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lack of uniformity pointed out. To bring about an improvement the writer suggested for consideration the qualifications necessary for technical positions within the mining industry, and the courses of study, the regrading of present educational institutions, the practical experience necessary, and the methods of examination, issuing of degrees, &c. He recommended that three kinds of courses of study should be established—degree, diploma, and certificate. The degree course would be of five years. Of them the first three would be spent at a university, and would comprise mathematics, natural philosophy, chemistry, geology, economics (including one year social psychology), and one art subject. The last two years should be spent on a mining field where an up-to-date school of mines had been established. There the student would gain in practical experience in the day time and continue his studies as an evening student. The diploma course should be of three years, with the student gaining his practical experience in the daytime and attending lectures in the evening. Those courses would give a complete training in the sciences, but would be definitely directional and specialized. The certificate course would be for the more subordinate, yet responsible, positions on a mine or mining plant. Such a scheme suggested a reading of their educational institutions, and offered a solution to the problem of practical experience.

HISTORY IN SCHOOLS.

Curriculum Examined.

"The teaching of history in Australian schools" was the title of an address by S. Browne, M.A. (Vice-Principal Teachers' College, Lecturer in Education, University of Melbourne). Mr. Browne devoted his paper to a consideration of the curriculum in history suitable for Australian primary school children and scholars of the junior high school, who were the 90 per cent. who never went on to the University, but formed the great majority of their future citizens. It was a mistake to map out the history programme for the 90 per cent. as a mere preliminary to university work. It should be a unit in itself, vital and interesting, with a definite practical course in civics. If teachers could only realize how fascinating a subject history and civics could be made a distinct step forward would be taken on the road towards combating that general apathy which was preventing the proper functioning of representative government. Mr. Browne gave several striking examples, from his own experiences in England and America, of the way in which "atmosphere" could be obtained in history teaching in a country which abounded in historical memories like those of England. He asked was that impossible in Australia? They had very little that was old or had the spell of the past over it; but there were few Australian boys who would not thrill at the story of the final opening of the door to the discovery of Australia, or to the romance of the Australian squatter, how they came by their name, and how they followed their sheep into the unknown interior, in spite of great hardships and strong Government opposition. He contended the curriculum for Australian children in primary schools should be based on British history in broad outline, followed by a good course in "the development of the British Commonwealth of Nations" and topped by the "history of Australasia and the Southern Pacific." In the junior high school the same course could be broadened and extended to include a year's treatment of world history and a special study of some such topic as problems of the Pacific or Australian economic history.

Bad Text Books.

The school history text book of the past was extraordinarily bad. It was too often a mere compilation of dry facts without any personal appeal in them, or any regard to the natural instincts and interests of the boys and girls. England had recognised that, and now had some splendid books dealing with national and social history in such a way that the children read them with eagerness, asked continuous questions about them, and raised discussions at home about them. There was a great need in Australia for a series of good history text books on sound but modern lines, dealing with the whole course of history, and gradually turning it in the direction of Empire development and Australia's own story. Mr. Browne spoke of the suitableness of history for Dalton plan work, and gave an assignment written in Lancashire, which showed what the essentials of success in that hard, but ideal, system were. He recommended, however, with great confidence the project method to all teachers of history in Australia, for it was easy to organize and most effective in its results. He gave some very interesting examples of projects carried out in Plymouth, Oxford, New York, and Melbourne. A teacher who was keen about the subject could arrange for work similar to that, and could obtain correspondingly good results.

In conclusion, Mr. Browne pointed out that if the teacher was to do less of the work and allow his class to develop habits of self-expression and investigation, it was essential that there should be a good reference library at each school. They willingly spent £400 on a school physics library, and it could be asked whether it was an unreasonable demand to ask for £50 for a history library. The reference library in the school was steadily coming into its own all over the world, and in 20 years' time a school that had not a good library, with their scholars trained in its use, would be hopelesly out of date.

APPRENTICE TRAINING.

All-Round Education Urged.

Dr. C. Fenner (South Australian Director of Technical Training), speaking to the social science section, pointed out that the education of apprentices in the skilled trades was receiving much attention today from both the educationist and the industrialist. In the past the training of the apprentice had been much neglected. The all-round education, in both school and workshop, of the youth who aspires to be a skilled tradesman was a problem comparable in interest and importance to the training of the professional man or woman. The present unsatisfactory position regarding the number and efficiency of skilled tradesmen was to some extent a reflection of the lack of popular and educational interest in those matters. An effort to deal with the problem in South Australia was shown by the Technical Education of Apprentices Act of 1917. An account was given of the details of the working of that Act for the past five years, and it was clear that a marked degree of success had been attained. Figures were given showing the very great advance in effectiveness made under the conditions of the Act, as compared with voluntary evening technical classes. Dealing with the general problem of apprenticeship, the lecturer strongly urged that the best method whereby a high standard of craftsmanship might be preserved was by remodelling the Elizabethan apprenticeship system, so that it would adequately fit in with modern social and industrial conditions. The upsetting and distracting factors to-day in South Australia were the existence of the "improvers" (who in some cases out-numbered three or four times the properly indentured apprentices) the unnecessary length of apprenticeship in certain cases, the lack of control of cancellations and transfers, and the variation and confusion caused by the overlapping Wages Board and Arbitration Court awards. A great good would be done for the system of apprenticeship if a scheme could be devised that would set the wages and conditions of apprentices wholly apart from those upsetting factors. The lack for any guidance or systematic mode of selection of apprentices was also a marked defect of the system. Tabulated results of the operation of the Technical Education of Apprentices Act in South Australia showed that there was an increasing favour shown to apprenticeship, and that the results in attendance and efficiency achieved under the Act were even greater than most advocates of the measure would have thought possible.

