example, they contain unique examples of historical and evidential value; their material can be made to appeal to nearly all the human senses, and thus be made more interesting; expenses can be incurred for special exhibits which would be beyond the means of every local school or college; they can cover nearly the whole field of human knowledge and endeavour. As the educational possibilities of museums become more generally recognized, the time may come when visits to them will be included in the experience of all individuals (perhaps specially arranged tours to cover several weeks). The organization and display of museums would be adapted to increase their educational value.

One can visualize the time when the national museums will be organized to cover all the branches of knowledge systematically. For example, there would be a museum or museums illustrating what may roughly be defined as "Man's methods of dealing with himself and with his fellow men": this might include such subjects as government, laws, customs, warfare, religions, philosophies, education, psychology, physiology, anatomy and medicine.

These museums would deal with their particular subjects fairly fully and contain as much as possible of the important actual evidence available, such as historical relics. Descriptive labels would be attached to each exhibit: these should include sources of evidence and appropriate cross-references, and thus encourage the visitor to further research and self-education. Exhibits representing recent advances in our knowledge in the present or of the past would be brought particularly to the visitor's notice; in fact, it would be to museums that the public would naturally go for the latest information on such subjects.

Special Museums

In addition to these national museums dealing with limited and specialized subjects, I think there is another type of museum which would be of great educational value. This would deal with the development of civilization in general and as a whole, and form an introduction to, and a link between, the national museums. It would be integrative, and in it an attempt would be made to make the past live again. The ideas, politics, social organization, arts, crafts, and sciences, etc., of the past would be combined. It would be impossible to show the complete story of the development of civilization in the world as a continuous process, and so only certain important phases would be selected for treatment. For example, for a museum in Great Britain, a selection of periods such as the following might be made: early Egyptian; early Greek; Roman; Europe in Dark Ages; Italian Renaissance; and then, say, three periods of English history. The final period would be outside the museum—the actual present world. Of course, the periods, if thought desirable, could be extended backward in time to prehistoric eras.

In this museum actual relics of the periods would not normally be shown (unless large numbers in good condition happened to be available), but the reconstructions would be made as accurately as possible on the available evidence. Great care would be taken to provide suitable explanatory labels. Such a museum would not claim to represent final truth, but merely to be a careful attempt to reconstruct the past. It would invite criticism and would, of course, be modified as new evidence came to light. Possibly, in suitable cases, the staff might be dressed in the costumes of the periods illustrated, and other means of adding realism adopted.

Mental instruments and methods have developed as well as material instruments, and it is most important to bring this out. Lecture theatres, cinemas and stages, where plays illustrating the life and ideas and demonstrations of the arts and crafts and instruments of the past could be given, might form an important part of the museum. There might also be rooms devoted to the great philosophers, and their philosophies, which influenced the periods concerned.

OBITUARIES

Dr. Cyril Crossland

BY the death of Dr. Cyril Crossland on January 7 at Copenhagen at the age of sixty-four, zoology has lost one of its last explorer-naturalists of the Darwin type. He was educated in the Lake District, where his father was a well-known lake painter. During his whole life he suffered from deafness, but this did not prevent him from becoming a personality in Clare College, Cambridge, where he compelled its steward to provide vegetarian meals for him and his numerous disciples.

Wanting an assistant for his researches on the naked Mollusca, Sir Charles Eliot, Consul General and Commissioner, took Crossland to East Africa, where he developed a taste for small boat sailing, which enabled him to explore the coasts of Zanzibar, Pemba and the adjacent mainland. He compared the barrier reefs off the latter with those described by Darwin off Brazil, both series being formed by erosion. Zanzibar proved to be an enlarged portion of the continental barrier, whereas Pemba was an independent elevation; the coastal flats of the whole area were due to a recent lowering of sea-level. No reefs were found that could be considered as due to growth *in situ*. For comparison, he next visited the Azores, having been appointed fellow of the University of St. Andrews, discovering well-consolidated Dendrophyllia, Vermetus and Lithothamnion coastal formations.

In 1904, Crossland proceeded to the Red Sea on a year's biological exploration, in which he covered about five hundred miles of its western coast, collecting all the time. "Its shores are all composed of elevated coral and are fringed with its luxuriant growth, while Barrier and other reefs and patches fill the sea for miles from either shore." The Sudan was being opened up by the development of Port Sudan, and Crossland was given a commission for the economic culture of shell oysters, being allowed a free hand. He ran a farm for the next fifteen years at Donganab, about sixty miles north of Port Sudan, off which there was a maze of surface reefs and submerged banks with clear water between. Here he built a patriarchal settlement for his fishermen and he became a source of supply for Red Sea animals to nearly every school of zoology and museum in Europe. In 1913 he published his "Desert and Water Gardens of the Red Sea", descriptive of the lives of his people and reefs and of the sides of his fault line, more than 1,500 miles linearly of coral reef. In the War of 1914–18 his settlement was useful in policing the Red Sea, and his oyster farm was producing a crop of millions, for he had succeeded, where all his

predecessors had failed, in breeding his oysters, laying their spat and protecting their shells. Meantime, the market for pearl shell had gone, Vienna, its chief user, being almost a city of the dead, and he himself driven to hawking his shells where he could. Donganab was abandoned and Crossland came back to England.

