with 100,000 dollars a year for the next five years the insect will be practically exterminated, and the remaining five years will be spent in a careful watch of the entire territory, lest a few insects might have been overlooked in isolated localities. Unless a sufficient amount is appropriated to make a very substantial gain each year, it would be better to abandon the work entirely."

It is perhaps not surprising that, after having already spent half a million of dollars in what many persons, rightly or wrongly, considered the hopeless task of exterminating a single insect, the Committee's application for a continuous grant of 200,000 dollars annually should have met with much opposition. A proposal was made to reduce the amount of the grant for 1898 to 75,000 dollars; but it was successfully resisted, and ultimately the full amount of 200,000 dollars asked for was granted for the year.

Another European moth-pest has lately been introduced into America—the Wood Leopard Moth (*Zeuzera pyrina*), which is at present rapidly destroying the shade-trees of New York. But this insect is still more difficult to deal with than the Gipsy Moth, for its naked yellow, black-spotted caterpillar feeds inside the wood of the trees, like that of the Goat Moth, to which it is allied; whereas the black, red-spotted tufted caterpillar of the Gipsy Moth feeds exposed on the leaves of its food-plants.

Different countries exchange their injurious animals and plants from time to time, but no one can tell beforehand which species are likely to establish themselves and to become injurious. We have seen that the Gipsy Moth had ample opportunities of becoming as injurious in England as in America; but, nevertheless, it has died out.

On the other hand, the Woolly Aphis (*Schizoneura lanigera*), which is one of the worst pests of our apple-trees, is said to have come from America, and is often called the American Blight. The vagaries of plants are equally uncertain. Our common water-cress, a harmless plant enough, one would think, has developed a giant form in New Zealand, which is blocking up the water-courses. In the middle of the present century, an American water-plant (*Anacharis alsinastrum*) was introduced into England by some accident, like the Gipsy Moth into America, when it was called the new water-weed, and caused great trouble for a time by choking up rivers and ponds. Fortunately, however, after a few years the plant seems to lose its vitality, and ceases to become a pest, owing, as is supposed, to the female plant only having been introduced into England, and it therefore propagates by buds alone.

Time will show whether the Gipsy Moth will continue its devastations in America, or whether it will either be exterminated by the energetic measures taken for its destruction, or by the conditions of American life proving ultimately unfavourable to it, notwithstanding its first rapid increase. It is evident that, although we cannot avoid the accidental introduction of injurious plants and animals from abroad, some care should be taken in introducing any which might become injurious into another country. M. Trouvelot's experiments were intended to benefit the silk industry in the United States; but they have resulted in letting loose a pest which hundreds of workers are now striving, at enormous annual expense, to eradicate if they can. Let us hope that their efforts may be crowned with success, for otherwise the whole of temperate North America may suffer more or less severely, as the infested districts of Massachusetts are now suffering.

W. F. KIRBY.

THE AUSTRALASIAN ASSOCIATION.[1]

AN Association for the Advancement of Science which can produce, as the record of one year's proceedings, such a volume as the one before us, is at once an indication that a widely-spread interest in science and a vigorous scientific activity already exist, and a promise of future progress. It is a volume on the production of which the Australasian Colonies may be sincerely congratulated.

The Australasian Association for the Advancement of Science held its first session at Sydney in 1888; it next met in Melbourne in 1890; then in Christchurch (New Zealand) in 1891, in Hobart (Tasmania) in 1892, in Adelaide in 1893, in Brisbane in 1895, and in Sydney again in 1898. We do not know whether the fact that only one meeting was held in the five years from 1893 to 1898 was connected with the commercial difficulties through which Australia has recently passed; if so, we trust that the resumption of meetings last year may be taken as a sign of returning prosperity.

