

address, by Mr. Charles C. Moore, on the volume composition of rocks. He deals with the porosity of various rocks and observes that in many cases the appearance of the specimen does not give the slightest clue to its actual porosity. Comparisons are made between various rocks of similar chemical or mineralogical composition. The effect of pressure in the faulting of a sandstone has been used to calculate the amount of displacement. The structural changes that would occur from the conversion of a bed of limonite into hæmatite are pointed out. The subject is one of considerable practical importance. Among other papers is one by Prof Bonney, on fragmental rocks as records of the past.

MR. HUGH J. L. BEADNELL has given an account of the Cretaceous region of Abu Roash, near the pyramids of Giza (Geological Survey Department, Egypt, 1902). The area lies near the edge of the Libyan Desert, some distance west of Cairo, and it is composed of an isolated massif of Cretaceous rocks in the midst of an unconformable and overlapping tract of Eocene strata. These structural relations have not hitherto been determined. Owing to the highly disturbed nature of the beds, due, as the author explains, to pre-Eocene folding and faulting, it has been a difficult matter to work out the complete succession in the Cretaceous rocks; but this has now been done, and Cenomanian, Turonian, Senonian and Danian subdivisions have been determined. Particulars of these and their fossils are given, together with illustrative sections and excellent photographic views of scenery, and there are brief descriptions of the Eocene and newer deposits. The author observes that the effects of the action of wind-borne sand in the denudation of rocks are perhaps more beautifully displayed at Abu Roash than in most other localities in the western desert—a fact due in great measure to the abundance of hard cherty and crystalline limestones, which so well exhibit the effects. Illustrations of these are given.

A THIRD edition of "Modern Microscopy," by Mr. M. I. Cross and Mr. Martin J. Cole, has been published by Messrs. Baillière, Tindall and Cox. The book has been completely revised, and now contains, in addition to the two parts into which the last edition was divided, a third section on the choice and use of microtomes, prepared by Mr. G. West.

MESSRS. WATTS AND CO. have issued, for the Rationalist Press Association, Ltd., a sixpenny edition, in paper covers, of Mr. Herbert Spencer's "Education: Intellectual, Moral and Physical." These essays are all well known to teachers throughout the world, and it is to be hoped that this cheap re-issue will serve to encourage parents everywhere to become familiar with sound principles of education.

THE "Handbook of the Federated Malay States" (Stanford, 2s. 6d.), compiled by Mr. H. Conway Belfield, British Resident of Selangor, contains trustworthy information brought together at the request of the Government for the use of persons interested in the Malay States. Direct guidance is offered to different classes who propose to emigrate to this part of the world. The handbook is well illustrated and plentifully supplied with maps and statistics.

A COPY of the thirty-third of the thirty-six parts of "Living London," being issued by Messrs. Cassell and Co., Ltd., under the editorship of Mr. G. R. Sims, has been received. It contains a section, by Mr. John Munro, on scientific London, profusely illustrated by pictures showing audiences at the Royal Institution, the Royal Geographical Society and the Society of Arts. A full-page illustration depicts the ladies' night at the Royal Society.

AN almanac for 1903, compiled at the offices of the Survey Department of the Public Works Ministry and published at Cairo, has been received. Much of the miscellaneous inform-

ation contained in the almanac will be of use to persons in this country personally interested in Egyptian affairs, for example, the conversion tables giving the Egyptian equivalents of English and French money, measures of length and weight. The facts provided deal with every department of administrative activity in the country.

THE eighteenth issue of "Hazell's Annual," that for 1903, has reached us. It is well described by its subtitle as a cyclopædic record of men and topics of the day. Its abundance of information is arranged alphabetically and includes, amongst other matters of interest to men of science, summaries of the work accomplished during 1902 in the chief branches of natural knowledge. Particulars are also given concerning the important scientific societies and of the scientific institutions of a national character, such as the Royal Observatory, the National Physical Laboratory and Kew Observatory.

