

and finally to a settlement of the important fundamental physical question, whether the properties of flame, in reference to the absorption and transmission of heat and light, are, as I have ventured to suggest, diametrically opposite to those of gases and vapours—whether flames are specially transparent and diathermous to rays of their own emission, and resist the passage of heterogeneous rays; that a flame is thus not merely heated gas, but another and distinct form of matter, or rather is matter in a different state of activity.

If this be established, we shall be driven back upon "the wisdom of the ancients," and be forced to admit the classification of the four elements, "fire, air, earth, and water," or flame, gas, solid, and liquid; remembering, of course, that they used the term "element" with a different meaning to that of our modern acceptance. They described elementary or necessary conditions, not elementary constituents. It was the philosophy of material existence, not the composition of material substances, which chiefly occupied their attention. From this point of view their classification may, after all, prove to be correct.

I must reserve for another communication some remarks I proposed to make on the application of the above to Mr. Ericsson's researches on the radiation of the chromosphere.

W. MATTIEU WILLIAMS

SCIENTIFIC SERIALS

THE part of the *Transactions of the Linnean Society* just published, forming the 2nd part of vol. xxviii, consists of two elaborate botanical papers; "Memoir on the Spermogones and Pycnides of Crustaceous Lichens" by Dr. Lauder Lindsay; and "On the Hippocrateaceæ of South America" by Mr. Miers. Of the important features of the latter paper we gave a sketch on the occasion of its being read before the Society. It is illustrated by seventeen very beautiful plates executed by the author. The first is an extremely elaborate paper, illustrating the great variation in the spermogones and pycnides in the same species of lichen, and even in the same individual. For this purpose as many as twelve or even 20 specimens of the same species, preserved in various herbaria, are in some cases minutely described. This paper is also illustrated by eight coloured plates.

THE *American Naturalist* for August does not contain so many original articles as usual. The Rev. Samuel Lockwood describes a new Entozoon from the eel, belonging to Duvaine's type, the Acanthocephala or spiny-heads, but forming a new genus; the name proposed is *Koleops anguilla*. Dr. J. J. Woodward has a paper on the use of monochromatic sunlight, as an aid to high-power definition; and the Rev. H. J. Bruce describes some of the familiar birds of India. Among the shorter articles there are some very interesting notes.

The number for September opens with an interesting article by Mr. S. H. Scudder, the curious history of a butterfly. The American butterfly *Brenthis bellona* occurs in two different forms produced at different times of the year, in both cases the larva hibernates, but with one set when just out of the egg, with the other when half grown, the butterfly appearing in one case in May, in the other in September; and it seems impossible that these two parallel races of the same species can ever mingle. Prof. N. S. Shaler has a paper on the Geology of the Island of Aquidneck and the neighbouring parts of the shores of Narraganset Bay; and Dr. R. H. Ward sends a microscopical contribution entitled "The new Immersion Illuminator." Mr. C. V. Riley, who has paid great attention to the *Phylloxera* and other diseases of the vine, has some valuable remarks on the cause of the deterioration of some of the native grape-vines, which he has contributed to his report as Entomologist to the State of Missouri.

THE *Quarterly Journal of Science* for October commences with two meteorological articles, the Origin of the Great Cyclones, by Prof. T. B. Maury, and an anonymous paper on Weather Prophecies. The author of the former article considers it proved that cyclones are formed chiefly, if not exclusively, along the edges of the great atmospheric currents, the surface currents and the upper currents alike, the polar streams which descend into our valleys, and the aerial gulf streams which move invisibly over our heads. Capt. Oliver continues his series of papers on the Amorpholitic Monuments of Brittany, and in continuation of a previous series we have an article on Natural and Artificial Flight—an Aerial Ship. Mr. F. C. Danvers, on Paper in the International Exhibition, gives a slight sketch of the history of the

manufacture of paper and of the various specimens to be seen in the Exhibition. The Physiological Position of Tobacco, by Mr. E. A. Axon is a powerful attack on the use of the weed as not only unnecessary and destitute of any beneficial results, but positively injurious.

THE first paper in the *American Journal of Science and Arts* for September is by Prof. J. W. Draper, "Researches in Actino-Chemistry," from which we have already reprinted an extract on the distribution of heat in the spectrum. Prof. Shepard concludes his account of the Corundum region of North Carolina and Georgia; and then follows a sketch of Barrande's account of the origin of Palæozoic species. Mr. A. A. Hayes has a long article on the red oxide of zinc of New Jersey. In Prof. O. C. Marsh's continuation of his preliminary description of new Tertiary Mammals are descriptions of a large number of new genera and species.

