

to the various departments of the college, courses of study, &c., is to be found in the "Catalogue," which also contains many full-page illustrations of the college buildings, interiors of the laboratories, &c.

THE *Journal* of the Straits branch of the Royal Asiatic Society for January, 1900, contains, *inter alia*, an important contribution by Mr. H. N. Ridley on the flora of Singapore. The district is a rich one, something like 1900 flowering plants, and 130 ferns being recorded. Mr. Ridley opens with an interesting introduction, in which he gives a sketch of the factors which determine or modify the vegetation. He also describes some interesting phenological facts, and finally gives a sketch of the history of the botanical work in the Island. The chief space is, of course, devoted to an enumeration of the plants, but it contains short notes respecting the more striking individual species.

THE revised edition of "First Records of British Flowering Plants," by Mr. W. A. Clarke, just published by Messrs. West, Newman and Co., is full of extracts of interest to every one who finds pleasure in the study of the British flora. To members of Field Clubs and Natural History Societies the book is particularly valuable. It gives, in the form of extracts from printed botanical works published in Great Britain, the earliest notice of each distinct species of our native and naturalised plants, the last edition of the "London Catalogue" being taken as a basis. The volume thus provides a concise answer to the question which a naturalist often asks, viz.: "How long has this plant been known as British?" An interesting analysis of the "first records" is given at the end of the book. William Turner was the first to record the majority of our native plants. His works, ranging from 1538 to 1568, contain notices of 238 flowering plants, and may be considered the foundation of our British flora. From Lobel (1570, &c.), Mr. Clarke obtains eighty first records and from Gerard's famous *Herball* (1597), 182 species, so that about 500 species of British plants were known and described three hundred years ago. The book in which these and many other particulars are given is one which every naturalist should keep handy for reference.

THE *Proceedings* of the London Mathematical Society (vol. xxxi.), containing papers read from April to December of last year, have just been published by Mr. Francis Hodgson. The titles and brief abstracts of the papers have already appeared among our reports of societies.

THE Great Eastern Railway Company's "Tourist Guide to the Continent," edited by Mr. Percy Lindley, contains concise notes and numerous illustrations of interesting and easily accessible places in Holland, Belgium, Germany, Switzerland, Norway, Denmark and Sweden. The book is a useful travelling companion for Continental tourists, and is as matter-of-fact as most guide-books.

THE volume of *Proceedings* of the forty-eighth meeting of the American Association for the Advancement of Science, held at Columbus a year ago, has just been received. The presidential addresses, papers and abstracts cover a wide field of scientific work. A noteworthy feature is the series of portraits of former presidents of the Association, accompanying an address by Dr. Marcus Benjamin.

THE value of a well chosen set of inorganic chemical preparations as a part of a course of general chemistry is now generally acknowledged, although the number of elementary text-books dealing with this branch of the subject is comparatively small. The works of Prof. Erdmann, of Halle, in this field are well known, and the English translation of his "Introduction to Chemical Preparations" (Chapman and Hall)

by Dr. F. L. Dunlap, the German edition of which has already been noticed in these columns, will be of great service to students in England and America.

THE seventh part of vol. ii. of the seventh edition of Fresenius's "Quantitative Chemical Analysis," translated from the revised sixth edition by Mr. C. E. Groves, F.R.S., has just been published by Messrs. J. and A. Churchill. This completes the new edition of the work, which has been revised throughout. The special part, dealing largely with applications of chemical analysis to industrial products and other technical matters, has been considerably extended, and many new analytical processes have been introduced. The last section of the work includes sixty exercises especially designed for teaching the theory and practice of quantitative chemical analysis. In addition, there is an appendix containing analytical notes and tables for the calculation of analyses. Practical chemists and teachers are thus now provided with a complete new edition of a standard work on analysis.

THE reaction discovered by Lubawin of the formation of  $\alpha$ -amino-acids by the interaction of ammonium cyanide and aldehydes, has been extended by Dr. W. Gulewitsch to ketones, and in the current number of the *Berichte* he describes the details of the preparation of  $\alpha$ -amino-isobutyric acid from acetone, the yield under favourable conditions being as high as 74 per cent. of the theoretical. The same number of the *Berichte* also contains a masterly investigation of the action of soda solution upon nitroso-benzene by Prof. Bamberger. No less than twelve substances have been isolated from the products of this extremely complex reaction, including azoxybenzene, nitrobenzene, aniline, *p*-nitrosophenol, *o*-amidophenol, *p*-amidophenol, hydrocyanic acid, ammonia, and four new acids, and there are still further products awaiting investigation.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*) from India, presented by Mr. P. M. Thornton; a Rhesus Monkey (*Macacus rhesus*) from India, presented by Miss A. N. Ball; a Humboldt's Lagotherix (*Lagotherix humboldti*) from the Upper Amazons, presented by Mr. W. S. Churchill; two Masked Paradoxures (*Paradoxurus larvatus*) from China, presented by Mr. W. T. Lay; a Senegal Parrot (*Poocephalus senegalus*) from West Africa, presented by Mr. S. Cordwell; two Chukar Partridges (*Caccabis chukar*) from North-west India, presented by Mr. Chas. E. Pitman; a Missel Thrush (*Turdus viscivorus*), European, presented by Mr. J. B. Williamson; a Common Cuckoo (*Cuculus canorus*), British, presented by Miss Lucy Holland; two Larger Hill Mynahs (*Gracula intermedia*) from Northern India, a Mauve-necked Cassowary (*Casuarus violi-collis*) from the Aru Islands, a Clumsy Tortoise (*Testudo inepta*) from Mauritius, four Elephantine Tortoises (*Testudo elephantina*) from the Aldabra Islands, an Alligator Terrapin (*Chelydra serpentina*), six Blanding's Terrapins (*Enys blandingi*) from North America, deposited; a Guira Cuckoo (*Guira piririgua*) from Para, six Painted Frogs (*Discoglossus pictus*), South European, purchased.