PROF. LLOYD MORGAN, F.R.S., contributes to the current number of the *International Quarterly* an article on the beginnings of mind. He discusses in the first place the questions, Is mind a product of evolution? second, Is mind a factor in the evolutionary process, and if so, under what limiting conditions? Towards the conclusion of his essay, Prof. Morgan says:—"From the physiological point of view, the conditions of the beginnings of mind would seem to be the differentiation of a control system with conscious concomitants. From the standpoint of behaviour, conscious accommodation through control as the result of individual experience. And what from the psychological point of view? . . . One may surmise that there is, in some dim form of expectation, at least the germ of that looking before and after to which consciousness eventually attains with more and more clearness." Another article in the same magazine deals with ethnology and the science of religion, and Prof. C. Lombroso endeavours to explain why criminals of genius have no type.

THE additions to the Zoological Society's Gardens during the past week include an American Grass Snake (*Contia vernalis*) from Mexico, presented by Miss Green; two Smooth-headed Capuchins (*Cebus monachus*) from South-east Brazil, two Derbyan Wallabys (*Macropus derbyanus*), three Brush Turkeys (*Talegalla lathami*) from Australia, a Blue-fronted Amazon (*Chrysotis oestiva*), a Common Boa (*Boa constrictor*) from South America, deposited; nine Regent Birds (*Sericulus melinus*) from Australia, purchased.

#### OUR ASTRONOMICAL COLUMN.

##### ASTRONOMICAL OCCURRENCES IN FEBRUARY:—

- Feb. 2. 7h. 11m. Minimum of Algol ( $\beta$  Persei).  
 6. 9h. 45m. to 10h. 30m. Moon occults  $\delta^2$  Tauri (mag. 4.7).  
 9. 3h. 56m. to 4h. 49m. Moon occults  $\lambda$  Geminorum (mag. 3.6).  
 9. 11h. 21m. to 12h. 25m. Moon occults  $\delta^8$  Geminorum (mag. 5.0).  
 11. 16h. 47m. to 17h. 45m. Moon occults  $\nu$  Leonis (mag. 4.5).  
 11. Ceres in opposition to the sun (Ceres mag. 7.4).  
 14. Venus. Illuminated portion of disc = 0.951, of Mars = 0.942.  
 15. 11h. 0m. Mars in conjunction with Moon (Mars  $3^{\circ} 22' N.$ ).  
 19. 4h. 0m. Jupiter in conjunction with the sun.  
 19. 12h. 5m. Minimum of Algol ( $\beta$  Persei).  
 22. 8h. 54m. Minimum of Algol ( $\beta$  Persei).  
 22. Perrine's comet (1902  $b$ )  $2\frac{1}{2}^{\circ}$  E. of Sirius.  
 25. 5h. 43m. Minimum of Algol ( $\beta$  Persei).  
 27. 11h. 0m. Mercury at greatest elongation ( $26^{\circ} 58' W.$ ).  
 27. Perrine's comet (1902  $b$ )  $3\frac{1}{2}^{\circ}$  N. of Sirius.  
 28. Giacobini's comet (1902  $d$ )  $2\frac{1}{2}^{\circ}$  S.S.W. of  $\epsilon$  Geminorum (mag. 3.2).



COMET 1902 *d* (GIACOBINI).—A daily ephemeris of this comet is given by M. G. Fayet in No. 3840 of the *Astronomische Nachrichten*. The following is an extract therefrom:—

| 12h. M.T. Paris. |          |    |          |                |                |             |      |
|------------------|----------|----|----------|----------------|----------------|-------------|------|
| Date.            | $\alpha$ |    | $\delta$ | log <i>r</i> . | log $\Delta$ . | Brightness. |      |
|                  | h.       | m. | s.       |                |                |             |      |
| Jan. 29 ...      | 6        | 43 | 16       | +12 53'2       | 0'4524         | 0'2871      | 1'48 |
| Feb. 2 ...       | 6        | 41 | 15       | +14 12'7       | 0'4513         | 0'2911      | 1'46 |
| „ 6 ...          | 6        | 39 | 33       | +15 31'2       | 0'4502         | 0'2961      | 1'43 |
| „ 10 ...         | 6        | 38 | 13       | +16 48'3       | 0'4493         | 0'3019      | 1'40 |
| „ 14 ...         | 6        | 37 | 17       | +18 3'5        | 0'4484         | 0'3085      | 1'36 |
| „ 18 ...         | 6        | 36 | 45       | +19 16'4       | 0'4476         | 0'3158      | 1'32 |
| „ 22 ...         | 6        | 36 | 38       | +20 26'7       | 0'4469         | 0'3237      | 1'28 |
| „ 26 ...         | 6        | 36 | 58       | +21 34'3       | 0'4463         | 0'3321      | 1'24 |
| Mar. 2 ...       | 6        | 37 | 44       | +22 39'0       | 0'4458         | 0'3408      | 1'19 |

