

OUR ASTRONOMICAL COLUMN.

THE ENSUING RETURN OF THE PERSEID METEORS.—The season especially favourable for the observation of meteors may be said to commence in July, and after the full moon of July 3 of the present year the sky will begin to exhibit a marked increase of meteoric activity. The Perseids, Aquarids, and many other showers give evidence of their presence at about the middle of July, and afford an abundance of material to the vigilant student until about the third week in August.

It is true that the great, annually visible stream of Perseids has been already fairly well watched, but it seems likely that we shall have to accumulate data for several future centuries before our knowledge of the system may be regarded as pretty complete and satisfactory. We do not know the period of revolution of the parent comet and of that particular region of the meteoric group where the particles are collected most abundantly, nor have we learnt the precise nature of the variations affecting the annual returns of the shower. The different conditions occurring every year in regard to the weather, moonlight, &c., render it extremely difficult to form correct conclusions as to the strength of the region encountered at successive returns.

During the forthcoming display it is to be hoped that observers will record the apparent paths of all the brighter meteors they may observe, for the computation of the real paths of these objects is very important.

THE SOLAR PARALLAX, FROM OBSERVATIONS OF EROS.—A preliminary account of the results obtained from the observation of Eros, at Mount Hamilton, for the determination of the solar parallax, is given by Prof. Perrine in No. 150 of the Lick Observatory Bulletins. The observations were made during the latter part of 1900, and the full discussion is reserved for publication by the Carnegie Institution of Washington.

The solutions of 126 equations, giving the correction to the assumed value of the parallax, $8.80''$, are given, and the various methods of weighting the means discussed. Finally, the value $8.8067'' \pm 0.0025''$ is adopted as the result.

Comparing the results of a long series of daily meridian observations with the ephemeris, an apparent periodicity of the residuals is exhibited, the double amplitude of the variation being $0.05s.$, and the period about nine days; this periodicity is not accounted for by the effect of any known bodies, but there appears to be some relation to the period of light variation of Eros during the opposition of 1900-1. For a further discussion it will be necessary to have brightness observations of Eros made at the same times as the position observations, but it is thought that, even should this periodic inequality be found to be real, the final value will be but little affected.

A DOUBLE-IMAGE CŒLOSTAT FOR DETERMINING THE MOON'S POSITION.—In No. 2016 of NATURE (June 18, 1908, vol. lxxviii., p. 152) Prof. Boys described an apparatus, designed by Mr. Wade, of the Egyptian Survey Department, for the field determination of longitude, the moon's position being known.

Mr. Wade has now adapted his apparatus so that it may be used for the inverse problem, viz. the determination of the moon's position when the longitude is known, and a lecture in which he described the modified instrument appears in No. 30, vol. iii., of the *Cairo Scientific Journal* (March, p. 64).

The two mirrors of the former instrument are combined in a cœlostat mirror, on which two distinct faces are figured, the one to reflect the moon's image, the other to reflect the images of the reference stars. The instrument having been adapted for photographic observations, the difficulties of the moon's relative brilliance and differential motion among the stars had to be obviated, and this has been done by the interposition of an especially designed prism before that half of the camera objective which forms the lunar image. This prism reduces the brightness of the image, and, when rotated by a handle at a uniform rate, corrects the moon's motion to stellar rate. Thus photographs are obtained showing a properly exposed lunar image among a number of star images, and it only re-

mains to measure the positions of the moon's centre, or a well-marked crater, and the stars. A number of difficulties and devices are explained in Mr. Wade's paper, but cannot be given in a brief note.

THE DETERMINATION OF THE SOLAR CONSTANT.—In No. 4, vol. xxix., of the *Astrophysical Journal*, Messrs. Abbot and Fowle, jun., discuss a number of improvements and new results in solar-constant determinations.

Among other results is a new value for the effective solar temperature, which Mr. L. B. Aldrich computed from the previously published results, by Goldhammer's process, and found to be 6200° absolute. In the previous results, published by the Smithsonian observers, allowance was made for the extreme regions of the spectrum not observable by them, and recent research indicates that the corrections then applied were all too small. By employing a quartz prism and magnaninum mirrors, it is hoped to settle this point definitely in future researches.

