

not smooth but produced by a large number of irregular facets, making the curvature quite unfit for optical purposes. In truth it may be fairly taken as established that there is no evidence of any kind to justify us in believing that lenses for optical purposes were known or used before the invention of spectacles."

While studying the evolution of fire-getting it occurred to me that this lens might have been used for obtaining fire from the sun; in other words, as a burning glass. It is well known that when the fires on the ancient altars happened by some accident to go out they had to be renewed by "pure" fire, obtained either by rubbing two sticks together or by concentrating the rays of the sun.

It would be an interesting investigation to see if this lens could be thus used. Of course, in the dull climate of England it might not work so well as in the sunny latitude of Nimroud, but the experiment would be worth trying, and by noting the extent to which the temperature was raised a good guess might be made as to its efficiency.

JOHN PHIN.

Paterson, N.J., U.S.A., December 25, 1912.

"Primeval Man."

YOUR brief review of "Primeval Man" (NATURE, January 9, p. 512) devotes rather more than half of its space to the flat contradiction of two statements contained in a footnote. Your reviewer writes:—"That there was no connection between the Druids and the megaliths is absolutely unsupported by evidence. The idea is certainly older than the eighteenth century."

It is now commonly held that the Druids were an institution peculiar to the Celts, and there is no reason for tracing their origin to the pre-Celtic inhabitants of our islands. As the first wave of Goidelic or Brythonic invaders cannot have reached Britain much before 600 B.C., a gap of many centuries separates the Druids from the builders of the megalithic structures, which, by common consent, belong mainly to the end of the Neolithic or beginning of the Bronze age.

With regard to the popular notion connecting the Druids with the megaliths, the earliest printed reference appears in the enlarged edition of Camden's "Britannia," 1695. Here seven theories as to the origin of Stonehenge, &c., are cited, and the Druidic theory is quoted as being derived from a MS. paper of Aubrey. It is interesting to note in this connection that there is no instance of the words *druidic*, *druidical*, recorded in the "New English Dictionary" before 1755.

I am able to take a somewhat impartial view of the objections raised by your reviewer, as the footnote in question was written for me by the author of the articles, "Druidism," "Celt," and "Early Ireland," in the "Encyclopædia Britannica."

A. HINGSTON QUIGGIN.

88 Hartington Grove, Cambridge, January 14.

THE origin of the footnote is satisfactorily explained. Sir John Rhys's papers in the Transactions of the British Academy are strongly recommended. For literary information about the British Druids Welsh and Irish sources should be consulted. The material evidence bearing on primeval man, which was omitted from Mrs. Quiggin's book, is the astronomical testimony of the monuments, as interpretative both of Neolithic culture and of the real avocation of the Druid, whose nationality or race should be regarded as a secondary matter. Mrs. Quiggin's Celtic chrono-

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logy should be revised. Mr. Common Consent, *alias* Commonly Held, is very apt to ignore evidence which he cannot quite follow, and what he follows generally is the angle of least resistance. He is very hard on astronomers and Druids—ancient astronomers.

Mediæval Welsh bards speak of bardic prophets as *derwyton*, modern Welsh *derwyddon*, "Druids." The traditional regulations for the erection of a stone circle for bardic purposes are prefaced with the statement that the regulations had been handed down from the time of the Welsh princes—that is, before the subjugation of Wales by Edward I. (see the section, "Voice of Gorsedd," in Welsh and English, in the printed collection called "Iolo MSS.," which may be consulted in most large libraries). Efforts have been made to show that such bardic documents are forgeries, with what motive is not stated. It has been proved, on the other hand, that the "forgers" did not understand their own alleged productions, and that their traducers are still more unaware of the meaning of the architectural principles involved in the traditional account (see NATURE for the last twenty years, and the second edition of Sir Norman Lockyer's "Stonehenge")

JOHN GRIFFITH.

X-rays and Crystals.

It is not at all difficult to measure the ionisation produced by the radiation reflected by crystals, as indeed Prof. Barkla has already suggested. Using a sheet of mica and a pencil of a few millimetres diameter, I find it possible to follow with an ionisation chamber the movement of the reflected spot while the mirror is rotated

W. H. BRAGG.

Leeds, January 17

ANTARCTIC BIOLOGY AND THE ROCKS OF WESTERN WILKES LAND¹

THE three last publications on the results of the Antarctic expeditions of the *Discovery*, *Scotia* and *Gauss* show that these works are approaching completion. The new contribution to the scientific results of the *Scotia* includes all the botanical reports except that on the phytoplankton, which may prove the most important. Of the ten memoirs in this volume, two deal with localities, Ascension and Gough Islands (lat. 50° S.), which are outside the Antarctic area. Seven of the memoirs are republished from various journals, while that by Mr. and Mrs. Gipp on the marine algæ is a compilation of their three papers with a rediscussion of some of the results. It is a great convenience to have these valuable memoirs collected into one volume; but it is unfortunate that the species founded in them are described in this work as "new species." Much trouble may be thus caused by the annual biological records again cataloguing these species, or by their being subsequently assigned to wrong dates.

¹ "National Antarctic Expedition, 1901-4." *Natural History*. Vol. vi. "Zoology and Botany." Pp. xvi+9+32+63+plates in text. (London: Printed by Order of the Trustees of the British Museum, and sold by Longmans and Co.; Bernard Quaritch; Dulau and Co., Ltd.; and at the British Museum (Natural History), 1912.) Price 16s.

"Scottish National Antarctic Expedition." Report on the Scientific Results of the Voyage of the S.V. *Scotia* during the years 1902, 1903, and 1904. Under the leadership of Dr. W. S. Bruce. Vol. iii. "Botany." Parts i.-xi. Pp. ix+153+plates in text. (Edinburgh: The Scottish Oceanographical Laboratory; Edinburgh and London: Oliver and Boyd; Glasgow: James MacLehose and Sons, 1912.) Price 23s. 6d.

