2. 'A Comparative Review of Pliocene Floras, based on the Study of Fossil Seeds.' By Mrs. Eleanor M. Reid, B.Sc., F.L.S., F.G.S.

Portions of an atlas vertebra of a big Elephant, probably near *Elephas meridionalis*, from the Pliocene of County Durham, were exhibited on behalf of Dr. C. T. Trechmann, F.G.S.

Lantern-slides of fossil seeds, etc. were exhibited by Mrs. E. M. Reid, in illustration of her papers.

April 21st, 1920.

Mr. R. D. Oldham, F.R.S., President, in the Chair.

The List of Donations to the Library was read.

The following communications were read:—

1. 'The Devonian of Ferques (Lower Boulonnais).' By John William Dudley Robinson, B.Sc., F.G.S.

2. 'The Cambrian Horizons of Comley (Shropshire), and their Brachiopoda, Pteropoda, Gasteropoda, etc.' By Edgar Sterling Cobbold, F.G.S. (Read by Dr. H. Lapworth, M.Inst.C.E., Sec.G.S.)

Lantern-slides and rock-specimens were exhibited by Mr. J. W. Dudley Robinson, in illustration of his paper.

Diagrams and drawings of fossils were exhibited on behalf of Mr. E. S. Cobbold, in illustration of his paper.

A specimen copy of 'Mineralogical Abstracts' was exhibited on behalf of the Mineralogical Society.

May 5th, 1920.

Mr. G. W. Lamplugh, F.R.S., Vice-President, in the Chair.

Leonard William Berry, B.A., Bradford, near Taunton (Somerset); George Rudd Collinson, B.Sc., Assoc.M.Inst.C.E., Manager of the Swansea Corporation Waterworks, Guildhall, Swansea; Alfred Charles Gardner, M.Inst.C.E., M.I.Mech.E., Great Central Railway, Healing (Lincolnshire); Trevor Starkey, Nelson (British Columbia); and Ernest Arthur Turner, 79 Trinity Road, Wimbledon, S.W. 19, were elected Fellows of the Society.

The List of Donations to the Library was read.

The following communication was read:—

'A Natural "Eolith" Factory beneath the Thanet Sand.' By Samuel Hazzledine Warren, F.G.S.

Flaked flints were exhibited, in illustration of Mr. S. Hazzledine Warren's paper, by Mr. F. N. Haward, Mr. C. Carus-Wilson, and the Author.

May 19th, 1920.

Mr. R. D. Oldham, F.R.S., President, in the Chair.

Charles Edward Best, 11 Blenheim Gardens, N.W. 2; and Brooke Hodgson, Catamarca 1371, Pueblo General Paz, Córdoba (Argentine Republic) were elected Fellows of the Society.

The List of Donations to the Library was read.

The following communication was read:—

'On Certain Xenolithic Tertiary Minor Intrusions in the Island of Mull (Argyllshire).' By Herbert Henry Thomas, M.A., Sc.D., Sec.G.S., with chemical analyses by Ernest George Radley.

Specimens and microscope-slides in illustration of his paper were exhibited by Dr. H. H. Thomas.

A model of *Diplodocus*, presented to the Society by the Rev. H. N. Hutchinson, M.A., F.G.S., was also exhibited.

June 9th, 1920.

Mr. R. D. Oldham, F.R.S., President, in the Chair.

The List of Donations to the Library was read.

The President said that, during the War, when the ordinary supply of papers for reading and discussion fell short, a series of lectures by workers on subjects cognate with geology had been instituted to fill the gap. These had been so well received and appreciated that it was hoped to continue the practice, and to devote at least one meeting in each session to this purpose. The subject of that afternoon's lecture came so far within the

scope of the objects for which the Society was established that it threw considerable light, at any rate, on the structure of the Earth. Dr. Knott had worked out a method of mathematical discussion of the long-distance records of earthquakes by which it was possible to calculate the form of the wave-paths along which the disturbance had been propagated, without recourse to the approximations and assumptions previously needed, and from these calculations it was possible to deduce conclusions of great interest regarding the constitution and structure of the Earth.

Mr. Cargill Gilston Knott, D.Sc., LL.D., F.R.S., then proceeded to deliver a Lecture on Earthquake Waves and the Elasticity of the Earth. The Lecturer remarked that the record produced on delicate seismographs of the earth-movements due to distant earthquakes proves that an earthquake is the source of two types of wave-motion which pass through the body of the Earth, and a third type which passes round the surface of the Earth. Before earthquake records were obtained, mathematicians had shown that these three types of wave-motion existed in and over a sphere consisting of elastic solid material. Many volcanic phenomena, however, suggest the quite different conception of a molten interior underlying the solid crust. At first statement these views seem to be antagonistic; but there is no difficulty in reconciling them. Whatever be the nature of the material lying immediately below the accessible crust, it must become at a certain depth a highly-heated fairly-homogeneous substance behaving like an elastic solid, with two kinds of elasticity giving rise to what are called the compressional and the distortional waves. The velocities of these waves are markedly different, being at every depth nearly in the ratio of 1·8 to 1. Both increase steadily within the first 1000 miles of descent towards the Earth's centre, the compressional wave-velocity ranging from 4·5 miles per second at the surface to 8 miles per second at depths of 1000 miles and more; the corresponding velocities of the distortional wave are 2·5 and 4·3 at the surface and at the 1000-mile depth respectively. At greater depths these high velocities seem to fall off slightly; but the records fail to give us clear information as to velocities at depths greater than about 2500 miles. Down to this depth the Earth behaves towards these waves as a highly-elastic solid. The elastic constants, which at first increase with depth more rapidly than the density, become proportional to the density, for the velocity of propagation becomes practically steady. About half-way down, however, the material seems to lose its rigidity (in the elastic sense of the term), and viscosity possibly takes its place, so that the distortional wave is killed out. In other words, there is a nucleus of about 1600 miles radius which cannot transmit distortional waves. This nucleus is enclosed by a shell of highly-elastic material transmitting both compressional and distortional waves exactly like an elastic solid.

