which his name will for ever be associated. In 1889 he was made a foreign member of the Royal Society, and two years later was awarded the Copley medal for his services to chemical theory. On the occasion of his seventieth birthday, NATURE published an appreciation of his labours, in the series of its "Scientific Worthies," accompanied by a portrait (No. xxx., 1897). From this account it may be permitted to give the following extract:—

"Cannizzaro, when compared with such men as Berthelot and certain of the leaders of the German schools of chemistry, or even with some of the younger generation of Italian chemists, cannot be called a voluminous writer. In all, about eighty memoirs have proceeded from his laboratory. It is on the special quality and character of his published work, rather than on its extent, or on the range and variety of its subject-matter, that his fame depends. In this respect he resembles the late August Kekulé. The names of both men will for ever be associated in the history of chemistry with the promulgation of generalisations which mark epochs in the development of chemical science." T. E. T.

PROF. E. VAN BENEDEN.

EDOUARD VAN BENEDEN, who died on April 28, adds another to the already long list of illustrious zoologists who have left us since last summer. He belongs essentially to the epoch which brought forth Anton Dohrn and Alexander Agassiz, whose loss we have so recently mourned, and, like them, he participated in the triumphs of biological achievement which mark the 'sixties, 'seventies, and 'eighties of last century. If Dohrn may be called the founder of marine laboratories, and Agassiz one of the originators of modern oceanic research, van Beneden may surely be styled the father of modern cytology. For it was he who discovered the exact similarity of the male and female nuclei in fertilisation, and the halving of the number of chromosomes in gametogenesis.

Born at Louvain on March 5, 1846, he was the son of that distinguished zoologist Prof. P. J. van Beneden, of the Catholic University of Louvain. He was educated at Louvain in the university, and later he studied in Germany, especially at Würzburg under Kölliker. He succeeded the zoologist Lacordaire at Liége, and was put in charge of the course of zoology in the faculty of sciences in 1871, at the age of twenty-five. In 1872 he was appointed professeur extraordinaire, and in 1874 professeur ordinaire. This position he held until his death, and made full use of the opportunities it afforded him of advancing the interests of his favourite science. Though his principal achievements were in the domain of mammalian embryology and cytology, his work covered a wide field. He was the first to give an accurate account of the structure and life-history of those strange parasites of the Cephalopoda, the Dicyemida (1876 and 1882), and he founded the conception of a group between the Protozoa and the Metazoa, to which he gave the name of Mesozoa, a conception which has largely influenced speculative zoology. In conjunction with his pupil Julin, he carried out some interesting researches on the development of the Tunicata, and one of the last of his zoological works was an important memoir on the Anthozoa of the Plankton expedition. He is also the author of researches on Gregarines, Crustacea, Limulus, Cetacea, and other groups.

His work on mammalian embryology, to which he was apparently led by his researches on the ovum, chiefly concerns the rabbit and the bat. His first papers on this subject, "La Maturation de l'Œuf, la Fécondation et les Premières Phases du Développement embryonaire des Mammifères" (1875), and "Recherches sur l'Embryologie des Mammifères" (1880), were noteworthy for his description of the cleavage and for the comparison he instituted between the fully segmented ovum and the gastrula. Though these speculative views proved untenable, and were eventually given up by him, they had a considerable influence in stimulating interest in the subject, and so leading to further researches. Later (1884) he gave, in conjunction with Julin, the first complete elucidation of the fœtal membranes of the rabbit and certain other types, and he was the first to name the pro-amnion and to explain its significance. He was, further, successful in making out the early stages of bats, and as far back as 1875 he directed attention, we believe for the first time, to the remarkable method of impregnation in these animals. His paper on the development of bats, published in the *Anatomischer Anzeiger* for 1899, contains the results of many years' observations, and is regarded by embryologists as the most far-reaching of all his mammalian work.

But although van Beneden's name will always hold a prominent position in the history of embryology, it is by his researches on the minute structure of living matter that he will be chiefly remembered. Of cytology, as this branch of science is now called, he will always be hailed as one of the fathers. He early directed his attention to the subject, and his first important published work, "Recherches sur la Composition et la Signification de l'Œuf, Mémoire couronné de l'Académie royale des Sciences de Belgique," published in 1870, dealt with it. This was followed in 1875 by his memoir, already referred to, on the maturation and fecundation of the ovum of the rabbit, and in 1883 by his greatest work, "Recherches sur la Maturation de l'Œuf, la Fécondation et la Division cellulaire." Then follows a lull in his activity, caused, no doubt, by the terrible accident which happened to him about this time on the Eiger, and as a result of which he was unconscious for three weeks and incapacitated from work for two years, and it was not until 1887 that he published, in conjunction with A. Neyt, his "Nouvelles Recherches sur la Fécondation et la Division mitosique chez l'Ascaride mégalocéphale." All his great achievements in cytological research are recorded in this series of remarkable papers. They prove, beyond all possibility of doubt, the right of Edouard van Beneden to take his place in that select band of great original observers to whom science owes her progress.

By his use of *Ascaris megalocephala* as the material of his investigation, he introduced a means of research which, in his own hands and those of his followers, led to the most important results. He was the first to show, for the ovum, that the chromatic threads are a portion of the network existing in the nucleus. He laid special stress upon the fact that the two daughter chromosomes were alike to the smallest detail, and he first pointed out that they pass to opposite poles of the spindle. He discovered the *corpuscule centrale* in 1876 (first seen, it is true, by Flemming in 1875), and first demonstrated its importance in cell division. He was also the first to show that it is in many cases, if not in all, a permanent organ of the cell (1885 and 1887). He also discovered the *sphère attractive*. Both these structures later received other names, the former being known as centrosome and the latter as centrosphere; but whatever names be applied to them—a matter of no importance—the fact remains that they

were discovered, and their importance appreciated, by van Beneden.

