| Ref. No. | Kirchhoff. | Angström. | Relative | Relative Brightness | Chemical Element. | Previous Observer. |
|---|---|---|---|---|---|---|
| 32 | 1505·5 | 5283· | 5 | 4 | | |
| 33 | 1515 5 | 5275·0 | 7 | 5 | | L. R. |
| 34 | $E_1$ | 5269·5 | 1 | 3 | Fe. Ca. | |
| 35 | $E_2$ | 5268·5 | 1 | 2 | Fe. | |
| 36 | 1528·0 | 5265·5 | 3 | 2 | Fe. Co. | L. |
| 37 | 1561·0 | 5239·0 | 1 | 1 | Fe. | |
| 38 | 1564·1 | 5236·2 | 1 | 1 | | |
| 39 | 1567·7 | 5233·5 | 2 | 2 | Mn. | R. |
| 40 | 1569·7 | 5232·0 | 1 | 2 | Fe. | |
| 41 | 1577·3 | 5226·0 | 1 | 2 | Fe. | |
| 42 | 1580·5 ? | 5224·5 | 1 | 1 | Ti. | |
| 43 | 1601·5 | 5207·3 | 3 | 3 | Cr. Fe. ? | |
| 44 | 1604·4 | 5205·3 | 3 | 3 | Cr. | |
| 45 | 1606·5 | 5203·7 | 3 | 3 | Cr. Fe. ? | |
| 46 | 1609·3 | 5201·6 | 1 | 2 | Fe. | |
| 47 | 1611.5 | 5199·5 | 1 | 1 | | |
| 48 | 1615·6 | 5197·0 | 3 | 2 | | L. R. |
| 49 | $b_1$ | 5183·0 | 15 | 15 | Mg. | L. |
| 50 | $b_2$ | 5172·0 | 15 | 15 | Mg. | L. |
| 51 | $b_3$ | 5168·5 | 12 | 10 | Ni. | L. |
| 52 | $b_4$ | 5166·5 | 10 | 10 | Mg. | L. |
| 53 | 1673·9 | 5153·2 | 1 | 1 | Na. | |
| 54 | 1678·0 | 5150·1 | 1 | 2 | Fe. | |
| 55 | 1778·5 | 5077·8 | 1 | 1 | Fe. | |
| 56 | 1866·8 | 5017·5 | 2 | 3 | | R. |
| 57 | 1870·3 | 5015·? | 2 | 2 | | R. |
| 58 | 1989·5 | 4933·4 | 8 | 5 | Ba. | L. |
| 59 | 2001·5 | 4923·2 | 5 | 3 | Fe. | R. L. |
| 60 | 2003·2 | 4921·3 | 1 | 1 | | |
| 61 | 2007·1 | 4918·1 | 3 | 3 | | L. |
| 62 | 2031·0 | 4899·3 | 6 | 4 | Ba. | L. |
| 63 | 2051·5 | 4882·5 | 2 | 2 | | L. |
| 64 | F. | 4860·6 | 100 | 75 | H. | J. L. |
| 65 | 2358·5 | 4629·0 | 1 | 1 | Ti. | |
| 66 | 2419·3 | 4583·5 | 1 | 1 | | |
| 67 | 2435·5 | 4571·4 | 1 | 1 | Li. | |
| 68 | 2444·0 | 4564·6 | 1 | 1 | | |
| 69 | 2446·6 | 4563·1 | 1 | 2 | Ti. | |
| 70 | 2457·8 | 4555·0 | 1 | 1 | Ti. | |
| 71 | 2461·2 | 4553·3 | 3 | 3 | Ba. | |
| 72 | 2467·7 | 4548·7 | 1 | 3 | Ti. | |
| 73 | 2486·8 | 4535·2 | 1 | 1 | Ti. Ca. ? | |
| 74 | 2489·5 | 4533·2 | 1 | 1 | Fe. | |
| 75 | 2490·6 | 4531·7 | 1 | 1 | Ti. | |
| 76 | 2502·5 | 4524·2 | 2 | 2 | Ba. | |
| 77 | 2505·8 | 4522·1 | 1 | 2 | Ti. | |
| 78 | 2537·3 | 4500·4 | 1 | 3 | Ti. | |
| 79 | 2553·? | 4491·0 ? | 1 | 1 | Mn. ? | |
| 80 | 2555·? | 4489·5 ? | 1 | 1 | Mn. ? | |
| 81 | 2566·5 | 4480·4 | 1 | 2 | Mg. | L. |
| 82 | 2581·5 ? | 4471·4 | 75 | 8 | A band rather than a line. | |
| 83 | 2585·5 | 4468·6 | 1 | 1 | Ti. | |
| 84 | 2625·0 | 4443·0 | 1 | 1 | Ti. | |
| 85 | 2670·0 | 4414·6 | 1 | 1 | Fe. Mn. | |
| 86 | 2686·7 | 4404·3 | 1 | 2 | Fe. | |
| 87 | 2705·0 | 4393·5 | 3 | 2 | Ti. | |
| 88 | 2719·? | 4384·8 | 1 | 1 | Ca. ? | |
| 89 | 2721·2 | 4382·7 | 1 | 2 | Fe. | |
| 90 | 2734·? | 4372· | 1 | 1 | | |
| 91 | 2737·? | 4369·3 ? | 1 | 1 | Cr. | |
| 92 | 2775 8 | 4352·0 | 1 | 1 | Fe. Cr. | |
| 93 | 2796·0 | 4340·0 | 100 | 50 | H. | L. J. |
| 94 | G. | 4307·0 | 1 | 2 | Fe. Ti. Ca. | |
| 95 | 2870·0 | 4300·0 | 1 | 1 | Ti. | |
| 96 | | 4297·5 | 1 | 1 | Ti. Ca. | |
| 97 | | 4289·0 | 1 | 2 | Cr. | |
| 98 | | 4274·5 | 1 | 2 | Cr. | |
| 99 | | 4260·0 | 1 | 1 | Fe. | |
| 100 | | 4245·2 | 1 | 1 | Fe. | |
| 101 | | 4226·5 | 1 | 1 | Ca. | |
| 102 | | 4215·5 | 1 | 2 | Fe. Ca. | |
| 103 | *h.* | 4101·2 | 100 | 20 | H. | R. L. |

