

geography, seven; anthropology and philology, four; social science and statistics, six; agriculture, eight; engineering and architecture, seven; sanitary science and hygiene, nine; and in mental science and education, four; this section is a very popular one with teachers and others interested in education, and the attendance is usually very large.

The association has made several recommendations to the various Australasian Governments and other authorities, and in the majority of cases these have been sympathetically received, and in certain cases carried out. One of the first recommendations was to the British Admiralty, suggesting that the ocean between Australia, New Zealand, and Tasmania should be named the Tasman Sea; this was agreed to, and the name was at once ordered by the Admiralty to be printed on all charts; previous to this there was some difficulty in speaking of this hitherto nameless part of the Pacific.

The association has also made requests for the reservation of certain areas in Australia and New Zealand for the preservation of the native flora and fauna, some of these have been agreed to; a notable one is the reservation of the island upon which the Tuatara lizard is found. Another smaller reservation was that of a sandstone quarry at Bondi, near Sydney, showing a remarkable columnar or prismatic structure.

Amongst other recommendations made at various meetings to the Australian and New Zealand Governments are the following, some of which have been given effect to:—

(1) That the Federal Government should endeavour to obtain data in the Indian Ocean for long-distance weather forecasting.

(2) The installation at Perth, Western Australia, of a complete set of magnetographs for the continuous registration of magnetic variations; also installations at Brisbane, Port Darwin, and Hobart similar to those at Sydney, Melbourne, &c. One has recently been installed at Adelaide in response to the association's suggestions.

(3) That the Australian and New Zealand Governments should adopt additional measures to prevent the further extension of tuberculosis amongst cattle and swine.

(4) Recommending the teaching of hygiene and the medical inspection of school children.

(5) That the New Zealand Government should undertake the magnetic survey of the Macquarie Islands now that the survey of the main islands has been completed.

(6) The Australian Governments were urged to take more effective steps for the conservation of forest areas.

The Federal Government was requested in 1902, before determining upon the site of the Federal capital, to appoint a board, consisting of architects, engineers, surveyors, medical and business men, to inquire and report upon the sites proposed; also to reserve a site for a national museum and for the housing of scientific societies and institutions in the proposed Federal capital. In 1898 successful recommendations were made to the New South Wales Government to proceed with the boring at Funafuti.

So that members may come prepared for the discussions, it has been agreed to arrange for the preparation of papers on subjects of which notice had been given at a previous meeting. Arrangements are being made for the preparation and publication of bibliographies which would be beyond the powers of an unaided individual.

Some of the papers of permanent value might usefully be reproduced in English publications, for in spite of the volumes of reports being widely distributed, a paper published at the Antipodes finds very few readers elsewhere, because on receipt of the volumes by an institution they are usually put on the library shelves, and there they remain.

The desirability of inviting the British Association to visit Australia has been considered and warmly advocated at different times since 1885; a reference to the proposed invitation will be found on p. xxiii of the present volume, in which it was suggested at the Adelaide meeting in 1907 that a sum of 10,000*l.* to 20,000*l.* should be provided to defray part of the travelling expenses of the visitors, and that the invitation should be issued for not earlier than 1913, so as to leave plenty of time to make proper arrangements.

The permanent offices of the Australian Association are

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in the house of the Royal Society of New South Wales, which has recently provided accommodation for other scientific societies, so as in a small way to afford some of the advantages which Burlington House provides for certain of the English societies; the Sydney societies thus housed have already found much mutual advantage from being under one roof.

A. LIVERSIDGE.

EPIDEMIC DISEASE AMONG THE NORTH AMERICAN INDIANS.

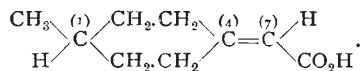
IN the Bulletin of the Johns Hopkins Hospital for November Dr. H. U. Williams discusses the origin of epidemic diseases among the North American Indians.

He believes that these American races developed an extremely small number of infectious maladies. Many of the most deadly kind—small-pox, leprosy, bubonic plague, glanders, anthrax, rabies—were the result of the introduction of infection from Europe. With regard to tuberculosis, diphtheria, influenza, gonorrhœa, beri beri, and malaria, the case is more doubtful; but these maladies do not seem to have been noticed among the native tribes by the earlier explorers. The origin of syphilis and yellow fever alone can with some degree of certainty be assigned to American soil. As contributory causes to this immunity from infection, the dispersion of the tribes in isolated camps, and the lack of domestic animals (the horse being connected with glanders, the cow with tuberculosis, and the goat with Malta fever), may have prevented the spread of disease.