Finally, and this, perhaps, is the greatest discovery associated with his name, he showed, in 1883, that in the last gametogenic divisions by which the ovum is produced, the number of chromosomes of the nucleus becomes reduced to one-half the original number, and the like fact for the spermatozoon was discovered in 1884 by him, working in conjunction with C. Julin. Though it cannot be asserted that he was the first to give a complete account of the morphology of fertilisation, yet it may fairly be said that he went as near to that as any other worker, and that he was one of the three zoologists whose discoveries led to the complete elucidation of that phenomenon. Lastly, we must not forget to mention that he founded and edited the *Archives de Biologie*, in which some of his most important work was published.

Van Beneden was a strikingly handsome and distinguished-looking man. His splendid figure will not readily be forgotten by those who were present at the Darwin centenary celebration at Cambridge last year. He was a keen and active sportsman, and his proclivities in this direction often led him far afield—to Sweden for reindeer and, as we have seen, to Switzerland for climbing. He was a lauréat and correspondant of the Institut de France, correspondant of the Acadamies of Berlin, Vienna, and St. Petersburg, foreign member of the Academy "Dei Lincei" of Rome, and an honorary member of many other similar institutions in different parts of the world. He was an honorary doctor of many universities, including those of Oxford and Cambridge, and had many other titles and honours. A. S.

NOTES.

THE next meeting of the Royal Society will be held on Thursday, May 26, when the Croonian lecture will be delivered by Prof. G. Klebs on "Alterations of the Development and Forms of Plants as a Result of Environment."

OWING to the lamented death of King Edward, the Chemical Society's banquet to the past-presidents who have completed their jubilee as fellows has been postponed from May 26 to the autumn. We are also asked to announce that the conversazione of the Entomological Society of London, fixed for Friday, May 27, is postponed indefinitely.

THE annual May lecture of the Institute of Metals will this year be delivered by Prof. Gowland, F.R.S., vice-president of the institute, who will take as his subject "The Art of Working Metals in Japan." The lecture will be given on Tuesday, May 24, at 8.30 p.m., at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W. Tickets admitting visitors may be had gratuitously on application to the secretary of the institute, Mr. G. Shaw Scott, Caxton House, Westminster, S.W., to whom applications should be made not later than Saturday next.

TWO meetings—the first with Lord Verulam in the chair—were held on Friday in St. Albans to support the scheme of the society for excavating the site of Verulam during the ensuing summer and autumn. The site covers close on 200 acres, and although the Roman walls and other buildings were used as a quarry in obtaining materials with which to construct St. Albans Abbey, the greater part of Verulam is unique in that it has never been built upon. The beheading of the proto-martyr Alban, together with other circumstances, suggests that remains of early Christian churches may be discovered; and, in any case, the theatre and forum are known to have been larger than any other similar buildings in England.

ON Tuesday, May 24, Prof. Love will begin at the Royal Institution a course of two lectures on "Earth Tides," the second to be delivered on Monday, May 30, and on Thursday, May 26, Dr. W. Rosenhain will deliver the first, and on Wednesday, June 1, the second, of two lectures on "Alloys"; on Friday afternoons May 27 and June 3 Dr. D. H. Scott will deliver the remaining two of his course of three lectures on "The World of Plants before the Appearance of Flowers." The Friday evening discourse on May 27 will be delivered by Captain R. F. Scott on "The Forthcoming Antarctic Expedition," and on June 10 by Dr. H. Deslandres on "The Progressive Disclosure of the Entire Atmosphere of the Sun" (in French).

FRANCE seems inclined to follow the example of Prussia in forming a Government Department for the Preservation of Natural Monuments. Last October an International Congress for the Protection of Landscape was held in Paris, the German Ambassador being one of the vice-presidents. The Prussian organisation for the preservation of nature—the term "Natural Monuments" referring to natural scenery and indigenous fauna and flora—was highly praised by French men of science, and it was proposed to take steps for the institution of a similar system in France. Prof. Miyoshi, of Tokyo, in a brochure laid before the conference, speaks highly of the Prussian movement, and invites Japan to take a similar precaution. Prof. Kumm, of Danzig, illustrated the working of the statute against disfiguration of scenery. Of particular interest was Dr. Hermann's paper on natural parks for the protection of animal and plant life, which have long been a German institution. The second Conference for the Preservation of Natural Monuments in Prussia has also just been held at Berlin. It is worth remark that the German Press and public take a keen interest in this useful work. There is, we may add, plenty of scope for such work in the United Kingdom; but it must be done soon, before the building speculator and the municipal engineer have quite exterminated nature in these islands.

THE number of *L'Anthropologie* for March-April, under the title of "Les Sofs chez les Abadhites," of North Africa, contains the first portion of an important study of tribal sociology by Dr. J. Huguet. The vague term Sof is defined by the writer as "the reunion of all those individuals who, by reason of community of origin, needs, and political interests, have been forced to associate for purposes of attack and defence." The political influence of associations such as these has recently attracted much attention from the officers responsible for the control of these often unruly tribes.

IN the May issue of *Travel and Exploration* Miss E. C. M. Browne describes an adventurous journey by two ladies to the famous sacred lake Manasarowar, in Tibet, which has been hitherto visited only by a comparatively small number of Europeans. Evidently recent British action in Lhasa has borne fruit so far west as Manasarowar. The head Lama of the local Gomba was very friendly, and went so far as to allow the Bhotiya coolies following the camp to shoot birds in the holy waters, an unusual concession on the part of a Tibetan Buddhist, who, in theory at least, is much opposed to taking animal life.