whence with the obliquity of the ecliptic = 23° 41′·1, Stone's places for A.D. 138 become—

| | Longitude. | Latitude. |
|---|---|---|
| Var. Schmidt (Piazzi, xiii. 126) ... | 180° 52′ ... | − 2° 58′ |
| 68 Virginis ... ... ... ... ... | 178° 53′ ... | − 3° 14′ |

As we have seen, Ptolemy's 19th star of Virgo is placed in longitude 178° 0′, latitude − 3° 0′; but, as is well known, the longitudes of the Almagest are about one degree too small. Hence Schjellerup's identification of the variable with Ptolemy's star is likely to be correct; the object deserves frequent attention.

D'ARREST'S COMET.—With reference to the remarks last week in this column on the first announcement of the observation of D'Arrest's comet in the Dun Echt Circular, Prof. Krueger, Director of the Observatory at Kiel, writes us from that establishment, as the "Centralstelle für astronomische Telegramme," as follows:—"I wish to state with reference to No. 703, p. 589, as I have done in *A. N.* No. 2507 [not yet received], that Dr. Hartwig had not telegraphed any daily motion of the supposed comet D'Arrest on the 4th April. The hypothetical daily motion was added by myself in the cable-telegram to Cambridge, U.S., because I assumed that the American astronomers were not in possession of an ephemeris. Lord Crawford received, as usual, the same telegram as Cambridge, U.S., with the additional note (in order to avoid double-telegrams) that the telegram had been sent to America. European astronomers received only Dr. Hartwig's original communication."

## ON THE SENSE OF COLOUR AMONGST SOME OF THE LOWER ANIMALS[1]

AT the meeting of the Linnean Society on Thurday, April 19, Sir John Lubbock read a paper on this subject. Some years ago M. Paul Bert made a series of interesting experiments with the common Daphnia, or water-flea, which is so abundant in our ditches and pools. He exposed them to light of different colours, and he thought himself justified in concluding from his observations that their limits of vision at both ends of the spectrum are the same as our own, being limited by the red at one end, and the violet at the other.

In a previous communication Sir John Lubbock showed, on the contrary, that they are not insensible to the ultra-violet rays, and that at that end of the spectrum their eyes were affected by light which we are unable to perceive. These experiments have recently been repeated by M. Merezkowski, who, however, maintains that, though the Daphnias prefer the yellow rays, which are the brightest of the spectrum, they are, in fact, attracted, not by the colour, but by the brightness; that, while conscious of the intensity of the light, they have no power to distinguish colours. Given an animal which prefers the brightest rays, it may seem difficult to distinguish between a mere preference for light itself rather than for any particular colour. To test this, however, Sir John Lubbock took porcelain troughs about an inch deep, eight inches long, and three broad. In these he put fifty Daphnias, and then, in a darkened chamber, threw upon them an electric spectrum arranged so that on each side of a given line the light was equal, and he found that an immense majority of the Daphnias preferred the green to the red end of the spectrum. Again, to select one out of many experiments, he took four troughs, and covered one-half of the first with a yellow solution, half of the second with a green solution, half of the third with an opaque plate, and he threw over half of the fourth a certain amount of extra light by means of a mirror. He then found that in the first trough a large majority of the Daphnias preferred being under the yellow liquid rather than in the exposed half; that in the second a large majority preferred being under the green liquid rather than in the exposed half; that in the third a large majority preferred the exposed half to that which was shaded; and in the fourth that a large majority preferred the half on which the extra amount of light was thrown.

It is evident, then, that in the first and second troughs the Daphnias did not go under the solution for the sake of the shade, because other Daphnias placed by their side under similar conditions preferred a somewhat brighter light.

It seems clear, therefore, that they were able to distinguish the yellow and green light, and that they preferred it to white light. No such result was given with blue or red solutions. In such cases the Daphnias always preferred the uncovered half of the trough.

It is, of course, impossible absolutely to prove that they perceive colours, but these experiments certainly show that rays of various wave-lengths produce distinct impressions on their eyes; that they prefer rays of light of such wave-lengths as produce upon our eyes the impression of green and yellow. It is, of course, possible that rays of different wave-lengths produce different impressions upon their eyes, but yet that such impressions differ in a manner of which we have no conception. This, however, seems improbable, and on the whole, therefore, it certainly does appear that Daphnias can distinguish not only different degrees of brightness, but also differences of colour.

[1] By Sir John Lubbock, Bart., M.P.

## UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—Prof. Dewar commenced a short course on Chemical Technology in its relation to Organic Chemistry on April 23.

Mr. Sedgwick is lecturing on the Embryology of Mammals and Birds, and Mr. Caldwell on the Morphology of Gephyrea, Brachiopoda, Polyzoa, Chœtognatha, and Larval Forms, practical work accompanying both courses.

Dr. Hans Gadow is lecturing on the Tegumentary and Muscular Systems of the Vertebrata.

Prof. Darwin's lectures on the Theory of the Potential will include an account of Gauss's treatment of those problems generally associated with the name of Green.

The Demonstrator of Mechanism is giving a course of Mechanics applied to the strains in winding, pumping, and blast engines, and in other machines. A practical class is being formed for instruction in Surveying.

## SOCIETIES AND ACADEMIES

### LONDON

**Royal Society**, April 12.—"Introductory Note on Communications to be presented on the Physiology of the Carbohydrates in the Animal System." By F. W. Pavy, M.D., F.R.S.

My last communication (*Proc. Roy. Soc.*, vol. xxxii. p. 418) was entitled "A New Line of Research bearing on the Physiology of Sugar in the Animal System."

During the time which has since elapsed, I have been actively continuing my investigations in the direction started, and the results obtained give an entirely new aspect to the whole subject of the physiology of the carbohydrates in the animal system.

Modern research has shown that, besides the well-known carbohydrate principles, such as sugar, &c., there are several dextrins distinguishable by their optical properties and their cupric oxide reducing power.

From the colloidal principle starch, which has no cupric oxide reducing power, principles (dextrins) are producible by the action of ferments possessing gradually-increasing cupric oxide reducing power until maltose is reached, which constitutes the final product, and which possess a little more than half the cupric oxide reducing power of glucose.

This is one foundation point connected with the researches I have been conducting upon the physiology of the carbohydrates in the animal system.

The other foundation point is that the various members of the carbohydrate group are brought into glucose by the agency of sulphuric acid and heat.

Proceeding upon these facts, and taking the cupric oxide reducing power before and after subjection to the converting action of sulphuric acid and heat, I have prosecuted investigations upon the transformation of the carbohydrates within the animal system with the result of acquiring knowledge of an altogether unexpected nature.

Hitherto what has been observed as regards the transformation of carbohydrates by the action of ferments and chemical agents, has been a change attended with increased hydration—for example, the passage of starch into the successive forms of dextrin and maltose and cane-sugar into glucose.

The issue of the researches, however, which I have been conducting recently, is to demonstrate the passage of carbohydrates exactly in the opposite direction by the action of certain ferments existing within the animal system.

Alike in the alimentary canal, the circulatory system, and the