

THE SCIENCE CONGRESS.

(Continued from previous page.)

and in this hard but ideal system were recommended, however, with great enthusiasm the project method to all teachers of history in Australia, for it was easy to organize and was most effective in its results. He gave interesting examples of projects carried out in Plymouth, Oneida, New York, and Melbourne. Any teacher who was keen about the subject could arrange for work similar to this and could obtain correspondingly good results. 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 time in a science physics laboratory. Was it not reasonable to demand to ask for \$100 for a history laboratory? 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and in 20 years time a school that had not a good library, with its scholars trained in its use, would be hopelessly out of date.

GEOLOGY SECTION.

THE DEVONIAN AGE.

"The Devonian Age of the Tatiwill fauna and flora of Victoria," was the subject of a paper read by Mr. Frederick Chapman, A.L.S., to the geological section. The name given by the author at a former meeting of the Australian Association in 1912 of "Tatiwill," to an extensive series of Palaeozoic rocks in Gippsland, was here re-estimated as representing the Lower Devonian rather than the Upper Silurian. These rocks were characterized by large cockle-like shells (Pancalites), minute shaly intercals (Mytilites), and a remarkably interesting series of plant remains allied to the Devonian flora of Rhynie, in Aberdeenshire. The definition of this series would necessitate a revision of the geological map over quite a large area in Gippsland, formerly referred to the Silurian. The examination of the flora of this interesting deposit was commenced by Miss A. Vincent, B.Sc., and was now being carried on by another research student, Miss K. C. Cookson, B.Sc., in conjunction with detailed work on the fauna by the author.

"The Devonian and older rocks of the Tabberabbera district, Gippsland, Victoria," was dealt with by Professor Ernest W. Skeats, D.Sc., A.R.C.S., F.G.S., University of Melbourne, in a paper. Recent field work by the author resulted in the finding of Ordovician graptolites in additional localities to those previously known, and in the finding of a black chert crowded with radiolaria, probably of Upper Silurian age. The chief result was the recognition that most, if not all, of the highly folded and crumpled rocks, known as the Tabberabbera series, formerly mapped as Middle Devonian, must now be referred to the Veronicale series of the Upper Silurian. This conclusion followed from the determination of the fossils by Mr. Chapman, of the Melbourne National Museum.

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, remarked 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 Massin area, off New Guinea, the Seine River, the Riau Archipelago, and the Admiralties. From there both material culture and art went back together into the Malay Archipelago 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. The body of Polynesian material culture seemed to begin its parent stem in South-East Asia in the region of Cambodia.

WATER CONSERVATION.

THE TORRENS AND THE MURRAY SCHEMES.

Interesting lantern lectures were delivered to members of the Institution of Engineers (Australia) on Wednesday afternoon in the Institute Lecture Theatre, North Terrace, by the Resident Engineer of No. 2 Lock, River Murray (Mr. R. J. Dennis) and the City Engineer (Mr. E. M. Scott). Mr. Scott took as his subject the problem of the Torrens Boles, and Mr. Dennis dealt with the construction of Lock No. 2, River Murray, Professor Whittlesey presiding.

Describing the construction of No. 2 lock, Mr. Dennis said the work comprised a navigable passageway, and so it was necessary to have a lock chamber 290 ft. long between the gates, and 36 ft. wide so that a river boat and a barge could be in the chamber together. The navigable passageway was 100 ft. wide, and the roadway 194 ft. The lock, which will throw the water back to Loxton, was designed so that in high river the gates could be opened and the passageway removed to make an open channel 200 ft. wide. The lock chamber consisted of two mass concrete walls 31 ft. high. Most of the plant, probably the most modern in Australia, was supplied by South Australian firms. The stone for the concrete consisted of crushed granite from the Mannum quarry, 174 miles down stream, and was taken up by barge. After preliminary preparations two cedar dams were built one covering nearly four acres, the other something less. The foundation at the lock consisted of a bluish clay, solid, regular, and almost watertight, and on this the walls were built in monoliths 24 ft. long, each containing 200 cubic yards of concrete. Immediately the ironwork for the lock gate chains was in position, the lock gates of New South Wales ironworks, were constructed, each gate being 22 ft. wide, 24 ft. high, and 18 in. thick. On completion of the work in the first scheme, the second had to be built, and as conditions were ideal, an attempt was made to build the second while dismantling the first dam, but the piles proved too tight, although a pull of 50 tons, a lammer driving 300 blows a minute of 1,000 foot lbs, each blow, a swinging weight of 220 lbs, and a jet were employed. On several occasions the piles would stand firm for some hours before coming out.