#### OUR ASTRONOMICAL COLUMN

##### ASTRONOMICAL OCCURRENCES IN AUGUST.

- August 4. 11h. 55m. Minimum of Algol ( $\beta$  Persei).  
 7. 8h. 43m. " " " "  
 7. 5h. Conjunction of Mars and Neptune. (Maas  $1^{\circ} 27' N.$ )  
 9. 11h. 34m. to 12h. 40m. Moon occults the star D.M. - 16°, 5609 (mag. 6).  
 11. Maximum of August meteoric shower. Perseids. (Radiant  $45^{\circ} + 57^{\circ}$ ).

- Aug. 12. 16h. 10m. to 17h. 10m. Moon occults  $\kappa$  Piscium (mag. 5).
- 13. 20h. Venus at greatest brilliancy.
- 15. Venus. Illuminated portion of disc = 0.280.
- 15. Mars. " " " = 0.932.
- 18. Saturn. Outer minor axis of outer ring = 18"'.35.
- 18. 12h. 42m. to 13h. 24m. Moon occults  $\iota$  Tauri (mag. 4.7).
- 18. 14h. 47m. to 15h. 39m. Moon occults 105 Tauri (mag. 5.8).
- 19. Mercury at greatest elongation (18° 32' W.).
- 20. 22h. Venus in conjunction with moon. (Venus 1° 49' S.).
- 22. Jupiter 26' S. of  $\beta$  Scorpii.
- 23. Expected return to perihelion of De Vico-Swift's comet (1844-1894).
- 27. 10h. 26m. Minimum of Algol ( $\beta$  Persei).

NEW VARIABLE IN HERCULIS.—Prof. W. Ceraski, of the Moscow Observatory, communicates to the *Astronomische Nachrichten* (Bd. 153, No. 3650) the discovery of a new variable by Mdme. Ceraski on photographs taken by M. S. Blajko. The star's position is as follows:—

| R.A. |    |      | Decl.      | Epoch.   |
|------|----|------|------------|----------|
| h.   | m. | s.   | "          |          |
| 18   | 30 | 54.8 | + 25 55 49 | (1855'0) |
| 18   | 32 | 44.1 | + 25 57 54 | (1900'0) |

The star is not found in the B.D. At maximum the star is slightly brighter than 9th magnitude, decreasing to a minimum of about 12th magnitude. At present its brightness is increasing.

NEW STAR IN AQUILA.—A telegram from Prof. Pickering, Cambridge, Mass., dated 1900 July 9, states that the *Nova* of the 8th magnitude found by Mrs. Fleming in April 1899 is now a nebula of 12 magnitude. Its position is

| R.A. |    |    | Decl.  |
|------|----|----|--------|
| h.   | m. | s. | "      |
| 19   | 15 | 16 | - 0 19 |

A further statement is made in the *Astronomische Nachrichten* (Bd. 153, No. 3651) that the measures are from the photographs.

METEORIC THEORY OF THE GEGENSCHIEIN.—In the *Astronomical Journal*, No. 483 (vol. xxi. pp. 17-21), Mr. F. R. Moulton puts forward a mathematical analysis of the conditions which would appertain if the *Gegenschiein* were due to the presence of a more or less condensed region of meteorites. The idea of the problem appears to have been suggested by remarks of Prof. Barnard (who has made consistent observations of the phenomenon during the last sixteen years) to the author.

Discovered by Brorsen about the middle of this century, very few systematic observations are recorded until those of Barnard, who has made careful determinations both of its position and shape. He comes to the conclusion that it is always exactly opposite the sun, or as nearly so as can be determined. Other observers have stated varying positions, but in the case of so difficult an object it is advisable to consider the more systematic records as having greatest truth.