Brightness at time of discovery = 1'0.

COMET 1903 *a* (GIACOBINI).—The following ephemeris has been calculated by Herr M. Ebell and Prof. H. Kreutz (*Kiel Circular*, No. 57).

| Ephemeris for 12h. M.T. Berlin. |          |    |          |              |            |     |
|---------------------------------|----------|----|----------|--------------|------------|-----|
| Date.                           | $\alpha$ |    | $\delta$ | log $\Delta$ | Brightness |     |
|                                 | h.       | m. | s.       |              |            |     |
| Jan. 31 ...                     | 23       | 11 | 57       | +5 24'9      | 0'2043     | 1'9 |
| Feb. 4 ...                      | 23       | 17 | 25       | +6 35'6      | 0'1909     | 2'4 |
| 8 ...                           | 23       | 23 | 17       | +7 51'3      | 0'1753     | 3'0 |
| 12 ...                          | 23       | 29 | 35       | +9 13'1      | 0'1573     | 3'8 |

Brightness at time of discovery = 1'0.

SEARCH-EPHEMERIS FOR THE COMET TEMPEL<sub>3</sub>-SWIFT. — In No. 3840 of the *Astronomische Nachrichten*, M. J. Bissert gives a daily ephemeris for the search of this comet from which the following is an abstract:—

| 12h. M.T. Paris. |          |    |          |              |              |       |
|------------------|----------|----|----------|--------------|--------------|-------|
| Date             | $\alpha$ |    | $\delta$ | log <i>r</i> | log $\Delta$ |       |
|                  | h.       | m. | s.       |              |              |       |
| Jan. 29 ...      | 0        | 8  | 43       | +5 17'4      | 0'062        | 0'141 |
| Feb. 1 ...       | 0        | 20 | 24       | +6 25'4      |              |       |
| 3 ...            | 0        | 28 | 15       | +7 10'5      | 0'064        | 0'142 |
| 6 ...            | 0        | 40 | 9        | +8 17'7      |              |       |
| 8 ...            | 0        | 48 | 9        | +9 2'0       | 0'067        | 0'144 |
| 11 ...           | 1        | 0  | 14       | +10 7'6      |              |       |
| 13 ...           | 1        | 8  | 21       | +10 50'7     | 0'072        | 0'148 |

A BRIGHT METEOR.—Mr. C. J. Lacy, writing to the *Times* from Fleet, Hants, says that on January 25, at 7.57 p.m., he observed a very bright meteor. “It first attracted my attention near the zenith, and must have come within our range a few degrees to the south of Capella, which star, being directly in its path, was possibly even occulted. It sailed slowly and majestically in a N.N.W. direction, passing about two degrees north of Cassiopea and finally disappearing near the star Alderamin in Cepheus.” The head was remarkably brilliant and the tail was about ten or eleven degrees in length.

THE PLANET MARS.—In the January *Bulletin de la Société astronomique de France*, M. E. Touchet gives some details respecting the coming opposition of Mars, and directs special attention to the fact that between February 27 and August 20 of this year, observers will have the opportunity of observing the phenomena attending the Martian summer in the northern hemisphere. The disappearance of the snow-cap will be the main feature, and is easily seen with small instruments.

Two excellent coloured drawings of this planet, as observed with the 9½-inch equatorial at Juvisy by MM. Flammarion and Antoniadi during the last opposition, accompany the article.

REPORT OF THE HARVARD COLLEGE OBSERVATORY.—The fifty-seventh annual report of this observatory deals with the work done during the year which ended on September 30, 1902.

