

the result in No. 4189 (p. 209, July 6) of the *Astronomische Nachrichten*. In the new set of elements (iv) the eccentricity is given as 0.5057 and the period as 78.81 years. There are still differences between the observed and calculated positions which must be accounted for either by unusually large constant errors in the measures or by the presence of an invisible third body, the effect of which, in this case, would be enhanced on account of the large eccentricity of the orbit; an ephemeris for 1907.5-1936.5 accompanies the paper.

COMPARISON OF THE SPECTRA OF THE LIMB AND CENTRE OF THE SUN.—In No. 5, vol. xxv. (p. 300, June), of the *Astrophysical Journal*, Prof. Hale publishes an important paper showing the results of a comparison of the spectrum of the central parts of the sun's disc with that of the sun's limb. In 1879-80, Prof. Hastings showed that the modifications of the Fraunhofer spectrum at the limb were similar to those which obtain when a spot spectrum is examined, but to a much less degree. Recent work at Mount Wilson confirms this, and shows that the effect is greater than was previously expected.

The differences between centre and limb are plainly shown in three sets of spectra which Prof. Hale reproduces. All winged lines such as H, K, H γ and the lines of the *b* group lose, to a great extent, their hazy borders, the latter, for example, appearing as comparatively hard, well-defined lines. Other lines, e.g. $\lambda\lambda$ 5156.823, 5219.875, 5426.474, which are intensified in passing from the Fraunhofer to the spot spectrum, are intensified at the limb, whilst still others, generally "spark" lines, are weakened at the limb as they are in spots.

There are, however, as shown by the preliminary examination, important differences in the changes undergone. Perhaps the most striking is in the winged lines the borders of which, at the limb, are universally contracted, whereas in spots the wings on the strong lines in the more re-frangible portion of the spectrum are intensified rather than diminished. Another anomaly is that at the limb the lines of V and Ti, certainly the most affected in spots, are not so strongly affected as those of Mg, Fe, Ca, &c. Again, in spots, H α , like all the other H lines, is thinned, whereas at the limb this line is actually widened and perhaps strengthened.

The thinning of the spark lines is strikingly shown in a table in which the behaviour at the limb of twenty-seven of the more prominent enhanced lines of Fe, Ti, and V, as given by Sir Norman Lockyer, is exhibited. All these lines are considerably weakened in passing from centre to limb, and the majority of them have been observed similarly affected in spots.

A discussion of these results in their bearing on the solar theory is promised in a later paper.

THE ORBIT OF ϵ ORIONIS.—A note by Mr. Plaskett in No. 3, vol. i. (p. 206, May-June), of the *Journal of the R.A.S. (Canada)* mentions the preliminary results obtained from the radial-velocity measurements of the spectrum of ϵ Orionis. These show that the eccentricity of the orbit is 0.75, greater than that of any other yet known spectroscopic binary, and that the period is about 29.12 days.

METEOR AND FIREBALL OBSERVATIONS.—*Astronomische Nachrichten*, No. 4187 (p. 183, June 29), contains an account by Mr. Denning, of a first-magnitude Leonid observed on November 17 last. This meteor travelled along a visible path more than ninety-one miles in length at a velocity of thirty miles per second, a considerably lower velocity than that usually attained by Leonids. The height at the beginning of the flight was seventy-seven miles, at the end sixty-six miles, so that the path was very long and nearly horizontal, facts which may account for the low velocity, as the body would thus encounter considerable atmospheric resistance.

A fireball, observed over Yorkshire on November 23, 8h. 5m., was brighter than Venus, and appears to have proceeded from a radiant at $46^{\circ}+5^{\circ}$, a position near α Ceti. From previous observations there appears to be a shower of long duration, or a succession of showers, from this radiant, Cetiids having been observed in September, October, and November, those in November furnishing the most brilliant examples. The mean position of the radiant is $43^{\circ}+5^{\circ}$.

THE ROYAL SOCIETY OF CANADA.

THE annual sessions of this society, the premier scientific society in Canada, were held, as usual, in the capital city of Ottawa on May 13-16. The society, which was founded twenty-five years ago by the Duke and Duchess of Argyll (the Princess Louise and the then Marquis of Lorne), combines the features of the Royal Society of London and the French Academy. The number of fellows is very limited, and there are four sections, viz. French literature and history, English literature, &c., physics and chemistry, and biology and geology. There was an unusually large attendance from all parts of the vast Canadian dominion, and in Sections iii. and iv. the meetings were regarded as the best ever held.

