

sun. The first great departure from prevailing opinions is the view that the sun is in a tranquil state, and is in no way subject to the violent storms which are commonly believed to disturb it. The stratified character of the solar atmosphere is set forth as evidence of this tranquil state. Dr. Brester believes that the apparent motions of the protuberances are not real, but simply indicate the displacement of the luminous condition brought about by chemical combinations in tranquil matter. This he believes to be quite consistent with the observed displacements of the prominence lines, and we see no reason to differ with him.

The next important divergence from prevailing ideas is the suggestion that pores, spots, and faculæ are all at exactly the same temperature because they are at the same level. The experiments of Spoerer and Langley have shown that the spots emit less heat than the other parts of the photosphere; but Dr. Brester states that this is not due to a difference in temperature, but to a difference of emissive power. He believes that spots are formed by the vaporization of the photospheric matter in the regions where they are formed, the luminosity being reduced, whilst the temperature remains the same. On this supposition, the photosphere bears the same thermal relation to the spot that ice does to the water formed as it melts.

The forms of the spots he believes to be due to the increase of pressure caused by the volatilization of the photospheric matter, the conical form being due to the fact that the nearer the centre the greater the resistance to the expansion.

That faculæ should precede spots Dr. Brester states to be essential to his hypothesis. They indicate the places where increased condensations are taking place prior to the "eruptions of heat" which will produce spots.

For an explanation of the periodical phenomena, and the increased angular velocities of spots near the equator, Dr. Brester assumes that, while the photospheric surface which we see is spherical, the different layers of the atmosphere must be ellipsoidal, owing to the rotation of the sun. He admits that this state of things is not easy to explain, but states that it is sufficient to know that the fact exists. This being taken for granted, the varying periods of rotation in different latitudes is not difficult to explain. For since the photospheric matter is formed by the condensation of the vapours of the ellipsoidal layers, the particles in equatorial regions have to descend a greater distance towards the centre than those in the same layers near the Polar regions; and since the linear velocity remains the same during the descent, the angular velocity is increased, and is increased more at the equator than away from it. Since the spots lie in the photosphere, they thus indicate an increased angular velocity in equatorial regions. It will be seen that this explanation is much akin to that suggested by Mr. Lockyer,<sup>1</sup> differing from it mainly in giving the whole photosphere the additional velocity, whereas, according to Mr. Lockyer's view, only the spot-forming material partakes of the added angular velocity.

The relation of spot spectra to the eleven-yearly period observed by Mr. Lockyer is also partially explained. According to Dr. Brester's view of the solar economy, the photosphere must have a special composition in each latitude, and since the latitudes of the spots vary with the period, the spectra would also vary with the period. The exact nature of the change—namely, from lines of iron and other known substances at minimum to unknown lines at maximum—is not explained.

The similarity of the spot zones on both sides of the equator, according to Dr. Brester's view, is due to the fact that the same atmospheric layer meets the photosphere in equal latitudes on opposite sides of the equator.

<sup>1</sup> "Chemistry of the Sun," p. 424.

The slight differences which do exist are regarded as simply the effect of chance, since an "eruption of heat" may either produce one large spot or several smaller ones.

Dr. Brester also attempts to explain the cause of the eleven-yearly period, but his explanation is difficult to follow. Broadly speaking, his idea is that during eleven years the integrated effects of the various chemical combinations which have taken place are such as to very nearly restore the conditions which had existed at the commencement of the period. Slight differences would be produced each time, so that after a long interval, well-marked differences might be expected.

Although the theory explains many of the phenomena observed, an explanation of many more is still required. Thus, although it is not difficult to understand the absence of spots at the equator, the cooler layers there being at the greatest distance from the photosphere, we should be led to expect the greatest number of spots in polar regions, where the atmosphere in the neighbourhood of the photosphere is coolest, and where, therefore, chemical combinations would be most likely to take place. The question of the corona is reserved for a future essay, but Dr. Brester is confident that it will present no great difficulty. He also hopes to satisfactorily explain the phenomena of comets' tails, the zodiacal light, and the variability of Jupiter and his satellites.

