by the Moon at Greenwich. The angles are counted from the true North through the true East as in observations of double stars, &c. :—

*Disappearances.*

| Star's No. | | Angle. ° | | G.M.T. h. m. |
|---|---|---|---|---|
| 148 | ... | 74 | ... | 10 23·1 |
| 152 | ... | 107 | ... | 25·8 |
| 156 | ... | 80 | ... | 30·5 |
| Beginning of total phase | | | | |
| 150 | ... | 131 | ... | 10 32·3 |
| 157 | ... | 65 | ... | 33·8 |
| 153 | ... | 128 | ... | 34·8 |
| 142 | ... | 154 | ... | 37·1 |
| 166 | ... | 89 | ... | 38·7 |
| 164 | ... | 111 | ... | 39·7 |
| 165 | ... | 116 | ... | 41·1 |
| 180 | ... | 86 | ... | 52·0 |
| 155 | ... | 163 | ... | 55·3 |
| 172 | ... | 145 | ... | 58·8 |
| 181 | ... | 63 | ... | 11 1·3 |
| 198 | ... | 100 | ... | 17·6 |
| 194 | ... | 57 | ... | 18·6 |
| 197 | ... | 127 | ... | 24·4 |
| 207 | ... | 97 | ... | 25·5 |
| 201 | ... | 56 | ... | 27·8 |
| 210 | ... | 84 | ... | 28·1 |
| 209 | ... | 110 | ... | 29·4 |
| 190 | ... | 164 | ... | 34·2 |
| 212 | ... | 127 | ... | 41·2 |
| 223 | ... | 94 | ... | 42·9 |
| 216 | ... | 124 | ... | 45·3 |
| 224 | ... | 70 | ... | 46·4 |
| 225 | ... | 107 | ... | 46·9 |
| 221 | ... | 56 | ... | 49·4 |
| 226 | ... | 138 | ... | 58·2 |
| 236 | ... | 105 | ... | 12 0·8 |
| 237 | ... | 70 | ... | 3·5 |
| End of total phase | | | | |
| 242 | ... | 116 | ... | 12 11·9 |
| 219 | ... | 168 | ... | 12·1 |
| 233 | ... | 155 | ... | 17·4 |
| 247 | ... | 87 | ... | 19·1 |

*Reappearances.*

| Star's No. | | Angle. ° | | G.M.T. h. m. |
|---|---|---|---|---|
| 87 | ... | 243 | ... | 10 22·3 |
| 97 | ... | 316 | ... | 23·6 |
| 124 | ... | 351 | ... | 29·3 |
| 116 | ... | 339 | ... | 30·2 |
| 102 | ... | 234 | ... | 30·2 |
| Beginning of total phase | | | | |
| 91 | ... | 277 | ... | 10 32·3 |
| 112 | ... | 330 | ... | 32·7 |
| 93 | ... | 278 | ... | 33·7 |
| 115 | ... | 331 | ... | 34·6 |
| 98 | ... | 286 | ... | 34·6 |
| 114 | ... | 211 | ... | 35·1 |
| 120 | ... | 288 | ... | 35·4 |
| 108 | ... | 314 | ... | 35·7 |
| 125 | ... | 211 | ... | 42·5 |
| 110 | ... | 264 | ... | 50·1 |
| 130 | ... | 328 | ... | 53·1 |
| 136 | ... | 337 | ... | 57·9 |
| 126 | ... | 269 | ... | 11 3·7 |
| 134 | ... | 317 | ... | 6·4 |
| 128 | ... | 283 | ... | 6·6 |
| 138 | ... | 260 | ... | 22·1 |
| 142 | ... | 228 | ... | 22·3 |
| 144 | ... | 294 | ... | 29·8 |
| 148 | ... | 308 | ... | 30·2 |
| 155 | ... | 221 | ... | 31·5 |
| 157 | ... | 318 | ... | 34·5 |
| 159 | ... | 252 | ... | 38·1 |
| 156 | ... | 303 | ... | 40·3 |
| 152 | ... | 275 | ... | 40·6 |
| 153 | ... | 254 | ... | 41·8 |
| 166 | ... | 294 | ... | 52·6 |
| 164 | ... | 273 | ... | 54·4 |
| 172 | ... | 240 | ... | 54·5 |
| 165 | ... | 268 | ... | 54·7 |
| 181 | ... | 322 | ... | 59·7 |
| 180 | ... | 298 | ... | 12 4·8 |
| End of total phase | | | | |
| 190 | ... | 222 | ... | 12 10·9 |
| 194 | ... | 328 | ... | 11·2 |
| 201 | ... | 330 | ... | 19·4 |

