water. A skeleton of a salamander, more or less resembling this one, has recently been found in Germany, where it was taken for a fossil man. It is the insect world which supplied M. David with the greatest novelties. Great though the collections sent to Europe are, they are but a small fraction of the riches in entomology that China supplies. The Coleoptera have been described by M. Fairmaire, formerly President of the French Entomological Society, and the Lepidoptera by M. Oberthur, of Rennes, who has the finest collection in France, and perhaps in the world. Amongst insects, more even than amongst animals and plants, there is a large number called by the names of the missionaries who sent specimens of them to Europe. For example, *Cicindela desgodinsii*, *Carabus delavayi*, *Cychrus davidi*, *Nebria chaslei*, *Enoplotrupes largeteani*, *Donacia provosti*, &c., in Coleoptera; and in butterflies, *Anthocharis bieti*, *Armandia thaïdina*, &c. With regard to the vegetable kingdom, the first important work we have on the Chinese flora has been finished this year, and styled "Plantæ Davidianæ." It has been printed at the expense of the State, and is in two quarto volumes, illustrated with forty-five very fine plates, and contains a description of all the new species of plants in M. David's collection, and an enumeration of all the plants collected by him. The collection contains a small proportion only of the plants of China. It should only be regarded as a mere skeleton of the magnificent vegetation of the east-central provinces, but it contains the greater portion of the plants to the north of the empire and in the Mongolian mountains. Collections made by English and Russian collectors do not include many of the specimens found by M. David. Perhaps the most remarkable find was the *Davidia involucrata*—a pretty tall tree with large leaves, for the introduction of which an English amateur has offered a big prize. Our European plants are not at all common in the East. No trefoils are found in China, nor heather, nor broom. There are also many plants there which have no representatives in Europe, but which have representatives in America, as, *Pavia*, *Bignonia*, *Aralia*, *Dielytra*. Northern China, with its dry climate, its cold winter, as cold as that of Upsala, and its summer as warm as that of Senegal, has a poor and little-varied vegetation when compared with the centre and west of the empire. The number of Phanerogams collected by M. David in the north of China did not exceed 1500 species, and he doubts if there are many more.

In geography and geology, besides several occasional reports, the "Archives du Muséum" have published full accounts of his first and second journeys of exploration. These voluminous writings are merely journals written for some friends, for whom he wrote day by day everything that seemed worthy of attention, whether botanical, geological, or geographical, in the extensive regions which for five years he travelled over. Itinerary charts, striking altitudes, up to 15,000 feet, the direction and importance of rivers and mountain chains, the position of the lesser known towns and countries, and of the coal and metal mines—all have been noted down by him. From the writings of M. David, M. Elisée Reclus took many of his observations on the Chinese Empire in vol. vii. of his "Géographie Universelle," and especially the natural history portion of that volume. Similarly Baron Richthofen has derived much of the information in his work on geology from M. David. In Mongolia M. David's guide was Sambdatchiemda, the famous ex-lama described by M. Huc, and this leads M. David to speak of the lamas, and tell some stories about them.

M. David describes a curious meteorological phenomenon observed by him when crossing the top of a mountain about 5500 feet high. A storm had just passed, and a little rain had fallen. The clouds were heavy, and lay on the numerous peaks below his feet like an immense sea of silvery white. Little by little the masses of clouds began to move and to split up here and there. They rose slowly and soon came to the right of M. David, who was journeying from south to north. The wind was blowing from the west, and when the clouds reached the summit of the mountain they could not pass over on account of the opposition of the wind, and there they rested, a huge mass of opaque clouds. The sun was setting on the horizon, and threw the image of M. David on the wall of white clouds, where it was surrounded by two rainbows, or rather two complete concentric circles. This phenomenon lasted nearly half an hour. M. David had been six months in Mongolia when the revolt of the Mussulmans broke out and prevented him from penetrating as far as Koukounoor, and even beyond it, as was his intention. These high Mongolian plateaux are of about three thousand feet above the level of the sea. The population is very sparse, and the fauna and flora but little varied. The remarkable animals most frequently seen in this region are the souslik, or yellow antelope, a kind of little marmot analogous to the prairie dog of America, a brownish weevil, and a curious lizard with round head (*Phrynocephalus*) which is seen everywhere rolling its tail in regular cadences. During the summer the open country is covered either with the blue-flowered iris, or with the liquorice (*Glycyrrhiza echinata*) or the yellow rose. M. David found in Mongolia in a wild state, but very rare, a pretty flowering tree, which the Pekinese cultivate as an ornamental plant (*Xanthoceras sorbifolia*), and which he introduced into France with much success. In his journey he satisfied himself of the existence of wild camels, some of which were afterwards captured by the Russian traveller Prjevalski. M. David spent twenty-five months in Western China. He had intended to spend three years, but his health broke down. In that time he travelled over 2500 leagues. He returned thence to Tien-tsin, fortunately for him after the massacres had taken place, his boat having been delayed on the way.