Dr. Wm. Saunders, C.M.G., president of the society for 1906-7, and head of the Government Experimental Farms, gave his presidential address on the evening of May 14 in the presence of a distinguished audience, including Sir Sandford Fleming, Sir James Grant, Profs. Ramsay Wright, Penhallow, Prince, and Clark Murray, and representatives from most of the universities of Canada. The subject was "The Development of Agricultural Science," and it consisted of a masterly review of the history of farming from classical times to our own day.

The ancient Hebrews and Egyptians were the most proficient tillers of the soil in those distant ages, and the latter race was the first to raise domestic cattle. Amongst the Romans, agriculture was highly esteemed, and when luxury brought demoralisation, the noblest minds reverted to farming. "The earth," said one of these old Romans, "gives back what it receives with usury, and nothing can be more profitable or beautiful than a well-kept farm."

During the Middle Ages, only the wealthy ate wheat for food; the poorer classes used rye, barley, and oats. But in the sixteenth century Raleigh introduced the potato into Ireland. However, when the Queen of England wanted a salad for luncheon, she had still to despatch a messenger to Holland.

Up to the eighteenth century land was sown until exhausted. By that time farmers had learned the alternate crop plan of conserving the strength of the soil, and at the opening of the nineteenth century they understood the value of manure as a fertiliser.

"It is highly probable," declared Dr. Saunders, "that the plant-life will always supply enough food for mankind, and the supposition sometimes advanced, that the rapidly increasing population will not find sufficient nourishment, seems far remote from probability."

Twenty-three years ago farming was in a very depressed condition in Canada. In 1884 a select committee of the Canadian House of Commons investigated the causes of this depression, and found it was due, not to poor soil or idleness, but to a lack of knowledge and skill in the farmers, and the committee recommended the establishment of experimental farms to promote agriculture and instruct the farmers. Accordingly, in 1886 a central farm was started near Ottawa, with four other branch farms in other parts of Canada. In agriculture, Canada is now pre-eminent among the nations, and even Egypt, the ancient farming land, is asking for samples of Canadian products that she may emulate this country in the pursuit of the farming industry.

Prof. Rutherford, F.R.S., was president of Section iii. (Physics), and gave an address on the life-history of radium, and other fellows of the society presented twenty-five original communications, while Prof. Edward E. Prince, Chief Commissioner of Fisheries, delivered an address, as president of Section iv. (Biology and Geology), on marine biology in Canada. Prof. Prince is the head of the three biological stations carried on by the Government on the Atlantic, the Pacific, and the Great Lakes shores, and his account of the progress of zoological research and of the investigations at the stations proved exceptionally interesting. Twenty-seven papers were read and discussed, including one, the first ever presented to the society by a lady, the subject being "The Islets of Langerhans in the Pancreas of Certain Fishes," by Prof. Swale and Mrs. Thompson, of Winnipeg. Prof. Adami, McGill University, gave a paper upon certain curious cases

of vertebrate teratology recently studied by him, and Prof. A. B. Macallum, F.R.S., described some new cells with protruding tail-like processes occurring in the mesogloea of Aurelia and other Medusae.

The popular evening lecture, which is always an important feature of the Canadian Royal Society's annual meeting, was delivered to a crowded assembly in the large hall of the Normal School by Prof. Ernest Rutherford. The subject was "Recent Results of Researches on Radium." In a graphic manner, the lecturer explained his famous "disintegration" theory, the transformation of chemical elements, the marvellous phenomena of radiant matter, and illustrated his remarks by striking experiments. He aroused much interest by stating that in Canada there were probably more rocks containing radium than in any other territory on the globe, and he had found, by suspending a wire in the open air in Montreal during a shower of rain, that radium collected on the wire. Many brilliant social functions took place during the meetings, including a large garden party by Dr. and Mrs. Saunders at their official residence; dinners given by the president-elect, Dr. S. E. Dawson; luncheons by Sir James Grant, former president; and other entertainments.

THE ROYAL VISIT TO THE UNIVERSITY COLLEGE OF NORTH WALES.

IN last week's NATURE, a short account was given of the visit of the King and Queen to Bangor to lay the foundation stone of the new buildings of the University College of North Wales. A few particulars relating to the origin and work of the college, and some thoughts suggested by speeches made at last week's ceremony, may be of interest as a supplement to the report that has already appeared.

