

the American Journal and the Annals certainly have the lead. As regards quality, a comparison is not so easily made. In America groups are now receiving most attention; in the present volume analysis largely preponderates.

ACCORDING to a copy of a paper in the Bulletin of the Academy of Sciences of Cracow which has reached us, M. H. Merczyng has succeeded in measuring the refractive indices of water and alcohol for electrical waves of 4.5 and 3.5 centimetres, produced by means of a Righi oscillator working in petroleum. The rays sent out by the oscillator are rendered parallel by passing through a spherical flask filled with petroleum, and then fall at an angle of about  $40^\circ$  on the surface of the liquid. The reflected beam is received by a parabolic mirror, which concentrates it on to a thermo-junction. From the angle of incidence and the ratio of the intensities of the reflected and incident beams, the refractive index of the liquid is calculated. The wave lengths are measured by the Fresnel double mirror method. The results obtained, when compared with the known results for longer waves, show that in both cases the region in the neighbourhood of 4 centimetres is one of anomalous dispersion, the refractive indices increasing as the wave-length increases.

MESSRS. E. R. NORMAN AND CO., 26 Great George Street, Leeds, have issued a pamphlet describing the Sytam system of making notes and filing papers. The system consists of methods of binding together loose sheets of paper which can be readily introduced or removed or changed in position, forming a compact book. There are four different kinds of mechanism suitable for binding together sheets of various sizes, which range from  $3 \times 2\frac{1}{8}$  to  $13\frac{1}{2} \times 9\frac{1}{2}$  inches. The system appears to be quite practical and easy of application; we have seen a large ledger in which sheets are arranged for the D schedule (chemistry) of the International Catalogue, the names of the sections of the schedule being indicated by projecting tabs on the edges of the sheets, which renders reference very easy.

"REMARKABLE ECLIPSES" and "Remarkable Comets," both by Mr. W. T. Lynn, have just been issued in their eleventh and fifteenth editions, respectively, by Messrs. Samuel Bagster and Sons, Ltd. Both have been brought right up to date, and the most remarkable feature of each is the enormous amount of information compressed within so small a compass and sold at the low price of 6d. each net. The former volume includes notes on the most remarkable eclipses of the sun since 1063 B.C., and of the moon since 721 B.C., while the second briefly describes all the remarkable comets of which history speaks, even though it be with far-off whispers. An excellent drawing of Halley's comet, as seen by Miss E. M. Phillips at Barbados on May 17, 1910, is an additional feature, new in this edition.

THE April issue of Mr. C. Baker's quarterly classified list of second-hand instruments contains a description of more than 1500 pieces of scientific apparatus for sale or hire at Mr. Baker's second-hand department, 244 High Holborn, London.

IN Mr. E. P. Stebbing's paper on "Tree Planting in Towns," on p. 197, col. 1, of NATURE of April 6, the word "Etna" should have been "Everest." Mr. Stebbing asks us to correct this error, which was made by his typist, and was overlooked by him in the proof of the paper submitted to him.

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### OUR ASTRONOMICAL COLUMN.

APRIL METEORS.—Mr. W. F. Denning writes:—"The April meteoric shower will occur this year when there will be little moonlight. With clear skies it ought to be very satisfactorily observed, but the character of its return cannot be predicted.

"On April 19, 1803, there was a fine display, but it has not returned in the same abundance during the 108 years which have elapsed since the date alluded to. There is no reason to anticipate a brilliant exhibition this year, but the sky should be vigilantly watched on the nights of April 20, 21, and 22, so that if the shower actively returns it may be suitably recorded. It is often of short duration, and true Lyrids are rarely, if ever, observed before April 17 or after April 24.

"From observations made at Bristol since 1873, I certainly believe that the radiant point is liable to the same easterly motion as that which affects the emanating centre of the Perseids. But the April stream supplies so few meteors, except on the date of maximum, that it is extremely difficult to get the precise position of the radiant point on the 17th and 18th, and 23rd and 24th. Observers would do well to gather as many apparent paths as possible on the nights just named. Records of meteors obtained at two stations would be specially valuable as serving to indicate the point of radiation accurately. On April 18, 1901, 13h. 19m., a bright Lyrid was recorded by Prof. Herschel at Slough, and by the writer at Bristol, and the radiant was indicated at  $266^\circ + 33^\circ$ . This object afforded evidence that the Lyrid focus is a changeable one, for its centre is at  $270^\circ + 32^\circ$  on April 20. Additional observations of similar character would supply valuable details bearing on an interesting feature of the display."

