

was that described by his brother before Section A of the British Association at Exeter. By the time these lines are in print the cable may possibly have been laid, but much depends upon the weather. When the weather is fine, it usually takes half a day to lay each of the shore ends of a cable, and the deep-sea portion is ordinarily paid out at the rate of five knots per hour. The time occupied in paying out the deep-sea portion of the cable now under notice should be about twenty hours in all.

#### DR. PENNY, F.R.S.E.

IN our first number we had to record the death of Thomas Graham, one of the greatest chemists of the century, and formerly an occupant of the chair of chemistry in Anderson's Institution, Glasgow. We have now to announce the death of Frederick Penny, who, with the exception of the short interval between 1837 and 1839, when Gregory was its occupant, has filled it with increasing reputation and success ever since Graham vacated it to go to London, thirty-two years ago. Born in London in 1817, he was devoted to chemistry from his earliest years, and studied in the Apothecaries' Hall under Henry Hennell, F.R.S. It was while here that he was led to inquire into the combining weights of certain of the elements, by finding that the amount of potassic chloride obtained by acting upon pure potassic nitrate with excess of hydrochloric acid did not correspond with the quantity which theory showed should be obtained. Having made sure that the difference was not due to errors in his experiments, he ascribed it to inaccurate equivalents assigned to the elements. As the result of his investigations, he showed that the equivalents current at the time for chlorine, nitrogen, potassium, sodium, and silver were not in strict accordance with experiment, and that the "hypothesis of all equivalents being simple multiples of hydrogen is no longer tenable." [Phil. Trans. 1839. Part i. p. 32.] There can be no question as to the clearness of this paper and the value of the results obtained, and our interest in them is in no way diminished when we find that the equivalents determined by Penny agree in a very remarkable manner with the mean numbers published by Stas, and that this agreement has been pointed out by that chemist. [Fresenius, Zeits. für Annal. Chem. 1868, pp. 164, 168. Compare Penny's Table, Phil. Trans. 1839, i. p. 32, with Stas's Fres. Zeits. 1868, p. 170.]

The paper was published in January 1839, and the same year he was appointed to the vacant lectureship in Anderson's Institution. Dr. Penny himself has had but recently to give an account of his struggles and successes in Glasgow, since settling in it thirty years ago. Recommended by Graham, he went down to a sphere of life and action, more strange at that time to a native of London than it has since become; but he devoted himself strenuously to his work, and at the time of his death had won in Glasgow and the West of Scotland a wide reputation as one of the clearest and most emphatic lecturers, and one of the most painstaking teachers.

#### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his Correspondents.]

#### Lectures to Working Men

I HEARTILY concur in Mr. Stuart's opinion, that the working men of England—speaking at least for the North—are fully aware of the value of Scientific Instruction in its strict sense. The subject has a special interest for me; as in the winter of 1866-7, I started in this city a series of Science Lectures for the People, which, with the kind help of Prof. Jevons, Dr. Alcock, and Dr. Morgan, were undertaken for the purpose of ascertaining whether the working men of Manchester really appreciate the value of science instruction when given in a plain, but scientific

form, illustrated with diagrams and experiments made on a scale such as could be seen by a large audience. The experiment proved highly successful. Upwards of 4,000 people attended the thirteen Lectures which we gave, and the class of persons present was exactly that for whom the lectures were designed; whilst the marked attention and interest invariably exhibited by the audiences showed how keenly they appreciated the information they received, and the insight into true scientific methods which they obtained.

The lecturer's words were taken down by Mr. Pitman, and the lectures were each week printed and published by Mr. John Heywood, of Manchester, and largely sold at one penny each at the door of the lecture-room and elsewhere. I printed syllabuses of the chief points of my four lectures, and one was given to each person entering the room. When I say that the subject of my first lecture was the explanation of the principles of the Indestructibility of Matter and of Energy, with a description of Joule's Determination of the Mechanical Equivalent of Heat, I think you will see that mere amusement was not the aim; the same remark applies to all the other lectures, and yet I never met with a more attentive and appreciative audience than these Manchester working men.

Professor Jevons gave us a most excellent lecture on "Coal, its Value and Importance in the Arts and Sciences;" Dr. Alcock gave four capital lectures on Elementary Zoology, and Dr. Morgan a course of four on Elementary Physiology, a subject in which the greatest interest was evinced.

