instances before the travellers had left home, so that it was competent for the recipients to inform themselves thoroughly on Australian topics before reaching the country. Members joining locally in Australia received the Commonwealth volume and that relating to their own State. The volumes are not uniform in style, though they were all prepared on an approximately uniform plan, specially for the occasion, with the exception of the Queensland volume, which was that originally issued in 1909, by authority of the Government, under the title of "Our First Half-Century," in commemoration of the jubilee of the State.

The volumes form a fine monument to the scientific achievements of Australian workers, for they contain chapters by acknowledged experts in every department of science—natural, economic, social, and political. Thus the Commonwealth volume, edited by Mr. G. H. Knibbs, the Commonwealth statistician, and published at the charge of the Federal Government, contains chapters on the history of Australia, by Prof. Ernest Scott, of Melbourne; the aborigines, by Prof. Baldwin Spencer; physical and general geography, by Mr. Griffith Taylor; climate, by Mr. H. A. Hunt; vegetation, by Mr. J. H. Maiden; animal life, by Prof. W. A. Haswell; geology, by Prof. Edgeworth David, Prof. E. W. Skeats, and Messrs. T. S. Hall, W. S. Dun, and F. Chapman; astronomy and geodesy, by Mr. P. Baracchi; pastoral and agricultural development, by Mr. G. A. Sinclair; mining fields, by Mr. E. F. Pittman; manufactures, etc., by Mr. Gerald Lightfoot; education, by Prof. F. Anderson; political systems, by Prof. Harrison Moore; and miscellaneous notes, by the editor. This is in itself a very notable list, and while some of the names in it reappear among those of the contributors to the States volumes, we find also in these the names of other well-known workers in special fields, too many to detail here.

It is the purpose of the Commonwealth volume to provide a general scientific survey of Australia, while the States volumes give details each for each. While absolutely perfect co-ordination between the various volumes was scarcely to be expected, the many writers have clearly received and acted upon very precise editorial instructions as to their different fields, and duplication has been avoided as far as possible. Thus, even if the visit of the association had effected no other good, it has brought into existence a remarkable compendium of present knowledge of the continent of Australia and its resources, and a record of progress in human endeavour to make use of those resources, such as exists probably for no other country which is at a similar stage of development. These volumes, therefore, apart from their intrinsic interest and value at the moment, will become a valuable historical record. Frequently throughout them all writers are found to look forward to fields of future work, whether in the direction of pure scientific research or of economic development in which science will play a leading part.

In most of the volumes there are many excellent photographic reproductions, though the New South Wales book is less satisfactory than the rest in this respect. Particular mention may be made of a coloured plate in the Western Australia volume representing some of the wild flowers for which the State is famous. When photographic illustration is so successfully carried out, it is the more notable that the draughtsmanship and reproduction of maps is generally not so, and the valuable material which is available in the departments of geology, meteorology, and others suffers to some extent, though not always, in its representation by this means.

These handbooks were supplemented by booklets dealing with many of the excursions undertaken by members from different centres, so that the scientific interests of the visitors were provided for at almost every step, even if the guidance and verbal demonstrations given by their leaders on the spot had been less efficient than it was. The subject-matter of each State handbook is arranged under headings broadly similar to those of the Commonwealth book detailed above, with the exception of the Queensland volume, which, having been prepared, as has been seen, for a different purpose originally, deals more exclusively with historical, economic, and social topics than the others. From the point of view of the natural sciences this is unfortunate, but with such a book already in existence it was perhaps not to be expected that another should have been compiled.

It may be well to make clear that the British Association is not concerned in the issue of these books, which were compiled and issued by the Australian authorities; it is not stated whether they will be made accessible to the public.

CHEMISTRY AT THE BRITISH ASSOCIATION.

MEETINGS of the Chemistry Section were held only in Melbourne and Sydney, but in each of these cities they extended over three days. There were two joint discussions with other sections, and a number of locally contributed papers showed that in both Victoria and New South Wales a considerable amount of chemical research is being carried out, some happily on lines of special interest and value to Australia. It is to be regretted that such local features as the natural products of the characteristic Australian indigenous flora and the important problems connected with soil should not earlier have attracted local chemists, but as two sectional committees of the association are now engaged in examining the natural plant products we may hope that much will be recorded before the ever-increasing destruction of native trees and plants precludes any attempts at completeness.

MELBOURNE.

After the president's address Prof. Masson described an ingenious rearrangement of Mendeléeff's periodic table, by means of which many of the existing difficulties are removed. Instead of writing the elements in their eight groups in a two-dimensional figure throughout, Prof. Masson uses a mixture of two and three dimensions. Suppose the elements (rare earths excepted) be written in the order of their atomic weights on the inside of the covers of a book in horizontal lines, and the rare elements in their appropriate place along an uncut leaf, a fair picture of the arrangement is given. The rare earths follow each other along a horizontal series with little difference between any two members, but the end members of the series approximate to the ordinary elements found on the extreme right-hand side of the left-hand cover and the left side of the right-hand cover in the same horizontal line as the rare earths. Prof. Masson places hydrogen with the halogens, a position that is at least disputable, though by doing so the inactive gases at once form a complete series. Several properties of hydrogen and the hydrides are held to justify this position and the atomic weight of fluorine is almost the mean between those of hydrogen and chlorine.

Mr. F. H. Campbell described a method for the determination of vapour pressures the principle of which is that a liquid saturated with a suitable gas

(usually hydrogen) is allowed to evaporate into an enclosed space filled with the same gas at the same temperature and pressure. After the volume has been restored to its original value the increase in pressure is recorded on an open manometer.

