

that day, and who are so greedy for instruction that on a summer evening, instead of playing at some game during their only hours of leisure, they will spend one part of it in reading, and the other part in listening to a lecturer, the intricacies of whose demonstrations require the most unhalting attention. Suppose I were to start a lecture on some scientific subject at Cambridge, probably none, or at most a score, would come. I am not setting this down to their blame, for the truth is that they have not the same need, for they have many men able to teach them anything they could possibly want to learn. I am not here stating the reasons why there should be so small a demand for scientific teaching at the University; the reasons are various and complicated, although we have not to go far to seek them; but the fact is certain. Now all this ought not to be so. There is a supply without a demand, and a demand without a supply; and the matter calls for the gravest consideration of those scientific men who care that the benefits which are to be got from the true study of science should be diffused among the people of this country. Of all things in the world, this is a demand which, wherever it exists, it is right to foster and encourage, and it can only be successfully fostered and encouraged by men whose intimate acquaintance with the subjects with which they deal renders them competent for a task at once of such magnitude and of such importance. It is not any want of teachers at the University, but the almost absolute want of teaching and teachers for those classes that presses upon us.

JAMES STUART

Trinity College, Cambridge, Nov. 8

Fertilisation of Winter-flowering Plants

MR. DARWIN has done me the honour of calling my attention to one or two points in my paper, published in your last number, "On the Fertilisation of Winter-flowering Plants." He thinks there must be some error in my including *Vinca major* among the plants of which the pollen is discharged in the bud, as he "knows from experiment that some species of *Vinca* absolutely require insect aid for fertilisation." On referring to my notes, I find them perfectly clear with respect to the time at which the pollen is discharged. My observation, however, so far agrees with Mr. Darwin's, that I find no record of any fruit being produced in January; it was, in fact, the absence of capsules on the *Vinca* which induced me to qualify the sentence on this subject, and in these cases, abundance of fully formed seed is observed." It is worthy of remark, that the *Vinca* is the only species in my list of apparently bud-fertilised plants not indigenous to this country. The second point relates to the white dead-nettle, with respect to which Mr. Darwin says, "I covered up *Lamium album* early in June, and the plants produced no seed, although surrounding plants produced plenty." This again would agree with my conjecture that it is only the flowers produced in winter that are self-fertilised. I may, however, be permitted to suggest that the test of covering up a plant with a bell-glass is not conclusive on the point of cross-fertilisation, as it is quite probable that with plants that are ordinarily self-fertilised, the mere fact of a complete stoppage of a free circulation of air may prevent the impregnation taking place. Has the experiment ever been tried with grasses, which, according to the French observer, M. Bidard are necessarily self-fertilised?

ALFRED W. BENNETT

3, Park Village East, Nov. 8, 1869

A Meteor

THIS evening, at 6.50, Greenwich time, I was called to my door by the letter-carrier, who pointed out a serpentine band in the sky, having a brightness rather above that of the Milky Way. It was about 3° in greatest breadth, and 20° in length. Its longest axis was in the line from the north-west point of the horizon to the pole star, from which, where nearest, it was about 20° distant. Its other extremity was very near the Milky Way, and surpassed every other part in brightness. Its pole-ward termination was faint, filmy, and bifurcated.

The postman said, "About five minutes ago," i.e. 6.45 p.m., "whilst waiting at another house, I suddenly became aware of a great light, but on looking up, instead of a shooting star, as I expected, I saw a fixed crooked line, as broad as my finger, and quite as bright as that star" (pointing to Jupiter). It gradually became broader and fainter, but not longer; and I came on here as fast as I could to let you know about it."

I observed it at intervals of five minutes; and observed that it gradually grew fainter and straighter, and moved slowly towards the north-east, its axis remaining apparently parallel to itself throughout. I saw it distinctly at 7.35, but was not satisfied that I did so at 7.40. It must have remained visible from 50 to 55 minutes.