Mr. Scott began by describing the banks of the River Torrens and the various embankments across. Twice in the past 25 years the discharges at the Adelaide weir had exceeded 200,000 gallons a minute, but comparatively little trouble was experienced until the flood reached the embankment below Taylor's Bridge, Hindmarsh. A temporary reservoir, to be constructed immediately below the junction of Kangaroo Creek and the Torrens at an estimated cost of £300,000, would regulate the floods in the lower reaches of the Torrens. It would impound 100,000 gallons, and form a useful source of supply to landholders along the river in the summer season. This was the most attractive part of the Torrens Floodwater Bill. The balance scheme would not be a relaxing burden to the treasurers of the world, but before 200,000 gallons could be safely retained in a reservoir storage for use in irrigation. The previous peaks emerging from the western base of the Mount Lofty Range were too narrow and steep to provide adequate storage for the first 200,000 gallons, and even when closed at both ends and under the lower reaches of the Torrens would be inadequate to carry the runoff from these peaks with safety. As regards Sixth Creek and the upper Torrens, the possibility of providing storage was distinctly hopeful and it was probable that a remaining basin of twice the capacity of Kangaroo Creek Reservoir could be constructed. Further investigations would have to be made before deciding on the previous and consequent use of any reservoirs, and the ultimate velocity determined. An increase of solid matter in suspension in streams along the river in varying amounts of sand, which was an important factor in the amount of silt carried away, was observed, the effect of the flooding. It was clearly related to sedimentation and to some extent flooding our streams improve sediment areas, the sand acting as a loose vegetal sponge, absorbing a large and rapid rainfall. Rivers have the water clearer and purer, sand is clearly illustrated at the point

of the Torrens and Sixth Creek, which, though the water of the former is turbid and muddy, that of Sixth Creek is hardly discoloured at times of flood, the creek having a watershed covered in scrub, creek having a watershed covered in scrub, and bushes. Two little attention had been paid to the alteration which forestry might afford the water problems and the allied interests, water conservation and forestry, needed careful consideration as they might supply a key to the solution.

CHEMISTS VISIT BURFORD'S.

About 50 delegates of the chemistry section accepted the invitation of Messrs. W. H. Burford & Sons to visit their soap and candle factory at Dry Creek on Wednesday afternoon. They were conducted over the works in parties under the guidance of Messrs. F. A. Bowen (managing director), J. W. Shattock (factory manager), D. Fraser (coffee manager), and A. Miller (chemist), who explained to them the processes in the manufacture of the firm's products. Everywhere the visitors were impressed with the modern buildings and plant, and the conditions under which the employees worked. The fitting shop was the first visited, and subsequently the visitors inspected the boiler house and furnaces. The cracking shop, where the ingredients are first introduced, aroused considerable interest. On the surface floor were seen huge cauldrons in which the soap is heated in order to rid it of impurities. After boiling the soap runs by gravitation into a mixer, where it is thoroughly stirred. When ready it is allowed to run into moulds, each of which contains from 10 to 12 lbs. of soap. When it has solidified the block is placed on the slabbing machine, which cuts it into blocks about three feet long, a foot wide, and 2 inches thick. In the next stage it is run through a blocking machine, which trims the slab and cuts it into bars of the requisite size, on each of which it imprints a brand, and then pushes it aside to an ingenious mobile rack on which it is taken to the packers. In the case of the smaller blocks the soap proceeds on a conveyor belt through a branding machine, and into an intricate contrivance where it is wrapped. The toilet soap goes through a more involved process. After being boiled the product passes through a shredder, and a dryer, from which it emerges in the form of white shavings. This is the basis from which soap of any color or perfume can be manufactured. The material is then transferred to a mixing machine, where it is finely ground and the color and perfume are added. When this operation is completed the soap passes on to a mill, where it is compressed and from which it emerges in long bars of the required shape. After being cut into tablets it is branded and wrapped, and finally packed. Conveyor belts from every department carry the packages to the warehouse. In the perfumery department the recipes for various lines of soap are compounded. Candles in various stages of manufacture were seen in the candle department, and the visitors were shown products of the factory ranging from three inches to over three feet in length. A visit to the glycerine department completed the tour of inspection. The visitors were also shown the nucleus of the model village which the company intends establishing at Dry Creek.

