was more common in old dairy cows and working bullocks than it was in beef cattle, because they were allowed to live longer. Referring to cancer in the ear in sheep, the speaker remarked that chronic irritation was held to be one of the common causes of a certain type of cancer in man. The same cause was at work in the production of cancer of the ear in sheep. The same point was also brought out in connection with what was known in horses and cattle as brand cancer. I must not be assumed, however, that all cases of ear trouble in sheep, or what was known as "brand cancer," were true cancers, because the greater number of them were not. Sometimes, in those cases, something happened to the part that instead of recovering or remaining a case of inflammation, it developed into a malignant growth, or cancer. Continuing, the speaker discussed the question of food being the cause of cancer of the bowels and of childbearing, including the milk-producing function of the breasts being the cause of some forms of cancer in women, and contrasted it with a variety of cancer in the same organs in animals, such as cows and dogs. He added that if those points that were common knowledge of the veterinarian were taken cognisance of by the investigators of cancer in man, more valuable light might be thrown upon some of the theories held as to the existing cause of that dreadful disease.

### Hereditary Defects.

Present-day civilization meant that many lived who would formerly have died before they reached maturity, which meant that the unfit, as well as the fit—that was in reference to cancer—survived and many begot progeny that were peculiarly susceptible to conditions which might result in cancer formation when they reached adult or old age. On the other hand, many animals were killed for food in their prime or when their usefulness had disappeared. Furthermore, there was, generally speaking, a selection made in breeding, not of course with the idea that the progeny should be cancer resisting, but nevertheless that factor might be at work unwittingly; also that as a general rule only select types of animals were allowed to perpetuate their species, with the result that this unconscious action had meant that the incidence of cancer was stationary in animals when it was progressing in man. In order to emphasize his train of thought the speaker referred to what were known as hereditary unsoundnesses in horses, where it was known that if a sire possessed certain defects there was always a danger that his progeny might develop the same type of defect. Weakly animals did not usually survive infancy, not to speak of youth. He was careful to emphasize that in speaking of unfitness in human beings, he did not mean it in a mental or an ordinary physical sense, but solely in connection with the tendency of some of the cells of the body to grow in such a manner as to result in cancer formation. Again, more close co-operation between the human and veterinary pathologist was needed in behalf of humanity.

## CHEMISTRY IN UNIVERSITIES.

### By Professor A. C. D. Rivett.

In his Presidential address to section B Professor A. C. D. Rivett paid a tribute to the work of Professor E. H. Rennie, the senior active teacher of chemistry in the universities of the Commonwealth, and regretted that, as was all too frequently the case in Australia, pressure of administrative work had steadily made it more and more difficult for Professor Rennie to devote himself to original investigations. The general plan adopted by their section at the congress of giving by far the greater of its time to general discussions on fundamental modern enquiries, rather than to single papers in isolated subjects was warmly supported. If it were a success, and made customary, it was possible to look forward every two years to much mutual stimulus from the treatment from various points of view, of the chief chemical problems to which attention throughout the world was being directed at the time.

### An Enormous Field.

The diversity of the discussions set out on the programme of the section brought home to them a sense of the enormous breadth of the field of chemistry to-day. To compass it was beyond any one man's power, and it was perhaps worth while to ask whether the specialization now prevalent in schools and universities was the right way to meet the task of educating chemists. The average student entering a university with the object of becoming a chemist was very keen and alert, but he was very heavily handicapped as a rule by inability to express himself clearly and readily, and by the absence of a well-developed habit of reading. Those two negative qualities were severe drawbacks, and it was suggested that the reason for their occurrence was an undue prominence in school work of practical science, with a corresponding reduction in the time and energy devoted to literary studies. Rather narrow specialization seemd almost unavoidable in science faculties in universities. It might be well for the schools to leave that to the latter, while they themselves aimed at cultivating the broader general outlook, the attainment of which at the university stage seemed to be becoming less and less possible, except for the rare student who refused to limit his studies to his approved course. In the specialized training of the universities there were many difficult questions for the chemist to face. The entry for chemical philosophy nowadays, seemed to be through the gateway of the physicist's atom, in terms of which Valency, the fundamental chemical characteristic, was to be explained. He asked, did not that imply a very different mode of approach to the subject from the one hitherto adopted? They seemed to be at a stage in chemical teaching when a sharp turn was imminent.

