from his study, seems to be the true position of the beds, without, however, exaggerating the certainty of such results? At any rate, no matter how the final map may be drawn, it is hard to conceive of any way but Lesley's (more or less perfectly followed) for making out a continuous section of rocks that are exposed only at intervals either on one stream or on different sides of a hill, if the fossils or the resemblance of beds are not (as commonly happens) a complete guide.

You seem rather inclined to regard the hope that my Japanese assistants should become accomplished geologists "in a few years" as an "Oriental exaggeration." But I still see no reason to attach a special geological sense to the expression; though it is not to be supposed that they could advance far more rapidly than we self-satisfied Anglo-Saxons. Most of them can already make topographical maps with a facility that is unfortunately rare not only among geologists, but even among railroad engineers.

In speaking of the report it would perhaps not be amiss to commend the Japanese for making public even so small a contribution to geology, not only in their own language, but in one more readily understood by a foreign scholar; the first case of the kind under any native Asiatic government. It is still doubtful whether they will be willing to publish in like manner more voluminous local details with maps and sections. BENJ. SMITH LYMAN.

KAITAKUSHI, SHIBA, YEDO,
9th January, 1875.

QUESTIONS CONCERNING THE GEOLOGICAL ACTION OF ICE.

ADDRESSED TO THE OFFICERS OF THE ARCTIC EXPEDITION.

I HAVE been led by a long series of observations on the drifts and boulders of the north of England and Wales to conclude that we cannot arrive at a consistent and satisfactory explanation of glacial phenomena until more light has been thrown on many questions, including the following: Is the *interior* of the Greenland *ice-sheet* or *ice-sheets* free from rocky débris, or is it more or less charged with it? Is the *base* of the Greenland ice capable of pushing forward large stones to great distances? Is it capable of holding stones of considerable size firmly fixed in its grasp, or of polishing and uniformly striating any stones *not* fixed in the subjacent ground? What is the state of the *base* of icebergs as regards being charged with clay, sand, small stones, or large boulders? Can a *grounding iceberg* give a rounded as well as a flat shape to the surface of submarine rocks, or, while endeavouring to regain its normal level, striate a rock-surface down-hill? Can a *revolving* iceberg scoop out a hollow in the rocky bottom of the sea? To what extent can *coast-ice* transport earth, stones, and large boulders? Are there any instances, in the Arctic regions, of floating coast-ice radiating from islands so as to distribute rocky débris over an area of 90 degrees? Are there any conditions under which floating coast-ice, "charged throughout with detrital matter," may deposit dome-shaped masses of concentrically-shaped

laminæ, or masses of alternately fine and coarse detritus in an irregular and complicated order of succession? To what extent does moving or floating coast-ice smooth and striate rock-surfaces, or give rise to *roches moutonnées*? To what extent may moving or floating coast-ice, while grounding, be capable of flattening and smoothing the pebbles fixed in its base? Can it produce a series of *clearly-cut* and *parallel* grooves on the flattened surface? In the marine Boulder-clay of Cheshire there are many pebbles which have been flattened and uniformly striated on *two opposite sides*. Are there any conditions under which the mode of action of moving or floating coast-ice may be supposed capable of giving rise to such a phenomenon? How far, in the Arctic Seas, is the course of surface-currents carrying sea-ice crossed by that of under-currents carrying icebergs? Do these currents ever flow in diametrically opposite directions?

2, Abbey Court, Chester. D. Mackintosh, F.G.S.

MISCELLANEOUS.

The Chair of Natural History in the University of St. Andrews has been offered to and accepted by Professor Alleyne Nicholson, of the College of Physical Science, Newcastle-on-Tyne. Dr. Nicholson was in no way a candidate, directly or indirectly, for this appointment; but in thus offering it to him unsolicited, the Marquess of Ailsa has the cordial approbation of the University authorities, and may be congratulated in securing for the chair, of which he is patron, so distinguished a naturalist and professor, whose experience extends over two continents.—*Scotsman*, February 22, 1875.

Sub-aerial Denudation.—In the Registrar-General's annual return for 1872, which was printed March 10th, attention is drawn to the excessive rain-fall. The total fall of rain was enormous, and each of the last three months of the year showed an excess. During the quarter rain had fallen at Greenwich on sixty-seven days, a greater number than had been previously experienced as far back as the year 1815. The total fall in the sixty-seven days amounted to 11·32 inches. It has been shown that an inch deep of rain weighs nearly 101 tons per acre, so that upwards of 1,100 tons of water fell in the last three months of the year on each of the 37,000,000 acres of England and Wales!—*Daily News*, 11th March, 1875.

The Lyell Medal and Fund.—Sir Charles Lyell has bequeathed to the Geological Society of London the sum of £2000, together with the die of a medal, to be called "the Lyell Medal." Not less than one-third of the annual proceeds of the Fund is to be awarded with the Medal. The Balance to be given in any proportions that the Council may see fit. The recipients may be of either sex, and of any country; and the award may be made for work done, or to assist in present researches, or for memoirs on Geology and the allied sciences. The bequest and the terms in which it is made are alike worthy of so great a name as that of Lyell.