The constitution of the Association and the order of proceedings at the general meetings are evidently closely modelled on those of the British Association. The public proceedings begin with an evening address delivered by the President for the year; on the following days, meetings of the several Sections are held, relieved by evening lectures, including one to "working men," conversazioni and concerts, garden parties (with "the number of invitations limited"), Saturday afternoon excursions, and, to wind up the whole entertainment, excursions going further afield. One who is accustomed to the doings at the annual gatherings of the British Association would find himself familiar with the whole programme of its Colonial counterpart. Perhaps he might find his way into a Section whose name and subject he had not been used to in the old country, but he would find most of them just what he was accustomed to, as the following list of Sections will show, namely:—Section A—Astronomy, Mathematics, and Physics; Section B—Chemistry; Section C—Geology and Mineralogy; Section D—Biology, with the sub-departments Botany and Zoology; Section E—Geography; Section F—Ethnology and Anthropology; Section G—Economic Science and Agriculture; Section H—Engineering and Architecture; Section I—Sanitary Science and Hygiene; Section J—Mental Science and Education.

To review with any completeness a volume of over eleven hundred pages, dealing with the almost unlimited range of subjects covered by the ten Sections here enumerated, is obviously impossible. All that we can attempt is to indicate some of what appear to us to be among its more noteworthy contents.

There can be little doubt that the most serious contribution to pure science contained in it is the "Report on our Knowledge of the Thermodynamics of the Voltaic Cell," by Mr. E. F. J. Love. This is a really admirable account of the results that have been obtained, chiefly by Lord Kelvin, Willard Gibbs, and von Helmholtz, by the application of thermodynamic considerations to voltaic phenomena. These results are deduced simply and concisely, and are discussed throughout in relation to the experimental tests to which they have been subjected by various observers. It would, we think, be welcome to many physicists if this paper were reprinted in some more generally accessible publication than the bulky volume before us.

In his presidential address to Section A, Mr. Baracchi, Government Astronomer at Melbourne, gives a very interesting account of the great International Photographic Survey of the Heavens, and especially of the share in this

[1] "Report of the Seventh Meeting of the Australasian Association for the Advancement of Science," held at Sydney, 1898. Pp. lii + 1161.

work undertaken by the Observatories of Sydney and Melbourne. Another part of his address is devoted to urging the importance of a systematic magnetic survey of the Australasian Colonies, and establishing a permanent magnetic observatory in New Zealand. Among other communications to this Section, we may mention an elaborate account of the Trigonometrical Survey of New South Wales, by Mr. T. F. Furber. This work is apparently being carried out with great judgment and skill. The author gives a comparative table, showing the mean errors of the angles in a large number of surveys carried out in Europe, the United States, and elsewhere, which seems to justify him in saying that "The above figures speak for themselves in showing that our work is probably equal to that done in any part of the world." A tide-predicting machine, described by Captain A. Inglis, seems to be recommended by simplicity of construction; the periodic components are represented by templates cut to accurate sine-curves, with appropriate differences of wave-length, which are all fed through the machine at the same speed.

Naturally Australasian fauna and flora, geography and geology, supply material for a large number of descriptive papers. Among these, "A short Dichotomous Key to the hitherto known Species of Eucalyptus," may be remarked. The author, Mr. J. G. Luchmann, identifies no less than 140 species of this, the most important Australian genus of timber-trees. In connection with this paper, we may mention a timely and very earnest protest by Mr. W. S. Campbell against the wantonly improvident destruction of forest trees which is, unfortunately, so common in Australia, as well as in the United States and Canada.

Some of the fundamental questions of social economy, including the production and distribution of wealth, are ably dealt with by Mr. R. M. Johnston, Government Statist of Tasmania, in a presidential address to the Section of Economic Science and Agriculture. Some of Mr. Johnston's conclusions by no means coincide with what are at present fashionable in certain circles in this country, as will be evident from the following quotation: "It is the country which relatively places the smallest number of hands on the land for the production of food and raw products which has also attained the highest stage of progress. . . . I deny, therefore, most emphatically that whatever distress in the United Kingdom still exists would be lessened by any scheme which would place more hands on the land than its economic conditions demand for the production of food and raw products."