Dr. Williams further attempts to identify the serious epidemic which prevailed on the western coast about 1612–20. When the Puritans appeared on the scene they found this region almost entirely depopulated, and they regarded the epidemic as a dispensation of Providence which had removed the savages to make room for the Europeans. It seems probable that this terrible malady was introduced by foreign settlers. It is very generally supposed to have been an outbreak of small-pox or yellow fever; if this be the case, it is remarkable that the early travellers should not have described it under those names. It is significant that in 1614 that ruffian, Hunt, kidnapped several natives, who were carried to Europe, and after a time those who survived were brought back to their native country. Bubonic plague prevailed in London from 1603 to 1611, and sporadic cases were reported in the following years. The European settlers in America seem to have escaped the disease; and if, as seems most probable, the terrible mortality among the Indians was due to plague, the settlers may have been protected, as in the recent epidemic in India, by the fact that they were cleaner in their habits and better shod than the native population, and that they were thus less liable to contagion through wounds or insect bites.

OPTICAL ACTIVITY WITH NO ASYMMETRIC ATOM.

AN important paper by Profs. Perkin, Pope and Wallach on optically active substances containing no asymmetric atom appears in the Chemical Society's Journal for November. The substance described is 1-methylcyclohexylidene-4-acetic acid, and its structure is represented by the formula



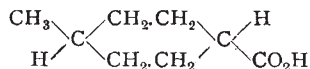
The carbon atom (1) is linked to two identical chains of atoms, and is therefore not asymmetric. The optical activity of the compound depends on the fact that the plane

of the $\begin{array}{c} \text{CH}_3 \\ \diagdown \\ \text{C} = \\ \diagup \\ \text{H} \end{array}$ group is at right angles to the plane of

the $\begin{array}{c} \text{H} \\ \diagdown \\ \text{C} = \\ \diagup \\ \text{CO}_2\text{H} \end{array}$ group, the former being perpendicular to

the plane of the hexagonal ring and the latter identical with it; the dissimilarity of the —H and —CH₃ radicles

destroys the symmetry on either side of the plane of the ring, whilst the dissimilarity of the $-H$ and $-CO_2H$ groups destroys the symmetry about the perpendicular plane. The compound therefore fulfils the fundamental condition for enantiomorphism, namely, that no plane of symmetry shall exist. By way of contrast it may be noted that the compound



could not exist in enantiomorphous forms or exhibit optical activity, because the four radicles are all situated in a plane (perpendicular to that of the ring) which would thus form a plane of symmetry of the molecule.

Extraordinary difficulties were encountered in effecting the resolution of the acid. Owing to its weak basicity the salts were very ill-defined, and the brucine salt by means of which the resolution was finally accomplished separated from its solutions as an oil which only slowly became crystalline. Again, the brucine salts of the enantiomorphous acids were so similar that an exceedingly tedious process of re-crystallisation was required before they could be obtained with a constant rotatory power, and even then the acids separated from them were not homogeneous, but proved to be capable of further resolution. Evidently the salts are not only similar, but partially isomorphous. Finally, however, both acids were obtained in a pure state, the *l*-acid giving $[\alpha]_D -81.1^\circ$ and the *d*-acid $[\alpha]_D +81.4^\circ$ in absolute alcohol (0.145 gr. in 20 c.c.).

TECHNICAL EDUCATION IN MANCHESTER.

THE sixth annual report of the Manchester Education Committee, dealing with the work of the year 1907-8, has now been published, and provides an excellent example of the way in which an educational authority can build up a complete and duly correlated system of education to meet the precise needs of the area under its charge. The report deals fully with higher, secondary, and elementary education.

The section dealing with higher education is concerned with the year ending in October, 1908, and deals chiefly with technical education. The number of individual day and evening students enrolled at the Municipal School of Technology for the session ending July 31 was 5299, as compared with 5149 for the previous session. The number of individual students enrolled in the day departments was 661, as compared with 651 for the session 1906-7. The class entries for the session were 11,379, against 10,979 for the session 1906-7. These figures do not, however, include the class entries in respect of students in the day departments of the school. Computing the total volume of work of the evening departments in student-hours—that is, by multiplying the number of students enrolled by the total number of hours' instruction given during the session—it was found to be 459,805. The actual volume of work, namely, the total number of hours of instruction multiplied by the actual attendances, was 302,162 student-hours, or 60 per cent. of the total volume of work. Whichever method of computation is adopted, the result obtained shows a marked increase on the previous session.