### Necessity for National Research.

In conclusion, he made an earnest plea for an effort by all chemists to educate their countrymen to a realization of the significance of organized national research into their profession's huge and adequately equipped and financed. The most practical path to that was undoubtedly through a national institute, adequately equipped anad financed. The deplorable position of the Commonwealth Institute of Science and Industry was a grave misfortune. The Treasury provision for its vast tasks was nothing less than contemptible. No more urgent immediate practical task lay in front of Australian scientists than the creation in the country at large, and in its political leaders, of a strong and intelligent realization of the vital importance of national research of the type originally in view when this institute was founded during the war. To get the institute placed on a sound basis would be one of the greatest possible achievements of scientific men at the present stage of their national development.

## VOLCANIC ACTIVITY IN QUEENSLAND.

### By Professor H. C. Richards.

In the geological section Professor H. C. Richards gave his presidential address on "Volcanic activities in Queensland." He said that in Queensland, as elsewhere, there was a very close association between the products of Vulcanism and the mineral resources. One expected close association between intrusions and ore bodies, but in Queensland there was found frequently a close relationship between the effusive rocks and the ores of gold and copper and the matrices containing sapphires, opal, and alum. Moreover, there were very close relationships between the great coal deposits of central and northern Queensland and the volcanic products. What this State owed especially to Cainozoic volcanic activity for her rich coastal strip carrying valuable soft woods under natural conditions, and flourishing sugar cane, banana and maize crops, and dairying pastures under the hand of man, could be understood only by those who had travelled the Queensland coastal strip of from 100 to 200 miles in width, from the northern rivers district of New South Wales up to the base of Cape York Peninsula. The Palaeozoic era, especially during the Devonian and Permo-carboniferous periods, was characterized by very great activity, and it was likely that lava flows of an acid to sub-acid nature were extruded in northern Queensland in pre-Silurian and Silurian times as well. The Devonian activity was especially pronounced in southern Queensland, and there was today an accumulation of 6,000 ft. of lavas and tuffs of an andecitic or spilitic nature. An interesting feature about them was their association with great thicknesses of radiolarium charts. In central Queensland there were some basaltic outpourings, probably of Carboniferous age, but it was in the lower and upper stages of the Permo-carboniferous period that they had the serious rival to the Cainozoic activity. The relationship between the volcanic activity and earth movements was difficult to establish, for the Palaeozoic era, but they knew that in post-Devonian and pre-Permo-carboniferous times Queensland was subjected to very strong orogenic movements, and then following upon those they had the widespread and prolonged activity of lower Permo-carboniferous times. In the Cainozoic era there was a peirogenic uplift, taking the form of a gentle warp, trending parallel with the coast. The uplift ranged from 3,000 to 4,000 ft., and the volcanic eruptions were mainly of a basic nature, and followed the trend of the warp of the eastern main divide.

## IDEAS OF SPACE AND TIME.

### By Professor D. M. Y. Sommerville

In the astronomy, mathematics, and physics section the presidential address was delivered by Professor D. M. Y. Sommerville. He took as his subject the "Development of the ideas of space and time." The theory of the relativity was, he said, not only the most fundamental thing in present-day thought, but it marked the most thorough revolution in the scientific and philosophical conception of the universe since Copernicus. Essentially a geometrical theory, it had seized upon the already wide spacial generalizations which were to hand, and had applied these and developed them in an all-embracing process of geometrizing. The address traced in brief outline the development of spacial ideas, from the earliest origins of geometry in Egypt and the marvellous advances of the Greeks. The first philosophical criticism of spacial ideas arose in connection with the theory of parallel lines, and that led to the discovery early in the 19th century of the famous non-Euclidean geometry of the Russian Lobachevsky and the Hungarian Bolyai. A further idea of spacial ideas arose sporadically about the same time about the conception of space of four, and more, dimensions. By a combination of these ideas arose the ideas of "curved space." These conceptions were all clearly defined, and the mathematical apparatus for dealing with them elaborated to a considerable extent long before the theory of relativity was thought of. They were entirely theoretical and interested almost exclusively the pure mathematician. By bringing in the element of time, Einstein brought those generalizations to earth. Restricted at first to dealing with uniform motions, the theory at first produced only some examples in bizarre effects, and a change in attitude in regard to the philosophy of time. With the application to accelerated motions, gravitation became involved as a fundamental property of the space-time combination. Space and time were no longer to be regarded as the separate entities or forms of thought, but fused together into a four-dimensional world, in which they were gradually coming to see all things, matter and motion, gravitation, electricity, and magnetism as geometrical relations, determined by their fundamental structure.

