

are found in its depths. In the British seas it is to be looked for around the Zetlands and Hebrides, where many of our most curious animals, forms of zoophytes and echinoderms, have been drawn up from the abysses of the ocean. Its deepest recesses have not as yet been examined. Into this region we find that not a few species extend their range from the higher zones. When they do so they often change their aspect, especially so far as color is concerned, losing brightness of hue and becoming dull-color or even colorless. In the lower zones it is the association of species rather than the presence of peculiar forms which gives them a distinctive character. All recent researches, when scientifically conducted, have confirmed this classification of provinces of depth. When we have an apparent exception, as in the case of the submarine ravine off the Mull of Galloway, dredged by Capt. Beechy and recorded by Mr. Thompson, in which, though it is 150 fathoms deep, the fauna is that of the coralline zone, we must seek for an explanation of the anomaly by inquiring into the geological history of the area in question. In this particular instance there is every reason to believe that the ravine mentioned is of very late date compared with the epoch of diffusion of the British fauna.

When we trace the horizontal distribution of creatures in the British seas, we find that though our area must be mainly or almost entirely referred to one of the great European marine provinces, that to which the lecturer has given the name of Celtic, yet there are sub-divisions within itself marked out by the presence or absence of peculiar species. The marine fauna and flora of the Channel Isles present certain differences, not numerous but not the less important, from that of the south-western shores of England, which in its turn differs from that of the Irish sea, and it again from that of the Hebrides. The Cornish and Devon sea fauna and that of the Hebrides are marked by redundancies of species; that of the eastern coast of England on the contrary by deficiencies. Along the whole of our western coasts, whether of Great Britain or Ireland, we find certain creatures prevailing, not present on our eastern shores. In the depths off the south coast of Ireland we find an assemblage of creatures which do not strictly belong to that province, but are identical with similar isolated assemblages on the west coast of Scotland. In the west of Ireland we find a district of shore distinguished from all other parts of our coasts by the presence of a peculiar sea-urchin, to find the continuance of whose range we must cross the Atlantic to Spain. In such phenomena the lecturer sees evidences of conformation of land, of outlines of coast and connections of land with land under different climatal conditions than at present prevail within our area, for an explanation of which we must go back into the history of the geological past. If we do so, we can discover reasons for these anomalies, but not otherwise.

The dredging researches about to be published, go to show that among our sublittoral animals the northern element prevails over the southern,—a fact indicated by the number of peculiar northern species; at the same time the southern forms appear to be diffusing themselves northwards more rapidly than the northern do southwards. This diffusion is mainly maintained along our western shores, and appears to be in action, not only in the British seas, but also along the shores of Norway. We must attribute it to the influence of warm currents flowing northwards, originating probably in extensions of the gulf-stream. The body of colder water in the depths of our seas preserves the original inhabitants of this area, remnants of the fauna of the glacial epoch, overlain and surrounded by a fauna of later migration, and adapted to a higher temperature. A curious fact respecting the marine creatures of the Arctic seas of Europe, viz., that the littoral and laminarian forms are peculiarly arctic, whilst the deeper species are boreal or celtic, may be explained also by the

influences of warm currents flowing northwards and diffusing the germs of species of more southern regions in the coralline and deep-sea-coral zones; for in the arctic seas the temperature of the water is higher at some depth than near the surface. On the other hand, we find in a region farther to the south than Britain an outlier of the celtic fauna preserved in the bays of Asturias, where it was discovered in 1849 by Mr. MacAndrew; a very remarkable fact, and one appealed to by the lecturer as confirmatory of his theory of an ancient coast extension between Ireland and Spain.

There is still much to be done in the investigation of the natural history of our seas, and many districts remain for more minute exploration. It is chiefly among articulate animals and especially among worms, that fresh discoveries may be looked for. Yet even now, new and remarkable forms of mollusca may occasionally be procured, and, during the autumn of last year, in a cruise with Mr. Mac Andrew, no fewer than twenty additional molluscs and radiata were discovered in the Hebrides, and have just been described by the lecturer in conjunction with Professor Goodsir. Among these is one of the largest, (if not the largest) compound ascidians ever discovered. In our southernmost province, fresh and valuable researches have been conducted during the past year by Professor Acland and Dr. Carus, who, selecting the Scilly Isles as a field for exploration, have filled up a blank in our fauna.

The lecturer concluded by an expression of gratification at the spread and progress of natural history studies in Great Britain among all ranks, and at the love of science manifested in the systematic manner in which our fauna and flora have been explored, and the beautiful works which have been produced in illustration of them.

Government School of Mines.

The session of 1852-3 was opened on Wednesday, November 3rd, with an introductory lecture by Dr. Lyon Playfair, on the very appropriate subject of the industrial education on the Continent. A review was taken of the vast importance of skill and labour in the arts, by which this country was enabled to import cotton from India and America, to export it again as calico and manufactured articles; malachite and other cupriferous ores from Russia and Australia, to be sent to all parts of the world as refined copper, with many other natural products which received an equal increase in value from the hands of the artisan, rendering it of the utmost importance to cultivate the intellect, and improve industrial experience with the light of scientific truth. It was then shown that intellectual information on the Continent, as relates to the arts, existed to a greater extent than in this country, partly owing to the care bestowed on real scientific education there, and partly to the British artisan relying too much on practice, and too often sneering at the application of scientific theories, so essential for carrying out that practice to a successful issue. It was also shown that this education had led to the establishment and rapid growth of new industries abroad, by which foreign states were realizing an increasing amount of production, leaving us a decreasing standard. In describing the various continental schools, Dr. Playfair commenced with Prussia, where there are three descriptions of institutions, the Gymnasias, the Real Schools, and the Trade Schools; pupils admitted at 14 years old for two years, must have had a practical elementary education, when they receive a full course of instruction, qualifying them for miners, engineers, architects, mathematicians, or for any branch of the arts for which they may be intended. The education is not gratuitous, but does not cost each student more than from 30s. to 60s. per annum, while the cost to the State for about 1200 students is £7000 a year. Saxony also has the same three kinds of schools. Austria has no Trade Schools, but several polytechnic establish-