The following table gives the magnitude of the occulted stars :—

| Star's No. | Mag. | Star's No. | Mag. | Star's No. | Mag. | Star's No. | Mag. |
|---|---|---|---|---|---|---|---|
| 100 | 9·5 | 150 | 10 | 181 | 10 | 219 | 10 |
| 108 | 9·3 | 153 | 10 | 197 | 10 | 221 | 10 |
| 126 | 9·5 | 157 | 9·4 | 198 | 9·5 | 225 | 10 |
| 128 | 9·5 | 164 | 8·0 | 201 | 8·7 | 226 | 10 |
| 136 | 9·5 | 165 | 9·4 | 209 | 10 | 236 | 9·5 |
| 142 | 10 | 166 | 9·5 | 210 | 9·5 | 247 | 9·2 |
| 148 | 10 | 180 | 9·5 | 216 | 10 | | |

The remaining stars are all of the eleventh magnitude.

It would be advisable for intending observers to make a rough map of the stars they are to observe, and to acquaint themselves as completely as they are able with their configuration. The observations should be rehearsed as far as possible on previous evenings, that the necessary quickness in changing from one point of the Moon's limb to another may be acquired, and a fair acquaintance made with the sequence of the settings. It will be well probably, to somewhat reduce the list of stars for observation ; since some of the phenomena follow each other so closely that some must be lost, and if the work of selection is left for the actual time of observation probably more stars will be lost than necessity demands, and a risk of confusion and mistake will be incurred. The suggestion has also been made that the eye-piece to be employed should not be placed as usual in the centre of the field, but be made to revolve round it at the distance of the Moon's radius. The Moon would then be brought to the centre of the field, and kept there throughout the entire series of observations, and only the eye-piece would be moved. A fairly high power will probably be found the best for the work.

## UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Among the lectures for the present term we note the following:—

Chemistry: Prof. Dewar, on Organic Chemistry; Mr. Pattison Muir (Caius), on Chemical Affinity; Mr. Heycock (King's), on Chemical Philosophy for Natural Sciences Tripos, Part I.; Mr. Robinson, on Agricultural Chemistry.

Physics: Prof. Stokes, Physical Optics; Prof. J. J. Thomson, Properties of Matter; Mr. Shaw (Emmanuel), Thermodynamics and Radiation.

Geology: Prof. Hughes, Geology of a District to be visited at Easter; Mr. Marr, Principles of Geology.

Botany: Mr. Gardiner, Advanced Anatomy of Plants; Mr. Potter, Advanced Systematic Botany.

Zoology: Prof. Newton, Geographical Distribution of Vertebrates; Mr. Sedgwick, Morphology of Mollucsa and Echinodermata; Mr. Gordon, Morphology of Amniota, recent and extinct.

Physiology: Dr. Lea, Chemical Physiology; Mr. Langley, Advanced Histology and Physiology; Dr. Gaskell, Advanced Physiology of Vascular System.

Prof. Ray lectures on Pathology, and has practical classes; Prof. Latham on the Physiological Actions and Therapeutical Uses of Remedies; Dr. Anningson gives demonstrations in Practical Hygiene.

In Mathematics the following are among the lectures:—Prof. Cayley, Analytical Geometry; Mr. Forsyth, Modern Algebra, symbolical methods and ternary forms; Dr. Ferrers, Elliptic Functions; Dr. Besant, Integral Calculus, Definite Integrals, Mean Value and Probability, Calculus of Variations, and Differential Equations; Mr. Ball, History of Mathematics up to 1637; Mr. Mollison, Discontinuous Functions and Conduction of Heat; Mr. Whitehead, Grassmann's Ausdehnungslehre, with special reference to its applications.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, December 22, 1887.—"The Early Stages in the Development of *Antedon rosacea.*" By H. Bury, B.A., F.L.S., Scholar of Trinity College, Cambridge. Communicated by P. Herbert Carpenter, D.Sc., F.R.S., F.L.S.

