should also, during the first and second year, work at mechanical drawing as provided for in the Art Directory, Stage 23*a*. *Third Year.*—The work of this year must depend so much on the student's aptitude, and the progress he has made in the preceding course, that it is impossible to lay down the subjects for the third year's course with any definiteness. It is essential that before continuing his course, or commencing new subjects, he should have a sound knowledge of the first stage of Mathematics, Elementary Mechanics, Physics, and Chemistry; that he should have such a knowledge of practical Geometry and Mechanical Drawing as to be able to draw and read simple plans, elevations, and sections with readiness, and that he should have sufficient facility in Freehand Drawing to make clear and neat explanatory diagrams.

When these subjects have been mastered, the student should, while continuing his studies in mathematics, take up the first stage of Animal Physiology, if he has not already done so. He will then be in a position to specialise his studies with advantage in one of the following groups, according to his requirements, taking up, for instance—1. Physics and Chemistry and Metallurgy; 2. Theoretical and Applied Mechanics, Steam, and Machine Construction and Drawing; 3. Theoretical and Applied Mechanics, and Building Construction and Drawing; 4. Biology; 5. Geology, Physical Geography, Mineralogy, and Mining. The student may also with advantage continue his free-hand drawing and practical geometry.

The foregoing course is framed to lay the foundation of a thorough and systematic scientific training. It must, however, be understood that this course, though strongly recommended for all those who can devote sufficient time to go through it, in no way supersedes or does away with the power of holding special classes in different subjects for those who have not these opportunities, or diminishes the aid at present offered to such classes.

The fact of the course being intended as a systematic training will also explain the omission of certain subjects which are not to be considered unimportant because they find no place in the course. Thus systematic Botany will be found of very great use as a preliminary to the study of natural science. As such it may be taught in elementary schools before this course is commenced. But, further than that, it cannot be considered a step in a systematic course till the student takes it up as a portion of Biology in his third year. In the same way Physical Geography is a subject which may with great advantage be studied in all schools, and is especially adapted for students who cannot go through a systematic course. The first elements of Physical Geography, treating broadly the outlines of physical science and describing its objects, should, as stated above, be taught as an introduction to its systematic study. But Physical Geography in its general sense covers so wide a field, embracing to a greater or less degree so many branches of Science, that it does not fall into a systematic course of training in science, though as a means of imparting highly valuable general information, as distinct from a systematic training, it may be strongly recommended.

ARCTIC EXPLORATIONS

AN excellent paper on the above subject appears in NATURE of Nov. 30, and it is to be hoped that it may have the desired effect of reanimating in our Government and among scientific men a fresh interest in the prosecution of a further survey of the unknown seas round the Pole.

Agreeing as I do with the writer as to the great importance of such an exploration as he recommends, I cannot so readily acknowledge the correctness of his opinion as to the advantages of the route by Smith Sound over that along the west shore and to the north of Spitzbergen, from which point Parry (the greatest and noblest of arctic explorers) attempted to reach the Pole with boat sledges in 1827.

Parry had, I think, on this occasion chosen the right route, but the wrong season of the year; for he attempted the journey in the month of July, instead of in March, April, May, and June.

At Spitzbergen a vessel can always get as far as 80° north, probably higher; for Mr. Lamont has, during the last two summers, on his pleasure cruises, readily reached the latitude named.

I had it from the great navigator Parry himself, that the ice he saw to the north of Spitzbergen would not have been difficult to travel over at the proper season of the year.

The farthest north point reached with much difficulty by ships in Smith Sound has been 78°40′, and we have not the least warrant or certainty that any future expedition may be able to winter its ship or ships nearer the Pole by this route.

From lat. 78°40′ the distance to the Pole is 680 geographical miles, making the journey there and back 1,360 miles in a straight line.

But surely no experienced Arctic traveller would be sanguine enough to believe that he could take a "bee line" in a sledge journey to the Pole; in fact, he would require to make an allowance of about one-fifth for obstructions by rough ice, probable contour of coast line, &c., so that the actual distance to be made would be 1,360 + 270 = 1,630 geographical miles, a journey 200 or 300 miles longer than any that has yet been accomplished, even by that admirable Arctic traveller, the late Lieut. Mecham. Yet Mecham, in his two longest journeys of 1,200 or 1,300 miles each (I forget whether these are geographical or statute miles, but I think they are the latter), had advantages not likely to be found in a journey to the Pole. On the one occasion deer, musk-cattle, and other game were so abundant and so tame that he could and did easily kill as many as the party required, and could have killed many more. On the other occasion he was travelling along a known route, at several points of which depots of provisions had been placed by ships wintering there, or by other means, from which he was enabled to obtain supplies both on the outward and homeward march.

Mr. Markham says that a ship can always get so far north in Smith Sound that the Pole can be reached by a journey from it with sledges of 968 miles there and back.

By what powers of reasoning or rule of arithmetic this conclusion has been arrived at I am at a loss to know, unless there is always a certainty of ships getting into winter quarters in Smith Sound as far up as 82° latitude, yet Kane was stopped 200 miles south of this, and Hayes even at a greater distance.

The Spitzbergen route has never had a fair trial with sledges over ice either with or without the aid of dogs, and I believe that if the Pole is ever to be reached, it will be by it, and not by Smith Sound. The distance to be travelled will not probably be less than 1,400 geographical miles, possibly more, a journey practicable enough under favourable circumstances, but by no means easy of accomplishment.

JOHN RAE

NOTES

AT the Anniversary Meeting of the Fellows of the Royal Society on Thursday last, Lieut.-General Sir Edward Sabine, R.A., K.C.B., resigned the office of president, which he has filled since 1861, and the Astronomer Royal was elected to fill the presidential chair. The following gentlemen were appointed officers and council for the ensuing year:—President: George Biddell Airy, M.A., D.C.L., LL.D., Astronomer Royal. Treasurer: William Spottiswoode, M.A. Secretaries: William Sharpey, M.D.,