THE SPECTRUM OF NOVA LACERTÆ.—Spectrograms of Nova Lacertæ were secured at the Potsdam Observatory on January 6, 7, 8, and 23, and are described by Prof. Münch in No. 4490 of the *Astronomische Nachrichten*. The wave-lengths were determined by taking the mean measured wave-lengths of the hydrogen lines as normal, and then interpolating the other measures. Naturally, no rigid accuracy is claimed for the values as being absolute, but the table is a useful record of the lines seen and of their various intensities and characters. On January 7 H $\gamma$  and H $\delta$  were sharply defined on the red side, but diffuse on their more refrangible edges, where they were accompanied by broad absorption bands: the maximum intensity lay on the red side of each line; on the other hand, He and H $\zeta$  were equally sharp on both sides. The usual decrease in the intensity of the continuous spectrum took place, and on January 23 it was much fainter than on January 7. Prof. Münch discusses the intensity curve of the nova spectrum, and by a comparison of the distribution of energy therein shown with that given by several stars of the A type, he derives an energy curve for the nova.

THE DIFFERENT QUALITY OF THE LIGHT REFLECTED FROM VARIOUS PARTS OF THE LUNAR SURFACE.—It will be remembered that Prof. R. W. Wood found recently that, when photographed in ultra-violet light, various features on the moon presented different appearances from those presented on ordinary photographs.

Working at the Charlottenburg Technischen Hochschule, Herren A. Miethe and B. Seegert have carried the investigation a step further by using two screens in connection with a reflector, one of which transmitted light of wave-lengths 360–330  $\mu\mu$ , the other light of wave-lengths 700–600  $\mu\mu$ . A comparison of the plates so obtained shows remarkable differences of illumination, especially on some of the surfaces of the *maria*. The higher parts of the lunar surface, especially in the region of the south pole and about the ring mountains of Copernicus, reflect hardly any ultra-violet light, while the north polar regions reflect a great deal. By projecting the two photographs through complementary screens, the differentiation of colour is brought out remarkably, the Sinus Roris and Mare Nubium showing remarkable variations (*Astronomische Nachrichten*, No. 4489).

THE PYRHELIOMETRIC SCALE.—A paper with important bearing on the question of the value of the solar constant is published by Messrs. Abbot and Aldrich in No. 3, vol.

xxxiii., of *The Astrophysical Journal*. Feeling dissatisfied with the Crova alcohol actinometer obtained in 1902, Mr. Abbot conceived the idea of constructing a new form of pyrheliometer. This consists of a double walled, large test-tube blackened within, with a stream of water circulating between the double walls and absorbing the heat collected inside the chamber. The sun's rays shine into this chamber through a measured orifice, and the heat collected by the water is measured by a system of platinum wires forming a resistance thermometer.

Test experiments with electrically heated coils, in which the heat could be measured with great accuracy, have shown that the water system collects all the heat introduced within 1 per cent., and that the solar heat can be collected and measured to within 0.2 per cent. Thus the scale of the solar-constant observations of the Astrophysical Observatory is reduced to the absolute scale of calories ( $15^{\circ}$  C.) per square centimetre per minute within a probable error of 0.2 per cent., an accuracy hitherto not attained.

**DOUBLE-STAR OBSERVATIONS.** Circular No. 6 of the Transvaal Observatory contains a list of about 350 double stars discovered with the 9-inch Grubb refractor of the observatory during 1910. Mr. Innes directs attention to the common statement that the southern heavens offer a practically unexplored field to the would-be double-star discoverer, and shows that this is by no means the case. The circular also contains a list of double stars discovered by Mr. Ward at Wanganui, New Zealand. The list contained observations of 212 stars, but has been revised, and in some cases the observations confirmed, by Mr. Innes.

Nos. 4486 and 4488 of the *Astronomische Nachrichten* also contain series of double-star measures, the former by Herr J. Voûte at the Leyden Observatory, the second a longer list of micrometer measures by Prof. H. E. Lau at Copenhagen.

**MICROMETRICAL MEASUREMENTS OF NEBULÆ.**—A useful catalogue of nebulae lying south of the equator is published as No. 17 of the Publications of the Cincinnati Observatory. In the preface Prof. Porter explains that when the 16-inch Clark refractor was ready for work at the end of 1904 it was decided to observe those nebulae of Dreyer's N.G.C. which have southern declinations, and the work has been carried on since. There was no idea of discovering new objects, but seventeen were found, of which nine appear certainly to be novæ. The catalogue includes the positions of 669 objects, with the micrometrical measures of them and of the companion stars.

**THE MOTION OF CERTAIN STARS IN SPACE.**—As an extract from the *Bulletin Astronomique*, we have received a paper in which Prof. Stroobant discusses the question of the sun being a member of a group of stars having a common motion through space. In the result, he finds a fairly strong indication that the sun does belong to such a system, which also comprises the stars  $\alpha$  Cassiopeiæ,  $\beta$  Persei,  $\alpha$  Persei,  $\alpha$  Scorpionis,  $\gamma$  Cygni, and  $\epsilon$  and  $\alpha$  Pegasi.