The University College of North Wales was founded in 1884, and is at present located in the buildings of the former Penrhyn Arms Hotel. It has been enlarged by the addition of laboratories and lecture rooms for the faculty of science, which includes departments of agriculture and electrical engineering. The former was the first institution of its kind in Great Britain, and has been adopted as the model of similar agricultural departments started elsewhere. Its operations have been extended by the foundation in 1904 of a school of forestry under the auspices of the Board of Agriculture, one of two in the United Kingdom. The electrical engineering department is maintained by an annual grant from the Drapers' Company. If its resources in the matter of equipment have not been on a lavish scale, the training it has afforded has been of a high character and has probably possessed advantages which an over-elaborate plant might not afford. Still, much apparatus is badly needed before the condition of maximum efficiency can be reached. Another feature is the fisheries department, which has performed useful work in developing the fishing industry of North Wales, an industry which is capable of being greatly developed by the diffusion of practical scientific knowledge in the fishing districts. Although the present notice necessarily deals primarily with the scientific aspect of the work of the college, allusion must be made to the day training department, the courses in secondary education, and the facilities for kindergarten training afforded by the establishment of a preparatory school under the auspices of the college.

The new college will consist, when finished, of two quadrangles. At present it is only intended to erect the arts and administrative buildings, and it is to be hoped that by the time this has been done the building fund will admit of the science buildings being commenced. The library is very inadequately housed, and when we point out that only about 10*l.* a year is available for the purchase of books in such a subject as pure and applied mathematics combined, physics or chemistry, it will be seen that the present college staff is doing good work under difficulties which would not exist in a similar institution in Germany or America.

At the public luncheon, the Right Hon. D. Lloyd George, M.P., gave some interesting statistics showing the liberality and enthusiasm of the people of North Wales in matters relating to education. The contributions for uni-

versity and technical education are six times, and to secondary education nine times, as high as in England, and the contributions of the town and suburbs of Bangor to the college alone represent the proportional equivalent of a sum which for a town of the size of Liverpool and its suburbs works out to 1,750,000*l.* In regard to the question of Government assistance, Mr. Lloyd George thought that waiting for Governments was like waiting for sunshine, and that the college afforded a grand opportunity for a millionaire to earn gratitude and fame.

But where is Mr. Lloyd George going to find his millionaire? A country which raises a protective tariff against millionaires in the form of death duties is scarcely a promising field. When we take account of the heavy losses North Wales has sustained by the death of a number of its most influential and prominent landowners during the last decade, the progress of the new college buildings will be found to represent a widespread feeling of munificence and loyalty towards the cause of higher national education far in advance of anything that exists in America. But in the race between British and American universities, Great Britain is heavily handicapped, with the result that, in spite of all the efforts we are putting forward, we are rapidly falling further and further behind. The inevitable result is that the responsibilities which the acquisition of wealth entails will be pressed more and more heavily every year on our Governments, and unless they can supply the extra few rays of sunshine we shall be less and less able every year to raise up the intellectual produce necessary to enable us to compete with the foreign producer.

The problem was solved long ago for Germany by her system of State universities. That Germany owes her national prosperity in no small measure to the principle of *Lehrfreiheit*, which has been adopted as the fundamental law governing the relations of the university professors with the State, is a fact which every German citizen knows well. It is no trifling thing to say that there is probably not a single university college in the United Kingdom the council and senate of which are more thoroughly imbued with the spirit of the German ideal than the University College of North Wales. In the large industrial centres of South Wales there exists an unfortunate conflict of rival factions, and it is sad to notice that many people only associate themselves with university education in order to acquire a cheap reputation by belittling the academic element, making unjustified and vexatious attacks on its representatives, and hampering the progress of the nation whose interests they falsely profess to have at heart. We refer in particular to the state of affairs which culminated some years ago in the premature death of the late Principal Viriamu Jones, and has continued to exist ever since. In North Wales the ardent Welsh nationalist, and the scientific worker who believes that "he is the greatest patriot who has the world for his nation," all realise that they are working together for a common cause.

G. H. BRYAN.

THE ALDROVANDI CELEBRATIONS AT BOLOGNA.

IT is not improbable that some of the delegates appointed to represent foreign universities and learned societies at the tercentenary of the death of Ulisse Aldrovandi (1522-1607) were insufficiently acquainted with the works of this great naturalist to appreciate thoroughly the importance of the occasion. The international gathering at Bologna (June 11-13) has been the means of rescuing from partial obscurity the memory of one of the many pioneers in the study of nature which Italy has produced. Bologna, the birthplace of universities and the *alma mater* of not a few students whose names occupy a prominent place in the history of the natural sciences, is an ideal meeting place of the nations to do homage to one of the fathers of scientific investigation. The numerous coats of arms which decorate the walls of the old university buildings bear witness to the hospitality of Bologna to students from all parts of the world, and the celebration which has now been brought to a successful conclusion testifies to the continuance of a spirit of hospitality after the lapse of centuries.