Illustrated Lecture at Galway
Saturday, February 22nd, 1965

A small but enthusiastic group of Society members gathered in the Warwick Hotel, Salthill, Galway on Saturday, 22nd February, at 8 p.m. to hear Dr. Neil Murray give a learned and highly interesting lecture (illustrated with slides) on Pollen Analysis.

INVESTIGATION OF FORMER WOODLAND GROWTH AT CLONSAST BOG

This talk was based on a thesis for the degree of Ph.D. presented in 1957 at T.C.D. The investigations were carried out with a view to tracing the sequence of events leading to the overwhelming by peat of the forests or woods which once grew on the mineral soil in the Clonsast area and also any subsequent colonisation of the peat by trees.

Dr. Murray described briefly the history of Pollen analysis and the methods used in Pollen analytical research. By means of Pollen diagrams and also colour slides Dr. Murray described the process of peat formation in a section of Clonsast Bog. At the points in question, peat development had commenced about 6,000 years ago. The area is at present being intensively worked by Bord na Mona, to whom Dr. Murray expressed his thanks for their kind co-operation.

Pollen is produced in large quantities by most plants including trees, is dispersed and settles over the whole landscape but only that deposited in bogs or lakes becomes preserved well enough and in sufficient quantities to be of use to the pollen analyist.

Dr. Murray quoted Swedish research workers who have estimated that the spruce forest of Southern and middle Sweden produce about seventy five thousand tons of pollen annually when flowering freely. The usual distance of dispersal varies from thirty to sixty miles. Samples containing pollen are commonly obtained in Ireland from bogs. The number of pollen grains of trees and ground vegetation contained in these samples are counted under the microscope following laboratory treatments which concentrate the grains. The results are plotted on graphs which also show the stratigraphy and level of the bog or lake mud from which the particular sample came, and yield curves showing changes which occured in the relative percentages of the different species represented. From the movement of these curves inferences may be drawn as to the vegetational cover of the landscape at the time of formation of the different levels of the deposit. Further inferences may be drawn from the manner in which the curves alter and from the appearance or disappearance of certain species from the spectra. The graphs, or Pollen diagrams as they are called, are divided by means of these changes into different zones which have been dated. These zones, which may be traced in bogs all over the country, are based on a very large number of stratigraphical and pollen-analytical investigations. Very briefly they are described as follows :—

Zone VI is terminated and VII begins where pine values drop, alder increases and hazel is at its minimum for the late-Boreal period. Zone VII ends and VIII begins where there is a general fall in elm followed later by a rise and subsequent decline in oak. Elm later increases again. The pollen of *Plantago lanceolata* appears. This is a weed of cultivation and indicates some form of tilling of the soil on a scale wide enough for its pollen to make an appreciable contribution to the "pollen rain" as this wind-dispersed pollen is often called, due to the way in which it falls to the ground.

The VII to VIII transition occurs about B.C. 3,100. It is the transition from the Atlantic to the Pagan period.

Towards the end (B.C. 300) of Zone VIII elm values rise, while alder decreases to low values. Ash behaves similarly to elm and any factor affecting one affects both.

Zone VIII ends and IX begins where elm falls to low values, which persist until the pollen of planted elm causes an expansion of the curve in Zone X. Ash values also decrease and alder and birch increase. The Zone VIII to Zone IX transition occurs at approximately A.D. 250 and is the Pagan to Christian Period transition.

The Zone IX to X transition is indicated by the appearance of beech and spruce pollen. The curves for elm and pine expand as a result of the planting of these species. The transition is dated at A.D. 1700.

Agricultural interference with the vegetational cover is inferred from the curves where Elm values fall to a minimum, hazel, alder and birch values rise and ash, where present, decreases. These movements in the curves for tree pollen are accompanied by the appearance of or increase in value of *Plantago lanceolata, Artemisia* and *Cerealia.* The pollen of *Rumex* or Dock is sometimes used as an indication of agricultural interference with the woodland cover.

During the course of his talk Dr. Murray pointed out levels of the Pollen diagrams representing times at which early farmers were at work. He showed how the surface of the mineral soil at Clonsast had gradually been covered by peat which was at first basic or fen peat. The change over to acid conditions was reflected in both pollen and macroscopic and fossil remains such as leaves, wood and fibre.

