

embrace the habits and customs of the American Indians, their tribal organisations and government, and their myths and ceremonials.

Major Powell was made director, and no one could have been better fitted for the task. For more than thirty years he had been a student of the native races of this continent. He and his associates in the Bureau have succeeded in placing on record, before it was too late, a vast number of facts in regard to the Indians. The Annual Reports of the Bureau, twelve in number, and nine volumes of Contributions to North American Ethnology, with the Bulletin of the Bureau, form a considerable library in themselves. The archives still contain much unpublished material, including hundreds of vocabularies.

A complete linguistic classification of the native languages of the United States has been prepared by the director, and an effective classification of the tribes on the reservation, reducing materially the danger of warlike outbreaks, has already been accomplished.

EXPLORATIONS.

The promotion of exploration has, from the beginning, been an important feature in the work of the Institution, and grants of money and loans of apparatus have been made to many hundreds of explorers, who have thus been enabled to contribute to the knowledge of the zoology, botany and ethnology of the American continent. Much has also been done in supplying scientific apparatus to the officers of the various Government surveys, which, in early days, were very often equipped only for geographical work. The Naval Astronomical Expedition to Chili was supplied by the Institution with a telescope and other apparatus, which was afterwards bought by the Government of Chili for the National Observatory at Santiago. The medical officers of the numerous surveys preliminary to the building of the transcontinental railroads, and those of the several boundary surveys, thus equipped for natural history work, made vast collections.

Members of the Smithsonian staff have frequently been detailed to serve as tidal or meteorological observers, under other departments of the Government, in remote localities, for the purposes of exploration. The important early explorations of John Xantus on the extremity of the Lower Californian Peninsula, and of Turner, Nelson, Murdoch, Kumlien, and others in the Arctic regions, were effected in this manner, as well as the earlier and more important work of Kennicott, Dall and Bannister, in Alaska, in connection with the Russian Telegraph Expedition.

On the staff of the Bureau of Ethnology important explorations of the western portion of the continent have been made, especially those of the Stevensons, Cushing, Fewkes, and the Mindellifs, among the Pueblo people and the ruins of the southwest; those of Holmes among the prehistoric quarry sites and villages of the eastern part of the continent; those of Thomas among the mounds of the Mississippi Valley, and of McGee among the Papago and Seri Indians of the Mexican boundary; and the notable explorations of Major J. W. Powell among the tribes of Utah, California, Arizona and New Mexico.

The expeditions of Rockhill in Tibet, of Jouy in Korea, of Abbot and Chanler in Eastern Africa and Kashmir, Madagascar and the islands of the Indian Ocean, have been indirectly under the auspices of the Institution, and allusion should also be made to the visit of Major Dutton to the Hawaiian Islands for the study of volcanic phenomena, which was carried on directly at the expense of the Smithsonian Fund.

The Institution participated also in fitting out the Arctic Expedition of Kane, Hayes and Hall.

THE PROMISE OF THE FUTURE.

At the time of the Smithson bequest, the endowment of research had scarcely been attempted in America. There were schools and colleges in which science was taught, and certain of the teachers employed in these institutions were engaged in original investigation. There were a few young and struggling scientific societies, very limited in extent and influence, but at that time the chief outcome of American scientific work. Science in America was an infant in swaddling clothes. Fifty years have passed, and American science now stands by the side of the science of Great Britain, of Germany, of France, a fellow worker competing in nearly every field of research.

The Smithsonian Institution did what was, at the time of its organisation, absolutely indispensable to the rapid and symmetrical development of American scientific institutions, and but

for it, science in America would no doubt have advanced with much less rapidity. It is also certain that the progress of American science has had an immense influence upon the welfare of America in every department of intellectual and industrial activity, and also a reflex action upon the scientific and industrial progress of the entire world.

This year the Smithsonian Institution will celebrate the end of its first half-century. A special volume will be published to commemorate the event, and two memorial tablets will be erected in honour of the founder in the city of Genoa, where he died, June 26, 1829; one in the English church, and one upon his tomb in the beautiful little English cemetery on the cypress-clad heights of San Benigno.

It is interesting to remember that in September next will occur not only the semi-centenary anniversary of the birth of the Institution founded in the City of Washington by Smithson, but also the centenary of the delivery of that immortal address in which Washington so forcibly recommended to his countrymen "to promote as an object of the highest importance INSTITUTIONS FOR THE INCREASE AND DIFFUSION OF KNOWLEDGE."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Council of the Royal Geographical Society offer in the present academical year a Studentship of £100, to be used in the geographical investigation (physical or historical) of some district approved by the Council. Candidates must be members of the University of not more than eight years' standing from matriculation, who have attended the courses of lectures given in Cambridge by the University Lecturer in Geography. Applications should be addressed to the Vice-Chancellor not later than the last day of the full Lent Term, March 13, 1896.