In conclusion, Dr. Brester states that his theory, so far from being at variance with the laws of chemistry and physics, really strengthens them, and that it is not discordant with the observed facts. At the same time he admits that the difficulty of comprehending it in detail will prove a great drawback to its acceptance.

A. FOWLER.

#### THE RABBIT PEST.

MR. W. RODIER, of Tambua, Cobar, New South Wales, has forwarded to this Society a printed sheet, containing, as it appears to me, by far the best suggestion yet made for the extermination of rabbits—a subject to which my attention has been repeatedly called by various correspondents in the Australian colonies, where, as is well known, the damage done by these animals is enormous. Mr. Rodier states that his plan has been in operation at his station in New South Wales for about eight months "with the utmost possible success," and has cleared the country of rabbits. It is a very simple plan. Ferrets and nets are used in the usual way to capture the rabbits, but while all the females taken are destroyed, the males are turned out again uninjured.

The results of this mode of operation are that the male rabbits, as soon as they begin to predominate in numbers, persecute the females with their attentions, and prevent them from breeding. They also kill the young rabbits that happen to be born; and even, as Mr. Rodier asserts, when they largely predominate in numbers, "worry the remaining does to death."

This is all strictly in accordance with what we know takes place under similar circumstances in the case of other animals, so that we can readily believe it to be likely to happen.

The ordinary mode of trapping, as Mr. Rodier points out, is more likely to increase the number of rabbits than to diminish them. For reasons which he clearly explains, more buck rabbits are always killed by the trappers than does. Thus the does predominate in numbers, and, a few bucks being sufficient for a large number of does, are perpetually breeding and increasing the stock.

The plan advocated by Mr. Rodier is so simple and easy that I cannot doubt it will be widely followed when known. No disease that might otherwise cause injury is introduced, no other noxious animal is proposed to be

imported, but advantage is taken of the well-known natural laws which regulate the increase of life to effect in this instance a salutary decrease.

P. L. SCLATER.

Zoological Society of London,  
3, Hanover Square, W., March 18, 1889.

#### NOTES.

THE number of candidates for the Fellowship of the Royal Society this year is seventy-one, being about a dozen above the average number.

THE contributions hitherto paid or promised in this country towards the intended statue of G. S. Ohm amount to £95 14s. 6d. from ninety-four subscribers. It is proposed that the subscription-list shall be closed at the end of the present month, and we are desired by the Committee to ask intending subscribers to send their contributions as early as convenient to the Treasurer, Dr. Hugo Müller, F.R.S., 13 Park Square, N.W.

A COMMITTEE was formed some time ago at Limoges for the purpose of securing the erection of a statue of the great French physicist and chemist, Gay-Lussac. The preliminary arrangements have now been made, and the task of preparing the statue has been intrusted to M. Millet, who expects to be able to exhibit it at the *Salon* next year.

WE have to congratulate the Fishery Board for Scotland upon the acquirement of the services of Dr. J. Beard, who for some years has been working on the Continent. Dr. Beard's researches into the development of fishes take rank among the leading recent contributions to the subject, and they augur well for the future work of the Board. We are pleased to see that the members of this body are now issuing their scientific Bulletins independently of their official Reports.

MR. W. E. HOYLE, late of the *Challenger* Office, has been appointed to the Curatorship of the Manchester Museum in the Owens College. The Museum Committee is fortunate in having secured the services of so competent a man.

A VALUABLE collection of photographs, representing Alpine and Caucasian scenery, taken by the late Mr. W. F. Donkin, is now being exhibited at the Gainsborough Gallery, 25 Old Bond Street.

WE regret to have to record the death, at a very early age, of Mr. J. Reynolds Vaizey, a promising member of the younger school of botanists at Cambridge. His best-known contributions to botanical science are his papers in the first volume of the *Annals of Botany*, on "The Transpiration of the Sporophore of the Musci," and on "The Absorption of Water, and its Relation to the Constitution of the Cell-wall in Mosses." Mr. Vaizey was subject to epileptic fits, and, during one of these, received fatal injuries from falling into the fire.

