

mingled with bits of felsite and other material, were deposited as the peculiar limestone breccias. This view regarding their formation is held to afford an adequate explanation of the patchy development of these rocks.

The intrusive rocks are of considerable interest. They are, in the main, felsites with large quartz-crystals, and not infrequently contain augite. Some of them are certainly intrusive in the coarse Bala (?) conglomerate. A number of small but interesting intrusions of olivine dolerite, hornblende lamprophyre, and fine-grained plagioclase bearing rocks are scattered throughout the district.

The appendix embodies a critical review of the fauna of the Llandeilo Beds of the district, and a description of several new species of brachiopods and trilobites.

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## CORRESPONDENCE.

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### POST - GLACIAL CONDITIONS OF THE BRITISH ISLES, AND PRESENT GLACIAL PHENOMENA OBSERVED IN ANTARCTIC LANDS.

SIR,—Ever since the publication by Captain R. F. Scott of *The Voyage of the Discovery*, in which he gives his impressions of the Great Barrier discovered by Sir James Ross, we have been asked to suspend our judgment concerning its actual physical features. It is not quite clear what is now the uncertain feature in the minds of those who ask us to delay; but it would appear that this counsel results from a fear that if the conditions of the barrier are as stated it cannot be maintained that a similar ice-sheet did not once fill the area now occupied by the North Sea during the Ice Age.

To those who consider that the glacial phenomena of the British Isles prove that an ice-sheet did move from Scandinavia over the North Sea area and invade the east of England, the facts concerning the Great Barrier are of the highest importance.

Although there is abundant matter for further investigation in the Antarctic area, the facts put on record by Sir James Ross and Captain Scott are sufficient, I think, to warrant my calling attention to their great interest to the glacial geologist.

From about 71° S. lat. to about 83° S. lat. and 167° E. long. a range of snow- and ice-covered mountains runs in the direction of the South Pole. Some of the summits exceed 15,000 feet in height, and the range forms, for at least 800 miles, the eastern boundary of South Victoria Land. It rises abruptly from the ice-covered sea. About the centre of the known portion of this great mountain range is the active volcanic cone of Mount Erebus. It is not, however, actually a portion of the range, for it stands on an island close to the shore.

From Erebus stretches the Great Barrier in an easterly direction. This 'wall of ice', which faces the open sea, varies in height from 50 to 240 feet and extends as far as King Edward VII Land, a distance of about 390 miles. The depth of the sea along its edge, according to

Ross and Scott, varies from 1,500 to 2,700 feet. If the submerged ice is six times the thickness of the portion above the sea-level, the depth of the barrier in the sea must vary from 300 to 1,440 feet. There is, therefore, in many places more than 1,000 feet of water between the sea-bottom, for the thin ice is frequently above the deep water. The ice of the barrier, except at its ends, is floating along its whole front. On this matter Sir James Ross says: "Whilst waiting we obtained soundings in two hundred and thirty fathoms, the deep sea clams bringing up some green mud intermixed with small volcanic stones. This depth of water would seem to prove that the outer edge of the barrier was not resting upon the ground; for by various measurements of its highest part it was found to be one hundred and seven feet above the sea, from which point it gradually diminished for about ten miles to the eastward, where it could not have been more than eighty feet." Here there was, therefore, about 1,100 feet of water under the ice. Captain Scott found that the edge of the ice when he sailed along it was about 30 miles further south and the sea quite as deep. The statement made by Ross that the barrier was floating must, consequently, have been quite correct. At Balcon Inlet, near the eastern edge of the barrier, Captain Scott noticed that a small "berg, as well as the pack ice which had been driven in by the current, took its way out to sea again, clearly showing that there is a regular tidal stream in this region, and as, in spite of this, we and the barrier ice about us rose and fell together, there was no doubt that at least this part of the barrier was afloat".

But Scott travelled south over the barrier ice until he was about 300 miles from its face, and his observations showed that he had travelled over a comparatively level plain all the way, the ice being of nearly uniform thickness, his opinion being that the "Great Barrier ice-sheet is afloat at least as far south as we travelled". He also remarks: "I still hold that the greater part of it is afloat; and strange as it is to imagine that the sea should run beneath such a solid sheet for so many hundreds of miles, I have yet to learn any reasonable argument against such an idea." I am here in complete accord with Captain Scott, and think that his reasoning is quite unanswerable. Ice behaves as a very viscous liquid, and may rest upon and slowly spread over water, a tendency to spread resulting from the fact that a portion of it stands above the sea-level.

As it is possible for an ice-sheet such as that which Ross and Scott described to maintain itself when exposed to the open Pacific, it is also possible for a similar ice-sheet to maintain itself in the North Sea during a glacial epoch, this sea facing the cold north instead of the open warm sea.

It is argued without any clear reason being given that an ice-sheet could not cross the deep channel near the Scandinavian Peninsula. I do not think that this is a real difficulty. In the first place, the moderately thick ice lobes would float across the channel, and when they touched the sea-bottom on the opposite side the ice over the channel would thicken. This thickening and consequent rise above the sea-level would furnish the necessary gradient to force the ice towards Great Britain. The distance the ice would travel would

depend upon the supply of snow, and eventually the deep channel might be filled with ice to the bottom.—Yours truly,

R. M. DEELEY.

MELBOURNE HOUSE, OSMASTON ROAD, DERBY.

January 11, 1909.

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PEARL FROM THE CHALK.

SIR,—The interesting notice of Mr. Newton's paper on Chalk Pearls in your January number recalled to my memory that I still possessed the original pearl from which Mr. B. B. Woodward's section was cut. Singularly enough the circumstance had entirely escaped the memory of both of us until your notice referred me to Mr. Newton's figure and allowed me to recognize the section and the pearl as one and the same specimen. Following Mr. Woodward's example I have had the pleasure of presenting the larger half of the pearl to the British Museum (Natural History), so they can in future be inspected in the Geological Department.

G. E. DIBLEY.

46, BURGHILL ROAD, SYDENHAM, S.E.

January 13, 1909.

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FLINTS IN THE DRIFT.

SIR,—I am delighted to learn from Dr. Bather's note in your January issue (p. 47) that flints are as abundant in Denmark as in East Anglia, and doubtless the prehistoric Danes made their implements from their own chalk-flints. If the word 'pink' is inserted before the word 'flint' in line 9 of my previous letter (see *GEOL. MAG.*, 1908, p. 575), it will, I think, be in order. In the *Trans. Hull Geol. Soc.*, 1902 (vol. v, pt. ii, p. 31), Mr. J. W. Stather writes:—"Following Mr. C. Reid's surmise in the Holderness Memoir, we have become accustomed to regard Denmark as the source of the *pink* flints, common in the Boulder clays of Holderness. This is an error, as Mr. A. Jessen, of the Danish Geological Survey, recently informed the secretary that *pink* flints do not occur either in the Cretaceous Rocks or the drifts of Denmark, and are quite unknown there."

T. SHEPPARD.

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THE DISCUSSIONS AT THE GEOLOGICAL SOCIETY.

SIR,—Though I have never had the pleasure of hearing a discussion at the Geological Society, and do not know how closely the views expressed there in full agree with the brief report subsequently given, I should be glad if I might be allowed to make a suggestion.

The publication of the discussion in the proceedings adds considerably to the interest of papers to Fellows who, like myself, are unable to attend the meetings. But the question I wish to ask is whether their usefulness does not stop at this point? There are, of course, cases when a paper deals with a subject closely studied by those present, and when even criticisms that are hastily composed may have a value. There are other cases when the subject-matter