THE AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

SYDNEY, *July* 1888.

THE formation of this Association, which already gives promise of being a great success, was first suggested by Prof. Liversidge, of the Sydney University, during the Exhibition in Sydney in 1879, but matters at that time not being considered quite ripe for it, the formation of the Association was again brought forward through the press in the year 1884. It was then suggested that, as it did not seem likely that the British Association would see their way to visit Australia during the Centennial year, an Australasian Association should be formed, on the same lines as the British Association, in order to bring about a federation or union of the members of the various scientific Societies throughout Australasia.

It was also suggested that the first general meeting should be held in Sydney on the one hundredth anniversary of the foundation of the colony, as it was at that time thought there would be an International Exhibition in Sydney to celebrate that event. In furtherance of this object a preliminary meeting of delegates was held in Sydney in November 1886, the project having met with the approbation and support of almost all the learned and scientific Societies of Australasia.

As this meeting the formation of the Australasian Association for the Advancement of Science was agreed to unanimously, the rules of the British Association being adopted until the first general meeting, which it was decided should be held in Sydney during the year 1888.

In accordance with another resolution passed at the meeting of delegates, the election of officers for the year took place in March of the present year, Mr. H. C. Russell, F.R.S., Government Astronomer, being elected President,

Sir Edward Strickland, K.C.B., Hon. Treasurer, and Prof. Liversidge, F.R.S., and Dr. George Bennett, Hon. Secretaries.

The formation of the Council was afterwards proceeded with, each learned or scientific Society electing one representative for every hundred of its members; and the Chief Justice, Minister for Public Instruction, the Chancellor and Vice-Chancellor of the Sydney University, the Mayor of Sydney, and the Presidents of the Royal Societies in other colonies were elected Vice-Presidents for the year.

The Presidents of Sections were then elected, the gentlemen chosen being all resident in other colonies than New South Wales; whilst the Secretaries of Sections, as a matter of necessity, were elected from amongst residents in Sydney.

The Association is hence thoroughly Australasian in its character, and the succeeding general meetings are to take place in turn in the capitals of the other colonies, the executive officers being elected year by year by the colony in which the meeting is held.

The first general meeting is to be held at the Sydney University, the opening ceremony, at which His Excellency the Governor will be present, taking place on Tuesday evening, August 28, when the Presidential address will be delivered.

On the following day the Sectional meetings for the reading and discussion of papers will commence, and it is thought that the principal portion of the business will close with the end of the week.

Up to the present time the titles of about ninety papers have been sent in by gentlemen of distinction in science, literature and art, in the different colonies, and it seems probable that this number will be considerably increased before the meeting.

It may therefore be anticipated that the nature of the work done by the Association during the first year of its existence will be of a highly important and useful character.

The more solid work of the meeting is to be lightened by excursions to various places of interest to geologists, botanists, and others; and efforts are being made to provide for the entertainment and comfort of visiting members, as far as possible, so that they may spend their time to the best advantage.

The various steamship companies have arranged to carry members proceeding to Sydney to attend the meeting at a reduction of 20 per cent. on the ordinary rates, and it is anticipated that liberal concessions will also be granted in the railway fares.