LORD HALSBURY has been elected Chairman of the Council of the City and Guilds of London Institution for the Advancement of Technical Education.

THE *Technical World* has extended its sphere of usefulness. Henceforth it will be the newspaper for secondary and technical education broadly defined. It has been accepted as the official organ of the Association of Headmasters, and of the Association of Organising Secretaries and Directors. The general policy of our contemporary will be to support the conclusions of the Royal Commission on Secondary Education, by which we understand that it will exert its influence in co-ordinating the work of secondary education. With one paragraph in the announcement of the enlargement of the journal we are in entire agreement; it is this: "That the organising secretaries and directors should have an official organ will serve to remind them (a fact which a few are prone to forget) that they have duties not only to their own counties and committees, but to each other and to higher education generally. The more they co-operate, and within limits agree, the better will be the individual work of each."

WISE words were spoken by Sir Henry Fowler last week, while commenting upon the report of the Wolverhampton Chamber of Commerce. Referring to the necessity for technical education, he remarked: "In this respect foreigners are ahead of England, and Chambers of Commerce might attach more importance to the point. In foreign countries they make greater sacrifices for it and do not grumble at the expense. In England we are now waking up to the importance of it, but we want technical education on a very much larger scale than we have as yet got it. We want it very much on the lines which the Committee of the Chamber of Commerce in their report point out, namely, technical instruction for foremen and better-class artisans. In a competition between two manufacturing countries, the country where the manufacturing population has the better technical education is more favourably placed in connection with its operations, and has a distinct advantage in the markets of the world." We are doing a little, it is true, to advance technical and scientific knowledge, but much of the money allocated to local authorities for technical education is being frittered away. Many Technical Instruction Committees are incapable of organising a scheme of instruction which will prove of permanent benefit to industry. Instead of concentrating their attention upon a few subjects, and supplying effective education in them, they devote £10 or £20 to each of a multiplicity

of little efforts. We find that technical education has been made to include all sorts of subjects, even music. Several Councils give grants to classes formed for the exclusive study of music, either instrumental or vocal. The following selection of subjects taught will give some idea of the variegated nature of "technical" work: farriery, straw-plaiting, basket-making, ploughing, draining and dyking, clicking, cabinet-making, thatching, sheep-shearing, fishing, sail-making, china-painting, hat-manufacture, type-writing, political economy, life-saving, and house-decoration. So long as such subjects absorb the attention of Committees, little national advancement is possible. Instruction in the dodges of the workshop may produce a more dexterous and quicker workman, but it does nothing to educate him in those broad principles which enable him to assist intelligently in the real improvement of industry.

THE spirit of rivalry which regulates the conduct of educational institutions in some of our large towns is to be deplored, for its effects are detrimental to the advance of education. Reports, received from time to time, show that, in many districts, local institutions compete with one another instead of forming distinct steps in the educational ladder. So common is this kind of competition that it is refreshing to learn that the City Council and the School Board of Manchester have agreed between themselves that the Technical School shall discontinue its more elementary classes, and begin its curriculum at the points where the Board schools leave off. An effort is to be made to secure a corresponding gradation between the Technical School and Owens College. Manchester has thus taken important steps towards the solution of a difficult problem in public education, and it would be well if those provincial towns that have not already considered the correlation of their technical and scientific institutions would do so without delay. It is a question, indeed, whether a central authority ought not to be able to give a definite place in the educational ladder to the various institutions in a town, and to insist upon the absence of competition with one another. With each part of the engine doing its proper work, progress will be made; but if there is a confusion of functions, advance is impossible. The establishment, in recent years, of numerous technical institutions in many of our large provincial towns, and the extension of the work of old-established Mechanics' Institutes and Trade Schools, make it very necessary that something should be done to define the place of these institutions in our educational system. The University Colleges are especially affected by such institutions. Bristol, for instance, possesses one of the best University Colleges in the country; it has done excellent work, and will certainly do more. But during the past few years the Merchant Venturers' School has largely developed, and it is now a rival establishment situated only a few hundred yards from University College, with which it competes. This competition is no doubt responsible, to some extent, for the adverse balance of £950 in the accounts of University College, Bristol, for the year 1895; the total indebtedness of the College is now more than £6000. There is ample room for both institutions in Bristol, but the work of one should supplement, and not clash with, the work of the other. What is happening in Bristol is happening elsewhere, and is retarding educational advancement. In fact, we have no hesitation in saying that one of the most important points which needs to be settled at the present time is that which refers to the status of various institutions in the scheme of education.

