

north of the known limit of icebergs in this trip, still there were several fragments which appear to have been derived from icebergs:—

- 'Station 285, rounded fragments of granite, arkose ;
- „ 286, granite pebble ;
- „ 289, fragment of diabase ;
- „ 299, angular piece of granite ;
- „ 302, piece of granite coated with manganese, fragment of flint.

If the positions of the fragments above enumerated be compared with a map showing the distribution of icebergs in the present seas, it will be observed that they are all within, or just beyond, the limits of the iceberg regions, and it cannot be regarded as other than a remarkable fact that the Challenger should not have found any fragments of continental rocks in the central portions of the ocean basins, except in the localities indicated. The position, then, in which these blocks and fragments of continental rocks were found is in itself sufficient evidence that they have been transported by floating icebergs and icefields of the present or of recent geological times. This view is confirmed by the nature and character of the transported material. The blocks are of all sizes, from several feet in diameter to the smallest dimensions ; their angles are sometimes rounded or softened, at other times sharp, and the larger fragments are frequently covered on one or more surfaces by glacial striations. In their nature the fragments are very heterogeneous, being derived from almost all the varieties of the rocks that crop out on the surface of the continents. This great variety in the dimensions and lithological nature of the continental debris spread over the floor of the ocean towards the polar regions of either hemisphere is exactly what we would expect to find in materials transported by floating ice. The glaciers, which give birth to the icebergs, in passing over the continental surfaces would necessarily carry away large and small fragments of all the continental rocks cropping out at the surface. The icebergs, in widely distributing these continental materials, would produce in the deep sea a deposit containing fragments of granite, gneiss, quartzite, schists, dolomites, crystalline limestones, and even fragments of volcanic rocks. The heterogeneity of such a deposit is thus in striking contrast, so far as its mineralogical constituents are concerned, to the homogeneity presented by truly pelagic deposits, in which, as we have seen, volcanic materials alone make up the inorganic portion of the deposit.

While icebergs are the only agents that are capable of effecting this wide distribution of continental rocks and minerals, Mr. Murray has shown that both seals and penguins carry to sea large numbers of stones and rounded pebbles in their stomachs, to which the sealers give the name of "ballast."<sup>1</sup> These animals may therefore, to some extent, distribute rock fragments to great distances from the land. Should any of them be killed

<sup>1</sup> See Zool. Chall. Exp., pt. viii. pp. 126, 127 ; also Turner, Report on the Seals, Zool. Chall. Exp., pt. lxviii. p. 136.