The sixth column contains the symbols of the chemical substances to which, according to the maps above referred to, the lines owe their origin.

There are no disagreements between the two authorities; in a majority of cases, however, Angström alone indicates the element, and there are several instances where the lines of more than one substance coincide with each other and with a line of the solar spectrum so closely as to make it impossible to decide between them.

In the seventh and last column the letters J., L., and R. denote that to my knowledge the line indicated has been observed and its place published by Janssen, Lockyer, or Rayet. It is altogether probable that a large portion of the other lines contained in the catalogue have before this been seen and located by one or the other of these keen and active observers, but if so I have as yet seen no account of such determinations.

I would call especial attention to the lines numbered 1 and 82 in the catalogue; they are very persistently present, though faint, and can be distinctly seen in the spectroscope to belong to the chromosphere as such, not being due, like most of the other lines, to the exceptional elevation of matter to heights where it does not properly belong. It would seem very probable that both these lines are due to the same substance which causes the $D^3$ line.

I do not know that the presence of titanium vapour in the prominences and chromosphere has before been ascertained. It comes out very clearly from the catalogue, as no less than 20 of the whole 103 lines are due to this metal.

Hanover, N.H., Sept 13, 1871 C. A. YOUNG

## SCIENTIFIC SERIALS

THE *American Naturalist* for October 1871 commences with a paper by Dr. Jeffreys Wyman entitled, "Experiments with Vibrating Cilia," the chief points in which are some determinations of the rate of movement of the vibrating cilia on the gills of Mollusca, both in air and in water, and the description and drawing of an instrument by means of which this rapidity can be measured and exhibited so as to be seen over a large lecture-room. Prof. James Orton furnishes some contributions to the Natural History of the Valley of Quito (continued in the next number); and Dr. J. S. Billings contributes a paper on *Hysterium*, a genus of Ascomycetous Fungi, and some of its allies, illustrated by a plate. Mr. T. Martin Trippe has a very interesting paper on some differences between Eastern and Western Birds, in which he traces the difference in habits, note, time of breeding, &c., in the same species of bird in the eastern and newly-settled western portions of the American continent, and the manner in which the indigenous avifauna of the Western States is becoming gradually superseded by eastern forms, along with the advance of man.

The first paper in the number for November is by Grace Anna Lewis on Symmetrical Figures in Birds' Feathers, in illustration of the beauties furnished for the microscope by the feathers of birds. Dr. Elliott Coues gives a description and drawing of a little-known species of oriole, the only one which is a native of the Western States, and is known as Bullock's Oriole, *Xanthorthus Bullochii*, Swainson. Prof. George H. Perkins contributes some "Notes on the Geodes of Illinois;" and the remainder of the number is occupied by reviews, and the usual interesting items of Natural History Miscellany.