SCIENTIFIC SERIALS.

American Journal of Science, January.—The quarries in the lava beds at Meriden, Conn., by W. M. Davies. The present condition of the quarries in the Triassic (Newark) formation near Meriden shows the vesicular upper surface of one lava bed under the dense basal portion of a later flow, and a number of fractures dislocating the double flow.—The form of isolated submarine peaks, by G. W. Littlehales. Theoretically the form of an isolated submarine peak would be that of a solid of revolution in which the crushing strength of any section is equal to the combined weight of the portion of the formation above that section and of the superincumbent body of water. The author derives a general equation for the slope of submarine peaks, and finds that the average slopes of Dacia Bank, Seine Bank, The Salvages, and Enderbury Island are fairly in accordance with the formula. This investigation has an important bearing upon the

intervals at which deep-sea soundings should be taken in searching for probable shoals in the open ocean and in developing the character of the sea-bottom. The minimum radius at the bottom which a dangerous shoal can have, must vary directly with the depth, but on the average, in the deep sea, it may be stated as ten miles. An interval of ten miles, coupled with an interval of two miles, would be sufficient for general development, and would prove with certainty the existence or absence of any formation rising close to the surface.—On the epidote from Huntingdon, Mass., and the optical properties of epidote. This epidote is almost identical with that of Zillerthal, in Tyrol, but has the lowest percentage of iron oxides (6.2) and the lowest double refraction of any epidote recorded.—The iodometric determination of selenious and selenic acids, by F. A. Gooch and A. W. Peirce. The principle previously applied to the estimation of chlorates is equally advantageous for the determination of selenious and selenic acids. The selenious acid is treated with potassium iodide, di-hydrogen potassium arseniate, and half-strength sulphuric acid. The liquid is concentrated by boiling, the residue is cooled and the acid nearly neutralised with potassium hydroxide, acid potassium carbonate is added in excess of neutralisation, and, after the addition of starch, standard iodide is introduced until the starch-blue appears. The iodine introduced measures the arsenious acid, and the difference between it and the iodine, originally present in the form of the iodide, represents the amount set free by the selenious acid. Selenic acid, on the other hand, may be determined iodometrically with accuracy by first reducing it to the condition of selenious acid by treatment with potassium bromide in the presence of sulphuric acid, and then completing the reduction to the elementary condition by the treatment with potassium iodide and potassium arseniate.

SOCIETIES AND ACADEMIES.

LONDON.

Geological Society, December 18, 1895.—Dr. Henry Woodward, F.R.S., President, in the Chair.—Prof. G. K. Gilbert, Washington, D.C., was elected a Foreign Member, and Dr. A. Penck, Vienna, was elected a Foreign Correspondent of the Society.—The tertiary basalt-plateaux of North-western Europe, by Sir Archibald Geikie, F.R.S. The author in this paper gave the results obtained by him in the continued study of Tertiary volcanic geology during the seven years which have elapsed since the publication of his memoir on "The History of Volcanic Action during the Tertiary Period in the British Isles." His researches have embraced the Western Islands of Scotland, St. Kilda, and the Farøe Islands. In an account of the rocks of the basalt-plateaux, attention was particularly directed in this paper to a type of banded basic lavas which played an important part in the structure of the volcanic districts both of the Inner Hebrides and of the Farøes. A number of examples were adduced of the volcanic vents which form a characteristic feature of the basalt-plateaux. The paper described in some detail the evidence for the flow of a large river across the lava-fields during the time when volcanic activity was still vigorous. Many additional details were given to illustrate the structure and behaviour of the basic sills which are so abundantly developed, especially at the base of the plateaux. The author added some additional particulars, more especially from Skye and St. Kilda, to his published account of the dykes which had taken so important a place in the origin and structure of the plateaux. Further observations were narrated regarding the great bosses of gabbro in the Inner Hebrides. The author, having been able to visit St. Kilda, described the junction of the granophyre of that remote island with the basalts and gabbros. He brought away a series of specimens and photographs which demonstrated that the acid rock had been injected into the basic masses, traversing them in veins and enclosing angular pieces of them. The granophyre was precisely like that of Skye and Mull, and was traversed by veins of finer material, as in these islands. By way of illustrating the probable history of the basaltic plateaux of North-western Europe, the author gave a short summary of the results of recent investigations of the modern volcanic eruptions of Iceland, especially of Th. Thoroddsen and A. Helland. Reference was made to the evidence of considerable terrestrial movement since the Tertiary volcanic period, as shown by the tilting of large sections of the plateaux in different directions, and also by the existence of actual faults. The con-