Natural History in the Field.

WILL you allow me to draw the attention of students of field botany, field naturalists, and those interested in encouraging natural history in the field, especially schoolmasters who may be initiating classes for the study of our native plants, to the high probability of the present year being quite an exceptionally prolific year for all our sun-loving vegetable flora.

The want of sunshine last year kept all our wild flowers back. Nothing had its full development: flowers were late, foliage was thin, colours were dull and undefined, fruit small and without flavour, seeds unripe.

But one season's loss is the next season's gain; in all probability the plants this year will be exceptionally fine, and many plants that are usually small and poor will flourish with unusual vigour, while, not improbably, many plants which seldom show themselves here will this year blossom and become visible.

On this account it might be well to advise the starting of classes for the study this year of field natural history, for students, particularly young students, are encouraged to go on with a pursuit that has been very successful at its commencement.

Chigwell. W. LINTON WILSON.

Detonating Meteor.

ACCORDING to the Jamaica Weather Report for November 1888, a very brilliant meteor was seen at Kingston, Jamaica, on the evening of November 10, at 8h. 52m. local mean time.

It appeared about 30° above the south-west horizon, crossed the heavens, and disappeared about 30° above the north-north-east horizon; and as Kingston is in lat. 18° N., we have for the point of appearance the celestial co-ordinates R.A. 21h. 24m., N.P.D. 113°, and for the point of disappearance, R.A. 3h. 45m., N.P.D. 25°.

Mr. R. Johnstone writes:—"It was by far the brightest meteor I have ever seen, and it so lit up the sky as to cause consternation among many of the negro population. Exactly four minutes afterwards I heard a sound as of a distant explosion, which was not quite so loud as the 9 o'clock gun at Port Royal, heard in due time about four minutes later. The sound was heard by other people in Kingston."

As Kingston is 5h. 7m. W. of Greenwich, the meteor appeared November 11, 1h. 59m. a.m. Greenwich civil time; and therefore the meteor falls within the period November 11–15, which is one of the large-meteor periods, according to the useful summary given in Whitaker's Almanac.

The interval of four minutes between the appearance of the meteor and the sound of its explosion corresponds to a distance of forty-eight miles. I am sorry that the details are at present incomplete in many respects, but inquiry will be made.

MAXWELL HALL.

12 Hartington Road, Ealing, February 2.

MEMORIAL TO G. S. OHM.

A MEETING was held on Thursday afternoon, January 31, in the meeting-room of the Royal Society, the Right Hon. Lord Rayleigh, Sec.R.S., in the chair, for the purpose of promoting the co-operation of English men of science and others in a project, set afoot in the first instance by some of the Professors and other leading men in Munich, of erecting in that city a statue of George Simon Ohm—a man who, although he discovered no new phenomena of very striking importance, yet by the accuracy of his thought, and the clearness of his insight into the true bearings of physical facts, was able to lay one of the principal and firmest parts of the foundation of the noble edifice of modern physics.

The occasion for the proposal at this particular time to erect a memorial to Ohm is the near approach of the hundredth anniversary of his birth, on March 16, 1789. There are, moreover, reasons why this proposal should be, and no doubt will be, taken up warmly in this country. English physicists may recall with satisfaction that the award of the Copley Medal by the Royal Society on November 30, 1841, was the first public or official recognition that Ohm received of the value of his work upon the laws of the electric circuit, and that this award contributed in a very great degree to obtain for his researches the attention and appreciation they deserved. It may not be without interest at the present time to refer to the words in which the Chairman, Sir J. W. Lubbock, Bart, V.P. and Treas., announced the award. The following is from the report of the proceedings at the anniversary meeting of 1841:—