The number for December opens with an extremely interesting paper by the Editors on "The Mammoth Cave and its Inhabitants," an account of a visit paid to this extraordinary cavern in a hill of the sub-carboniferous limestone formation in Edmondson County, Kentucky, after the Indianapolis meeting of the American Association for the Advancement of Science. After a general description of the cave and history of its inhabitants, it contains a description, with drawings, of all the species of Crustacea and insects which are found in it. The Rev. Samuel Lockwood writes an account of "A Singing *Hesperomys* or Vesper-mouse," the species known as the jumping-mouse, wood-mouse, and white-footed mouse, with the notes of its song. This number concludes Vol. v. of this admirably-conducted magazine, which we commend to the notice of all interested in the study of natural history.

*Journal of Botany* for January. A memoir of the late lamented editor of this journal, Dr. Berthold Seemann, commences the new

volume, now conducted by Dr. Trimen, assisted by Mr. J. G. Baker. The original articles are as follows:—"On the Genus *Albizzia*, nearly allied to *Acacia*," by Baron Ferd. von Mueller; "The *Erysiphei* of the United States," by Messrs. M. C. Cooke and Peck; a continuation of Mr. J. G. Baker's "Botany of the Lizard Peninsula;" and Lichenographical Notes, by J. A. Martindale. Short notes, reviews, and reprints, complete the programme of the number.

THE first article in the *Quarterly Journal of Science* for January is by Captain S. P. Oliver, on "The Dolmen Mounds and Amorpholithic Monuments of Brittany," in which he details the history and analogies of these mounds, classifying them into twelve distinct varieties. The article is apparently not complete. Next follows a short paper on "The Illumination of Beacons and Buoys," detailing the most recent inventions in this direction. The third article is on "Natural and Artificial Flight," detailing M. Marey's investigations on this subject, with numerous illustrative woodcuts. A paper on "The Coal Commissioners' Report" is simply a *résumé* of the evidence brought before the Commission. Mr. Mungo Ponton, on "The Spectroscope: its Imperfections and their Remedy," advocates the construction of an instrument on the diffracting principle, without which the writer maintains that accuracy, certainty, and uniformity of results cannot be attained. The last and longest article in the number is on "Modern Cannon Powder," with two steel plates. A larger proportion than usual of this number is occupied by notices of books, and details of the progress of the physical and mechanical sciences.

THE last published part of the "Memoirs of the Natural History Society of Danzig" ("Schriften der Naturforschenden Gesellschaft in Danzig," New Series, vol. ii., Heft 3 and 4) contains but few papers of general interest, although the special scientific importance of some of them is doubtless very great. Thus a great part of it is occupied by a number of tables giving the results of meteorological observations made in Danzig, with great care and astonishing labour, by M. F. Strehlke, during the years 1841–43, and by a series of tables of refraction for micrometers, by M. E. Kayser. Two other papers of almost purely local interest relate to the chemical composition of the water supplied to Danzig, and to its effects upon lead pipes. The preceding papers occupy more than half the number before us; the remainder all relate to natural history matters. M. C. G. H. Brischke continues his minor observations upon insects, the greater part of his present communication relating to the enemies of the rape-plant and their parasites. The dipterologist will find a new species of *Phytomyza* described under this head. The same author contributes a list of the Rhynchota of the Province of Prussia. The fourth section of M. A. Menge's Prussian Spiders completes the list of zoological contributions. In it the author describes the first two families of his third tribe (the Tubitelæ), ending with *Argyroneta aquatica*, as the 170th species here described by him. M. A. Ohlert's "Lichenological Aphorisms," the only botanical paper, contains some important and interesting observations.

THE following are the most important articles in the *Revue Scientifique*, Nos. 25—32. Prof. Lorain, of Paris, has an interesting article on the report of the Committee of 1870 on the liberty of higher instruction; Mr. Herbert Spencer contributes a paper on General Laws; report of M. Quatrefage's course of lectures on Anthropology at the Museum of Natural History; Helmholtz's address in memory of Prof. Magnus at the Academy of Sciences at Berlin; Herbert Spencer on the Classification of the Sciences, an elaboration of his essay "On the Genesis of Science," published in 1854; Berthelot on the state of bodies in solution; report of Prof. Bernard's course of lectures at the College of France on Experimental Medicine; abstracts of paper read at the Indianopolis Meeting of the American Association for the Advancement of Science; translations of Lockyer's, Maclear's, and Respighi's accounts of the Total Solar Eclipse, together with reports of M. Janssen's observations; an article by Herbert Spencer on the reasons why he dissents from the philosophy of Comte, being a reply to a review in the *Révue des Deux Mondes;* M. Verneuil on Surgical Pathology; report of the committee appointed by the Society of Physicians and Surgeons of the Paris Hospitals to visit the new Hôtel Dieu; M. Alglave on the scientific *réunions* at the Assembly; M. Hebert on the "Tithonic Stage," and the new German school. There are in addition a number of reports of proceedings of foreign societies.

