

and its inhabitants. The two remaining papers are mainly geological, one being on the geography of Persia, by Dr. Tietze, the other the conclusion of Dr. Diener's paper on the hypsometry of Central Syria.

EXPERIMENTAL SCIENCE IN SCHOOLS AND UNIVERSITIES

PROF. G. F. FITZGERALD, as Vice-President of the Dublin University Experimental Science Association, delivered an address at the opening meeting, held on November 23 in the Museum Buildings of Trinity College, under the presidency of the Rev. the Provost, on "Experimental Science in Schools and Universities."

Prof. Fitzgerald, at the outset of his address, dealt with the history of Universities, and showed how they gave such preponderance to book as against experimental knowledge. That had led, the Professor continued, to a dual system of education—the professional and the commercial. That gap between the classes was much to be lamented, and necessitated, from a political point of view, the desirability of having all classes educated in the same institutions. The commercial classes would not, however, enter the Universities at present, because they required to be taught useful subjects, and they would not learn the Latin and Greek now required in our Universities. From the political side of the question, he thought, they had got these results—that they must be content to have useful subjects taught in their schools and Universities if the schools and Universities were to be used by the large body in the country who were willing and able to pay for it. What they must have, if possible, was a single school and college system for all classes of the community who were able to spend the first twenty years or so of their life in education, and they ought to have a system that was complete, a training which gave both those who could not afford to go on the whole length up to twenty years, and which ought to be able to train those who desired to go on for the higher culture. Returning to the education side of the question, he insisted that almost the whole importance was as to how the subject was taught. He thought the use of the Latin Grammar had been reduced to a very good system, but he thought it was perfectly evident from the course that things were taking and the reasonableness of things, that they must teach their youth some knowledge of science. People who felt responsibility in the matter were being more and more convinced that it was not right for them to allow their children to grow up ignorant of the laws of the world in which they live. Others made answer to that that they left those laws of the world to the doctors. But how were they to know under what circumstances it was well to consult a specialist? It was very necessary for us to have a knowledge when we required to consult a doctor. Hundreds of people were killed by ignorance of the fact that dirt was the cause of disease. That was a very elementary subject. Nevertheless, people were dying every day from ignorance of that very fact; and, unless they were taught to believe in the fact that there were laws of Nature, they would not believe that dirt was the cause of disease, because they saw some people living in dirt and yet not the victims of disease. He thought that time for teaching science must be found for these two reasons—it was necessary that our youth should learn the laws of the world in which they live, and that they also should learn how to discover those laws. Unless our people were taught the laws under which plants and animals were best grown, the people of other countries would rival them in the manufacture of butter and beef, and the result would be that our people must starve. Another advantage of such training was to prevent superstition such as that of the people of Spain, who preferred the use of charms as a safeguard against cholera to the cleansing of their wells. All the classes of the country required this training—they would die without it, so they must have it.

Having shown that the cultivation of Latin and Greek was originally with the view of acquiring the information contained in the ancient books in those languages, the Professor combated the five reasons formulated by the German professoriate as to why they thought that the cultivation of Latin and Greek was so important, observing, with regard to the fourth reason—that these languages were the best varied exercise in thinking—that if the connection between words and ideas was a thing that must be taught in every system of education, his impression was that that would be a great deal better