The social conditions of the Colonies apparently encourage a relatively great development of governmental participation in industrial operations. After giving some interesting records of his experience as Engineer-in-Chief of Railways and Public Works in South Australia, Mr. A. B. Moncrieff strongly urges the adoption, by the different Colonies, of a uniform system of preparing estimates and keeping records of public engineering work; for, as he rightly points out, in the absence of such a system it is not possible to institute fair and useful comparisons between the works carried out by the engineers of the different Colonies, such as are needed to promote a healthy rivalry among them. The work undertaken for supplying water for agricultural purposes over large areas of dry country seems likely to have very important and beneficial results. Mr. Moncrieff gives some interesting particulars of these operations, and mentions one boring that has been carried to a depth of 3000 feet, which yields 800,000 gallons per day of excellent water at a temperature of 176° F.

A large proportion of the most interesting papers in the volume, including most of those we have mentioned, are due to men who are at the head of various official departments. If the authors of these papers may be taken as fairly representative of their colleagues, we think there is ground for congratulating the Australasian Colonies on the intellectual quality of their chief officials. It appears clear that these men do not rely for departmental efficiency on a blind following of routine, but on an intelligent recognition of the conditions under which they are placed, and of the true nature of the facts with which they have to deal.

Taking the volume as a whole, it gives evidence of solid progress achieved and assurance of future advance.

SIR FREDERICK McCOY, K.C.M.G., F.R.S., &c.

IN the death of Sir Frederick McCoy, geological science loses one of its most devoted and enthusiastic disciples, one who in early life was associated with Sedgwick in the preparation of that classic work, the "Synopsis of the Classification of the British Palæozoic Rocks; with a systematic description of the British Palæozoic Fossils in the Geological Museum of the University of Cambridge," a quarto volume published in 1855.

Sir Frederick McCoy was the son of Dr. Simon McCoy of Dublin, in which city he was born in 1823. He was educated at the Universities of Dublin and Cambridge, and intended at first to devote himself to the medical profession, but natural history, and the study especially of fossil organic remains, absorbed his chief attention. When but eighteen years of age he had prepared and published a Catalogue of Organic Remains exhibited in the Rotundo, Dublin. Later on, he assisted Sir Richard Griffith in his researches on the fossils of the Carboniferous Limestone of Ireland, and afterwards they prepared a joint "Synopsis of the Silurian Fossils of Ireland," which was issued in 1846. In the same year, McCoy went to Cambridge to help Sedgwick, and we learn (from the "Life and Letters" of that eminent professor) that the new assistant devoted himself for at least four years "uninterruptedly and with unflinching zeal" to the determination and arrangement of "the whole series of British and Foreign Fossils" in the Museum. In 1850, he was appointed Professor of Geology in the Queen's College, Belfast. Meanwhile, he continued to labour at the great work previously mentioned, and which associates the names of Sedgwick and McCoy in the minds of all students of the Cambrian and Silurian rocks. This work was barely finished when McCoy, in 1854, accepted the newly-founded Professorship of Natural Science in the University of Melbourne.

Apart from the larger works to which he had contributed while in this country, McCoy had published numerous papers dealing with fossil Fishes, Crustacea, Echinoderms, Corals, and Foraminifera. He was indeed well prepared for the arduous and successful labours which he now undertook in a new home. Becoming associated with the Geological Survey of Victoria, he established the "Prodromus of the Palæontology of Victoria; or Figures and Descriptions of the Victorian Organic Remains," issued in decades, and he contributed many palæontological reports for the Survey. He also founded the Melbourne National Museum. His latest contribution to science, "Note on a New Australian *Pterygotus*," was printed in the *Geological Magazine* during the present month.

In 1879, he received the Murchison Medal, which was awarded to him by the Geological Society of London, of which society he became a Fellow in 1852. In 1880, he was elected a Fellow of the Royal Society, and he was one of the first to receive the honorary degree of D.Sc. from the University of Cambridge. In 1886, he was made a C.M.G., and in 1891 he was worthily promoted to be K.C.M.G. It is astonishing to note that, while for fifty-eight years he contributed to palæontological literature, his age at his death in May 1899 should be no more than seventy-six.

H. B. W.