In the orientation of the larva, J. Barrois' suggestion (*Comptes rendus*, November 9, 1886) has been adopted, viz. that the stalk of the Pentacrinoid represents the præoral lobe of other Echinoderms. Besides the right and left body-cavities, an anterior unpaired body-cavity is developed (distinct from the hydrocele), and opens to the exterior by the water-pore in the free-swimming larva.

A larval nervous system is developed, but is lost after fixation.

The vestibule of the fixed larva (Cystid) is formed by invagination, as described by Barrois (*Comptes rendus*, May 24, 1886).

The water-tube (stone canal), by opening into the anterior body-cavity (now very small), places the water-vascular ring in indirect communication with the exterior.

The anus opens in the same interradius as the water-pore.

In the skeleton, besides the parts already known, three underbasals are present, which are of great phylogenetic interest.

**Geological Society**, December 21, 1887.—Prof. J. W. Judd, F.R.S., President, in the chair.—The following communications were read:—On the correlation of some of the Eocene strata in the Tertiary basins of England, Belgium, and the north of France, by Prof. Joseph Prestwich, F.R.S. Although the relations of the several series have been for the most part established, there are still differences of opinion as to the exact relation of the Sable de Bracheux and of the Soissonnais to the English series; of the Oldhaven Beds to the Woolwich series; and of the London Clay and Lower and Upper Bagshots to equivalent strata in the Paris basin. The author referred to the usual classification of the Eocene series, and proceeded to deal with each group in ascending order. The Calcaire de Mons is not represented in England, but may be in France by the Strontianiferous marls of Meudon. It contains a rich molluscan fauna, including 300 species of Gasteropods, many of which are peculiar, but all the genera are Tertiary forms. The Heersian are beds of local occurrence, and the author sees no good reason for separating them from the Lower Landenian or Thanet Sands. He gave reasons for excluding the Sands of Bracheux from this group. Out twenty-eight Pegwell Bay species, ten are common to the Lower Landenian, and five to the Bracheux Sands, which present a marked analogy with the Woolwich series. These Sands of Bracheux are replaced in the neighbourhood of Paris by red and mottled clays. Out of forty-five species at Beauvais, only six are common to the Thanet Sands, and ten to the Woolwich series. Out of seventy-five species in the Woolwich and Reading Beds, nineteen occur in the Bracheux Beds, if we add to these latter the sands of Chalon-sur-Vesles. Respecting the Basement Bed of the London Clay (Oldhaven Beds in part), the author would exclude the Sundridge and Charlton fossils, which should be placed on a level with the Upper Marine Beds of Woolwich. He allowed that the former were deposited on an eroded surface, but this involves no real unconformity, whilst the palæontological evidence is in favour of this view, since, out of fifty-seven species in the Sundridge and associated beds, only sixteen are common to the London Clay. He therefore objected to the quadruple division. Either the Oldhaven should go with the Woolwich or with the Basement Bed. He admitted that the term "Basement Bed" is objectionable, and preferred Mr. Whitaker's term for the series, as he would limit it. The Lower Bagshot Sands the author would call "London Sands," whose Belgian equivalent is the Upper Ypresian, and the French the Sands of Cuise-de la-Motte, forming the uppermost series of the Lower Eocene. A group of fossils has been discovered in the Upper Ypresian sands of Belgium, which leaves no doubt of their being of Lower Eocene age, and consequently the Lower Bagshots must be placed upon the same horizon. There is no separating line of erosion between the London Clay and the Lower Bagshots, the upper part of the former is sandy, and the lower part of the latter frequently argillaceous. Similarly no definite line can be drawn between the Upper and Lower Ypresian; but in both countries this series is separated from overlying beds by a well-marked line of erosion. So also in France the base of the Calcaire Grossier (Bracklesham Beds) is a pebbly greensand resting on an eroded surface of the Sands of the Cuise-de-la-Motte. In Belgium, in Whitecliff Bay, and in the Bagshot district the Upper Eocene rests upon an eroded surface of the Lower Eocene. The reading of this paper was followed by a discussion in which the President, Mr. Whitaker, Dr. Evans, Dr. Geikie, and others took part.—On the Cambrian and associated rocks in North-West Caernarvonshire, by Prof. J. F. Blake.