## ECOLOGICAL FEATURES IN TASMANIA.

### By Mr. L. Rodway.

Mr. L. Rodway, Government Botanist of Tasmania, delivered his Presidential address to the botany section on "Some ecological features in Tasmania." He said that Tasmania, though small in area, offered the student of ecology a great variety of problems in each one of its sections. The climatic variations and insular geography were of so wide a range that excellent types of the main factors of research could be encountered within its borders. On the State's western coast, the rainfall was from 100 to 150 in. a year, graduating to about 14 in. on the west coast. The result of that variation was very marked in the plant life. Practically the whole of the island was more or less covered with trees, varying from open forest formation to dense forests. The latter consisted almost entirely of various species of eucalyptus. Beneath those forests there was a thick growth of subarborial species, the undergrowth. In the heavy rainfall areas being extremely dense—so dense that in no parts of the world outside the tropics was anything like it to be found. In parts, the bush was impenetrable. It was impossible to crawl underneath on through it, and the only way to get past was to crawl over it.

In plant life it was a general fact that light was an absolute necessity. In Tasmania, however, many of the trees had become adapted to the endurance of shade. Two forms of those trees native to Tasmania were the ever-green Cunningham's beech, and Gunn's beech (deciduous). No part of Tasmania was unfit to maintain forests, but there were parts where grasses and other such plants had established formations to the exclusion of tree growth, as in the Cradle Valley, which was a dense, grassy plain, completely denuded of trees and shrubs. Associations of cutting grass were very common, and had adopted an effective means of protecting itself from destruction by herbivorous animals by containing in its tissue a great quantity of silicious acid. Mr. Rodway outlined in detail the numerous varying formations of leafage, and concluded that there were many vestiges of past floras, which still survived in the western districts of Tasmania.

## EVOLUTION AND GENETICS.

### Problems of Australia.

In his Presidential address to the zoology section, Professor W. E. Agar, of Melbourne, said the genotype theory of Genolution, built upon the work of Mendel, de Vries, Johannsen and Morgan, gave a view of the existence of diversity among organisms, say among the members of single specie, something akin to the chemists' view to the diversities of chemical substances. That was to say that it was due to an enormous diversity of combinations of a comparatively few stable bodies—the atoms of the chemist and the genes of the biologist. Darwin looked upon the individual differences among the members of a species or even of a family as the raw material for evolution, and what was originally a slight difference between two brothers might be the action of natural selection in the course of ages exaggerated into the difference between separate orders or classes of animals. According to the genotype theory the power of natural selection to cause definite departure from type was much more limited, being restricted indeed to the selection of the most favourable from the combination of genes already existing in the population. That combination once established, natural selection could do no more. For further advance they were dependent on a mutation or change in a gene itself. All experiment showed those mutations to take place rarely in few directions, and quite without relation to the needs of organism.

### The Genotype Theory.

Most biologists who had occupied themselves with branches of biology, other than genetics, were not content with this as a theory of evolution. Fancy still held to the Darwinian idea of continuous fluctuation variation, but experimental evidence was against this. It could be shown that hereditary differences did not normally arise between parents and off-spring in a sexual reproduction. That was what was to be expected under the genotype theory, but not according to the Darwinian view. The theory of the inheritance of modifications induced on the organism by its environment, or as the result of its own actions, still awaited experimental proof, and the continued lapse of years without the devisal of a single experiment which could be repeated at will by any competent biologist to demonstrate that form of inheritance began to tell heavily against its occurrence. The degeneration of unused organs was often quoted as an example of inherited change produced in that way. An examination of one classical example, the degeneration of the eyes of animals living in permanent darkness, showed that similar degenerative variations were found occasionally in the human eye, which certainly had not arisen as the result of generations of living in the dark. The general conclusion was that the genotype theory was the only one for which they had adequate evidence. While that must be admitted to be true, so far as it went, it was exceeding doubtful if it could supply a full account of the processes of evolution. Other hypotheses which had been put forward were either inadequate or against the weight of evidence. They could only conclude, therefore, that there might still be factors in evolution as little thought of as was natural selection before the days of Darwin.