Colour slides were shown of a trackway which had been laid down at approximately the time of Christ. It was dated to this time on the evidence of the Pollen curves and this date was subsequently confirmed by the Radio Carbon dating method. Two pieces of Ash wood from this trackway showed ends cut by metal implements. Their diameters were 6.5 centimetres and 8 centimetres and they had seventy-six and over ninety growth rings respectively, which showed how slowly they had grown. Slightly above the level of this trackway the peat was more humified and contained the roots of a widespread colonisation of the bog surface at approximately 250 A.D. This date was also obtained by the Radio Carbon method. This colonisation lasted for well over 100 years, as ring counts on many of the smaller stumps revealed over one hundred growth rings. It was suggested by A. C. Forbes that the pine at present growing in Ireland is all descended from introduced stock, in other words, that there was a break in the lineage of the pine here. Dr. Murray does not believe this to be the case as he found the pollen of pine from the bottom of the bog right up to the recent surface. He pointed out however that is was quite likely that most of the pine growing in Ireland now is in fact descended from introduced stock but he believes that the native trees survived in small numbers in inaccessible places. He said that other workers in the field of Pollen Analysis do not regard the percentages of pine pollen which he found in the upper levels of the peat to be sufficient to indicate the continued presence of the native pine, as pine pollen is often carried over very large distances and

could have come from Britain or the Continent. Dr. Murray said he did not believe that such long distance pollen could be persistantly present at all levels and in addition pointed out that pine pollen had been found by a Swiss botanist up to the present day surface in a series of peat samples from Carrantuohill. In the upper levels of his diagrams Dr. Murray showed where the pollen from introduced spruce trees made its appearance, indicating the arrival of exotic conifers in Ireland. He discussed at length the inferences to be drawn from the pollen curves in several diagrams but this material is to be published elsewhere.

At the end of the lecture Dr. Murray answered questions and he attributed the disappearance of Ulmus from the scene at certain periods to two factors *viz* the use by man of the bark of elm and the presence of Dutch Elm disease. The association of *Plntago lanceolata* with human interference is based on a number of independent factors and it may be safely used as a indication of man's use of land for agricultural purposes.

The meeting ended with the vice president Mr. Mooney thanking Dr. Murray.

E. McG.

Illustrated Lecture—Dublin
27th February, 1965

THE President of the Society, Mr. C. Kilpatrick, introduced the speaker, Dr. J. S. Jackson, Keeper of the Natural History Museum, Dublin, a man not only noted for his wide knowledge of geology but also for his deep interest in forestry.

THE GEOLOGY OF THE IRISH COUNTRYSIDE, ITS RELATION TO SOILS AND ITS EFFECTS ON FORESTRY

In introducing his subject Dr. Jackson described it as being one complimentary to soils ; although it confines itself to the basic materials, insufficient knowledge of the geological situation can lead to erroneous interpretations of soil types and formation.

A series of slides showed the development of geological thought in Ireland beginning with the Rev. John Hamilton's map in which symbols were used for the first time. Griffith's quarter-inch geological map of 1838 went into great detail and was not superceded for many years. Major General J. E. Portlock was the first man to do a soil

survey in Ireland. The very comprehensive survey undertaken by him between 1835 and 1843 proved to be such a costly affair that it was abandoned after the counties of Derry and parts of Fermanagh and Tyrone had been completed. No similar effort on such a scale was undertaken until the present soil survey of An Foras Taluntais.

Further slides showed the development of soil parent-material and the influence of two major glaciations on this, how many rocks of Scottish and English origin have been found in Ireland and how the flow of ice has moved soil masses so that in many cases the present soil cover has not been derived from the underlying rock. Examples of this development in western Ireland were clearly shown. These soil movements have been of great assistance to geologists in determining the nature of former glaciations, and have had a profound effect on agriculture and forestry.

An intriguing study of geological phenomena and landforms followed in which was described and illustrated the karp limestone of the Burren, the coalfields of Castlecomer and the lakes of the midlands, created by the underlying limestone being carried away in solution. An interesting sideline was an illustration of the movement of sand on Dollymount strand where a large number of small horse-shoe shaped dunes were being carried along by the wind at about 16 feet per hour. Dr. Jackson estimated that some 28,000 tons of sand were on the move!

We were finally shown slides illustrating the main soil forming minerals ; their composition and the elements they contribute to the soil were outlined.

Following discussion Mr. R. N. O'Carroll proposed a vote of thanks and pointed out that the complexities of soil development spread farther than the origin and nature of the parent-material and that variations in environment could give rise to many soil series from similar parent-material. After Mr. L. U. Gallagher seconded the vote of thanks the President closed the meeting.

L.U.G.