#### THE COMPOSITION OF THE GASES CAUSED BY BLASTING IN MINES.<sup>1</sup>

THE report before us was drawn up for the Government of Western Australia by Mr. E. A. Mann, the Chief Inspector of Explosives. The importance of investigations on the subject of the composition of gases caused by blasting in mines cannot be overestimated, since, hand in hand with the safety in actual use of blasting explosives, there is the possibility of accidents arising from the products of the explosion accumulating in badly ventilated headings. This risk has been recognised by several Governments, and investigations instituted. In the present case a most valuable and suggestive report is the outcome.

Nitroglycerine is the only largely employed explosive which contains more than sufficient oxygen for its com-

<sup>1</sup> Report on investigations into the Composition of the Gases caused by Blasting in Mines, by E. A. Mann, Chief Inspector of Explosives for Western Australia. (Perth: by authority: Fred. Wm. Simpson, Government printer.)

plete combustion, and on firing should therefore yield only carbon dioxide, nitrogen, water vapour, and an excess of oxygen. The explosives investigated were mainly nitroglycerin explosives: blasting gelatin (nitroglycerin with approximately 10 per cent. soluble nitrocellulose), gelatin dynamite, and gelignite, both of which contain wood meal and potassium nitrate. Generally speaking, the former contains a slight deficiency of oxygen, whilst the latter two an excess.

The gases produced on firing under actual working conditions were collected by Mr. Mann, who wore for the purpose a Fleuss oxygen apparatus. In all 131 entries were made into the dangerous gases, and analysis invariably showed that carbon monoxide, which is so highly poisonous, was produced, together with small quantities of oxides of nitrogen, dangerous by reason of their physiological activity.

An important ratio obtained is that between  $\text{CO}:\text{CO}_2$ , which is a fair measure of the relative dangers of gas-poisoning with the different explosives. The highest is found with blasting gelatin (1:6.5), a general average for all the explosives being about 1:13. It is well known that pressure on firing exercises an enormous difference in the distribution of oxygen to form carbon dioxide or monoxide, high pressures increasing the  $\text{CO}_2$ , and this has an important bearing in practice. If the explosives mentioned are fired in a bomb, the maximum oxidation results, since maximum pressure is attained. In a rock, the greater the resistance, either from its character or the position of the charge, the lower should be the ratio  $\text{CO}:\text{CO}_2$ . The ideal condition would be where the rock only gives just when the maximum pressure is reached; but this is a condition impossible to realise in practice, so that holes are invariably overcharged, i.e. the rock is blown out before oxidation has been completed, hence the production of carbon monoxide.

Two very important points are brought out, first, the influence of the paper wrapper of the cartridge, which gives a deficiency of oxygen on the whole charge. Comparative tests with and without wrappers show that in the case of gelignite the ratio  $\text{CO}:\text{CO}_2$  has been reduced from 1:16 to 1:51, and in the case of blasting gelatin from 1:95 to 1:52. Secondly, the influence of the physical condition of the powder; where the most intimate mixture of the ingredients is obtained, there is every chance of oxidation proceeding more rapidly to the maximum actually obtainable before rupture of the rock. Some excellent coloured plates of the microstructure of many of the explosives under polarised light emphasise the frequent heterogeneity of their structure.

The effect of fuse firing as compared with electric firing is carefully considered, and everything is greatly in favour of the electrically fired charge, fuses being responsible for much deleterious gas.

#### DRAINAGE AND MALARIA.

IN India, the sanitary expert adviser of the complacent type must either "bend or break" under the weight of official opinion (held as strongly by the youngest Under-Secretary as the veteran Financial Member) that the Sanitary Department must be classed financially as "unproductive," and must therefore be, in its representations involving expense, tactfully unobtrusive. Hence, possibly, the unconscious evolution of the policy of "quinine prophylaxis," which would relieve the Government of India from applications for loans and "free grants" for radical anti-malarial measures, such as drainage works, requiring the sinking of capital, and would throw upon the inhabitants of malarious areas (who are notoriously impecunious as a sequence of disability to labour) the onus of purchasing an expensive drug—through an indefinite number of years.

In connection with the letter in NATURE of February 9 by Dr. Bentley—one of the small circle of supporters of this policy—and the reply thereto by Dr. Malcolm Watson, there is now available a record<sup>1</sup> of facts at issue, which will enable those interested in a question of much import-

<sup>1</sup> "The Prevention of Malaria in the Federated Malay States." By Dr. Malcolm Watson, with a preface by Prof. Ronald Ross, C.B., F.R.S. Pp. 139. (Liverpool: School of Tropical Medicine, 1911). Price 7s. 6d.