as the Royal society started with a close affiliation to Oxford, then became, as regards its officers, for many years a London society, it now returns from London to one of the older universities for its officers. If Professor Stokes be made president (an honor which is certainly due him), the president and one of the two secretaries will be Cambridge men. This is an interesting example of the fact that the older English universities, now that they have been legally set free from ecclesiastical control, are coming to the front in scientific research. It gives point to the agitation now in progress in London for a 'teaching' university, and shows, that, once ecclesiastical fetters are removed, even the most ancient educational endowments can produce national leaders in the physical and biological sciences.

THE NOVEMBER MEETING OF THE NATIONAL ACADEMY OF SCIENCES.

THE meeting of the National academy of sciences, held this autumn in Albany, though even smaller than usual at this season, was interesting and successful. The meeting began on Nov. 10, and lasted four days. Only 18 of the 97 members were present, and 22 papers were read, 16 of them by members of the academy. The papers elicited an unusual amount of interesting discussion, and the sessions, held in the new and cheery assembly parlor at the capitol, were largely attended by the citizens, who, indeed, did every thing to make the meeting of the academy a pleasant one, with dinners and evening receptions. The local scientific institutions combined to receive the academy on the first evening, and the assemblage at Geological hall was a large and distinguished one.

Although the papers were divided almost equally between the physical and natural sciences, those in the former department were, generally speaking, both more important and of wider interest. They were almost exclusively astronomical; and prominent among them, as opening new fields of research, were the papers of Professors E. C. Pickering and S. P. Langley.

The former presented to the academy the results of researches he had undertaken in stellar photography in connection with his brother, Mr. W. H. Pickering, aided by a grant from the Bache fund of the academy. He clearly proved that owing to the recent improvements in photographic methods, and particularly by the advances in dry-plate manufacture, we had now a new tool in astronomy of the utmost importance. The first stellar photographs ever taken were those of *a* Lyrae by the elder Bond, at the Harvard observatory, in 1850. In 1857 his son carried similar investigations much further. At first, however, they had been unable to obtain clear images of stars of the second magnitude, while now it was possible to print those of the fourteenth, or, in other words, to transfer to paper an image produced by an object only a hundred-thousandth part as bright as formerly. Professor Pickering's researches were carried on by means of a new instrument he had devised and constructed from the Bache fund, in which a photographic lens of eight inches aperture and forty-four inches focus is mounted equatorially, and moved by clock-work. By disconnecting the clock-work, photographs of several different regions may be taken upon the same plate, and the stars distinguished by varying the exposures.

Three different fields of investigation were here opened, each of which had been traced somewhat by way of exploration. One was a map of the heavens; a second, the study of atmospheric absorption; and the third, the study of stellar spectra, which, by these methods, may now be pursued with comparative ease. It was found that the negatives would show the lines of stars of the eighth magnitude perfectly, and that these spectra would even bear enlargement upon paper with clear definition. As the only limit of the further extension of stellar photography is the sensitiveness of the dry plate, and as this limit is plainly not yet reached, even better results may be expected.

Many photographs were exhibited, and great interest was manifested in this new departure, as well as in the simple, effective, and time-saving devices of the author for direct comparison on the same plate of a large number of objects for photometric purposes.

Professor Langley's paper related to 'obscure heat,' and continued, as was expected, his remarkable researches with the bolometer, by which he has so greatly extended our notions of the invisible spectrum. This time he dealt with the lunar spectrum, and estimated the heat derived from the unillumined moon. Rosse had estimated the temperature of the moon's surface as from 200 to 500° F. By studying the moon at its full with a rock-salt prism obtained only after repeated failures, and which, from its nature, had already required repolishing seven times, each time necessitating a new determination of its constants, he had succeeded on repeated occasions in securing a spectrum which showed two curves, — one according with that previously obtained in the infra red region beyond the visible portion of the solar spectrum, and clearly due to reflection; and another, lying entirely beyond that, as clearly due to the moon itself, and revealing its real temperature.