After the inspection of the works the visitors assembled in the dining room at the works, where they partook of afternoon tea. Mr. Bowen welcomed the guests and in responding on their behalf Professor Fawcett (Sydney) thanked the company for the hospitality that had been shown them.

RIVER PROBLEMS.

AND THE UPPER MURRAY.

"Problems of the Australian Rivers, with particular reference to the Upper Murray," was the subject of a paper read by Mr. G. L. Wood, M.A., F.R.G.S., in which the writer pointed out that the importance of the Upper Murray terrain depended upon the delicate character of the Australian rivers after they left the hill country. Therefore all problems of drainage, more especially that of irrigation, must be attacked in the region where the streams followed well-defined valley bottoms. The Upper Murray catchment, with its hundreds of wooded ranges, right back to the Kosciusko wall, was economically a most important area. Farther down the valley deforestation and dilapidation had followed in the wake of settlement. The chief effect on the streams had been to derange the natural regulation of the river volumes. Great changes in the catchments were taking place almost unnoticed. The reckless waste due to a stupid lack of control over the catchments beggar'd description; and in a matter which affected the economic life of three States more must be done to protect the natural regulators.

The chief mischief resulted from the farcical and criminal lack of control over leaseholds. Timber-getters did some damage, but in this matter far more was done by the employees of the big freeholders and pastoral lease holders. Their wanton derangements must be sternly and immediately checked. In particular the frequent and "accidental" fires that so strangely provided grass for the next season must be stopped. These wooded hills were losing their protective covering and becoming bare rock ridges. The coarse scrub gave place to grass, and the ground became "parked" hard by cattle traffic. The result was the forest clear, the natural reservoir and the reservoir of the run off, was gradually disappearing. The rainfall in this area was comparatively heavy, and the soil from the hillsides was being swept off into the valleys and deposited as barren sand and gravel flats. Thousands of acres of good agricultural land had already been lost through this cause alone.

The seasonal flow of the rivers was likewise disturbed by the acceleration in the speed of the run off. The rivers ran "bankers" and speedily sank to a low level. Indeed, in the last dry period some of the rivers actually ceased to flow for the first time in the memory of settlers. Flood water problems were causing road engineers and shire councils great anxiety, and the annual bill of the railways for washouts, etc., was mounting very rapidly.

The derangement of the natural regulators would become increasingly important as irrigation works were extended. The graph of the percentage of annual run-off passing down the river in the dry months December to May inclusive, showed a loss in 40 years of about 30 per cent. of the normal summer volume. They must think what this would mean to the Australia of 60 years hence. The rivers in all States would become the series of stagnant water holes that were so familiar in the interior. Further than this, great natural regulators and reservoirs of the Huon reservoir type would become necessary, at an expense of millions of pounds. The natural reservoir, the forested catchment, was being shamefully treated. Kosciusko was becoming very prominent over the whole area, gullies were everywhere being torn into the hill sides, and the rubbish deposited lower down; landslips were frequent, and a steady loss was going on from year to year by soil depreciation.