W. PENGELLY

Lamorna, Torquay, Nov. 6, 1869

[It is to be hoped that advantage was taken of this almost unprecedented opportunity to bring the spectroscope to bear upon a meteor cloud. From other accounts the meteor itself appears to have been exceptionally brilliant, and to have burst with noise, as of a rocket (Falmouth); to have changed its colour from yellowish red and lurid red to brilliant green at the moment of explosion, and then from violet to orange (Birmingham.) Another account (Wimborne) states, that at the moment of explosion the colour was dazzling purple and blueish, fading into white at its upper extremity. The cloud was observed to assume a serpentine form both at Bristol and Stokesay. Mr. Pengelly's 50 or 55 minutes' duration was most nearly equalled at the latter place, where it was observed for half an hour. There are ample elements for the determination of the meteor's path.—ED.]

Tempel's Comet

I ENCLOSE an orbit for the comet discovered by Tempel on October 11, of which no elements have yet been published in the *Astronomische Nachrichten*. Indeed, but for an observation kindly sent me by Dr. Winnecke, and not yet printed, it would not have been practicable to work out an orbit.

Elements of the Orbit of Tempel's Comet, 1869, Oct. 11.

Elements calculated from an observation at Bonn, Oct. 12, one by Dr. Winnecke, at Carlsruhe, Oct. 17, and a third at Leipzig, Oct. 23:—

Perihelion Passage, 1869, Oct.	8.4421	Greenwich M. T.
Longitude of Perihelion	124° 41' 1"	} From appt. Equinox.
Ascending Node	311° 24' 4"	
Inclination to Ecliptic	68° 48' 8"	
Log. perihelion distance	0° 08995	
Heliocentric Motion Retrograde.		

The above orbit does not resemble that of any comet previously computed.

J. R. HIND

Observatory, Twickenham, Nov. 8.

NOTES

THE argument that British manufacturing and commercial superiority cannot be maintained unless the means of a sound scientific education be placed within the reach of all classes all over the kingdom, seems likely to be put to the proof. Oxford and Cambridge local examinations, the examinations by the Society of Arts and the South Kensington Museum, we are told, only serve to show how backward we are in real knowledge, and that we want more schools, more places of instruction. Well, by act of parliament, a number of our Public Schools are to be ruled by new "Governing Bodies," the members of which are to be appointed by different authorities; but we confine ourselves here to the fact that among those authorities are "the President and Council of the Royal Society." These gentlemen, the very head and front of British science, are to nominate a member of the "Governing Body" of each of seven schools, namely, Westminster, Eton, Winchester, Harrow, Charterhouse, Rugby, and Shrewsbury. Here is, indeed, an innovation! The President and Council of the Royal Society will of course nominate men of science. Consequently, science will be taught in all those schools, side by side with the classics. Can the two run together? If science goes up, will Greek and Latin and scholarship go down? We hope not; but these are questions for the future to answer. Meanwhile, we have much pleasure in stating that the two nominations already made by the Council of the Royal Society are such as will command universal approval. Prof. G. G. Stokes, Secretary of the Royal Society and President of the British Association, has been nominated for Eton School, and Mr. W. Spottiswoode, F.R.S., for Westminster School. The interests of science could not be in better hands than these, and

we can only hope that the five nominations yet to be made will be equally acceptable. There is movement too in other quarters. The University of Durham is stirring, and desires to establish a school of Physical Science, and to change its humdrum terms of twenty-four weeks in the year, for terms of eight months. All hail to the innovation! Theology at Durham will now have Science for a companion. And the great county of York does not mean to be left behind, for a preliminary meeting of the general council of the Yorkshire Board of Education has been held at Leeds, to talk about the establishment of a Science college. Should this come to pass, the youth of the North of England will have a fair opportunity for scientific education, for Lancashire is already provided with a college at Manchester.