This, as shown by studying the spectrum of frigid masses, is colder than the temperature of melting ice.

By comparing the mean of the spectra obtained in summer with that of those obtained in winter, it is evident that a much greater amount of heat is received from the moon in winter than in summer. This may simply be due to the greater amount of aqueous vapor in our own atmosphere in the summer, as contrasted with the winter clarity. By directing the bolometer to the zenith and to the horizon, the temperature of space has also been measured by direct experiment for the first time, and the amazing transparency of our atmosphere to radiation of the earth's heat revealed; for his experiments show that our atmosphere transmits the earth's heat more readily than the sun's.

Professor Newcomb discussed the subject, 'When shall the astronomical day begin?' He took the ground that the inconvenience arising from the discordance between the civil and astronomical measure of time had been greatly exaggerated. It depended, not upon the number of people who had to use the one time, nor upon the number who had to use the other, but upon the number of times one had to be changed into the other. As an illustration, he said that the inhabitants of the planet Mars might use one reckoning of time, and we another, without the slightest inconvenience to the inhabitants of either planet. On the other hand, the proposed change of the beginning of the astronomical day from noon to midnight would be productive of confusion both to ourselves and our successors, the end of which it would be hard to see. It was, in fact, nothing less than a change in language: it was proposed that 'three hours mean time' should hereafter mean what 'fifteen hours' had hitherto meant, and *vice versa*. He explained, however, that his objections applied only to that resolution of the International conference which proposed to change the beginning of the local astronomical day to midnight, and that he made no objection to the introduction into astronomy of the universal day, beginning at Greenwich midnight, provided that this reckoning of time was expressed in language which would clearly distinguish it from any other.

Professor C. H. F. Peters sustained the view of Professor Newcomb, while Professors Young and Graham Bell opposed it. Professor Young held that the introduction of civil time into astronomical reckoning would be a great convenience in designating without ambiguity the times of observations, especially those made in the forenoon; he cited cases in which correspondents had written to him to inquire on which day such observations had been made. He considered that the public at large were ready to adopt the recommendations of the International conference, and that astronomers should not be behind them in doing so.

Professor Bell held that there were three strong reasons for the adoption of the change. The first was that the Meridian conference which proposed it was called by our government, and that we were bound to follow its recommendations. Another reason was that the astronomer royal at Greenwich had adopted the new reckoning at the beginning of the present year, so that the reform was secure if Americans would only follow his example. Third, he considered that ambiguity would be avoided in the records of astronomical or other events. For example, beginning the day at noon, it might happen that an eclipse of the sun occurred before noon at one place, and after noon at a place farther east. Then the historian of the future might be perplexed by finding the eclipse recorded in one place as beginning on one day, and in another place as beginning on the day after.

In reply to Professor Bell, Professor Newcomb called attention to the case when an eclipse of the moon would be observed before midnight at one place, and after midnight at another. So that if the day began at midnight the same trouble would arise that Professor Bell had pointed out in regard to the solar eclipse.

In reply to Professor Young, he said that in order to bring the astronomical and civil reckoning of time into accord it was necessary either that astronomers should subdivide the day into A.M. and P.M., or that the general public should count the hours up to twenty-four. He considered neither course feasible.

Other astronomical papers were read by Mr. O. T. Sherman, who exhibited spectra of β Lyrae and γ Casseiopeiae, showing the existence of bright lines which coincide closely with those of the solar chromosphere; by Prof. C. H. F. Peters, who believes that he has been able to make a plausible hypothesis for each of the twenty-two stars observed by Flamsteed, which were afterwards supposed to be lost; and by Prof. C. A. Young, on the fading star in the nebula of Andromeda, which he had found also to be of variable color.

On the biological side, the chief interest centred in the exposition, by Dr. A. Graham Bell, of the first results of the investigations it had been known he was making in hereditary deafness. A report of this paper will appear in *Science* of Nov. 27.

Space prevents our entering into detail concerning other papers which had mostly only a technical interest. A complete list will be found in our notes. The next meeting will be the annual session at Washington, in May, 1886.