PARIS.

**Academy of Sciences**, January 9.—M. Janssen, President, in the chair.—Remarks on M. Cornu's last note regarding the synchronizing of time-pieces, by M. C. Wolf. The author points out that M. Cornu has misunderstood the language of the English physicist, Mr. Everett, whose theory is shown to be perfectly applicable to the Vérité method of synchronization. The efficiency of this system has received a remarkable confirmation from the circumstances attending an accident by which the synchronizing apparatus was recently put out of order in the city of Paris.—Researches on ruthenium, by MM. H. Debray and A. Joly. In continuation of previous studies of this rare metal, the authors here deal with its oxidation and the dissociation of its bioxide. From these researches it appears that hyperruthenic acid must now be added to the list of compounds which are easily destroyed by heat, although obtained at such high temperatures that their existence was long considered problematical. Their formation at these temperatures is analogous to the dissociation of bodies that were supposed to be incapable of decomposition before H. Sainte-Claire's discovery.—Researches on the breath of man and other mammals, by MM. Brown-Séquard and d'Arsonval. These researches make it evident that the air exhaled by mammals, even in a healthy state, contains a very powerful toxic element, to which should probably if not certainly be attributed the bad effects caused by breathing a close atmosphere.—Variation of temperature of a condensed or expanded vapour while preserving the same quantity of heat, by M. Ch. Antoine. An easy method is given for calculating the final tension that results from the variation of a given temperature, and the final temperature that results from a given degree of condensation or expansion.—On the influence of temperature on the magnetic state of iron, by M. P. Ledeboer. Although it has long been known that a magnet raised to a red heat loses its magnetic properties, no successful attempt had hitherto been made to determine by direct measurement the actual degree of temperature at which iron ceases to be a magnetic body. The experiments here described now show that iron remains magnetic up to 650° C., after which a rapid variation is observed in its magnetic condition. At 750° the magnetic properties are scarcely perceptible, and at 770° they disappear altogether, returning in the same way as the metal cools down. This presents a remarkable analogy to the conclusions of M. Pionchon, who, in his recent paper on the specific heat of iron at high temperatures, has shown that this metal undergoes a sudden change of state between 660° and 720°.—On the present value of the magnetic elements at the Observatory of the Parc Saint-Maur, by M. Th. Moureaux. The absolute values, as deduced from the mean of horary observations recorded by the magnetograph are as follow: declination, 15° 52'·1; inclination, 65° 14'·7; horizontal component, 0·19480; vertical, 0·42245; total force, 0·46520; longitude of the Observatory, 0° 9' 23" E. of Paris; N. lat., 48° 48' 34".—On the employment of sulphureted hydrogen for purifying the salts of cobalt and nickel, by M. H. Baubigny. The experiments here described clearly show that from a mixture of the salts of these two metals it is impossible to obtain a pure sulphuret either of nickel or of cobalt by the action of sulphureted hydrogen. Dellfs' statements regarding the action of hydrogen on the salts of the heavy metals are thus shown to be groundless.—On a new method of quantitative analysis for the nitrites, by M. A. Vivier. This method consists in using the reaction discovered by Millon for the analysis of urea, but with absorption of carbonic acid and measurement of the nitrogen liberated in the process.

## BOOKS, PAMPHLETS, and SERIALS RECEIVED.

A Treatise on Algebra: Charles Smith (Macmillan).—The Nervous System and the Mind: C. Mercier (Macmillan).—Reports on the Mining Industries of New Zealand, 1887 (Wellington).—The Ethic of Freethought: K. Pearson (Unwin).—Year-book of Pharmacy, 1887 (Churchill).—An Elementary Text-book of Physiology: J. M'Gregor Robertson (Blackie).—Bergens Museums Aarsberetning for 1886 (Griegs, Bergen).—Zoological Record, vol. 23, 1886 (Gurney and Jackson).—A Course of Lectures on Electricity: G. Forbes (Longmans).—Report on Indian Fibres and Fibrous Substances (Spon).

## CONTENTS.