Another new point, arising from a comparison of the 1908 and 1906 results, is the suggestion that in 1908 the intensity of the ultra-violet rays in sunlight, as compared with that of the red rays, was less than in August, 1906; the proposed new outfit should enable the question of the reality of this apparent variation to be settled definitely. The "solar constants" for the two epochs indicate no such variation in the total emission.

Pyrheliometric experiments during 1908 gave a correction to the unit of energy previously employed which entails a lowering of the 1902-6 "solar constant" values by 7.6 per cent., whilst the correction for the unobserved infra-red and ultra-violet radiations would raise them about 10 per cent.

THE WELSH GORSEDD.

THE ritual of the present-day Welsh Gorsedd, while it attracts the curious crowd, arouses the indignation of many sober-minded nationalists, who deplore the tendency to "popery" so manifest in their fellows. But while these good people remain outside the mystic circle to rail and storm, every effort to persuade the bards to give up the Gorsedd and its ceremonies has been unavailing. The Gorsedd of the bards has grown year by year in its influence upon the life of the nation until it has become the centre of authority for holding the only truly national assembly of the Welsh people—the National Eisteddfod.

The bards, however, have done very little to satisfy the curious or to appease the indignant by a rational explanation of their doings, with the result that in certain quarters judgment has gone against them by default.

Perhaps the most serious effort to show them the evil of their ways was that of Prof. J. Morris Jones, of Bangor, during 1896. In a series of articles published in *Cymru* of that year he deplores the spirit of formalism that is on the increase in the "world and Church," and avows that it is "full time for the country to understand more plainly the true history of the Gorsedd" and the "fiction and deceit upon which its claims are based." The articles are five in number, and it must be admitted that they are a masterly contribution to the history of Gorseddic literature of modern times; since they appeared they have been considered as containing the last word on the antiquity of the Gorsedd, and as the author holds a position among the highest authorities on the poetry and language of Wales, it is in the nature of things that the results of his investigation of this subject should carry great weight. That this is actually so we will quote a paragraph from a very important book on Welsh history in general, "The Welsh People," by Sir John Rhys and D. Brynmor Jones. In chapter xii. of that book, dealing with the "language and literature" of Wales, an allusion is made to the Eisteddfod, and a quotation is given from the "Laws of Howel Dda" concerning the ceremony of chairing the bard. In a footnote relating to this quotation the following comment is made:—"We abstain from saying anything about the 'Gorsedd' as its antiquity is contested. See *Cymru* for 1896, where the reader will find several articles on the subject by Prof. J. Morris Jones, whom we have to thank for calling our attention to the passage

concerning the Chair Contest" (third edition, 517). This statement is repeated in the fourth edition, 1906. This is the only reference to the Gorsedd in the whole of that work. To cause the learned authors of that book to become suddenly cautious on a matter of so great an interest to Welsh people as the Bardic Gorsedd, and that in the course of an allusion to the Eisteddfod, is a fine tribute to the authority of Prof. J. Morris Jones, but to "abstain from saying anything concerning the Gorsedd" throughout a book dealing with purely Welsh history and institutions, more than is contained in a footnote, is, it seems to us, to force deference to the critic almost to breaking point.

Our object is not to minimise the value of these articles; their value as a contribution to the history of post-Reformation MSS. no one can deny or destroy. Our desire is simply to direct attention to the fact that they deal with the Gorsedd history from the sixteenth century onwards, and that it is only in a qualified sense it can be said that they are an examination of the antiquity of the Gorsedd itself. They are being constantly referred to as contesting the antiquity of the Gorsedd; what they actually deal with is the modernity of the bards' connection with the Gorsedd. The antiquity of the Gorsedd itself they do not touch but in so far as they teach us to look beyond modern bardism for that antiquity.