A new method for determining the specific heat of liquids was described by Mr. E. G. Hartung. It consists in measuring the lowering of temperature of a known amount of the particular liquid on the introduction of a definite weight of dry ice contained in a thin glass bulb, and the method claims attention on account of its simplicity, rapidity, and accuracy, except in the case of viscous liquids like glycerine. The formation of nitric and nitrous acids in the rainfall near Melbourne has been correlated with the weather conditions by Mr. G. V. Anderson, and reveals the fact that the nitrous acid attains a maximum in winter, and a minimum in summer. It further varies with the type of weather, the total oxidised nitrogen attaining a maximum with monsoonal and a minimum with Antarctic conditions.

A joint discussion with the Physics Section on the structure of atoms and molecules has been referred to elsewhere in NATURE. It will suffice here to say that there appears to be a gulf between the views of the physicist and chemist, and little attempt made to bridge it. The former concentrates attention on the internal atomic structure, at present of only secondary importance to the chemist, while on the chemically all-important matter why atoms combine in definite ways to form molecules he has little or nothing to say.

The Melbourne programme was completed with papers by Prof. G. T. Morgan on residual affinity and co-ordination, and by Dr. A. Holt on a comparison of the phenomenon of the occlusion of hydrogen by charcoal and by palladium.

SYDNEY.

A joint discussion with the Agricultural Section on metabolism occupied one day, and was a most successful feature of the sectional programme. It was opened by Prof. H. E. Armstrong, and among the various speakers may be mentioned Mr. A. D. Hall, Mr. Darnell-Smith, Profs. B. Moore, Waller, and J. B. Wood. The discussion covered a considerable field, and for convenience may be divided into three parts. The earlier part was devoted to what may be called the formaldehyde problem and enzyme action. It cannot be said that any very definite conclusion was reached, but many interesting views were put forward, so that though the photo-synthetic processes associated with assimilation may still be said to demand further attention, great advances have been made along this line of research. Enzyme action is a fruitful field for speculation. It may be true, as suggested in the discussion, that for the metabolic synthesis of protein and fat from carbohydrates a linkage and co-ordination of an endothermic with an exothermic reaction is necessary, and that for such synthesis a colloidal regulating mechanism must be furnished by an adsorption of enzymes into the cell protoplasm, but enormous difficulties are presented to the experimental proof of such views, and when we are told that an enzyme being a colloid has its action determined by its previous history, and hence that two portions of the colloid may act differently, confusion and difficulty of proof becomes greater. This part of the discussion was full of interest, for it showed the keen attention that is being paid to those all-important subjects.

Production of fat and skin temperatures was next considered, and the conclusion was reached that though many factors come into play, fat production is associated with low skin temperatures. As the air temperature rises the skin temperature may be higher than that of the internal organs, and hence skin temperatures must not be carelessly employed as an indication that an animal is a good or bad doer, for fat production and internal temperature must also be related.

The discussion was concluded by papers dealing with cyanogenetic plants and distribution of nitrogen in seeds by Dr. J. M. Petrie. It appears that in New South Wales more than a thousand species of plants have been examined for hydrocyanic acids and cyanogenetic glucosides, sixty of them giving positive results, and of these forty-four were native to the State, and represented seventeen natural orders. Some plants which are cyanophoric in Europe do not appear to be so in Australia, whilst in others, the Australian grown plant retains its glucoside to maturity instead of losing it when half-grown. A series of specialised papers, six of which were contributed locally, were read on another day, but it is only possible here to enumerate their authors and titles. Prof. G. T. Morgan, "Non-aromatic Diazonium Salts"; Prof. Robinson, "Researches on the Synthesis of *iso*Quinoline Alkaloids"; Mrs. G. M. Robinson, "Condensation of Cotarnine and Hydrastinine with Aromatic Aldehydes"; Dr. H. McCombie, "Influence of Substituents on the Velocity of Saponification of Phenyl Benzoate"; Dr. A. Holt, "The Colouring Matters of Certain Marine Organisms"; Prof. Fawsitt, "The Corrosion of Iron and Steel by Artesian Waters in New South Wales"; Dr. G. Harker, "The Use of Waste Gases of Combustion for Fire Extinction and Fumigating Purposes"; Mr. S. Radcliff, "The Extraction of Radium from Australian Ores"; Mr. G. J. Burrows, "The Inversion of Cane Sugar by Acids in Water-Alcohol Mixtures."

An experimental lecture by Prof. H. B. Dixon on gaseous explosions and a beautiful demonstration of optical properties of crystals and liquid crystals by Prof. Pope completed the programme. Both were attended by large and appreciative audiences. In conclusion it may be said that the work of the section was in every way successful, and was almost double in amount that at an ordinary meeting in Great Britain. The audiences, too, were good, and though the Australians are so distant from their brother chemists in Europe they exhibit an interest and enthusiasm not always seen in meetings of the section at home.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

GLASGOW.—The University Court has framed an Ordinance establishing the degree of B.Sc. in applied chemistry. The curriculum extends over four years, and includes nine full courses of study, of which five at least must be taken in the University or in the Royal Technical College affiliated thereto. After the usual preliminary examination, courses in mathematics, natural philosophy, and chemistry are prescribed, followed by a first science examination. Thereafter the student may pursue courses of study in advanced chemistry, inorganic, physical, and organic; technical chemistry and chemical engineering; engineering drawing; practical physics; and one of certain special branches, such as fuels, dyeing, oils, sugar, biochemistry, and technicological mycology (fermentation). Or, on the metallurgical side, he may take courses in advanced chemistry (inorganic), geology, and mineralogy; engineering and drawing; metallurgy, including fuels; electrical engineering; and one of certain special branches, such as precious metals,