We charged one penny per head for admission, and the penny fees did not nearly cover the necessary outlay, which was defrayed by some friends. Not only was the expense a difficulty, but the work of carrying on such a system was more than could be regularly and gratuitously borne by men whose strength was already sufficiently taxed by their own professional duties. Otherwise the lectures would have certainly been continued, for we were all fully persuaded that no mode of commencing science teaching for the people is so effective as this, or so likely to ripen into a permanent demand for scientific education amongst the working classes. As a proof of this, I may add that for two winters a class was formed in connection with these lectures for regular instruction in Chemistry under an able Government science master—one of my pupils, who had gradually raised himself from the position of a common factory hand. For this instruction sixty working men each paid 2s. 6d. for thirteen lessons. I often looked in upon them, and a more hard-working and enthusiastic class I never had the good fortune to see.

If such science lectures, followed up by regular science instruction, could be permanently established every winter, under careful and thoroughly competent teachers, in each of our great centres of industry, what invaluable results might not be accomplished! This is truly a subject worthy of the attention of some of our wealthy philanthropists; if, indeed, Government does not take the matter up. How much better would it be to devote money to the establishment of such a series of science classes, than, as is too often the custom, to employ it for building an almshouse!

H. E. ROSCOE

Owens College, Manchester, Nov. 23, 1869.

#### Changes in Jupiter

DURING the months of October and November the planet Jupiter has presented a spectacle of singular and almost unexampled beauty. The belts on the planet are more than usually numerous, and they display a greater variety of colours than I have ever yet seen ascribed to them. The equatorial belt, which has been for years the brightest part of the planet, is now not nearly so bright as the light belts to the north and south; usually it has been free from markings, now it is often covered with markings, which resemble piled-up cumulus clouds: it has generally been colourless, shining with a silver-grey, or pearly lustre—now it is of a rich deep yellow, greatly resembling the colour of electrotyped gold.

The woodcut represents Jupiter as it was seen on the night of the 9th of March in a reflecting telescope with a silvered glass mirror of 12½ inches diameter. The upper part of the planet is the S. pole. On this portion of the disc there are three dark belts, while on the N. there are only two.

The poles of the planet are ashy blue, and the darker belts nearest to them present a darker tint of the same colour. The bright belts next these are pearly-white, and shine more brilliantly than any other portion of the planet. The dark belts next to the central bright belts are coppery red. As already mentioned, the

central belt, which has been for years a pearly-white, is now a rich golden yellow.

Three or four dark markings on the lower part of the southern dark belt nearest the equator will be seen to incline to the left. If our earth were removed to Jupiter's distance, its disc would appear no larger than these dark masses, so enormous is their extent. The rotation of the planet is carrying them towards the right: we may assume that the bright vapour between them is left behind by the planet, which is here travelling at the rate of nearly 3,000 miles an hour.



JUPITER, OCTOBER 9, 1869, 11 P.M. G.M.T.

Spectrum analysis has taught us to suspect that any change in the colour of light proceeding from an object, indicates a change in the object itself. If Jupiter, the largest planet in the solar system, has still retained so much heat as to shine partially by his own light, the present considerable change in colour may enable spectroscopists to obtain some information on this interesting subject.

JOHN BROWNING

### Cuckows' Eggs

WILL you kindly grant me space for a few remarks in reference to the very interesting paper on the eggs of the cuckoo, by Professor Newton, in your last issue? I have no intention to criticise so able and accomplished a naturalist: my object is simply to elicit information on some points of difficulty; and as Mr. Newton promises a second paper, I should be very glad if he would throw any light on them.

And first as to the colour and markings of cuckows' eggs. Are they so variable as some assert? I must take leave to doubt this. I never met with such extreme varieties, nor can I hear amongst my oölogical friends of any who have done so. One of the most eminent and experienced of living oölogists has stated: "As far as my own experience goes, it teaches me that there are not many birds the eggs of which differ less than those of the cuckoo." On the other hand, Mr. Newton says: "It has long been notorious to oölogists, that the eggs of the cuckoo are subject to very great variety of colour." This, then, is a point on which I think further evidence is wanting. Dr. Baldamus mentions sixteen varieties of eggs which he alleges are cuckows'. Were these seen to be deposited by the bird, or how were they identified as those of the cuckoo? Dr. Baldamus does not appear to have taken them all himself. Is there not room for error here?