In conveying to the Lecturer the thanks of the Meeting for his illuminating discourse, the President said that, although these lectures were not open for discussion as in the case of an ordinary paper, he might be permitted to express a personal feeling of gratification that his own pioneer efforts in the same line had been confirmed by the Lecturer's fuller discussion, not merely in kind, but to an unexpected degree as concerned numerical estimates. The most important result of the investigations which had been described appeared to be the discovery of the remarkable reversal in curvature of the wave-paths at a depth of about 1000 miles. It might be a mere coincidence that this was also the depth of separation, according to one well-known hypothesis, between the metallic nucleus and the stony shell of the Earth, but the coincidence was at least suggestive, and the discovery was entirely due to the Lecturer, having been unknown before it was brought out by the ingenious and exact methods of discussion which had been elaborated by him.

A geological hammer that had belonged to the late Sir Charles Lyell, and had been presented to the Society by Capt. Francis H. Lyell (his nephew), was exhibited.

A plaster bust of the late Dr. Hugh Falconer (Foreign Secretary 1863–64), presented, on behalf of Miss Milne, by Mr. W. J. Lewis Abbott, F.G.S., was also exhibited.

June 23rd, 1920.

Mr. R. D. Oldham, F.R.S., President,
in the Chair.

Herbert Carlyle Billington, 5 Wellington Road, Higher Crumpsall, Manchester; William Alden Brown, Riverside, Marden (Kent); James Norman Carruthers, Glencoe, Leyton Avenue, Mansfield; Norman Cave-Brown-Cave, Stanmore House, Moffat (Dumfriesshire); Samuel Ernest Loxton, F.R.A.S., Icknield, Little Aston, near Sutton Coldfield (Staffordshire); Mungo Park, A.R.S.M., Assoc.Inst.M.M., Vimy Estate, Kundang, Selangor (Federated Malay States); Frank Petch, B.Sc., 6 Trentham Street, Dewsbury Road, Leeds; Henry Pooley, B.Sc., Assoc.M.Inst.C.E., 10 Gray's Inn Square, Gray's Inn, W.C.1; Percival Ross, 41 Mannville Terrace, Morley Street, Bradford; and Ethel Mary Reader Shakespear, D.B.E., D.Sc., 21 Woodland Road, Northfield, Birmingham, were elected Fellows of the Society.

The List of Donations to the Library was read.

The Names of certain Fellows of the Society were read out for the first time, in conformity with the Bye Laws, Sect. VI. Art. 5,

in consequence of the Non-Payment of the Arrears of their Annual Contributions.

The PRESIDENT then said:—

'I have to announce that the Council have, with regret, decided that it will not be possible to continue the free issue of all publications to the Fellows. The great increase in the cost of all charges connected with publications makes it necessary, either to secure a considerable increase of income, or to submit to a very material reduction of publication. Believing that the latter course would be the least acceptable to the Society, the possible means of effecting the former were examined, and of them the most suitable appeared to be that of putting a price on the Journal to those Fellows who wished to receive it. No change in the present practice will be made during the current year, but from January 1st next the Quarterly Journal will only be distributed regularly to those Fellows who pay a subscription of Ten Shillings for the regular issue of four numbers; those who do not desire the complete series will be able to obtain the particular numbers in which they are interested at the price of Three Shillings per number if applied for within a year of publication, and thereafter at the price fixed for Fellows. As a partial set-off to the cessation of free distribution of the Journal, the Abstracts of Proceedings will, from the commencement of next Session, be despatched regularly to all Fellows instead of only to those resident in the United Kingdom.

'The adoption of these measures will, by the combined effect of receipts for publications distributed and savings on those not distributed, enable the work of the Society to be carried on without any large reduction in the issue of original contributions to Geology. They appear to the Council to be preferable to a permanent increase in the Annual Contributions of Fellows, from the ease with which the charge can be altered and abolished when the financial position enables this to be accomplished.'

The following communication was read:—

'The Scandinavian Mountain Problem.' By Olaf Holtedahl. (Communicated by Sir Archibald Geikie, O.M., K.C.B., F.R.S., For.Sec.G.S.)