The only reason why the Gorseddites have not given an effective answer to these articles hitherto is that they had no argument—they lacked an effective weapon. There are gaps in the history of the Gorsedd which the historian has failed to bridge. The astro-archæologist, however, has come to the rescue. An effective weapon has at last been forged, or, to change the metaphor, an antidote has been discovered to neutralise the baneful effect of the dose administered by Prof. J. Morris Jones to Gorsedd enthusiasts. The Gorsedd has been invested with new interest since Sir Norman Lockyer gave to the world the theory upon which ancient stone circles were constructed. It is only now, bearing that theory in mind, that the proper value can be assigned to these articles, and also to much other Welsh literature bearing upon the Gorsedd.

The object of these articles was to show that the Gorsedd of to-day was the creation of the bards of Glamorgan of the sixteenth century. In the first article the reader is asked to bear in mind the following statements. We give full quotations, because they indicate what the author has set out to prove; they also show that the author does not particularise between the terms "Gorsedd" and "*Gorsedd Beirdd Ynys Prydain*" (the Gorsedd of the bards of the Isle of Britain).

"(1) It was in Glamorganshire, after the middle of the sixteenth century, that every one of the manuscripts which mention the Gorsedd was written.

"(2) In all manuscripts written before that time throughout Wales, not a word is mentioned of such a thing as the Gorsedd of the bards of the Isle of Britain. Mr. Gwenogfryn Evans has examined hundreds of these older manuscripts, and has failed to observe so much as the name of the Gorsedd in one of them."

The author finds evidence in the Gorsedd literature of this period that the bards "poached" the laws of Howel Dda for rules and regulations to be applied to the institution they were setting up; and in his remarks on these laws we see again the want of distinction between "Gorsedd" and "Gorsedd of the Bards." He says:—"Not one of the three books of law, neither does one of the thirty-one editors, mention anything of the Gorsedd of the Bards. These books treat minutely of every aspect of Welsh life in those ages, from the ceremonies of the Princes' Courts to the marketable value of a wooden spade; they relate much of bards, of the office and place of every grade of bard and the gift that was due to him for his song; and of the different Gorsedd: Gorsedd of assembly (*dygynnuill*); Lord's Gorsedd; Bishop's Gorsedd; Abbot's Gorsedd; but though mention is made of bards and of Gorsedd, Gorsedd of the Bards is not suggested."

When the writer says that no mention is made of "Gorsedd" in the whole range of Welsh literature, including the *Mabinogion* and the "Laws," we infer that he means to say that these ancient MSS. do not contain

reference to "Gorsedd of the Bards" as such. Seeing that the word "Gorsedd" does occur in the *Mabinogion* and in the "Laws," we deplore the fact that the author does not give a philological analysis of the word and let us know what it meant before the bards appropriated it as a name for their stone circle. It is quite evident, even from the author's own words, that the modern bards did not coin the name, but borrowed the name and the idea from antiquity.

Space will not allow us to give an account of the author's examination of the Gorsedd literature from the fifteenth century onwards. It is not to our purpose, and in the main his judgment concerning the value of these MSS. will stand the test of time, and we accept them at his valuation. They "increased," we are told, as a result of a quarrel between bards at the Carmarthen Eisteddfod of 1451. The bards of Glamorgan from that year sought to set up an institution in opposition to the former assembly of the Welsh bards, and soon after began to call it a Gorsedd. The first document cited by the author containing reference to the new heresy is a collection of Triads by Rhisiart Iorwerth, who flourished circa 1510. Then is passed under review a series of MSS., beginning with the collection of Iolo Morganwg (who died in 1826) onward to the middle of the last century. Of the claims made by the bards to the antiquity of the traditions contained in these documents the author makes ridicule as a story worthy only of repetition to the "marines."

When we admit, without reserve as we do, that the author has in these articles given a masterly account of the connection of modern bards with the modern Gorsedd, we strike the sum total of the value of these articles as a contribution to the history of the Gorsedd. He has led us back to the beginning of the sixteenth century by documentary evidence, and if his statement of the bardic quarrel is correct, we arrive at the middle of the fifteenth; but he has done more. By playing the gamekeeper on the bards of the fifteenth and sixteenth centuries we must follow him to their "poaching" ground, and find that we have travelled backwards at least 600 years.

