

contain the titles of all written or oral communications, and the names of their authors. A small space in each number will be used to announce the recent correspondence, and donations to the library and museum, and to state deficiencies existing in the collections, and the methods in which its friends may best aid in rendering them more complete. There will also be inserted a list of some of the duplicate volumes, pamphlets, newspapers, &c., in the library, which will be offered for exchange or sale. It is expected that the variety and interesting character of the communications this volume will contain, will make it a favourite with the public, while its low price will bring it within the means of all. The Bulletin can be obtained of Messrs. Triebner & Co.

A REPORT on excisions of the head of the femur for gunshot injury, by Mr. G. A. Otis, assistant-surgeon United States army, is the latest of a series of elaborate reports on important medical and surgical questions, published by the Surgeon-General of the War Department at Washington. The liberality of the Government of the United States in matters of science is, or at least should be, well known; and the handsome form in which these volumes, illustrated by numerous woodcuts, lithographs, and chromolithographs, are issued, deserves notice at our hands, although questions of practical surgery lie outside the province of NATURE as understood by us. In the volume we have, first, an apparently exhaustive historical survey of the operation of excision at the hip, and then the detailed records of the operation during the late civil war, these records being illustrated by figures of the pathological specimens and lithographs of individuals successfully operated on: finally, the records of temporisation are discussed, and the results compared with excision and amputation. Whether the surgical reader will endorse Mr. Otis' conclusions or not, they will, we are sure, agree that his report is in every way creditable to American military medical science.

PROFESSOR GRANT, the director of the Observatory in the University of Glasgow, has printed two letters, which he addressed to M. Leverrier, on the authenticity of the documents respecting Newton, communicated to the Academy of Sciences by M. Chasles. These letters, which are now more than two years old, have since the exposure of the Newton-Pascal forgeries, become specially interesting. They must be read in connection with M. Leverrier's more recently indited brochure.

THE sixty-eighth annual election of office-bearers of the Philosophical Society of Glasgow was arranged to take place last night (Wednesday). Professor Grant retires from the office of senior vice-president, and the Rev. H. W. Crosskey from that of librarian. The following members of council retire by rotation: Mr. Ramsay, of Kildalton, Professor W. J. Macquorn Rankine, Sir William Thomson, and Mr. William Ramsay.

A LETTER from Gross-Gerau in the *Cologne Gazette*, dated last Saturday, quoted in the *Pall Mall Gazette*, says that on the previous Wednesday a gentle rumbling was observed twenty-five times, but only one shock; on Thursday there were twenty-three rumblings, and a shock about midnight. On Friday there were six violent shocks resembling those of the 30th ult., and in the night, up to 7 a.m., there were nine more shocks, accompanied by frequent thunder. During the morning of Saturday there was again a calm, but in the afternoon two violent shocks were felt, the last of which occurred very suddenly at 4.32. It is a very remarkable fact that these shocks have entirely altered in character from the earlier ones, being announced by a single thunderclap similar to the noise of a cannon shot fired at a distance of some miles, but much stronger. Their direction, too, is vertical instead of horizontal as before. The total number of shocks felt at Gross Gerau during the last three weeks is between seven and eight hundred. Most of the clocks and watches in the place have stopped, and the houses have all been more or less damaged,

even those which are built of stone. The earthquake has also destroyed sixty-one chimneys. What if the volcanic region of the Eifel should burst open with its old activities, and the beautiful Laacher See and Pulvermaar, and the Mosenberg among others should favour us with phenomena which formerly one has gone at least as far as Vesuvius to see!

THE Royal Society has just issued Part I. of their 159th volume, the bulk of which is in very fair ratio to the importance of its contents. We have first a paper on Solar Physics, by Messrs. De La Rue, Stewart and Loewy, containing a first instalment of the measurements made with a view of making the solar photographs taken at Kew the basis of a new determination of the sun's astronomical elements: the privately-printed papers, with which all astronomers are familiar, are acknowledged to have been preliminary. The great Melbourne telescope is exhaustively described by Dr. Robinson and Mr. Grubb, and the description is accompanied by admirable and numerous plates, so that all may gain a very ample notion of the grand instrument from which so much may be anticipated. Terrestrial Magnetism is the subject of two papers, one by the Astronomer Royal, the other by Mr. Chambers; while prolific Prof. Cayley has three mathematical memoirs—one on Skew Surfaces otherwise Scrolls, another on the Theory of Reciprocal Surfaces, and the last on Cubic Surfaces. The Formation and Early Growth of the Bones of the Human Face, by Mr. Callender; the Osteology of the Solitaire or Didine Bird of the Island of Rodriguez, illustrated by ten exquisite plates by Ford, by Messrs. A. and E. Newton; the Developments of the Semilunar Valves of the Aorta and Pulmonary Artery of the Heart of the Chick by Dr. Tonge, are the papers which appeal to biologists; and Mr. Gore's paper on Hydrofluoric Acid, and one by Mr. Lockyer on Spectroscopic Observations of the Sun, are the other memoirs included in the volume.