During the next twenty years, Crossland used Cambridge as his home base, writing many papers on his collections, those on the chætopods in a class by themselves. There came next that curious expedition on the sailing yacht *St. George*, which anyone could join, each "going as he pleased". He wrote admirable accounts of the calm and muddy seas off Panama and of the fresh volcanic slopes of the Galapagos. In the older bays of the Marquesas corals tried to build in a singularly barren region. He left the ship at Tahiti, where he settled on its coasts for a year, to study its highly developed reefs and a luxuriant fauna, the most easterly outlier of Malaya. The surrounds of Tahiti, Mocrea and later Rarotonga were compared to those of other regions, with striking results. Basaltic stones were found lying in the reef surfaces or bedded in the rock below. The reefs are going back rather than extending seawards, and in extreme cases appear as submerged banks. The lagoons were formed by the hollowing out of an originally continuous reef. These important conclusions were followed by a close study of the corals, on which he was still engaged up to the time of his death.

Crossland, however, was called from retirement once again to go to the Red Sea, being commissioned by the Egyptian Government to found a biological station at Ghardaqa off the mouth of the Gulf of Suez. Like everything else, he did this well, the facilities for keeping living organisms being excellent. He explored the deep waters of the Gulf of Akaba and of the Red Sea off the same. To-day his station is a flourishing institution and Dr. Gohar, its director, generously extends its hospitality to Western workers.

In many respects Crossland was a most attractive person. He enthused everyone with whom he came into contact, this extending to his native) labour wherever he was. His published researches number about forty and are characterized by their original, often unorthodox, outlook. They demand the study of all who are concerned with biological and faunistic research in the tropics. His deafness was a tragedy, for it prevented that personal contact with his fellows so valuable to research workers. J. S. GARDINER.

Dr. Alexander Russell, F.R.S.

DR. ALEXANDER RUSSELL, advisory principal and governor of Faraday House College, died at his home at Mill Hill on January 14.

Dr. Russell was born at Ayr in 1861 and graduated at the University of Glasgow with first-class honours in mathematics and natural science. In 1882 he went to Caius College, Cambridge, and became a wrangler in 1886. He was for a time mathematical lecturer at Caius, and afterwards mathematical master at Cheltenham College and then at the Oxford Military College.

In 1890 Dr. Russell joined the staff of Faraday House, so that he was associated with it practically from the beginning. He became principal in 1909 and remained in this position until 1939, when he became advisory principal, leaving the more active work to a younger man. It was during these thirty years that he built up the college and its reputation, so that the name of Faraday House is always linked with his and can never be dissociated as long as it exists. No successor can take his place.

Many honours came to Dr. Russell during that time. He was awarded the D.Sc. by his old University of Glasgow in 1908 and in 1924 the LL.D. He was elected president of the Institution of Electrical Engineers in 1925 and had been president of the Physical Society and vice-president of the Institute of Physics, and nominated an electrical inspector by the Electricity Commissioners. He was elected to the Royal Society in 1924 and finally in 1940 he was awarded the Faraday Medal of the Institution of Electrical Engineers. There have been only eighteen recipients of this medal since its foundation, and among them are such famous names as Sir Oliver Lodge, Lord Rutherford, and Sir William Bragg.

Dr. Russell had been a pupil of Lord Kelvin, who had been a friend of Faraday, so that an authentic link was preserved, through him, with the pioneer of practical electricity.

Dr. Russell was fortunate in being known in the electrical world in the early days of the practical application of alternating currents and was able to apply his mathematical knowledge to the problems that they raised. His two books, "Alternating Currents" and "Theory of Cables", became standards, and the method he invented for computing the mean horizontal candle-power of a lamp is still called the "Russell angles". He was a most industrious writer and produced a life of Lord Kelvin as well as many papers communicated to the Royal Society, the Physical Society and the Institution of Electrical Engineers. For many years he was a frequent contributor to NATURE.

One of Dr. Russell's great interests was lightning and atmospheric electricity, but during his latter years he became absorbed in the theory of numbers.

In the early days of television, Dr. Russell took a party of engineers to Baird's early studio in St. Martin's Lane. It was suggested that an attempt should be made to transmit a human face, and Dr. Russell was selected for the experiment. It has, therefore, been claimed that he was the first man to be televized, but complete confirmation of this fact is lacking.

Many hundreds of old students of Faraday House College, now scattered all over the world and in the Services, will remember Dr. Russell by his kindness and helpfulness to all who came to him. This is the truest and most lasting memorial to the memory of a great man. W. R. C. COODE-ADAMS.

Prof. R. G. Collingwood, F.B.A.

PROF. ROBIN GEORGE COLLINGWOOD, archæologist, historian, and philosopher, originally acquired his artistic and scholarly tastes from his father, W. G. Collingwood, the friend and biographer of Ruskin, and his Jewish mother. He early became an omnivorous reader and an adept linguist, and thus laid the foundations of the almost universal learning which was the surprise and delight of his friends in conversation. In boyhood, too, he learnt how to use his hands in playing the piano and violin, in draughtsmanship, and in sailing a boat (always a favourite recreation), and he thus acquired the manual dexterity which was later a prominent characteristic, evidenced, for example, in toys he made for his children and in his beautiful handwriting.