As we have to thank the bards of modern times for reviving and restoring the Gorsedd even when they appropriate it for their own use, we have also to thank Prof. J. Morris Jones for leading us to the source of their inspiration as to its rules and regulations. This source, or quarry, is the Laws of Howel Dda. The Gorsedd rules, the author tells us, were taken mostly from the sections of the Laws regulating the court of "landed property."

Most authorities agree that these Laws were compiled in the tenth century (E. Llwyd gives 940, Taylor 942, Wotton 943, Rhys and Jones 942-3). The authors of "The Welsh People" say of the authenticity of the copies we now possess:—"There is no reason for not carrying back the first setting down in writing of the Welsh customs to the time of Howel Dda. Nor is there any real doubt that these bodies of law consist of customs which were once in actual operation" (third edition, 185).

The following quotations are taken from the "Venedotian Code," the oldest of the "Three Books of the Law" (from "Ancient Laws and Institutions of Wales," Commission Records, 1841, A. Owen).

"XI. Here begin the laws concerning landed property and the form of pleading in respect thereto.

"(1) Twice the law shall be open for landed property, and twice it shall be closed.

"(2) From the ninth of the calends of winter (Kalangayaf) it shall be open until the ninth day of February.

"(3) From the ninth day of February the law shall be closed until the ninth day of May.

"(4) From the ninth day of May the law shall be open until the ninth day of August.

"(5) From the ninth day of August the law shall be closed until the ninth day of the calends of winter.

"(6) The reason why the law shall be closed in autumn and spring is because the land is cultivated during these two periods: lest ploughing in the spring and reaping in autumn be impeded.

"(7) The cause why it is right for the law to be closed for nine days after the calends of winter, and nine days after the feast of St. Bridget to be open: is to avoid closing the law on one day: and the same manner, nine days after the calends of May to be closed, and nine days after August (footnote, the 'Calends of August') to be open: to avoid opening the law on one day likewise.

"(8) Whoever willetth to institute a suit for landed property let him do it when he will, from the ninth of the calends of winter forwards, or from the ninth of May, because those are the times the law is open for landed property."

Anyone conversant with the evidence given in Sir Norman Lockyer's "Stonehenge" as to the May-August-November-February arrangement of the year that once prevailed in this country, and the articles in NATURE by the Rev. John Griffith, of Llangynwyd, showing that the Gorsedd of the Welsh bards is a May-November stone circle, will not fail to appreciate the confirmatory evidence contained in the above quotations from the Laws of the tenth century. It is conclusive proof, we take it, that the May-November year was the only division of time recognised for legal purposes at the time of Howel Dda. It must be remembered, also, that there is no evidence to show that these Laws were creations of the tenth century, but simply records of customs from time immemorial.

While the Venedotian Code of the Laws gives the May-November division complete, the Demetian and Gwentian Codes, which are of slightly later date, in one or two instances mention solstitial dates as the proper time to "plead." For instance, the Demetian Code has:—"There are two days, that is, the ninth of December and the ninth day of May, whereon it is right to commence proceedings as to the inheritance of land by kin," &c. The bardic literature of the sixteenth century onward, discussed by Prof. J. Morris Jones, mentions only the solstices and equinoxes as the proper times to hold Gorsedd meetings.

Did the bards have access only to the later codes, and therefrom take their Gorsedd instructions? The Rev. John Griffith in NATURE, May 2, 1907, directed attention to the interesting fact that the plan of the May-November Welsh Gorsedd preserved by Iolo Morganwg was accompanied by instructions applicable only to a solstitial Gorsedd. The full history of this plan has not yet been found out, but we would suggest that the solstitial instructions became attached to the May-November plan by quarrying in the wrong sections of the Laws. The Venedotian Code contains the instructions proper for holding a May-November Gorsedd; they correspond with the stone-circle plan preserved by the bards, while the bards have failed to preserve a stone circle to correspond with the solstitial instructions.

Sir Norman Lockyer found evidence at Stonehenge that the solstitial replaced the earlier May-November cult, and in Welsh bardic traditions we have to this day evidence of this struggle. We have references to the solstitial and the May-November years. They seem to have got mixed up by the blunderings of the bards. The Gorsedd plan as preserved, and followed this week in London by the Welsh bards, and the corresponding enactments of Howel Dda's Laws, especially the Venedotian Code, represent the older arrangement, while the several references in the Welsh Triads to Stonehenge as one of the mighty deeds of the Cymry, the solstitial instructions about holding a Gorsedd, and the great desire of present-day leading Gorseddites to hold a meeting at Stonehenge, represent the newer arrangement that prevailed until the coming of the Julian year.