In the rivers serious silting effects were becoming noticeable. Fertile flats were becoming overlaid with stretches of sand, and bank erosion was becoming accelerated through the "widening-up" of flood waters caused by deforestation. The chief remedies that were urgent were suggested by the serious position revealed by the graph. The neglect of the Government concerned, for allowing the trouble to attain such dimensions could not be too strongly condemned. An immediate demand must be made for the abolition of the grazing leases in all catchment areas. Fines, penalties, forfeiture would all fail to protect the catchments. All highly inclined land-scarping basins should become a permanent reserve, and alienation should be forbidden for ever.

OATS AND SHEEP.

PROVISION OF FODDER.

Mr. J. T. Peacock, plant breeder of the New South Wales Agricultural Department, read a paper before the Agriculture and Forestry Section on oats and sheep. He said in view of the relatively high price for sheep and wool likely to continue, it was advisable on a holding devoted to wheat and sheep combined that primary consideration be given to the sheep instead of wheat growing being the chief aim. For this purpose several areas of oats and wheat might be sown and the seeds used as fodder, the grain being sown from March to May, grazed off and eaten prior to sowing. The sheep would be greatly helped on the green crop, and a good quality staff. Better lambs were sown with barley, rye, and oats, and these plants were recommended for an autumn feeding. The drop of oats should be harvested and sold in the summer. Seeds of this class not a good disease and the land-holding speech, the sown date were not very enough to give good results, though they gave a very heavy crop. A long grazing period could be given, and the grain could be sown in the fall. Sheep and goats were best suited for early sowing, and when the winter comes and power feed is available, a mix of oats and wheat was best to sow a mix.

The rotation planned would be—(1) Year wheat, (2) barley, (3) oats, (4) lucerne. The experience of the New South Wales Departmental feeding trials was that lucerne was about the best fodder for the purposes, the average yielding better than wheat or barley and standing growing well. Australia produced more wheat than oats, but in Canada the reverse was true. Although Canada grew as much oats her export of wheat was far greater. The bulk of her oats went to get live stock in the winter. To get the best results from a holding of a limited area they must either hand-feed or use cultivation paddocks, or do both. The best land some when it did not pay to rely on natural pasture alone. There was no good reason why oats as well as barley should not be raised on a farm, and with the improved rates they now had a large number carried than was possible under the old methods of "sheaf and shear," and with better financial returns.

PARASITES IN ANIMALS.

Mr. J. Charles Ross presented a paper to the Veterinary Science Section dealing with the recent advances in the treatment of intestinal parasites, with particular reference to those of the horse and dog.

Original observations conducted on animals in New South Wales for the most part confirmed the findings of workers in America. It was shown that the older methods of treatment were practically valueless. Figures were given as to the effective dose and the safety factor of the drugs mentioned. The results of the investigation showed that they now had most efficient and safe drugs for the eradication of parasites from live stock.

Mr. Ross also read a paper dealing with the examination of horses and dogs in New South Wales for the presence of parasites. A long list of the equine and canine parasites found was given. Many of the species mentioned had not previously been recorded as occurring in Australia.

A DISEASE OF FOALS.

In the Veterinary Science Section Dr. L. R. Ball read a paper dealing with a disease of foals characterised 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. The disease was distinct from mavel-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. Preventive measures in the form of vaccines were worthy of a trial. Breeders should seek the advice of investigators, so that more information might be obtained and the disease brought under control.

LORENZ METHOD FOR PHOSPHATES.

