

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