While we have no excuse to offer for the present-day ritual of the Gorsedd, we would plead for a re-consideration of the whole question in the light of recent discoveries. The Welsh bards have been "guilty" of saving an obsolete institution from oblivion. The control of bards was, perhaps, only one function belonging to the Gorsedd of ancient times. Long before the fifteenth century all its functions, except the control of the bards, had been taken over by the secular and ecclesiastical administrative courts of England and Wales. In the records of the tenth century there were at least four Gorsedd, suggestive of

peculiar administrative power, and on the analogy of the development of institutions in every country it does not require a very great effort of the imagination to see that in the long ago in this country there was but one Gorsedd, from which emanated the directing influence of a whole people.

W. GRIFFITH.

SCIENTIFIC WORK OF THE INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

IN reviewing the general nature of the papers communicated to the seventh International Congress of Applied Chemistry it may be observed that the tendency has been to discuss matters relating to the general improvement in the various chemical industries during recent years rather than to contribute the results of original researches. By far the greatest number of original papers before the congress were read in the section for organic chemistry, but the official order of the sections is here maintained.

In the section for analytical chemistry much stress was laid by various speakers on the general classification of the purity of marketable chemical reagents. Thus Dr. J. T. Baker proposed that all chemicals should be sold with a label stating the percentage of impurity present. The term "chemically pure" was described as liable to lead to confusion, since absolute purity is in all cases impracticable. The General Chemical Company of New York communicated improved methods for the estimation of small amounts of arsenic existing as impurity in sulphur and sulphuric acid. Messrs. Gardner and Hodgson described a method for the rapid estimation of phenols, based upon the action of iodine upon this class of substances. Prof. Chesneau gave an account of his work on the estimation of phosphorus in iron and steel, which indicated that the phosphorus is completely precipitated as ammonium phosphomolybdate only under definite conditions of concentration of the reacting substances, and that this precipitate, which is not a chemical compound, but a definite mixture of ammonium phosphomolybdate and molybdate, should in all cases be washed only with pure water. Papers on the estimation of creatinine were communicated by Mr. F. C. Cook and by Mr. A. C. Chapman. The effect of the creatinine in alkaline solution is to cause reduction of the picric acid to picramic acid, and errors of analysis are liable to be produced by the excessive reduction of the picric acid to colourless tri-amido phenol. A new form of electrode for electrolytic determination of metals was advocated by Mr. J. W. Turrentine. This was composed of graphite which had been impregnated with paraffin wax, and gave results as accurate as those obtained by the use of platinum electrodes.

In the section for inorganic chemistry Dr. Forster-Morley read a paper recommending authors to index all communications to scientific journals according to the system employed for the International Catalogue of Scientific Literature. This procedure would considerably lighten the labour of the regional bureaux. Papers on the decomposition of Portland cement by sea-water were read by Prof. Le Chatelier and by M. J. Bied. It was shown that the stability of cements towards sea-water is increased by the addition of puzzuolana. A review of the chemical nature of puzzuolana was contributed by M. R. Feret. Dr. George Harker gave an account of the methods of fire extinction in ships and enclosed spaces by means of flue-gas.

In the section for mining and metallurgy the greater portion of the communications dealt with purely technical points. Mr. C. W. Bannister reviewed the processes for extraction of zinc from its ores, and discussed the losses of this metal during distillation, recommending the employment of carbonaceous filters to prevent the admission of oxygen and to prevent the condensation of lead vapour with the zinc. Prof. R. Schelle described the production of pure tellurium from its ores. The finely powdered ore was fused with soda and sulphur, with formation of the sodium sulphide compound of tellurium. On treatment of the aqueous solution of this compound with sodium sulphite, a grey precipitate of the pure metal was produced. M. C. F. Jarl gave an account of the quarrying