WE learn from the *Astronomical Register* that an Observatory of the first order has been recently inaugurated at Florence with much solemnity, and in the presence of a large number of scientific men of all countries: among them being many astronomers who had come to Florence to discuss the measurement of the great European arc. From the municipality of Florence, the provincial council, the Government, and the King himself, have come the necessary funds: Professor Donati stating that in Italy, at all events, the maxim is well understood that "as private means are insufficient for continuous scientific researches, and as it is clear, that every advance of science, whatever it may be, becomes sooner or later of the greatest public benefit to all classes; it is therefore natural and just that the public coffers, and those of the wealthy, should unite to enrich the patrimony of science, which is the patrimony of all." What a happy day it will be for England when her administrators and statesmen, and Cabinet Ministers, come up to the Italian standard, when the governing classes are sufficiently educated, and single-minded, and far-sighted, help in the erection of scientific workshops. A crying want at the present moment is a Physical Observatory. He would be a brave man who would suggest that the municipality of London and the Government should supply us with one!

HERE is a welcome piece of news from the *London Gazette*:—"The Queen has been graciously pleased to give orders for the appointment of Joseph Dalton Hooker, Esq., M.D., Director of the Royal Botanical Gardens at Kew, to be an Ordinary Member of the Civil Division of the Third Class, or Companions of the Most Honourable Order of the Bath."

THE Geographical Society commenced work on Monday evening, the *pièce de resistance* being a long communication from Dr. Livingstone, full of interest and important details, to which we may return; the main drift of it is already known to our readers.

MELBOURNE no longer enjoys a monopoly of Australian science. A "Royal Society of New South Wales," to which we heartily wish success, has been established in Sydney, and the first volume of its "Transactions" is now before us. This publication—an octavo of about ninety pages—may be accepted as an earnest of good work yet to come; for, besides the inaugural address by the President (Rev. W. B. Clarke) it contains mathematical, geological, astronomical, and statistical papers. Chief Justice Cockle, F.R.S. (who, by the way, is President of a Philosophical Society in Queensland), contributes a paper on Non-linear Coresolvents; Mr. Gerard Krefft one on the Bones found in a Cave at Glenorchy, Tasmania; Mr. Smalley, the Government astronomer, one on the Mutual Influence of Clock Pendulums; and Prof. Pell one on the Rates of Mortality and Expectation of Life in New South Wales, as compared with England and other countries. In all, there are seven papers in the volume, and we congratulate our cousins at the antipodes on their meritorious contributions to the cause of science.

ON Saturday last the Cambridge Philosophical Society celebrated their jubilee by a dinner, Professor Cayley occupying the chair. It was pleasant to hear the venerable Professor Sedgwick give an account of the formation of the Society, and bless God that he had lived to see it so far on its way.

FROM Saint John's College, Cambridge, we learn that besides seven minor scholarships or exhibitions, there will be offered for competition an exhibition of 50*l.* per annum for proficiency in Natural Science, the exhibition to be tenable for three years in case the exhibitor have passed within two years the previous examination as required for candidates for honours; otherwise the exhibition to cease at the end of two years. The candidates for the Natural Science exhibition will have a special examination on Friday and Saturday the 29th and 30th of April, 1870, in chemistry, including practical work in the laboratory, physics (electricity, heat, light), and physiology. They will also have the opportunity of being examined in one or more of the following subjects, geology, anatomy, botany, provided that they give notice of the subjects in which they wish to be examined four weeks prior to the examination. No candidate will be examined in more than three of these six subjects, whereof one at least must be chosen from the former group. It is the wish of the master and seniors that excellence in some single department should be specially regarded by the candidates. They may also, if they think fit, offer themselves for examination in any of the classical or mathematical subjects. The exhibitions are not limited in respect to the age of candidates.

WE are promised a new illustrated weekly—the *Graphic*—shortly, and we observe with pleasure that Science is to find a place in it.

