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ON SILURIAN GRAPTOLITE SHALES FOUND BELOW
THE CHALK NORTHWEST OF LIÉGE,

by O. T. JONES (Cambridge).

In connection with certain works for obtaining water for the city of Liège, shafts were sunk through the Senonian Chalk about 880 m. N. of Voroux-Goreux, north west of Liège. F. HALET (1) reported in 1911 that Silurian Shales containing traces of Graptolites were found at a depth below the surface of between 41 m. and 55 m. MALAISE (2) believed that he could recognise *Monograptus vomerinus* or *M. priodon* and attributed the Shales to the Wenlockian.

MAILLIEUX (3) in 1930 reviewed this discovery and stated that having seen the original specimens collected by HALET which are in the Malaise Collection acquired by the Musée Royal d'Histoire naturelle de Belgique he believed that the only Graptolite, though scarcely determinable seemed to be *Monograptus lobiferus* which is a characteristic Llandoveryian species.

According to M. MAILLIEUX new shafts had recently been made close to the original ones and in these fossiliferous Silurian Shales had again been found. MAILLIEUX therefore made an extensive collection of Graptolites which is preserved at the Musée Royal.

Photographs of some of the best preserved specimens were sent to Dr G. L. ELLES of Cambridge who was able to identify 8 species belonging to the genera *Monograptus*, *Petalograptus*

and *Rastrites*. All the species clearly indicated a Llandoveryian age thus confirming M. MAILLIEUX'S earlier determination. « The complete study of the material will doubtless permit of a more precise determination, but at present the indications are that they should be assigned to the zone of *Monograptus convolutus* ».

Through the kindness of the Director of the Musée Royal d'Histoire naturelle I had the privilege recently of examining this collection and was able to make the « more precise determination » which M. MAILLIEUX foreshadowed.

The Graptolites are preserved in dark blue blocky shales or thin bedded mudstones. Pyrite is commonly developed and its crystallization has destroyed the structure of the Graptolites in some cases. There no trace of cleavage in these shales. In several respects the preservation is not as good as might be desired but I was able to identify the following species :

Monograptus clingani, *M. crenularis*, *M. decipiens*, *M. involutus*, *M. limatulus*, *M. lobiferus*, *M. regularis*, *Rastrites capillaris*, *R. hybridus*, *R. peregrinus* (sensu lato), *Cephalograptus cometa*, *Climacograptus hughesi*, *C. scalaris*, *Glyptograptus tamariscus*, *G. sp.*, *Orthograptus cyperoides*, *O. bellulus?*, *Petalograptus palmecus* var. *tenuis?*

The horizon of these shales can be correlated precisely with the zone of *Cephalograptus cometa* as developed in Britain. I found a particularly fine specimen of the zonal fossil in the collection : in addition all the precisely identified specimens in the above list occur in that zone. In fact very few species present in the zone in Britain are absent from Voroux-Goreux.

There is no evidence that any higher or lower zone is represented in the collection.

In addition to the shafts at Voroux-Goreux other shafts have been sunk through the Chalk near the sugar refinery of Fexhe-le-Haut-Clocher. These lie south of the village and almost due west of Voroux-Goreux. The distance between the two groups of shafts is 1.500 metres. According to MAILLIEUX the beds at Voroux-Goreux appear to dip slightly to the south.

Specimens from Fexhe preserved in the Museum consist of strongly cleaved slates of a greyish colour with darker bands. Graptolites are not uncommon but owing to the strong cleavage are difficult to identify. They include however a broad graptolite which appears to be that form of *Monograptus priodon* which occurs in the Wenlockian. Another specimen is probably *Cyrto-*

graptus murchisoni the lowest zonal graptolite of that series. It would appear therefore that the Fexhe slates occupy a considerably higher horizon than the uncleaved shales of Voroux-Goreux and must in all probability be referred to the Wenlockian.

REFERENCES.

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 3. MAILLIEUX, E., *Contribution à l'étude du Silurien du sous-sol de la Hesbaye.* (Bull. Mus. roy. Hist. nat. Belg., VI, n° 14, 1930.)
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