CHEMISTRY SECTION.

ANALYTICAL PROBLEMS.

Application of Steele-Grant Microbalance.

The chemistry section was addressed by Professor E. J. Hartung on "Application of the Steele-Grant microbalance to analytical problems."

The Steele-Grant microbalance, Professor Hartung explained, was invented by 1909 by Professors B. D. Steele and Kerr Grant, and attempts were soon made to use it in analytical investigations. The most sensitive model of the balance was not suitable for general analytical work. For that purpose a sturdier type, weighing to one-ten thousandth of a milligram (one-seven hundred thousandth of a grain) in a load of half a gram (about seven grains) was desirable. The balance, and the apparatus used with it, was made entirely from viteous silica (fused quartz), and weighings were made by changing the air pressure in the balance case, which altered the buoyancy of a small bulb filled with air, hanging from one of the balance beam. Pioneer analytical work with the microbalance was performed by G. Ampt, of Melbourne, in 1910. He was able to show that good results could be obtained with as small an amount of material as one or two milligrams, provided that the analytical operations included only such simple ones as direct iguitions or evaporations. Filtering imposed considerable difficulties, but the results were promising. Microanalytical technique had now been developed, and it was possible to carry out many estimations, not involving filtering on less than half-milligram samples, with an accuracy rivalling that of routine analytical methods. When a filtering procedure was necessary there was a liability to 1 or 2 per cent. error, owing to the accumulation of dust particles, but with properly devised technique, it was hoped that trouble would soon be very materially diminished.

CHEMISTRY OF POSIDONIA FIBRE.

By Dr. J. C. Earl.

Dr. J. C. Earl lectured to the chemistry division on "The chemistry of posidonia fibre." He remarked that the usual methods of routine analysis had already been applied to that fibre, and had shown that it was very resistent to the action of alkaliss, and that it contained about 60 per cent. of cellulose. It had now been found that another compound—a pentosan—was associated with the cellulose, the true percentage of cellulose in the sample examined being only 33 to 34 per cent. Both the pentosen and the cellulose had been further investigated. As yet the nature of the pentosen had not been absolutely determined, but the cellulose, by the application of recently devised methods, had been broken down quantatively into glucose. It was therefore of the same type as cotton cellulose, although not identical with it. The other constituents of the fibre had only been examined in a preliminary way, but they showed characters of great interest.

LORENZ METHOD FOR PHOSPHATE.

Official Standard Necessary.

Messrs. A. T. Jefferis and C. S. Piper discussed with the members of the chemistry section "The Lorenz methods for phosphates." They told the members that in consideration of the extensive use of phosphates throughout Australia—200,000 tons being imported annually—and practically all cereals being drilled in with super, while the manuring of pasture is becoming common, it was of the utmost importance that a standard method of determining phosphoric acid should be made official throughout the Commonwealth. Speed consistent with accuracy was required. The lecturers discussed the various methods in use, and demonstrated by referring to numerous comparative tests that had been conducted both in Queensland and in the Roseworthy laboratory that the Lorenz-Neubauer method was the best in point of view of its simplicity, speed, and accuracy.

A note in support was read from Mr. Brunnich, Agricultural Chemist for Queensland, where the method had been made official, which advocated the adoption of the Lorenz method throughout Australia.

DISEASES OF FOALS.

Cause and Cure.

Dr. L. B. Bull, before the veterinary science section, dealt with a disease of foals characterized by the presence of abscesses in the lungs and other parts of the body. The disease had hitherto not been described as occurring in Australia. It was distinct from navel ill, and was due to a specific bacillus. The course was relatively slow, but a fatal termination had resulted in all cases seen up to the present. Ordinary treatment was of no avail. Preventative measures in the form of vaccines were worthy of a trial. It was important that breeders should seek the advice of investigators, in order that more information might be obtained and the disease brought under control.

GENERAL.

MAORI DECORATIVE ART.

Tracing its Origin.

