

of the image can easily be shown to be of the same order as DE; whence the angular area of the image is, say, one-millionth of the area of AB; and since no optical arrangement can increase the surface brilliancy of an image, the latter is fifteen magnitudes fainter than AB, and therefore utterly invisible.

It is only when two stars approach each other so closely that their discs are almost in contact that any sensible Einstein effect occurs; and since the two discs are in this case absolutely inseparable, the visible effect would be simply a slight brightening. In view of (1) the rarity of such close appulses, (2) the impossibility of predicting them, and (3) the transient nature of the brightening, which would last for only a few days, the prospect of detecting such a phenomenon is very small.

The outburst of novæ cannot be explained in this manner, as some have suggested, for it could not possibly produce a ten-thousandfold increase in light; moreover, the light-curve before and after maximum would be exactly symmetrical, which is assuredly not the case with novæ, the increase of light being much more rapid than the decline.

It is to be noted that even if some brightening were observed in an apulse, it would be impossible to say whether the light-bending followed the Newtonian or the Einstein law.

A. C. D. CROMMELIN.

The New Zealand Institute.

THE publication of the fifty-first volume of the Transactions and Proceedings of the New Zealand Institute marks the commencement of a new epoch in the history of that very vigorous scientific organisation. The volume itself compares very favourably with those of past years, and its contents show that there is at least one part of the British Empire where pure science is being cultivated as strenuously as before the war. We are glad to see that the institute is receiving more support from the New Zealand Government, while the large membership of the nine constituent societies scattered throughout the Dominion clearly indicates the influence which it is exerting upon the New Zealand public.

The volume opens with obituary notices and portraits of three distinguished New Zealanders—Alexander Turnbull, who devoted his leisure to the collection of a magnificent library, bequeathed to the Dominion, including 32,000 bound volumes, dealing especially with the history of the Pacific Islands; Henry Suter, known throughout the scientific world as a distinguished student of conchology, and author of the "Manual of the New Zealand Mollusca"; and Thomas Adams, who did great work for his adopted country in the promotion of scientific arboriculture.

Of the numerous original memoirs which the volume contains, it is not too much to say that they embody a large amount of information of high scientific value, and if they relate almost exclusively to matters of local interest, dealing chiefly with the fauna, flora, and geology of the islands, this is only as it should be, for it is in these fields that the New Zealand man of science finds his magnificent opportunities. Where there is so much to choose from it is difficult to single out particular contributions for notice, but the attention of zoologists should be directed to the very interesting discovery of a second species of New Zealand frog, *Liopelma Hamiltoni*, found by Mr. Harold Hamilton on Stephen Island, in Cook Straits, and described (with excellent coloured illustrations) by Mr. A. R. McCulloch, of the Australian Museum. This species is closely related to the long-known but rare *Liopelma Hochstetteri* of the North Island, the only previously known New Zealand

amphibian. In the botanical field Dr. J. E. Holloway continues his admirable studies on the genus *Lycopodium*, while geology is well represented by papers by Dr. P. Marshall, Mr. R. Speight, and others. In the department of geophysics Mr. A. W. Burrell contributes a very interesting account of a working model to demonstrate the manner in which ocean currents may be caused by the rotation of the earth.

In conclusion, we may note that the institute has decided to elect a body of fellows, limited to forty in number, who are to have the privilege of writing after their names the letters F.N.Z.Inst.—a distinction which we do not doubt will have a real value in the world of science.

The Geology of the West Indies.

EARLY in 1914 Dr. T. Wayland Vaughan, of the United States Geological Survey, paid an official visit to several of the smaller West Indian islands, partly with help from the Carnegie Institution of Washington. Besides studying the stratigraphical geology of the islands and making notes on their physiography, he also collected large series of fossils which were sent for detailed examination to Washington. He thus obtained material for a valuable contribution to our knowledge of the Tertiary sedimentary rocks which form the greater part of these islands, and made possible satisfactory comparisons with the corresponding geological formations of the southern United States. Dr. Vaughan has already published several preliminary notes on his results, and an especially important memoir on some fossil corals and the formation of coral-reefs. His final report, however, on the details of local geology and the general conclusions are deferred until all the fossils are examined and described. He has just edited a series of these descriptions, which has been published by the Carnegie Institution (Publication No. 291, 1919) in a small volume illustrated by beautiful photographic plates.

Calcareous algæ from the Eocene limestone of St. Bartholomew and from the Oligocene limestone of Antigua and Anguilla are described by Mr. Marshall A. Howe. Lithothamnium and related forms are well illustrated by enlarged sections. The Foraminifera are not only described with excellent figures by Mr. J. A. Cushman, but also discussed from the geological point of view. Some of the larger orbitoid species make correlations possible with corresponding rocks both in continental America and in Europe, while the small Miocene species allow very definite correlations with Panama and the coastal plain of the United States. The Bryozoa, described by Drs. F. Canu and R. S. Bassler, are of Upper Oligocene and Lower Miocene age, and notes are added on the distribution of those species which occur in other parts of the world. The Eocene and Oligocene mollusca, described by Mr. C. W. Cooke, are of great geological importance, and comparisons are facilitated by faunal lists. The account of the Decapod Crustacea, by Miss Mary J. Rathbun, is almost entirely new, only two species of one genus (*Ranina*) having previously been recorded from the Tertiary formations of the West Indies. A few genera are distinctively American, but some have close affinity with those at present living in the Indo-Pacific region.

We congratulate Dr. Wayland Vaughan and his colleagues on the thoroughness with which they are accomplishing their task, and we look forward to the publication of the concluding sections of this great contribution to the geology and palæontology of the Central American region.