attained by describing accurately and thinking out the consequences of physical experiment. In choosing the sciences that they should teach, there were three conditions that should be fulfilled. First of all, the sciences chosen ought to be within the grasp of children, because it was highly important that the science begun with childhood should be continued on in the University days; secondly, it ought not to require any expensive apparatus, because schools and people who trained children could not be expected to buy elaborate apparatus, and children could not be expected to work with them satisfactorily; and, thirdly, he thought the sciences should be chosen so as to be concerned with a large number of the laws of the world in which we live. There were two large branches of science which included nearly all the laws of the world, namely, the physical and the biological; and, therefore, he thought it would be desirable to choose two sciences—one on the physical and one on the biological side, so that children might learn something about the laws of living things, and something about the laws of physical things. He therefore suggested chemistry and botany, and he thought the whole weight of their efforts should be devoted to trying to get the children in schools to learn the elements of chemistry and the elements of botany, for there were no other two sciences the elements of which were almost similar, and at the same time there were no other two sciences that led up to a greater number of the laws of life, nor that gave a wider and more extended view of the laws of the world in which we live. The objections to the present system of teaching a knowledge of experimental science was that it almost entirely concentrated the person's attention upon phenomena instead of upon reasoning. Therefore, in choosing their system of teaching, all their weight ought to be thrown into making sure that their plan had the effect of making the child learn to think a good deal. Another thing they had to consider was the enormous time that children were made to remain in school without being engaged in anything except mischief. He thought a child should not spend more than four hours a day at literary work. Well, that occupied but a small part of a child's day; and one of the great advantages of having experimental subjects introduced into school teaching would be that they were subjects at which a child could work without experiencing very much fatigue. He could not help calling attention to the flagrant abuse of the teaching of experimental science in Irish schools. Experimental science in Irish schools was very nearly the same as snakes in Iceland. Having pointed out the fallacy of an examination—as exemplified in the Intermediate Education system—that was satisfied with a reading of the musical signs unwedded to a knowledge of the sounds they represented, the Professor said it would be an enormous advantage if the Intermediate Commissioners could be induced to keep up a peripatetic system of periodical examinations that would insist upon practical knowledge. That, however, should not interfere with the giving of papers also. After observing that it was at the present time impossible to carry out a proper examination in laboratory work, and stating that he considered it would be very desirable that the actual work in the laboratory and analyses in practical subjects should count towards the University prizes, Mr. Fitzgerald said he considered that the present system of analysis was not very satisfactory, and he urged the introduction of a system that would teach chemistry practically. Though that might be harder to teach than Latin and Greek, it would not be so if they had a system worked out and teachers to promote it, and it would have the inestimable advantage that, in addition to training the child to think—which he thought it would do equally well with Latin and Greek—it would teach him the laws of things, and how to see and learn the laws of things. It would also teach the child to use language to express real ideas, and not merely phrases. They would also learn a good deal more of the laws of language from a modern language that they learned with the grain than they would by learning an ancient language against the grain. He thought that literature and history were co-ordinate with science, and they certainly ought to be a large part of education. Literature and history were grievously neglected in the present day—practically they had no place, and that was substantially because Latin and Greek were supposed to be a literary education. One of the reasons was that those subjects were hard to examine in, but there was an easy way out of that difficulty in Universities. They need not examine, but they could require attendance at lectures—attendance on good lecturers; and the student would pick up more

culture and would be obtaining a better literary education from hearing a good lecturer and being inspired by his enthusiasm than he would get by learning off one of Shakespeare's plays, and answering it at an examination. Those two aspects of education, the literary and scientific, were often put in opposition, just as the freedom of the individual and the power of the State to control the individual were very often set up in opposition to one another; but he did not think any one would believe that that opposition really arose, for the freest States were those in which the power of the State was the strongest. In conclusion, he would say that we must equip our youth for the battle of life physically and ethically. The present is a great crisis in Irish education. There is danger of science schools starting, and all the evils of dual education. There are a large body who like Latin and Greek, because they exclude literature and history. These are to be fought tooth and nail. There are those who would sacrifice the rising generation on an altar of so-called culture to starve and die, with their only comfort that they can describe their agony in well-expressed phrases. There are those who would grind all soul out of mankind in a mill of manual labour, constructed on scientific principles. All those are to be guarded against. We must have literature and history. We must have knowledge of the laws of the world in which we have to work. We can have both if we will but work out a reasonable system of education, instead of pretending that the lop-sided corpse that occupies our schools and Universities is a well-developed, symmetrical giant.

ABORIGINAL ART IN CALIFORNIA AND QUEEN CHARLOTTE'S ISLAND

IN the fourth volume, recently issued, of the Proceedings of the Davenport Academy of Natural Sciences there is a valuable article by Dr. W. J. Hoffman on "Aboriginal Art in California and Queen Charlotte's Island." In the summer of 1884 Dr. Hoffman visited the Pacific coast for the purpose of continuing his researches on primitive art, and he was fortunate enough to find a number of localities in which there are painted and "etched" records, of considerable interest, made by Indians belonging to tribes now unknown. These records occur in groups. One group, the first described by Dr. Hoffman, is in the neighbourhood of Santa Barbara. The best preserved paintings in this series are in a cavity which measures about twenty feet wide and eight feet high. The rock consists of gray sandstone, but the ceiling and back portion of the cave have a yellowish appearance. The colours employed were red ochre, white, and bluish black. Some of the paintings Dr. Hoffman takes to be representations of gaudily-coloured blankets. In several instances a grotesque human figure is drawn over or in front of what seems to be a blanket, as if the latter were intended as a body blanket or serape. In the Azusa cañon, about thirty miles north-east of Los Angeles, Dr. Hoffman examined a second series of painted records. Rudely sketched human figures are represented a pointing in certain directions, and the intention evidently was that they should serve as guides to travelling parties. For instance, the left arm of a figure on a white granitic boulder points towards the north-east. The precipitous walls of the cañon make egress in that direction impossible, but two hundred yards further on the cañon makes a sharp turn towards the north-east, and in rounding the point of land to the right the traveller comes to another boulder, on which are numerous faint drawings of various kinds. This boulder is on the line of an old trail leading from the country of the Chemehuevi, on the north of the mountains, down to the valley settlements of San Gabriel and Los Angeles. A third series of records was found in the southern part of Owens Valley, California, between the White Mountains on the east and the Benton Range on the west. They are "etched," not painted. The most common characters in this group are circles, either plain, nucleated, bisected, concentric, or spectacle-shaped, by pairs or threes, with various forms of interior ornamentation. This group resembles etchings in the Canary Islands so closely that the illustrations given by Dr. Hoffman serve for both localities. On one of his plates he presents a number of circles with ornamented interiors, from a simple bisection to the stellate and cruciform varieties. Similar circles bearing cross-lines occur at Grevinge, Zealand; and other forms resembling some at Owens Valley are found at Slieve-na-Calliagh, Grange, and Dowth, in Ireland. The spectacle-shaped variety resembles the mysterious symbol on