In the Agriculture Section a paper on the "Lorenz Method for Phosphates" was contributed by Messrs. A. T. Jefferis, B.Sc., A.I.C., and C. S. Piper, B.Sc. The paper stated that in consideration of the extensive use of phosphates throughout Australia, where 200,000 tons were imported annually, and where practically all cereals were drilled in with super, while the manuring of pasture was 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 various methods in use were discussed, and it was demonstrated by numerous comparative tests, conducted both in Queensland and in the Roseworth laboratory, that the Lorenz-Nebauer method was the best in point of view of simplicity, speed, and accuracy.

A note in support of this view was read from Mr. Brunish, Agricultural Chemist for Queensland, where it has been made official. The paper advocated the adoption of the Lorenz method throughout Australia.

TO-DAY'S PROGRAMME.

Section A.—Astronomy, Mathematics, and Physics.

10 a.m.—Joint session with Section J—In education section-room. Discussion on "The Teaching of Mathematics in the secondary schools in 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—

"The Application of Physical Methods to the Analysis of Liquid Mixtures," Professor C. E. Fawcett, 10.20—"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. Bradford Robertson; "The Structure and Metabolism of the Carbohydrates," Mr. L. A. Ray, 11.00—"Some Recent Advances in Cellulose Chemistry," Dr. J. C. Earl, 11.30—"Mutation and the Tautomer Hydrogen Atom," Professor E. H. Beams, 11.30—"Our Present Knowledge of the Structural Alteration of Glucose which precede Oxidation in the Tissues of Animals," Professor T. Bradford Robertson.

Section C.—Geology and Mineralogy.

In Prince of Wales Lecture-room—10 to 11.15—"Barrier Reef Problems 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 Baechus Marsh Basin," Dr. C. Fenner, joint C. D.; (a) "Graphical Methods for the Solution of Some Common Problems in Geological Mapping"; (b) "The Yass Earthquake of March and April, 1924"; (c) "Tidal Stresses as a Possible Secondary Cause of Earthquake," Professor L. Cotton, D. section.

Section D.—Zoology.

10—Joint discussion on Barrier Reef.

12.15 p.m.—"The Life History of *Ornithodoros*," by Professor Launcelet Harrison.

Section E.—Geography and History.

10.12—Joint discussion by Sections C. D., E., and M. on the Great Barrier Reef, Prince of Wales Theatre; 12.15—Mr. C. T. Madigan, "Antarctic Meteorology," Section E, room.

Section F.—Anthropology and Ethnology.

In the Section Room—Thursday morning.

Rev. Jenison, "A Native Statement of the Origin of Aboriginal Intertribal Divisions"; Mr. W. W. Thorpe—(1) "Some New Guinea Cultural Influences Found Among the Aborigines of Australia"; (2) "Neolithic Evidence in Australia, Tasmania, and New Guinea, and Traces of other Superior Cultures."

Section G.—Social and Statistical Science.

10—Mr. J. R. Butchart, "The Present London Exchange Position"; 11—Mr. G. Lightfoot, "Standardisation and Socialisation"; 12—Mr. G. H. Knibbs, "The World's Population and the Population Problem."

All lantern lectures.

Section H.—Engineering and Architecture.

8.30—Engineering excursions to Holden's Marine Body Builders, Osborne Power Station, Adelaide Electric Supply Company, the Torrens Gorge road and Millbrook Air Service (open motor car).

Section I.—Sanitary Science and Hygiene.

10—Mr. A. Gordon Gutteridge, "The Relation of Sewerage Systems to the Prevalence of Typhoid and Similar Diseases"; 11—Mr. Lawrie E. Coiding, "The Mosquito and its Relation to Practical Sanitation under Australian Conditions and to Tropical Colonization Generally."

Section J.—Mental Science and Education.

Morning—Professor A. D. Ross, M.A., D.Sc., F.I.C., F.I.A.S., F.Inst.P., Professor of Mathematics, University of W.A.; "The Teaching of Mathematics in Secondary Schools"; J. A. Scott, M.A., Teachers' College, Melbourne; "The Teaching of Physics," W. K. Saunders, M.A., Teachers' College, N.W