"The Council has awarded the Copley Medal for the present year to Dr. G. S. Ohm, of Nuremberg, for his researches into the laws of electric currents, contained in various memoirs published in *Schweigger's Journal*, *Poggendorff's Annalen*, and also in a separate work, entitled 'Die galvanische Kette mathematisch bearbeitet,' published at Berlin in the year 1827. In these works, Dr. Ohm has established, for the first time, the laws of the electric circuit; a subject of vast importance, and hitherto involved in the greatest uncertainty. He has shown that the usual vague distinctions of intensity and quantity have no foundation, and that all the explanations derived from these considerations are utterly erroneous. He has demonstrated, both theoretically and experimentally, that the action of a circuit is equal to the sum of the electromotive forces divided by the sum of the resistances; and that whatever be the nature of the current, whether voltaic or thermo-electric, if this quotient be equal, the effect is the same. He has also shown the means of determining with accuracy the values of the separate resistances and electromotive forces in the circuit. The light which these investigations have thrown on the theory of current electricity is very considerable; and although the labours of Ohm were for more than ten years neglected (Fechner being the only author who, within that time, admitted and confirmed his views), within the last five years, Gauss, Lenz, Jacobi, Poggendorff, Henry, and many other eminent philosophers, have acknowledged the great value of his researches, and their obligations to him in conducting their own investigations. Had the works of Ohm been earlier known, and their value recognized, the industry of experimentalists would have been better rewarded. In this country those who have had most experience in researches in which voltaic agency is concerned, have borne the strongest testimony to the assistance they have derived from this source, and to the invariable accuracy with which the observed phenomena have corresponded with the theory of Ohm. This accordance it may be observed is altogether independent of the particular hypothesis which may be adopted as to the origin of electromotive force; and obtains equally, whether that force is regarded as being derived from the contact of dissimilar metals, or as referable to chemical agency."

Ohm's book, "Die galvanische Kette," referred to in the above extract, was translated into English by Dr. William Francis, and published in 1841, in the second volume of "Taylor's Scientific Memoirs." The publication of Wheatstone's paper (read to the Royal Society, June 15, 1843), entitled "An Account of several New Instruments and Processes for determining the Constants of a Voltaic Circuit," also contributed in an important degree to attract attention to Ohm's work and to cause its importance to be recognized. We may call to mind also that it was in this country that the necessity of expressing electrical quantities in absolute measure first came to be generally recognized, and that the term "ohmad" or "ohm," suggested by Sir Charles Bright and Mr. Latimer Clark at the meeting of the British Association in Manchester, in 1861, first came into use as the name of a decimal multiple of the absolute unit of resistance convenient for practical purposes. Twenty years later, at the Congress of Electricians in Paris, in 1881, the "ohm" was unanimously adopted as an international standard. The name of the modest German Professor has thus come to be an understood term in the language of every civilized community in connection with the conception which he

was the first to define with perfect clearness, and to show the true bearing of in relation to the connected ideas of electromotive force and strength of current.

At the meeting on January 31, resolutions, moved by the President of the Royal Society and by Sir Frederick Abel, K.C.B., were adopted, expressing the concurrence of those present with the proposal to erect a statue to Ohm, and appointing a Committee to make the scheme known in this country and to collect subscriptions. Dr. Hugo Müller, F.R.S. (who, when a student at the University of Munich, was a pupil of Ohm's), was requested to act as Treasurer of the fund to be collected, and Profs. G. Carey Foster, F.R.S., and John Perry, F.R.S., were appointed Secretaries.

The following memoranda, taken from Lamont's *Denkrede* to the Munich Academy, 1855, may not be without interest at the present time:—Ohm was born in Erlangen, where his family had been settled for several generations. His father, who followed the hereditary trade of lock-smith, was a man of active intellect, and gained a very considerable acquaintance with mathematics and physics. It was in great measure owing to his example and encouragement that his two sons, George Simon and Martin (who afterwards attained great distinction as Professor of Mathematics in the University of Berlin), developed a love for similar studies. In 1805, G. S. Ohm became a student of the University of Erlangen, whither he returned in 1811, after some years spent as a private tutor in Switzerland, and then took his doctor's degree and established himself as *Privatdocent*. For a short time he was a teacher in the *Realschule* at Bamberg, and in 1817 obtained a more important post as teacher of mathematics in the Jesuits' Gymnasium at Cologne. It was while he held this appointment that his ideas as to the laws of the galvanic circuit took definite shape, and that his memorable book, "Die galvanische Kette mathematisch bearbeitet," was written. Soon after the publication of this book in 1827, Ohm presented himself at the Ministry of Education in Berlin, and there met with a reception so little appropriate to the whole-hearted and self-sacrificing devotion to science of which he was conscious, that he felt it impossible to remain any longer in the public service. He was thus driven to spend seven years in the prime of life in a state of deep mental dejection, and with very scanty means of subsistence. The end of this dismal period came in 1833, when he was appointed, by the Bavarian Government, Professor in the Polytechnic School at Nuremberg. The award of the Copley Medal, in 1841, already mentioned, cheered and encouraged him still further, and in grateful acknowledgment he dedicated to the Royal Society his "Molecular Physics." From this time he came to be recognized as one of the leading physicists of Germany, and "Ohm's law" soon found its way into every text-book of physics. In 1849, he was called to Munich as Curator of the Physical Cabinet, and in 1852 he became Professor of Experimental Physics in the University. On July 7, 1854, he died suddenly from apoplexy. For a great part of his life he had a hard fight with outward circumstances; but he seems to have remained throughout singularly simple-minded and unassuming, and at the same time thoroughly honest and conscientious in his work. G. C. F.