Mr. Newton saw these eggs, appears satisfied that they were those of the cuckoo, and agrees with Dr. Baldamus in his conclusions, that the object of the practice was that the cuckoo's egg should be "less easily recognised by the foster-parents as a substituted one." How then is this process effected? Mr. Newton's explanation is that each hen cuckoo deposits her eggs only in the nests of one species, that her eggs resemble those of the species whose nest she uses, and that this process is hereditary.

Here it is that I am most in doubt. How is this hereditary

habit of laying a particular style of egg maintained? It is quite possible that habits may become hereditary; but is there any instance of a wild species of animal inhabiting one locality and freely intermingling, where some members possess peculiarities of habit which are hereditary which their fellows do not? Mr. Newton will excuse me for saying, that the Golden Eagle he mentions scarcely fulfils these conditions. Is it likely there are sixteen varieties of our common cuckoo which are only to be distinguished from each other by laying a differently marked and coloured egg? Few birds are more vagrant or possess less conjugal or parental affection than the cuckoo. How then are these sixteen varieties to be kept from crossing? And if, as I believe, interbreeding does take place, how can the alleged distinctive style of eggs be preserved? Here I am at fault, and I shall be very glad if Mr. Newton will help me out of my difficulty.

In the face of the alleged object, that the egg shall be less easily recognised as a substituted one, how are we to account for the fact that, in this country at least, a larger number of cuckows' eggs are deposited in the nests of the hedge sparrow than in those of any other species, the speckled brown egg contrasting *strongly* with the greenish blue ones?

W. J. STERLAND

### The Corona

IN connexion with Mr. Lockyer's paper "On the Recent Total Eclipse of the Sun," the following observations may be useful.

I observed the total eclipse of July 1860, in company with my friends Professor Chevallier and Mr. B. E. Hammond, at the village of Pancorbo, in Spain. We were on the summit of a mountain of considerable height, about 5,000 feet above the sea, and were therefore under somewhat peculiar atmospheric conditions. I observed specially four things:—

(1) Venus; which was then extremely near the sun, the thickness of the crescent being only 1 or 2 seconds, and therefore very favourably placed for observing whether it has an atmosphere.

(2) The extent of the corona, and its form. This I am sure was very irregular; very nearly, if not quite, permanent during the three minutes of totality; was nowhere less than 25' in breadth; in one part, the top in an inverting telescope, 40' in breadth; and in another, the right, was more than 60' in breadth, running out in a long wavy line like floss silk. I have before me the drawing I made at the time, during the totality.

(3) The amount of light given by the corona. This was estimated by a photometer, consisting of a wedge of dark glass, with a moveable slit, contrived by Mr. Chevallier, and now, I believe, in the possession of the Astronomical Society, with the place marked through which I saw the corona. It was as bright as a small cloud, distant 8° from the sun, 10 minutes after reappearance; or as the moon when 2½ days old, as the sun was setting.

(4) The colours shown by a variety of coloured ribbons during totality. Of these, the only observation that bears on Mr. Lockyer's paper, was that on the extent of the corona. I estimated it twice; once as reaching, to the right, 2½ diameters of the sun, and once, later on, at nearly 2½ diameters. I had no micrometer, but could not possibly have been wrong by so much as 10'. I wrote down at the time, that it underwent no perceptible change during the eclipse. It remained visible for six seconds after the reappearance of the sun.

I had, and have, little doubt that the corona is in the solar, and not terrestrial atmosphere.

Rugby School, Nov. 11

JAMES M. WILSON

### Lightning in a Clear Sky

WE constantly find allusions in ancient classical authors, to lightning and thunder occurring in a clear sky. The former is often explained as referring to the phenomenon commonly known as "summer lightning," or the reflection in the sky of lightning from clouds below the horizon, which becomes visible at night. I have also seen it stated that in the calm and clear atmosphere of Italy, thunder might be audible under similar conditions. These explanations, however, do not meet the case as stated by good observers amongst the ancients themselves. They do not explain, for instance, what is stated by Cicero amongst the portents which preceded the conspiracy of Catiline—"that a Roman citizen was killed by lightning on a cloudless day." Pliny also mentions this case, adding that it happened at Pompeii. If such a phenomenon as lightning, falling from a cloudless sky, is disbelieved by men of science, may not the circumstance stated above be explained by supposing the man to have been killed by