A recent anonymous gift of twenty thousand dollars has enabled the authorities to erect a new fireproof wing in which to store the immense library of negatives which they now possess, and also to contract with Messrs. Alvan Clark and Sons for a new 2-foot reflector, which will be used, first at Cambridge (Mass.) and then at Arequipa, for obtaining photographs of faint objects in all parts of the sky.

Seventeen thousand photometric light comparisons, observed with the East equatorial, 66,932 settings of the 12-inch meridian photometer and 10,784 measures with the smaller meridian photometer have been made during the year by Profs. Wendell, E. C. Pickering and Bailey respectively.

The “Henry Draper Memorial” photographs now show the

spectrum of every star in the sky which is permanently greater than the ninth or tenth magnitude, besides many more which are fainter.

Prof. Bailey has been to Arequipa, taking the meridian photometer with him, in order to obtain measures of comparison stars for the observation of Eros at its next opposition, when it will be too far south for the European and United States observatories to observe it.

The Blue Hill Meteorological Observatory, carried on at the expense and under the direction of Mr. Rotch, has made several special series of observations during 1902, amongst which the determination of the meteorological conditions of the upper atmosphere by means of kites has been very successful. It is now proposed to explore the atmosphere above the tropics and the equator by this means.

The time service is now working under a new system, devised by Mr. Gerrish, in which an electric light, which acts as the signal, is made to pulsate in response to the signals from the standard clock.

### A RECORD OF THE TOTAL SOLAR ECLIPSE OF 1898.

THIS interesting report<sup>1</sup> has been considerably delayed for the reason given in the preface that the director, Prof. Naegamvala, has been engaged in securing solar and stellar spectra which might assist in discussing the chromosphere spectrum, which he considers was first adequately secured at this eclipse.

The report gives the usual details as to the selection of a site, ultimately fixed at Jeur, and gives a full description of the instruments used and of the work of the observers. It is liberally furnished with maps and photographs, and we must express our admiration of the excellent manner in which these records have been reproduced.

The report itself is interesting reading and appeals to a larger audience than professional astronomers; any intelligent reader casually taking it up will find much to attract his attention.

The pictures of the corona are particularly fine; maps showing the alterations in its shape at maximum and minimum sun-spot periods, compiled from various sources, are appended and may be useful for handy reference.

The spectrum of the lower chromosphere appears to have been the part of the subject which had the most attraction for Prof. Naegamvala, and he has devoted a large part of the report to this question. Some authorities regard it as a mere reversal of the Fraunhofer spectrum, while others, Sir Norman Lockyer in particular, consider that the reversals take place, not in one thin layer, but at various levels of the solar atmosphere. So far as this point is concerned, Prof. Naegamvala comes to the conclusion that there “can be no question that Lockyer has fully established his contention.” With regard to the true explanation of the chromospheric lines in relation to the Fraunhofer spectrum generally, he considers the question to be still *sub judice*. The very important point of the intensities of the lines of the chromospheric spectrum as compared with those of the Fraunhofer spectrum has, however, not been included in the discussion.

It is unfortunate that, as Prof. Naegamvala states, the six-inch prismatic camera with which the so-called “flash” spectrum was taken was somewhat out of focus, owing to the brief time at the observer’s disposal for its adjustment, and from the reproduction of the plate the arcs are apparently not sufficiently sharp for accurate measurement. For this purpose, they are distinctly inferior to the spectrum obtained by Mr. Shackleton at Novaya Zemlya in 1896, which, from a remark in the preface, Prof. Naegamvala thinks he has improved on. On this point, we are afraid we cannot agree with him.

The wave-length of the celebrated “green line” is found by the Poona measurements to be  $\lambda$  5301'195, which is rather less than that found by other observers.

Although we do not think that the many questions connected with eclipses are advanced beyond the point reached by other observers and whose reports were published long ago, we can heartily congratulate Prof. Naegamvala and his eclipse observers on having produced so interesting and readable a volume.

H. P.

<sup>1</sup> Report on the total solar eclipse of January, 1898, by Kavaoji Dadabhai Naegamvala, director of the Observatory at Poona. (Bombay: Government Central Press.)