In the *Geological Magazine* for October (No. 100), the Editor, Mr. Henry Woodward, gives us notes, illustrated with excellent figures, on some British Palæozoic Crustacea belonging to his order Merostomata. These notes include a full description of *Hemiaspis limuloides*, a species originally established by Mr. Woodward in 1865, and also shorter characters of three other species of the same genus, namely, *H. speratus* (Salt ms.), *H. horridus*, sp. n., and *H. Salweyi* (Salt). These Silurian forms are particularly interesting as they constitute a connecting link between the suborders Eurypterida and Xiphosura.—Of the latter group Mr. Woodward here notices some species of the genus *Bellinurus*, and describes a new form under the name of *B. Königianus*, also a new *Pretronicia*, *P. Birtwelli*, both from the Coal measures.—Mr. W. T. Aveline publishes a short note on the continuity and breaks between the various divisions of the Silurian strata in the Lake district, and Messrs. Davidson and King some remarks on the genera *Trimerella*, *Dinobolus*, and *Monomerella*. In this paper the authors propose the establishment of a new Brachiopod family, Trimerellidae, allied to the Lingulidae.—Dr. H. A. Nicholson describes a new genus of fossil tubicolar Annelides founded upon a division of the fossils hitherto referred by Palæontologists to *Tentaculites*. The so-called genus *Tentaculites*, according to Dr. Nicholson, includes forms belonging to the Pteropodous Mollusca and others which are true tubicolar Annelides, the former being free shells, the latter attached to other bodies. He proposes to retain the name *Tentaculites* for the Pteropods, and to establish a new genus, *Ortonia*, for the Annelides. He describes and figures a new species of the latter from the Cincinnati group of the Lower Silurian of Ohio under the name of *Ortonia conica*.—The concluding article in the number is a further instalment of Prof. Nordenskiöld's account of the Swedish Greenland Expedition of 1870.

SOCIETIES AND ACADEMIES

PHILADELPHIA

Academy of Natural Sciences, April 2.—Prof. Leidy made some remarks on specimens of fossils of extinct mammals from the Tertiary of Wyoming. One of these is an upper jaw fragment with two molars; the other a lower jaw fragment with a single molar. The upper molars have crowns composed of four lobes, of which the outer are like the corresponding ones in *Anchitherium*. Of the inner lobes, the front one is much the larger, and is prolonged outwardly in advance of the antero-external lobe. It is homologous with the antero-internal and antero-medial lobes as existing in *Anchitherium* in a completely connate condition. The postero-internal lobe is the smallest of the crown. It is conical and conjoins that in front. A barely perceptible trace of a postero-medial lobe is seen. A strong basal ridge incloses the crown, except externally, where it is feebly produced. The three upper molars occupied a space of 8 lines: The first molar is $2\frac{1}{2}$ lines fore and aft and $3\frac{1}{4}$ transversely; the second is $2\frac{3}{4}$ lines fore and aft, and the last one $2\frac{1}{4}$ lines. A question arises as to whether these teeth pertain to any of the animals previously indicated from lower jaw specimens with teeth. They are too large for the known species of *Hyopsodus* or *Microsops*. They nearly accord in size with the lower molars of *Notharctus*, and perhaps belong to this genus. *Linnotherium* appears not to differ from this, as the number of teeth and their constitution are the same. The lower jaw fragment accompanying the upper one may belong to the same animal. The molar it contains, though resembling those of *Notharctus*,

differs in several points. I propose to refer the fossils to a species with the name of *Hipposyus formosus*. Prof. Leidy further remarked that he had recently the opportunity of examining the tooth described by Prof. Marsh under the name of *Paleosyops minor*. The tooth evidently belongs to the curious pachyderm with the beaver-like incisors named *Trogosus castoridens*. On observing the molar tooth, which is not worn away like those in the jaw specimen upon which the latter was named, it at once called to mind, the tooth which had been described under the name of *Anchippodus riparius*. On comparison, it would appear as if the specimens referred to *Paleosyops minor* and *Trogosus castoridens*, really belong to the same genus and species. The tooth of *Anchippodus riparius* was obtained from a tertiary formation, Miocene or Eocene, in Monmouth Co., N.J. If the determination is correct, it would go to show that the Bridger Tertiary formation of Wyoming was contemporaneous with the Tertiary deposit of Monmouth Co., N.J. Prof. Cope stated that the largest mammal of the Eocene formations adjoining those of Wyoming, *i.e.* of the Wahsatch group of Hayden, was the *Bathmodon radians*, Cope, of about the size of Rhinoceros. It was an odd-toed ungulate, with peculiar dental characters. The incisors were well developed above and below, as in the tapir, but the dental series was little interrupted. The crowns of the upper molars were all wider than long, and presented mixed characters. On the outer margin one only of the usual crescents of ruminants was present, but a tubercle represented the anterior one. The one which was present was directed very obliquely inwards. Inner crescents were represented by two angles, the posterior forming the inner angular margin of a flat table, the anterior a mere cingulum at its interior base. The arrangement of these parts was stated to be of interest in connection with the relationships between the types of hoofed animals. The single outer crescent was a ruminant indication, while the inner table resembled the interior part of the crown of *Titanotherium*. It differed, however, in its early union with the outer margin, its edge being thus possibly homologous with the posterior transverse crest in *Rhinoceros*. The premolars had two or three lobes with crescentic section arranged transversely. He regarded the genus as allied to *Chalicotherium*. He stated that the mammalian fauna of Wyoming and Utah more nearly resembled that of the Paris Basin than any yet discovered in our country, and that it had been discovered to contain a still greater number of generalised mammalian forms. One of the most marked of these was the genus just described by Dr. Leidy.

