
DU SABLE CAMPINIEN ET DES DUNES MARITIMES DES PAYS BAS.  
PAR DR. T. C. WINKLER. Extrait des Archives du Musée Teyler,  
tome v. (Haarlem, 1878.)

**I**N the above paper on the drift deposits of the Netherlands, Dr. T. C. Winkler treats of the origin of the Drift sand, Campinien sand, and Maritime dunes of the Pays-Bas. These deposits had been previously described and divided, by Dr. Staring, in 1853, as the drifts (*diluvium*) of the Meuse and the Rhine, the northern drift, and that of Munsterland. Again, in 1860, the same author classed them in three categories, the sandy drift (*zand-diluvium*), gravelly drift (*grint-diluvium*), and loess. Subsequent researches and considerations by Dr. Winkler have led him to modify the views of Dr. Staring, and he proposes the following divisions for the diluvial deposits of the Netherlands: the northern, eastern, southern, mixed (*entremêlé*) and *remanié* drifts. The reasons for these subdivisions, and their lithological characters, are fully explained in the memoir, as also the nature and distribution of the maritime dunes. From the facts stated, and the reasonings based upon them, Dr. Winkler considers he has shown:—

1. That the *zand-diluvium* of Staring ought to be termed the *remanié* drift, and that it was not formed, as Staring said, by the action of rain and frost, nor as Godwin-Austen said, by the action of wind, but by the effects of the sea.

2. That the *remanié* drift of the Netherlands is analogous to the Campinien sand of Dumont, in Belgium.

3. That the southern drift of the Netherlands is analogous to the flinty drift of Dewalque, to the *silex et cailloux* of Dumont, to the Campinien sand with rolled flints of Omalius d'Halloy, to the lower stage of the Quaternary period, the rolled flints and gravelly sand, of Dupont.

4. That the deposits of the Campine ought not to be considered as being simply composed of sand with pebbles, and sand without pebbles, but that these two stages ought to be separated according to their very different origin; the one, lower, coming from the Ardennes and the Condroz by means of rivers; the other, superior, being a marine formation, derived from older drift deposits by the action of the sea.

5. That the Campinien sand is posterior to the Hesbayen clay.

6. That the sand which constitutes the maritime dunes is identical with the Campinien sand of Belgium, and to the *remanié* drift of the Pays-Bas.

7. That the band of moving sands, which has been the source of the present dunes, was formed after the formation of the drift in the Netherlands, and consequently at the latter period of the Glacial epoch, or after this period.

8. That the alluvial deposits of the Netherlands are posterior to the formation of the maritime dunes.

J. M.

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REVIEWS.

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I.—MÉMOIRES POUR SERVIR À L'EXPLICATION DE LA CARTE GÉOLOGIQUE DÉTAILLÉE DE LA FRANCE. LE PAYS DE BRAY. Par A. DE LAPPARENT, Ingénieur au Corps des Mines. (Paris, 1879.)

**T**HIS memoir, the result of many years of labour, undertaken for the preparation of the Geological Map of France, is descriptive of the Pays de Bray, a district (from its peculiar features) of considerable interest to the geologist.

The memoir consists of three parts, which treat respectively, of the physical features, the succession of geological formations of which the region is composed, the elevation of the district, and its connexion with other disturbances in the Paris basin. The Pays de Bray has long engaged the attention of geologists. Noticed by O. d'Halloy in 1813, its structure has been further described by Elie de Beaumont, Graves, Passy, Cornuel, Hébert, and Barrois. But the study of the district has been beset with much difficulty, for the region is covered by woods and pastures, and divided by thick hedges and a great number of inclosures of very difficult access. With no stone quarries, the geologist can only avail himself of sand-pits, or of clay-pits opened for the manufacture of different kinds of pottery. However, the improvement of roads, fresh openings of the surface, and constructing railways during the last fifteen years or more, have materially assisted a better knowledge of the country. The railway from Rouen to Amiens traverses the Pays de Bray at right angles to its chief elevation, and two others, from Beauvais to Gournay, and from Gournay to Neufchâtel, follow the longitudinal axis, so that the district "so long isolated in the middle of Normandy as a sort of quagmire, almost forsaken by observers, is at the present time one of those affording valuable results, although the thick herbage over a large area still prevents the direct study of the subsoil."

The Pays de Bray, or Valley of Bray, is not an ordinary valley, but, like the English Wealden area, a so-called valley of elevation and erosion; it is an elongated semi-elliptical opening or trapezoidal amphitheatre contracted at both ends, extending from St. Vaast on the north-west to Tillard south of Beauvais on the south-east; the longer axis is about 40 miles, and that of the smaller 30 miles. It is not, however, an elevated dome, but its structure is due to a rectilinear dislocation, fault or sharp fold, a true line of rupture, around which are grouped a number of secondary effects (p. 132).

A transverse profile of the Pays de Bray shows three principal