WE have to record the death of an astronomer of European reputation, Mr. W. F. Donkin, F.R.S., Savilian Professor of Astronomy at Oxford, and Honorary Fellow of University College.

ASTRONOMY

Correction of Atmospheric Chromatic Dispersion

THE Astronomer Royal, in his last communication to the Royal Astronomical Society on the Transits of Venus, adverted to the injurious effect on the observations, which might possibly arise from the chromatic dispersion produced by the atmosphere, and suggested that probably an efficient corrective might be found, in the application of a glass prism of small refracting angle in the eye-piece of the telescope. In a subsequent communication on the same subject, after stating the optical theory, Mr. Airy continues:—Suppose, then, that we have a series of flint prisms ground to the angles 2° , 4° , 6° , 8° , 12° , 16° . And suppose that we use a telescope with power 120 or with power 240. Then the following table, showing the zenith distance at which the atmospheric dispersion is corrected, is easily computed; the refraction being calculated by the formula just given, and the zenith-distance corresponding to the refraction being taken from a common table of refractions:—

Angle of Flint Prism.	Telescopic power 120.		Telescopic Power 240.	
	Atmospheric Refraction.	Zenith Distance.	Atmospheric Refraction.	Zenith Distance.
0		61 58	0 9	43 7
2	1 8	75 16	1 8	61 58
4	3 0	80 15	2 7	70 32
6	5 4	82 52	3 6	75 16
8	7 2	85 34	5 4	80 15
12	10 8	87 3	7 2	82 52

For view with the naked eye it would be necessary to use a prism (of appropriate small angle) with its edge downwards; but, for view with an inverting telescope, the edge of its appropriate prism must be upwards.

The object I proposed is completely attained. It is made possible, by this construction, to examine a celestial body with delicacy and accuracy, under circumstances which would,

without this construction, have rendered nice observation impossible.

The series of angles of the prism which I have given appears to me well adapted to general wants. I propose to furnish each of the principal telescopes to be used for the transit of Venus with a complete series of such prisms, arranged perhaps on a long slider. Care must be taken to make the thickness of the slider-frame as small as possible, inasmuch as it must be accompanied with another slider carrying dark glasses. It will probably be found best to place both sliders between the two glasses of the eye-piece. This slightly disturbs the elements of the calculation above; but in practice the selection of the best prism will always be matter of trial, and the disturbance of calculations will be unimportant.

Before closing this subject I will advert to a remark made by one of the most acute telescope-observers who have ever been known in this Society, the late Rev. W. R. Dawes. He states that, in general, a telescope performs better with one particular point of the edge of its object-glass upwards than in any other position. The explanation of this singular remark will be found, I think, in the combination of the effect of error of centering of the two lenses of an achromatic object-glass, with the effect of atmospheric dispersion. The centre of one lens (using the word "centre" to denote that part in which the tangent-planes of the two surfaces are parallel) ought to be exactly above the centre of the other lens. But it is not easy to make this adjustment perfect; the centre of one lens is frequently above a part of the other lens where the two surfaces have a slight inclination; and the refraction thus created produces in the image of every star a spectrum which rotates as the telescope-tube is made to rotate. In one position of the tube the atmospheric dispersion is opposed to this, and may wholly or in a great measure correct it; in the opposite position the atmospheric dispersion is added to it, and increases its injurious effects.

The atmospheric dispersion between B and G is about $\frac{1}{4}$ th of the atmospheric refraction. At zenith-distance 45° it is nearly $1''$, at 63° it is nearly $2''$, at 80° about $5''$. These are the lengths of the visible spectrum.

The Cause of the Incandescence of Meteors

The incandescence of meteors was at first ascribed to their friction against the air, until in 1854 M. Regnault showed that this was not probable. M. Govi, of Turin, now affirms that the high temperature is due to the heat disengaged by the compression exercised on the air in front of them. This accounts for the fact that the interior of a meteor sometimes shows no signs of excessive heating, and that the hydrogen is not expelled.—[Bul. Association Scientifique de France, t. vi. 305.]

AMONG the points of interest touched upon at the last meeting of the Royal Astronomical Society was the extension to the approaching transit of Venus of Professor Young's suggestion to observe times of contact in solar eclipses by means of the gradual reduction of the length of the lines of the chromosphere, as observed in a spectroscopic.