THE attention of the Ethnological Society during their last session was directed (in a series of able papers recorded in their journal) to the Megalithic remains—cromlechs, dolmens, stone circles, &c., such as are found in our own island, as well as in all parts of Southern Europe, in India, Arabia, and in Africa along the shores of the Mediterranean. The desirability of collecting evidence of at least relation of race in their builders, which the identity of form and size of these stone wonders suggest, whether found in Kaseem, in Arabia, or in Avebury in Somersetshire—induced the assistant-secretary of the Society to send a competent photographer to take views of the stone circles of Wiltshire. In these views, 12 inches by 10, by a simple method of scale measurement, the exact dimensions are recorded, and the compass bearings noted; enabling the closet student to make careful comparisons. Will not our learned societies, and munificent individuals interested in prehistoric studies, come forward to provide funds to secure a systematic delineation of at least the European Megalithic structures?

WELL-CONSTRUCTED maps are among the most needful appliances of scientific education: we are glad to notice a Physical Map of India, compiled by the Librarian R.G.S. of a size sufficient to render it easy of use, yet showing distinctly the comparative mountain elevations, the great alluvial plains, river systems, &c. This map, which has been adopted by one of our greatest educational establishments, is, we understand, the first of a series.

AT the last meeting of the German Chemical Society in Berlin, the President, Prof. Hofmann, opened the proceedings by referring to the great loss the Society had sustained through the death of their honorary member, Thomas Graham; and remarked: "Graham's was one of those singular minds which create an open new roads of science. Our young society deems itself fortunate to see his name inscribed amongst its members. Let us honour his memory by rising from our seats." On the 9th of October, a German chemist of high standing followed Graham into the grave. Otto Luiné Erdmann was born in Dresden, in

1804. He began his career as a pharmaceutical chemist, but soon embraced pure science with such success that a chair of Chemistry was given to him in the University of Leipzig, in 1830. This chair he occupied until his death; attending to his professional duties with great zeal, although a number of practical occupations (that of director of the Leipzig and Dresden Railway Company, the Leipzig Gas Company, &c.) divided his attention. We owe to him a great number of mineral analyses, a celebrated investigation of indigo, from which he was the first to obtain isatine (in 1840), and several other derivatives, also the analyses of several colouring matters, as *jaune indien*, *euxanthic acid*, *oxypicric acid*, of *stearic* and of *mellitic acid*. Together with Marchand he determined a great number of atomic weights with considerable accuracy. With the same chemist, and, after his death, with Professor Werther in Königsburg, he edited the Journal "*für praktische Chemie*"—a journal which will most likely cease to appear, both editors, as well as the publisher, having died during the last few months.

THE Königsburg chair has been offered to Prof. Baryen in Berlin, who declined it, and it still remains open.

PROFESSOR STRECKER of Tübingen has accepted the chair of Chemistry in Würzburg, in place of the late Professor Schirer, who was known chiefly as a physiological chemist.

IN the Annual Report of the Gardens of the Royal Botanic Society, Regent's Park, recently issued, it is stated that during last season free orders of admission to the gardens for the purpose of study have been granted to 200 students and artists, and 10,653 specimens of plants have been given to professors and lecturers at the principal hospitals and schools of art and medicine. The collection of living economic plants now contains specimens of all the spices and condiments in domestic use, most of the tropical esculent fruits, and many of those from which furniture and other woods are obtained, the principal gums and medicinal products, and the poison-trees of Brazil and Madagascar. The lecturers at the schools of medicine attached to the various metropolitan hospitals are greatly indebted to the liberality of the Botanic Gardens in furnishing them with a copious supply of fresh specimens, so difficult to obtain in London, and without which the lectures would lose so much of their instruction. We may suggest, however, whether some improvements might not be introduced into the so-called "herbaceous" department of the Gardens. A needless amount of space appears to be occupied by the arrangement of British plants in two different classifications, the Natural and the Linnæan, the latter being now entirely abandoned by all teachers of botany. Sufficient care also is not taken that the labels should correspond to the plants really growing beside them. It is confusing to the student to find immediately in front of a label a plant growing in full luxuriance belonging to an entirely different family, which has accidentally strayed there, and has not been weeded out. At Kew this department is kept in much better order. The Royal Botanic Society are now soliciting contributions in aid of the extension of their magnificent winter-garden.