Mr. H. D. Skinner, B.A., of New Zealand, in his presidential address to the ethnology and anthropology section on the origin and relationships of the material culture and decorative art of the Maoris of New Zealand, told his listeners that the origin of Maori art had in the past proved one of the puzzles of New Zealand ethnology. Both their language and traditions indicated clearly that the Maoris came to New Zealand from the central or east central Pacific. They should therefore expect to find in that area closely related forms in material culture and decorative art with that of the Maoris. In material culture that actually seemed to be the case but it was not so in decorative art. In tracing the origin of decorative design they found hardly anything to help them in Polynesia, but had to jump back two or three thousand miles to the Massim area of New Guinea, the Sepik river, the Bismarck Archipelago and the Admiralties. From there both material culture and art went back together into the Malay Archipeligo where they divided again, decorative art going back to India, whence some aspects of it could be traced back through North Persia and the eastern Mediterranean to Egypt, while the body of Polynesian material culture seemed to join its parent stem in south-east Asia, in the region of Cambodia.

THE SILURIAN AREA.

Changes Necessitated.

"The Devonian Age of the Tanjilian Fauna and Flora of Victoria," formed the topic of Mr. Frederick Chapman's, A.L.S., address to the geology section. The name of Tanjilian, given by the author at a former meeting of the Australasian Association in 1914, to an extensive series of Palaeozoic rocks in Gippsland was postulated as representing the lower Devonian rather than the upper Silurian. These rocks were characterized by large cockle-like shells (Panenka), minute sea-butterflies (Stylicola), and a remarkably interesting series of plant remains allied to the Devonian flora of Rhynie in Aberdeenshire. The definition of the series would necessitate a revision of the geological map over quite a large area in Gipsland, formerly referred to as the Silurian. The examination of the flora of the interesting deposit was commenced by Miss A. Vincent, B.Sc., and was now being carried on by another research student, Miss E. C. Cookson, B.Sc., in conjunction with detailed work on the fauna by the author.

TORRENS FLOOD WATERS.

Solving the Problem.

Mr. R. M. Scott, in an address delivered to the Science Congress on Wednesday on "Problems of the Torrens flood waters, said that in seeking the correct method of controlling the flood waters it was to be hoped that the authorities would give careful consideration to water conservation and forestry, as they might prove the key necessary to solve the problem. Until the flood waters reached the constricted channel below Taylor's bridge practically little trouble was experienced. The reason for the floods, therefore, was that the channel of the lower Torrens was too small by far to carry away the floods. A further contributing factor was the lack of a direct outlet. The problem was rapidly becoming more acute owing to the increasing quantities of silt that were being brought down by successive floods. The general level of the Reedbeeds where the river dispersed itself was raised by every flood. The cause of that excessive silting was denudation of the native timber and scrub by uncontrolled bush fires, by direct clearing for pasture or cultivation, and particularly by a greater run-off from the metropolitan area. As more streets were paved more silt was carried direct into the river than formerly. The most attractive part of the Torrens Flood Waters Bill was undoubtedly a balance reservoir proposed at Kangaroo Creek. As suggested by the Engineer-in-Chief, probably up to 300 million gallons of the total 900 million gallons capacity could be safely retained as a summer storage in that reservoir for use in irrigation. The question arose whether the proper solution of the problem was to provide a getaway from the floods in the lower reaches of the Torrens or to provide adequate retarding basins and storages in the upper reaches of the river.

TO-DAY'S PROGRAMME.

Section A.—Astronomy, Mathematics, and Physics.

10 a.m.—Joint session with Section J., in educaton section room. Discussion on "The teaching of mathematics in the Secondary Schools of Australia." Papers on—(1) The teaching of physics. (2) The teaching of science.

Section B.—Chemistry.

Morning—Methods of analysis and improvements in laboratory practice.

10 a.m.—"The application of physical methods to the analysis of liquid mixtures," Professor C. E. Fawsitt.

10.30.—"The Barium-hydroxide vacuum method for the determination of carbon dioxide," Mr. G. Ampt.

10.45.—"A simple apparatus for the continuous extraction of solids at the boiling temperature of the solvent," Professor T. Brailsford Robertson, Mr. L. A. Bay.

The Structure and Metabolism of the Carbohydrates.

11 a.m.—"Some recent advances in cellulose chemistry," Dr. J. C. Earl.

11.30.—"Mutarotation and the fautometric hydrogen atom," Professor E. H. Rennie.

12.15.—"Our present knowledge of the structural alteration in glucose which precedes oxidation in the tissues of animals," Professor T. Brailsford Robertson.

Section C.—Geology and Mineralogy.

In Prince of Wales Lecture Room.

10-11.15 a.m.—Barrier Reef problem and methods proposed for solving them. Joint meeting of C, D, E, and M.

The meteorology of Adelie Land, C. T. Madigan. Joint C, D.

Contribution to our knowledge of New Guinea, R. Stanley. Joint C, D.

The Bacchus Marsh basin, Dr. C. Fenner. Joint C, D.

(a) Graphical methods for the solution of some cementation problems in geographical mapping; (b) the Yass earthquake of March and April, 1924; (c) tidal stresses as a possible secondary cause of earthquake, by Professor L. Cotton, D.Sc.

Section D.—Zoology.

10 a.m.—Joint discussion on Barrier Reef.

12.15 p.m.—The life history of oraitothynchus, by Professor Launcelot Harrison.