

type area, therefore, ends with the *Chonetes* flags of the upper Ludlow.

These correlations have been accepted by L. D. Stamp for Shropshire and South Wales.<sup>2</sup> In southern Wales the *Grammysia* beds are regarded as transitional between the upper Ludlow and the lower Gedinian, here the Trichrûg beds.

The evidence for drawing this boundary between the Silurian and Devonian systems is primarily based on diastrophism, though fossils have always been given full consideration, lithology being regarded as of least value.

It now appears clear that the black limestones of Bohemia known as the Ff. beds, and the Tentaculite limestone or the Manlius of New York must also go into the Lower Devonian. Just where the division line in Maryland, Pennsylvania, and New Jersey will be drawn is, however, not so clear, for here there appears to be a more or less complete transition from the Silurian (Tonoloway) into the Manlius equivalent. The last worker on this problem, J. B. Reeside,<sup>3</sup> was not able to adjust the matter.

CHARLES SCHUCHERT

#### THE MEASUREMENT OF POSTGLACIAL TIME

TO THE EDITOR OF SCIENCE: The proposal of DeGeer to measure postglacial time in North America by the lamination of glacial clays and its criticism by Fairchild are of special interest to phytogeographers who see in early postglacial migrations of plants the fundamental explanation of the present conditions of plant distribution. Fairchild has taken exception to some of DeGeer's statements, especially his estimate of 20,000 years for postglacial time, and has apparently adopted Taylor's computation of 75,000 to 150,000 years for the recession of the ice from Cincinnati to Mackinac. In this connection it is of interest to refer to a paper of DeGeer's published in 1908. In it he stated that the recession of ice in southern Sweden was as slow as 25 meters per year, rose to 130 meters, stopped for 100 to 200 years, began again at 20 meters, and gradually accelerated to 400

<sup>2</sup> *Geol. Mag.*, April, 1920, pp. 164-171.

<sup>3</sup> Prof. Paper 108-K, U. S. Geol. Survey, 1917.

meters per year. If one assumes DeGeer's minimum figure of 20 meters as an average annual rate in Michigan and Ohio, 36,000 years would be sufficient to cause an ice recession from Cincinnati to Mackinac. Since this region is farther south and with less rainfall than Sweden, it is fair to presume that the rate was much more rapid. Assuming DeGeer's average figure of 200 meters per year, 3,600 years would have produced the same result. Neither is it necessary to invoke the precession of the equinoxes to explain the fifteen frontal moraines on the way. DeGeer states that frontal moraines were formed in Sweden during a stationary period of 100 to 200 years. Such periods may have resulted from cyclic variations in temperature, as DeGeer believes, or from similar variation in precipitation. The latter are of course well authenticated through the researches of Huntington and others. Allowing 400 years for such stationary periods, the total time of ice retreat over this distance is still within 10,000 years.

H. A. GLEASON

NEW YORK BOTANICAL GARDEN

#### EXPLORATIONS IN THE PANHANDLE OF TEXAS

THE third expedition to northwestern Texas and Oklahoma completed its labors about the first of July. This expedition found more than two hundred small stone buildings in groups scattered through a territory approximately 200 × 100 miles in extent. It appears that these are not distinct Pueblo type of architecture but rather mark the gradual evolution of a nomadic buffalo-hunting tribe of Indians to people who lived in stone dwellings. Near the Oklahoma line the buildings are small and rudimentary, and as one proceeds westward they increase in size and numbers. The art also develops. A preliminary paper has been published setting forth the observations on the artifacts, irrigation ditches, pictographs and buildings. These will be mailed free of expense to any interested persons by the author.

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