## SOCIETIES AND ACADEMIES

### LONDON

Royal Institution, February 5.—Sir Frederick Pollock, Bart. vice-president, in the chair. Messrs. Alexander Brodie, John Cleghorn, Edward John Gayer, Arthur Edward Griffiths, William Grogan, the Hon. Frederick H. North, Messrs. Samuel Wagstaff Smith, W. Soames, Henry Virtue Tebbs, Burney Yeo, Henry Yool, were elected members. The special thanks of the members were returned for the following donations to "The Fund for the Promotion of Experimental Researches:"—Prof. Tyndall (3rd donation) 30*l.*, Mr. Arthur Giles Puller (5th donation) 21*l.* The presents received since the last meeting were laid on the table, and the thanks of the members returned for the same.

Geologists' Association.—A special general meeting was held on the 2nd February, when a revised code of laws was adopted. Subsequently, at the annual meeting, the report for 1871 was adopted, and the officers for the ensuing year elected. At the ordinary meeting which followed, the Rev. J. Wiltshire, M.A., F.G.S., president, in the chair, a paper was read by the Rev. T. G. Bonney, M.A., F.G.S., tutor of St. John's College, Cambridge, "On the Chloritic marl, or Upper Greensand, of the neighbourhood of Cambridge." The author commenced by a brief sketch of the geology of the Cam valley, and the position of the seam, barely a foot in thickness, which rests upon the eroded surface of the Gault, and is full of green grains and dark nodules, rich in phosphate of lime. He described the matrix as a fine chalky marl, full of foraminifera, and minute fragments of organisms, with a considerable mixture of mud, insoluble in hydrochloric acid. The composition of the green grains (commonly called glauconite) was then discussed, and it was shown that they differed considerably from the typical mineral of that name; he had not satisfied himself that any were casts of foraminifera. After a few words on the phosphatic nodules, and some erratic rocks in the bed, he gave a sketch of the palæontology of the deposit, calling attention to the condition of the various fossil remains, and to the number and size of the pterodactyles and turtles. He then gave his reasons for considering this deposit as formed during the Upper Greensand epoch, but as containing many fossils which had been derived from the Upper Gault by slow denudation. The nodules he considered as mainly of concretionary origin; for they were too pure to be regarded as clay saturated by phosphate. He concluded by sketching out his conception of the physical geography of the East Anglian district in the Neocomian and lower part of the Cretaceous epoch.—Prof. Morris, after some remarks on the value of the paper, spoke of the composition of the green grains, and then traced the range of the deposit, which he agreed with Mr. Bonney in thinking was the formation of a very long period of time.—Mr. Lobley remarked upon the mineralogical and palæontological differences existing between the Cambridge deposit and the chloritic marl of Dorsetshire.—Mr. Bonney, in his reply, having referred to the great scarcity of fossils in the Gault of Cambridge, the Rev. T. Wiltshire stated that the Gault of Kent was in some places devoid of organisms.

Zoological Society, February 6.—Mr. R. Hudson, F.R.S. V.P., in the chair.—A communication was read from Dr. J. S. Bowerbank, F.R.S., containing the first portion of a series of papers, entitled "Contributions to a general History of the Spongiadæ," in which descriptions were given of several species of *Tethea*, and of *Halispongia choanoides*.—A communication was read from Dr. John Anderson, containing notes on a young living female of *Rhinoceros sumatrensis*, which had been captured in Chittagong, in February 1868, and had been removed to Calcutta on its way to England. These notes were accompanied by a photograph of the animal from life.—A second communication from Dr. Anderson contained notes on *Manouria* and *Scapia*, two supposed genera of Land-Tortoises, which Dr. Anderson showed to be identical with *Testudo emys* of Schlegel and Müller.—Mr. Sclater read a paper on Kaup's Cassowary (*Casuarius Kaupi*), of which the Society's collection contained a living specimen. To this was added a list of the other known species of the genus *Casuarius*, and an account of their geographical distribution.—A communication was read from Dr. A. Günther, F.R.S., on two specimens of Lizards of the genus *Hydrosaurus*, from the Philippine Islands, for one of which, being hitherto undescribed, Dr. Günther proposed the name *Hydrosaurus nuchalis*.—A second communication from Dr. A. Günther contained the