THE ROYAL SOCIETY OF EDINBURGH.[1]

AT the commencement of the session 1883-84, the Royal Society of Edinburgh entered upon the second century of its existence. Since its foundation it has had among its members men whose fame is national and often world-wide—Joseph Black, Henry Dundas, James Hutton, John Playfair, Adam Smith, Dugald Stewart, Adam Fergusson, James Gregory, Henry Mackenzie, John Leslie, William Wallace, Walter Scott, Maclaurin, Brewster, Forbes, and more recently Clerk Maxwell; and at present it has members whose names will rank as high as these. In the year 1886 the membership of the Society was 507, and was rapidly increasing. The number of papers communicated to it in the period 1883-87 was 317. We shall therefore select for special notice a few of these, which may be taken as typical of the work done by the Society; and it will be seen that its work, if large in quantity, is also high in quality. We agree with the opinion expressed to the Society by the Chairman in his opening address in December 1886, that, "if we include the extra volumes on the Ben Nevis observations, and on the botany of Socotra, . . . the Proceedings and Transactions of the Society during the past three years probably surpass in bulk and importance those of any other Society in the United Kingdom for the same period."

In the department of mathematics, these volumes include valuable contributions to the science of situation, or of those space-relations which are independent of *measure* though not necessarily of *number*, from the Rev. T. P. Kirkman and Prof. Tait. The former writer contributes papers "On the Enumeration, Description, and Construction of Knots of fewer than Ten Crossings," and "On the 364 Unifilar Knots of Ten Crossings;" a note "On the Twists of Listing and Tait," and "Examples upon the reading of a Circle or Circles of a Knot." Prof. Tait gives a "Census of 8-fold and 9-fold Knottiness," and a "Census of 10-fold Knottiness," with a special treatment of amphicheirals. There is also a paper, "Ueber algebraische Knoten," by Prof. Fr. Meyer, of Tübingen.

Dr. Thomas Muir treats of subjects connected with the theory of continued fractions and with the theory of determinants. Dr. Muir constantly aims at the attainment of simplicity through great generalization. An example of this is given in his paper "On the Researches of M. de Jonquières on Periodic Continued Fractions." He points out that many of the theorems given by M. de Jonquières are not new, and that the earlier ones are all special cases of a more general theorem previously published by Dr. Muir himself. He then proceeds to use this general theorem for the purpose of giving unity to M. de Jonquière's work.

Among other papers we note, "The Expansion of Functions in terms of Linear, Cylindric, Spherical, and Allied Functions," by Mr. P. Alexander; a quaternion investigation by Dr. G. Plarr of "The curve on one of the co-ordinate planes which forms the outer limit of the position of the point of contact of an ellipsoid which always touches the three planes of reference;" and a note "On the Hessian," by Prof. Chrystal. M. Hermite contributes a paper "Sur la Réduction des Intégrales Hyperelliptiques," and Prof. L. Cremona gives an "Esempio del metodo di dedurre una superficie da una figura piana."

In a remarkable paper "On the Law of Inertia; the Principle of Chronometry; and the Principle of Absolute Clinural Rest, and of Absolute Rotation," Prof. James Thomson treats of questions on the border-ground between pure mathematics and physics. He discusses "such motions of points in unmarked space, as can have a reference frame relatively to which these motions are rectilinear and are changeless in mutual rate." The problem of finding a reference frame for a known set of such points is worked out in another paper by the same author by a method of mechanical adaptations, and Prof. Tait has given a quaternion solution of it. Prof. Thomson's law of inertia is the equivalent of Newton's first and second laws of motion. The paper is one which merits the perusal of all students of dynamics, and it may be specially recommended for study to certain classes of metaphysicians.

[1] Proceedings, Sessions 1883-87. Transactions, Vol. xxx. Part 4; Vol. xxxii. Parts 2, 3, 4; Vol. xxxiii. Parts 1, 2.