The rules, as already mentioned, are practically the same as those of the British Association, and all who join the Association before the first general meeting in August next become original members, without entrance fee, the subscription of £1 entitling members to receive the publications of the Association gratis.

The number of members at the end of July exceeded 400.

PROFESSOR RUDOLF JULIUS EMANUEL CLAUSIUS.

BY the death of Prof. Clausius, which occurred on August 24 last, science has lost another member of the great triumvirate—Rankine, Clausius, and Thomson—who, upon the foundation laid by the experimental work of Davy and Rumford, the theoretical suggestions of Mohr, Séguin, Mayer, and Colding (which, though resting on imperfect data and defective reasoning, were the results of real scientific insight), and the splendid experimental investigations of Joule, founded and built up the great structure known as the science of thermodynamics.

Clausius was born at Cöslin, in Pomerania, on January 2, 1822. While yet at school in Berlin, he gave unmistakable evidence of the bent of his mind towards mathematics and physics, and on the completion of his University course he became Privatdocent in the University of Berlin and Instructor in Natural Philosophy at the School of Artillery. He very soon gave evidence of his power as an original worker, and some of his earliest papers—"On the Nature of those Constituents of the Atmosphere by which the Reflection of the Light within it is effected," and "On the Blue Colour of the Sky, and the Morning and the Evening Red"—contributed to *Poggendorff's Annalen*, were selected for translation in the first volume of Taylor's "Scientific Memoirs."

In 1857 he was appointed Professor of Natural Philosophy at the Polytechnic School of the Helvetic Confederacy at Zürich. Here he continued his researches in various branches of physics, and among these we may mention, to give some idea of the extent and variety of his investigations, "The Influence of Pressure on the Freezing-point," "The Mechanical Equivalent of an Electric Discharge, and the Heating of the Conducting-wire which accompanies it," "Electrical Conduction in Electrolytes," and "The Effect of Temperature on Electric Conductivity." He also published some short papers on some purely mathematical questions, suggested, however, by physical problems, and some papers dealing with points of what is generally known as physical chemistry.

His attention was then directed towards the dynamical theory of gases, owing to the light which it appeared capable of throwing upon questions of thermodynamics. The dynamical or kinetic theory of gases, which has received such extensive developments at the hands of Clerk Maxwell, Boltzmann, and others, was originally suggested by J. Bernouilli about the middle of the last century; but it was Clausius who first placed it upon a secure scientific basis. In 1866 he published a most important paper "On the Determination of the Energy and Entropy of a Body" (translated in the *Philosophical Magazine*), in which the very valuable and suggestive conception of the entropy of a body was first set forth.

In 1869 he was appointed Professor of Natural Philosophy in the University of Bonn.

Among more recent papers of great importance we may mention the following, all of which have been translated in the *Philosophical Magazine*:—"On a New Fundamental Law of Electrodynamics"; "On the Behaviour of Carbonic Acid in relation to Pressure, Volume, and Temperature"; "On the Theoretic Determination of Vapour-pressure and the Volumes of Vapour and Liquid"; "On the Different Systems of Measures for Electric and Magnetic Quantities"; "On the Employment of the Electrodynamic Potential for the Determination of the Ponderomotive and Electromotive Forces"; "On the Theory of Dynamo-electrical Machines"; and "On the Theory of the Transmission of Power by Dynamo-electrical Machines."

When we consider the far-reaching and fundamental character of these and many other investigations, and the very wide field which they cover, we cannot but wonder at the marvellous energy of the great physicist who has passed from among us. The Royal Society catalogue contains a list of no less than seventy-seven papers published up to 1873, and those published subsequently bring the total number up to considerably over a hundred.

In addition to these there is his great treatise on "The Mechanical Theory of Heat," of which the first volume was published in 1864, and a smaller work, "On the Potential Function and the Potential."

It would be impossible to discuss in detail the portions of thermodynamics specially worked out by Clausius, as his work is throughout closely interwoven with that of Rankine and Thomson, but it will be of interest to quote the following from Prof. Rankine, who in his paper "On the Economy of Heat in Expansive Machines,"[1] says:—

[1] "Rankine's Miscellaneous Scientific Papers," p. 300.