After citing the well-known reasons for considering that interplanetary space is densely occupied by meteoric particles, moving with widely varying velocities in all directions, he supposes that a great multitude will at any time be situated at the opposition point, and that a considerable proportion of these would be under such initial conditions as to remain there for some time. Then the meteors being very small compared with the earth, they are treated as infinitesimal bodies, disturbing neither the earth nor each other. He also neglects the eccentricity of the earth's orbit. Then referring the motion of one meteor to rectangular axes with the origin at the centre of gravity of the sun and the earth, he traces the conditions for stability for a certain time. Then by slightly varying the conditions, he finds the nature of the movement of the infinitesimal body with special reference to the circumstances under which it will make periodic oscillations around certain points. The result of successive integration suggests that meteors passing near one of these selected points with the assumed conditions of motion would be subject to forces directed nearly to this point, and would have a tendency to revolve round it. Although after a few revolutions they might escape, the average result would be a condensation with respect to space, if not with respect to time. The difficult point now to determine is whether a sufficient number would be captured to become visible. If the meteors are revolving round the sun at a distance of about 900,000 miles greater than the

earth's mean distance, they will be moving slower than the earth, which will gradually overtake them in longitude. As they approach opposition they will be retarded and drawn in towards the sun, their motion being thereby accelerated. The net result of these actions will be to bring the meteors into the plane of the ecliptic, thus causing the condensation at opposition, and explaining the tendency to an oscillation in latitude which has been observed.

Instead of being exactly opposite the earth, the point of condensation will be nearly opposite the centre of gravity of the earth and moon, and consequently the *Gegenschiein* should have a monthly oscillation in longitude of the nature indicated by the observations of Douglass, but much less in extent. The oscillation in latitude would, however, be monthly also, instead of yearly, as the observations tend to indicate.

A phenomenon, observed so far by Barnard alone, is the series of marked changes to which the *Gegenschiein* is subjected in short periods of time, being large and round in September and the beginning of October, becoming slightly elongated by the 4th or 5th, very much elongated by the 10th or 11th, and showing merely as a swelling on the zodiacal band by the 18th. Although this is not directly explicable, the shape of the *Gegenschiein* will depend on the thickness of the zodiacal disc of meteorites, and if the opposition point should pass through a dense portion of the swarm it is readily conceivable that a change of form would ensue. The distance of the opposition point works out at 930,240 miles from the earth. The period of oscillation would be 183.304 days. It is thus suggested as possible that meteors may move for long periods of time in the vicinity of the opposition point, in sufficient numbers to cause the faint glow of the *Gegenschiein* by reflecting the light of the sun. Reference is finally made to a paper by M. Hugo Glydén in the *Bulletin Astronomique*, Tome 1, where similar views are enunciated.

METEOR OF JULY 17.—A bright meteor was seen in many parts of the north of England on the evening of Tuesday, July 17, shortly before nine o'clock. A few particulars concerning the phenomena are given by correspondents in the *Yorkshire Post*. An observer at Menston-in-Wharfedale saw the meteor at a point about N.N.W. from that place, and about forty degrees above the horizon. At Wiseton, Notts, it was seen at 8.47, and at Bramhope at 8.48. At Armley, a hissing noise was heard, and the meteor seen to disappear close by.

THE GREAT EARTHQUAKE OF JUNE 12, 1897.

THE investigation of the great earthquake of June 12, 1897, being the most extensive of which there is historic record, has naturally led to important additions to our knowledge. A detailed report of this earthquake, by Mr. R. D. Oldham, has been published by the Indian Government,<sup>1</sup> and its investigation suggested a line of further research, the results of which have been published in the *Philosophical Transactions* of the Royal Society.<sup>2</sup> The principal results described in these bulky publications are here given in the form of an abstract.

The known extent of the principal seismic area was about 1,200,000 square miles, a figure which will surprise many after the statement that this was the greatest earthquake of which there is historic record. One of the results of this earthquake was, however, a re-examination of the records of the great Lisbon earthquake of 1755, which has shown that the statements regarding it, copied from one text-book to another, are grossly exaggerated. The statement that it was felt in the lead mines of Derbyshire is shown, by reference to the original record, to be an error, the shock that was felt being clearly an independent, local, though possibly sympathetic, shock. Apart from this, there is but one doubtful record of its having been felt so far north as England, though its effects were visible, both in England and in Holland, in disturbances of the water in ponds. The accounts of its having been felt in Iceland and America refer to the sea-waves, which may travel to regions far beyond the utmost limit at which the shock could be felt. Omitting these records, taking only those which refer to the sensible shock, and rounding off the seismic area to an elliptical form, it

<sup>1</sup> "Report on the great earthquake of June 12, 1897." By R. D. Oldham. *Memoirs of the Geological Survey of India*, vol. xxix. 1899, pp. xxx + 379 + xviii; 44 plates, 3 maps, 51 woodcuts in text.  
<sup>2</sup> "On the propagation of earthquake motion to great distances." By R. D. Oldham. *Phil. Trans.*, Series A, 1900, pp. 135-174.