BOTANY

Spontaneous Motion of Protoplasm

PROF. J. B. SCHNETZLER records in the *Archives des Sciences Physiques et Naturelles*, some observations on the spontaneous motion of the protoplasm in the cells of the leaves of the common water-weed, the *Anacharis alsinastrum*. The writer remarks that whether the cause of the motion is found, as some have maintained, in the successive contractions or vibrations of the exterior layer of the protoplasm, which transmit themselves to the interior layers; or whether the successive displacements of the molecules is produced by causes purely mechanical, as others have held, it still remains to be explained what produces these contractions or displacements. It is incontestable that they are found only in living protoplasm. Prof. Schnetzler believes that the principal cause which provokes the motion is the chemical action of oxygen, which passes through the wall of the cell, and of which a portion is probably transformed into ozone under the influence of light, as occurs also in the globules of blood. The most strongly refracted rays of light have a marked influence on these currents, which are also no doubt affected by the currents of electricity which form, under the influence of water, between the surface of the leaf and the contents of the cells. The energy of the motion depends principally on the temperature,

showing the greatest vigour between 16° and 20° C. In the point of view of mechanical theory, we have here evidently an example of the transformation of light and of heat into motion. The *Anacharis* is especially favourable for the observation of these motions; as, in consequence of the transparency of its tissue, they can be watched under the microscope without any preparation.

THE Lucerne crops in several parts of the country have recently been attacked by a species of Dodder, the *Cuscuta hassiaca*, allied to the parasitic Clover-dodder and Flax-dodder, which are so destructive to those crops. It is described as being a beautiful plant, with clear orange leafless stems, and abundant pure white and exquisitely-scented flowers.

THE magnificent "Flora Crasiliensis," the *magnum opus* of the late Von Martius, published under the auspices of the Bavarian and Brazilian Governments, is not likely to suffer by the death of that distinguished botanist. Under the able editorship of Dr. Eichler, of Munich, two new parts have recently been published, a most valuable and beautifully illustrated dissertation on the curious parasitic *Balanophora* by the Editor, and a monograph of the Brazilian *Convolvulaceæ* by the veteran Meissner. In the course of the ensuing winter we are promised a volume on the Ferns, about 350 species, with nature-printed illustrations, by Mr. J. G. Baker, of the Kew Herbarium; and the most eminent European botanists are engaged on other orders which still remain to complete the work. A. W. B.

CHEMISTRY

Italian Mineral Waters

THE following analyses of Italian Mineral Waters have been made by Prof. Purgotti of Perugia [Ann. di Chim. app. July, 1869, p. 59.]

I. Bromo-ioduretted water which collects in a reservoir, five kilometres from the station of Assisi:—

Carbon dioxide	0'44110
Silica	0'01500
Magnesium bromide	0'00124
Magnesium chloride	0'18830
Magnesium sulphhydrate	0'07750
Sodium chloride	0'86370
Sodium sulphate	0'13630
Calcium bicarbonate	0'35800
Magnesium bicarbonate	0'25190
Extractive organic matters	0'02150
Total mineral constituents	2'37454
Water	907'62546

1000'00000

This water likewise contained free oxygen, ozone, ferrous bicarbonate, and alumina (and iodine?), but in quantities too small for estimation.

II. A ferruginous water collected in a square reservoir about half a kilometre from Cannara, near Collemancio, was found to contain:—

Ferrous bicarbonate	0'0300 grm.	Magnesium bicarbonate
Manganous bicarbonate	0'0036	Magnesium chloride
Free carbon dioxide		Magnesium sulphate
Atmospheric air		Silica
Calcium bicarbonate		Calcium sulphate

The temperature of this water is considerably lower than that of the surrounding air.

Sal-ammoniacum Martiale

ANGELO BANIERI has made the following observations on the ammonio-ferric sulphate (*sal ammoniacum martiale*) collected on the lava of Vesuvius. Many naturalists believe that the hydrochloric acid evolved by lavas in their course, unites with the iron of the same lavas, forming ferric chloride, which, together with the ammonia of the air, gives rise to the compound of sal-ammoniac and ferric chloride found in the fumaroles. This view, however, does not appear to the author to be in harmony with facts observed in the Vesuvian lava-current of 1850. It was only in that part of the lava which had overwhelmed a cultivated and manured soil that fumaroles existed, and there they were so numerous as to yield more than 100 measured quintals of sal-ammoniac, whereas, on the other part of the igneous current, which had passed over an older lava of the year 1834, in which there was nothing but dry rock and sterile sand, there were no fumaroles of sal-ammoniac. The silica of the lavas acts at very high temperatures on the common salt contained in the manured soil, liberating hydrochloric acid, which, on the one hand, reacts on the ferric hydrate