SCIENTIFIC readers who want a treat should read M. Leverrier's masterly argument against M. Chasles in his assertion, based on the forged papers, that Pascal had anticipated Newton's discoveries. How any one could pretend to be unconvinced after such an overwhelmingly true and logical exposition of facts surpasses comprehension. Under the title "*Examen de la discussion soulevée au sein de l'Académie des Sciences au sujet de la découverte de l'attraction universelle*" M. Leverrier has republished from the *Comptes Rendus* the whole of his argument in ninety-two quarto pages. We recommend all who can to read it.

THERE was an omission—which we are very glad to supply—in our last week's Note on the results of the dredging expedition of the *Porcupine*. A large, if not the greatest share of the labour, both as regards time and work, fell upon Mr. Gwyn Jeffreys, and this fact will make all look forward to the publication of the results with a greater interest.

THE many friends of Professor Morris, who have long admired the zeal displayed by him, not only in giving to the world the sound knowledge which he possesses of geology and palæontology, but in presenting it to his pupils in such a form as to enable them profitably to apply it in after life, now propose to give their recognition and appreciation a substantial form, by presenting him with a suitable testimonial. To carry out this object, a committee has been formed, and Mr. Milnes, F.G.S., of the Coal Exchange, London, has accepted the office of treasurer to the committee, of which Sir Roderick Murchison is president.

THE fruit of the Mango has recently been sold in Covent Garden market, obtained from Madeira. It had previously fruited at Chatsworth, and in the garden of Lord Powis; but, we believe, has not before been offered for sale in this country.

AMONG the books which have reached us this week are two to which we wish especially in the interim to call attention in this column. One of them is the new edition of Sir John Lubbock's "*Prehistoric Times*," considerably enlarged; and the other is "*The World of the Sea*," translated from the French of the regretted Moquin Tandon, illustrations which it does one good to see, forming one of the many points of the latter.

THE editors of the new "*Journal of Ethnology*," published in Berlin, circulate with their first number a hand-bill, in which, after calling attention to the extreme importance of photography for ethnographical purposes, they request photographers of all nations to send to the publishers of the Journal their addresses, and a statement of the ethnographical types to be found in their neighbourhoods. It may fairly be questioned, whether scientific knowledge is likely to be much advanced by the indiscriminate collection of photographs of individuals, selected by persons totally unacquainted with ethnography. The editors seem, moreover, to be somewhat premature in issuing such a notice as this, as they appear to have taken no steps to arrange for the photographs being published; neither do they undertake to deposit them in any public library or museum. They merely say that men of business will no doubt be found, who will assist in a matter which assures them, as well as the photographers, the remuneration to which they are entitled. We venture to express a hope, that if any general response is made to this notice, the photographers will be at least cautioned to use great care in ascertaining the tribe and parentage of the subjects they select; also that, in all cases, one photograph may be taken in exact profile and another in exact full face.

ASTRONOMY

Winnecke's Comet

THE following ephemeris of Winnecke's comet has been calculated by M. Oppolzer.

Nov. 11	R.A.			N. Decl.
	h	m	s	
	1	25	40	11 30'0
	13	1	24 25	11 12'8
	15	1	23 20	10 55'1
	17	1	22 24	10 36'9
	19	1	21 37	10 18'4
	21	1	20 59	9 59'5
	23	1	20 29	9 40'4
	25	1	20 7	9 21'0
	27	1	19 53	9 1'4
	29	1	19 47	8 41'5