The imperial grant received year by year increases steadily, amounting during 1906-7 to 9773*l*. The capita­tion grant paid by the Lancashire County Council in respect of students outside the Manchester area was, for 1907-8, 1226*l*. The Cheshire County Council compounds, so far as its students are concerned, and from this source the school received 400*l*.

It is interesting to notice that a certificate has been instituted this year for students attending the engineering apprentices' course, held on Mondays from 9 a.m. to 6 p.m. throughout the session. To satisfy the conditions of award, students must pass all the prescribed examinations upon completion of the two years' course of study. The certificate has now been awarded to thirty-seven students, who have attended the course during the past four sessions. A similar day course for apprentice painters and decorators has also been inaugurated. The committee of the school has had under consideration the question of extending the facilities to apprentices in other

industries for instruction and training during one whole day a week, so as to relieve them from attendance at the evening classes, and at the same time to give additional time and opportunity for homework and study in the evening. After consultation with the Master Plumbers' Association of the Manchester and Salford district, a scheme has been drawn up for apprentice plumbers on the same lines as the course for apprentice engineers.

During the past year opportunity has been taken to improve and develop the organised courses of instruction in several of the evening departments in order more thoroughly to systematise the training given, and to bring the various subjects of the respective evening courses into closer organic relation. The courses in the departments of mechanical engineering, electrical engineering, architecture and builders' work, municipal and sanitary engineering, and textile manufacture, are thus graduated and organised to cover a period of three or five years, leading up to the evening certificate or diploma of the school, as the case may be.

A large number of tests has been carried out during the year for various firms in Manchester and district, and the facilities which the school offers for mechanical and electrical tests, and tests and analyses of a chemical nature, are taken advantage of increasingly, as shown by the fees received, which have increased from 119*l*. in 1904-5 to 319*l*. in 1906-7, and 352*l*. in 1907-8. The members of the staff have been responsible during the session for a considerable amount of original research, a large portion of which has been embodied in papers read before various scientific societies, and published in the journals of the scientific and technical Press.

Not only does the committee govern the Municipal School of Technology, but aids higher education in other ways. It recommended to the City Council the grant of 4000*l*. received by the Victoria University of Manchester, and is responsible for the grants received from the council by the secondary schools of the district.

ON THE INVENTION OF THE SLIDE RULE.¹

SOME modern writers attribute the invention of the rectilinear slide rule to Edmund Gunter, others to William Oughtred, but most of them to Edmund Wingate. This disagreement is due mainly to lack of opportunity to consult original sources. It is the purpose of this paper to demonstrate that Wingate never wrote on the slide rule, and that Oughtred is the inventor of the rectilinear as well as the circular type.

It was pointed out by Prof. De Morgan that Gunter invented Gunter's line or scale, but that he did not invent the slide rule. As Gunter's works are found in most large libraries, the correctness of this statement can be readily verified. This scale was not a slide rule, for it had no sliding parts.

No one denies that William Forster published in London in 1632 a book entitled "The Circles of Proportion," which described the circular slide rule invented by William Oughtred. In the dedication it is said that Oughtred invented also the straight-edge type; but this was not described until 1633, when Forster brought out an "Addition unto the Use of the Instrument," with an appendix entitled "The Declaration of the Two Rulers for Calculation," which described the rectilinear slide rule.²

The question remains, Did Wingate invent the straight-edge slide rule, and is he entitled to priority over Oughtred? De Morgan maintained that Wingate never wrote on the slide rule,³ but he had not seen all of Wingate's books. Thus he admits⁴ that he had not examined Wingate's "Of Naturall and Artificial Arithmetique," 1630, yet this very book is quoted by several recent writers as describing the slide rule⁵; but these and all writers who name Wingate as the inventor invariably fail to give

¹ Abstract of a paper, by Prof. F. Cajori, read before the Section of Mathematical and Physical Science of the British Association, Winnipeg, August 27.

² For extracts see Cajori, "History of the Logarithmic Slide Rule." (New York: Engineering News Publishing Co., 1900.)

³ "Penny Cyclop.," Art. "Slide Rule," and Wingate, Edmund, "Arithm. Books," pp. 38, 42. (London, 1847.)

⁴ "Arithm. Books," p. 48.

⁵ A. Favaro in "Veneto Istituto Atti" (5), 5, 1878-9, p. 500; Mehmke in "Encyklop. d. Math. Wiss.," vol. 1, p. 1054. (Leipzig, 1898-1904.)