some Scottish monuments which has given rise to so much vague speculation. The reversed Z, however, is wanting in the Californian examples. Of the various outlines of the human form presented by Mr. Wallace from Brazil, and referred to more recently by Prof. Richard Andree in "Ethnographische Parallelen und Vergleiche," a considerable number are almost identical with etchings in the Owens Valley series. Many of the characters in these three Californian groups are similar to, and some are indistinguishable from, those made by the Moki and other tribes of the Shoshonian linguistic stock. Further research on the same lines may, therefore, enable anthropologists to determine the former geographical area of the Shoshonian family, as has already been done in the case of the Algonkian tribes.

In the neighbourhood of Los Angeles Dr. Hoffman obtained a portion of an old Indian gravestone. On this slab there are incised characters which seem to represent a whale-hunt, and no doubt they were intended to denote the occupation of the person to whose memory the tablet was erected. Honour is done to the dead in a similar manner by the Innuut of Alaska and by the Ojibwa. Among the Innuut, the posts erected for men usually bear rude drawings of weapons and animals; those for women have representations of household utensils and implements. On Ojibwa gravestones, as Mr. Schoolcraft has noted, the totem of the deceased is drawn in an inverted position.

Dr. Hoffman offers some interesting remarks on the subject of tattooing. In former times, in the vicinity of Los Angeles, every chief caused the tattooed marks upon his face to be reproduced upon trees or poles which indicated the boundaries of his land; and as these marks were well known to neighbouring chiefs, they were a sufficient warning that trespassers would be punished. A custom akin to this prevails in Australia, where the tattooed designs upon the face of a native are often engraved upon the bark of trees near his grave. Among many of the tribes west of the Mississippi there are still numbers of persons who bear tattoo marks upon the chin, the cheeks, and even upon other parts of the body, but the marks seldom occur in any forms other than narrow lines, except among the Haida Indians of Queen Charlotte's Island, where the art of tattooing has reached a higher degree of development than on the mainland. The Haidas tattoo upon the back, breast, fore-arms, thighs, and the legs below the knees; and women submit to the operation as well as men. The characters are totemic, and represent either animate or mythologic beings. They are usually drawn in outline, with interior decorative lines, red being sometimes introduced to form what is supposed to be a pleasant contrast. The ceremonies at which the tattooing is done are held in the autumn, and extend over a period of several weeks. Among the figures generally adopted are the thunder-bird, raven, bear, skulpin, and squid. A former Factor of the Hudson's Bay Company told Dr. Hoffman that when he first went to the country occupied by the Haida Indians he saw no tattooing upon the bodies of the older members of the tribe; and he contends that they have learned the art from natives of some of the South Pacific Islands, which they occasionally visit as traders.

The Haidas display considerable skill as carvers in wood and slate. Totem posts are often placed before the council-houses, and more frequently before private dwellings. When the posts are the property of some individual, the personal totemic sign is carved at the top. Other animate and grotesque figures follow in rapid succession down to the base, so that unless one is familiar with the mythology and folk-lore of the tribe the subject would be utterly unintelligible. On one post to which Dr. Hoffman refers there are only seven pronounced carvings, but they relate to three distinct myths. On household vessels, the handles of wooden spoons, and other objects, the Haidas often carve the head of a human being in the act of eating a toad. Sometimes the toad is placed at a short distance below the mouth. The idea is that in the wooded country there is an evil spirit who has great power of committing evil by means of poison extracted from the toad. The Indians are not willing to acknowledge the common belief in this mystic being, even when they are aware that the inquirer is in possession of the main facts.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—The long-expected reform of the examination system which makes it unnecessary for men reading mathematics and natural science to pass any examinations of a non-scientific