## AT GOVERNMENT HOUSE.

His Excellency the Governor and Lady Bridges entertained a large number of guests at a reception at Government House on Tuesday evening in honour of the members of the Australasian Association for the Advancement of Science.

### A Brilliant Scene.

His Excellency, Lady Bridges, and Sir John Monash received the guests, who were announced by Capt. Colin Duncan. Her Ladyship was in a sheath frock of black chiffon velvet with a broad band of silver lace on the skirt, a pink rose was worn on the left shoulder and a string of pearls around her neck. The Lieutenant-Governor (Sir George Murray) and Miss Murray, who was in black marocain, were invited on to the vicereal dais, and also the Bishop of Adelaide (Right Rev. Dr. Thomas) and Mrs. Nutter Thomas, in a black charmeuse frock. About 750 guests were present, and the scene was a very brilliant one when the guests, after being received, moved about the ballroom and out into the drawing rooms where they formed chatting groups. Supper was served in a large marquee, the many tables having Iceland poppies and bowls of Arum lillies for decorations.

### Guests.

Among those invited were Mr. Justice and Mrs. Poole, Mr. Justice and Mrs. Angas Parsons, Mr. Justice and Mrs. Mellis Napier, Mr. President and Mrs. Jethro Brown, Sir Lewis and Lady Cohen, Sir Richard and Lady Butler, Sir Sidney and Lady Kidman, Sir Josiah and Lady Symon, the Premier and Mrs. Gunn, Sir Henry and Lady Barwell, Sir Lancelot and Lady Stirling, the Hon. the Speaker and Mrs. McInnes, the Hon. Minister of Education and Mrs. Hill, the Hon Minister of Agriculture and Mrs. Butterfield, Attorney-General and Mrs. W. Denny, Chief Secretary anad Mrs. Jelley, the Lord Mayor and Lady Mayoress (Mr. and Mrs. C. R. J. Glover), Sir T. W. Edgeworth David, Sir Baldwin Spencer, Professor W. E. Agar, Sir Charles Rosenthal, Sir Henry Barraclough, Major E. A. Le Souef, Professor and Mrs. Kerr Grant, Mr. and Mrs. E. W. Hawker, Mr. J. Herbert Phillipps, Mr. W. T. Stacey, Miss Stacey, Miss E. Wemyss, Mr. and Mrs. W. Angus, Mr. and Mrs. S. Russell Booth, Mr. F. H. Counsell, Dr. and Mrs. C. T. de Crespigny, Mr. and Mrs. Victor Cohen, Professor and Mrs. Cleland, Professor Howchin, Dr. and Mrs. W. A. Hargreaves, Miss Hargreaves, Dr. Gertrude Halley, Mr. and Mrs. W. Champion Hackett, Dr. Florence Hill, Mr. and Mrs. C. W. Hayward, Mr. and Mrs. A. Grenfell Price, Mr. and Mrs. C. T. Madigan, Sir Douglas and Lady Mawson, Mr. and Mrs. W. A. Magarey, Dr. Helen Mayo, Professor and Mrs. T. G. B. Osborn, Professor and Mrs. A. J. Perkins, Dr. Violet Plummer, Miss E. A. Plummer, Mr. and Mrs. A. W. Piper, Professor and Mrs. Brailsford Robertson, Mr. and Mrs. B. S. Roich, Major and Mrs. G. D. Shaw, Mr. and Mrs. A. A. Simpson, Dr. and Mrs. Ramsay Smith, Dr. and Mrs. F. Steele Scott, Misses Tilly, Sir Joseph and Lady Verco, Mr. and Mrs. L. K. Ward, Capt. S. A. White, Brig.-Gen. Price Weir, Mr. and Mrs. F. W. H. Wheadon, Mr. and Mrs. H. K. Wendt, Dr. and Mrs. Harold Daves, Miss Ina