"Deutsche Südpolar-Expedition, 1901-3." In Auftrag des Reichsamtes des Innern. Herausgegeben von Erich von Drygalski. II. Band, "Geographie und Geologie." Heft vii. Pp. viii+617-662+2 plates. (Berlin: Georg Reimer, 1912.) Price 7.50 marks (Subscription price 6.20 marks.)

The first of the two new contributions in this volume is an interesting essay by Dr. Rudmose Brown on the problems of Antarctic botany. He agrees with Dr. Skottsberg in limiting the Antarctic area to south of 60° S. He retains Dougherty Island as existing, in spite of the failure of the latest attempt to find it. Dr. Brown refers to the striking poverty of the Antarctic in land plants. In the South Orkneys (lat. 61° S.) the expedition did not find a single flowering plant, whereas in 79° N. in Spitsbergen some of the land is carpeted with flowers of a hundred species. Dr. Brown attributes the poverty of the Antarctic flora to the mean temperature in the summer being below freezing point and to the flocks of penguins, which, in the absence of carnivorous animals, overrun the land. In his discussion of the origin of the Antarctic land flora, Dr. Brown remarks that the presence of an Arctic element in the mosses might appear to support the doctrine of bipolarity, which, he agrees with Dr. Skottsberg, has no botanical support. That most of the zoological evidence is also opposed to the theory is remarked by Mr. F. Jeffrey Bell in his interesting introduction to the last volume on the collections of the National Antarctic Expedition. Mr. Rudmose Brown explains the presence of the Arctic mosses by their transmission by sea birds, of which some species range almost from pole to pole. Some plants may have been introduced to Antarctica by wind; for Dr. Fritsch found in material from the South Orkneys the pollen of *Podocarpus*, which must have been blown from South America. Dr. Brown regards the whole Antarctic land flora as derived from South America, a conclusion which is supported by the absence of New Zealand plants from eastern Antarctica.

The second new memoir is by Dr. J. H. Harvey Pirie on Antarctic bacteriology. Levin has shown that many Arctic birds and seals are free from bacteria. Dr. Pirie, however, found that three out of the four species of seals examined and ten of the fifteen species of birds contained bacteria. His general results agree with those of Gazert, Ekelof and Charcot of the German, Swedish and French expeditions respectively, that Antarctic animals usually contain bacteria but may be sterile. Dr. Pirie found that the air, when carefully collected from the crow's-nest and the deep sea samples, was always sterile. In seven out of ten cases the surface water of the sea yielded bacteria. Denitrifying bacteria are, however, very scarce, and Dr. Pirie points out that the nitrogen so continuously added to the sea is eliminated by the action of these bacteria. Owing to the slight bacterial denitrification in the polar seas, plant and animal life is more abundant there than in the tropics.

Hence is explained the extraordinary abundance of individuals in the polar seas in spite of the relative poverty in species, a fact which is referred to by Mr. Jeffrey Bell in the new volume of the reports on the collections of the National Antarctic Expedition. He quotes Mr. Hodgson's

remark that it was usual to take from ten to thirty thousand amphipods at a single haul, and Mr. Bell estimates that the collection included nearly ten thousand specimens of one schizopod. Mr. Bell refers to the two new species of *Cephalodiscus* and Mr. Hodgson's rediscovery of the ten-legged Pycnogonid as perhaps the most interesting of the biological results of the expedition. The volume includes three memoirs, a report on some young holothurians by Prof. MacBride, in which he suggests that these animals were derived from primitive echinoids, a hypothesis which appears less probable since Walcott's discovery of a Cambrian holothurian, which is much more ancient than any known echinoid. The second memoir is by Prof. Ehlers on the polychaets, and the last is by Prof. Fritsch on the freshwater algæ. This memoir is perhaps of less interest than the same author's report on the algæ collected by the *Scotia*, for Messrs W. and G. S. West have previously described the collection from South Victoria Land brought back by the Shackleton expedition. In the South Orkneys, in addition to the red snow which is familiar in Polar and Alpine regions, there is a yellow snow, due to a mixture of eighteen species of algæ and two of fungi. The colour is due to the numerous globules of fat. The general affinities of this flora are planktonic, and Dr. Fritsch suggested that it was carried ashore by the wind.

The last part of the volume on the geographical and geological results of the German south polar expedition contains a posthumous memoir by E. Philippi, the geologist of the expedition, on the intra-glacial material found near the winter quarters of the *Gauss*. The icebergs examined came from the east, and contained fragments of granite, gabbro, gneiss, crystalline schists, and a red quartzite, but no fossiliferous rock or representative of the "young volcanic" series. Icebergs were also examined eight miles west of the *Gaussberg*, and they contained similar rocks. Philippi concludes from the characters of the ice that it must have flowed over an irregular undulating land. The erratics collected by the expedition have been identified by Dr. Reinisch and include a similar but more varied series of rocks. They include granite and aplite, gabbro and gabbro porphyrite, many varieties of gneisses and hornblende schists, some of which are rich in pyrites, marble, quartzite, calc-silicate rock and sandstone. There is no true mica schist or phyllite. This association of rocks supports the view that western Wilkes Land is geologically a southern continuation of Western Australia. The third memoir in this part is a valuable study by Reinisch of the rocks collected in various Atlantic islands from the Azores to St. Helena. His report and analyses confirm the conclusion that the volcanic rocks of these islands mainly belong to the alkaline series, though, as Reinisch remarks, some of the basaltic rocks are intimately related to augite andesites.

J. W. G.