THE oldest botanical journal of Germany, *Flora*, hitherto published at Regensburg, under the auspices of the Bavarian Botanical Society, appears now, in its seventy-second year, under a new form, issued at Marburg, under the editorship of Prof. K. Goebel. In addition to original papers, it will contain a *résumé* of botanical work during the year in different departments. The first part under the new *régime*, for March, contains important papers by Goebel, Pfeffer, Ludwig, J. Müller, and others.

IN the March number of the *Kew Bulletin* there are papers on fibre industry at the Bahámás, hardy species of Eucalyptus, yam bean, West African rubbers, Phylloxera in Asia Minor, botanical station at Lagos, and Chiga bread.

AT the meeting of the Scientific Committee of the Royal Horticultural Society on March 12, corroborative information was received from Mr. Plowright, of Lynn, regarding the occurrence, described at the previous meeting, of boughs of various trees being broken off by the extraordinary growth of crystals of rime upon them. As no snow had fallen during the period, it was impossible to attribute the results to such a cause. There had been excessive fog before January 7; the rime forming upon the telephone wires was so great that they were broken down. The ice was deposited unilaterally like flat sheets of glass,  $1\frac{1}{2}$  to 2 inches in width on the south side. On the 8th was a thaw. The result of the frost was that a birch had a branch amounting to one-third of the tree broken off; the smaller branches particularly suffered. The elms were most injured, branches of all sizes being broken off, even large arms, one measuring 5 feet 6 inches in circumference and 1 foot 10 inches in diameter. To such an extent was the roadway covered with *débris*, that the market carts were greatly impeded. Oaks, willows, and poplars also suffered; but ashes and Scotch firs escaped. Mr. Plowright noticed that fracture without falling was a distinct feature of rime-injuries to trees, excepting to willows and poplars, the vast majority of whose branches fell to the ground.

THE Society established some months ago under the name of the Gesellschaft Urania has already issued the sixth monthly number of its excellent magazine, *Himmel und Erde*, which is edited by Dr. W. M. Meyer. The main object of the Society is to popularize the accurate knowledge of scientific matters, by practical demonstrations at the head-quarters in Berlin, and through the medium of its magazine. Astronomy, as it always did and always must, leads the way in this attempt to interest the general public in science. Since it is expounded by such authorities as Prof. Schiaparelli, whose illustrated article on Mars runs through the first three numbers, it is evident that the Society does not mean to sacrifice genuineness for the sake of popularity. Dr. Scheiner, of the Potsdam Observatory, contributed an admirable article to the January number, on the principles of spectrum analysis and their application to celestial physics. Astronomical articles have also been contributed by Prof. Foerster, Prof. Seeliger, F. K. Ginzel, and others. Other subjects, however, have not been neglected. A clear exposition of the proofs of subsidence and elevation afforded by the pillars of the Temple of Jupiter Serapis was given by Dr. Brauns in the November number. The January number also contains an excellent article on the aurora, by Dr. Weinstein. The magazine is got up in an attractive style, and is admirably illustrated. The Society has purchased a 13-inch refractor, several microscopes, and other apparatus for the demonstrations; and it is their intention to have models constructed to illustrate eclipses and other phenomena.

THE Educational Society of Japan has, says the *Japan Weekly Mail*, published and circulated a little volume containing its programme, organization, and a list of its members. It is worthy of note that, in the artistic device on the cover, women are conspicuous, and the fact that women are carrying on their studies side by side with men would seem to indicate that the Society is desirous of recognizing the equality of the sexes. No fewer than 5000 members have joined the ranks of the Association, and a kind of committee or parliament is elected by these for purposes of discussion and deliberation, consisting of 200 deliberative members, seven councillors, seven sectional presidents, and one president.

AN interesting step has been taken in Japan by the organization of a branch of the Anthropological Society of Tokio, to be called the "Maine Club," after the late Sir Henry S. Maine, having for its object the investigation of the ancient laws and