PARIS

Academy of Sciences, September 30.—M. Chevreul, president.—The following members of the International Committee on the Metric System were present at the meeting:—MM. Stankart and Bosscha, for the Low Countries; Mr. Chisholm, for England; General Ibanez, Spain; MM. Lang and Herr, Austria. The following papers were read:—"On the demonstration of the formula which represents the elementary action of two currents," by M. J. Bertrand, a long mathematical paper on Ampère's law of electro-dynamical attractions; "On the immediate determination by the principle of correspondence of the number of points of intersection of two curves of any order which meet at a finite distance," by M. Chasles.—Next came a note on the stability of colours on stuffs in general, and on silk in particular, by M. Chevreul. The author refers to a paper he read before the Academy twelve years back, when he drew attention to the instability of many of the aniline colours then recently introduced. He now again calls attention to these colours, and considers that the use of them cannot fail to have a disastrous effect on French commerce and industry.—A paper by Father Secchi followed, entitled, "Solar Spectroscopic Researches." The author calls attention to the following extract from a letter to Herr Schellen, written by Mr. Young, of Dartmouth College, U.S.A. Mr. Young was stationed on Mount Sherman, 3,300 feet above sea level, and used a telescope of 9.4 inches aperture. He says, "The spectrum of the sun, although not entirely reversed at the border of the disc, became continuous, as Father Secchi has seen in Italy. When the air is calm the height of the region where this occurs is not greater than 1". The lines rays of the chromosphere were remarkably augmented in number. H₁ and H₂ were seen reversed, as was *h* and the other hydrogen lines. In the spectrum of each spot the lines of hydrogen were reversed in a region slightly more extended than the penumbra; this has been verified for at least twenty different spots." Father Secchi states that these observations confirm his own made at Rome in 1869.—M. Bertrand then presented the Academy with a

posthumous work of M. Duhamel, entitled "An Essay on the application of scientific methods to the moral man," upon which he made some remarks. He was followed by M. Max Marie's concluding paper "On the theory of the residues of double integrals." Next came M. M. A. Rabuteau and F. Papillon's "Researches on the Physiological Action and Antifermentable properties of Sodid Silicate." The authors have added various quantities of this body to different kinds of fermentable matter and find a quantity of two grammes to completely stop all fermentation of whatever kind. Its action is exactly analogous to that of borax but more energetic. Two grammes of the latter injected into the veins of a dog produced no effect whilst one gramme of the silicate produced violent purging and vomiting and ultimately death after an interval of nine days.—On the effect of vegetable parasites in altering bread by M. M. F. Rochard and Ch. Legros was referred to the commission appointed to examine the *Oidium aurantiacum*. M. Bertrand then presented a note "On the movement of the Planets around the Sun according to the Electrodynamical Law of Weber," by M. F. Tisserand. M. Yvon Villarceau presented a note by M. Stephan on the "Elements and Ephemerides of Planet 122." M. Yvon Villarceau remarked that M. Stephan had also calculated the orbit of 121, and he then presented a note by M. R. Luther, on an "Observation of the Planet 95, Arethusa, made at the Observatory of Bilk-Düsseldorff," which was followed by a note of M. Trève, "On Magnetism."—M. Milne-Edwards then presented a note by M. N. Joly, entitled, "Observations on the Metamorphoses of Osseous Fish in general, and particularly on those of a small Chinese fish of the genus Macropoda, recently introduced into France."—This was followed by a paper by M. H. Sicard, "On the Connection which exists between the Nervous and Muscular Systems in the Helices."—And then came a note by M. Lichtenstein, "On a Process for the Destruction of *Phylloxera*," by the burying and subsequent destruction of the young shoots. Papers on the same subjects were received from MM. A. Rainaud, Peyrat, and Louvet, and were sent to the Phylloxera Commission.

PAMPHLETS RECEIVED.

ENGLISH.—The Philosophy of Theism: J. Croll.—Quarterly German Magazine, No. 2.—Proceedings of the Bath Natural History Society and Antiquarian Field Club, Vol. ii. No. 3.—Proceedings of the Liverpool Naturalists' Field Club, 1871-72.—The Geology of the country around Liverpool: C. H. Morton.—Notes for My Students in Magnetism: W. J. Wilson.—Annual Report of Committee for amending the law with respect to the property of married women.—Journal of Mental Science, October.—Quarterly Journal of Science, No. 34.—Heywood's School Atlas of Twelve Maps.—Pyrology, or Fire Analysis: Captain W. A. Ross.—Journal of the Statistical Society, September.

AMERICAN AND COLONIAL.—Canadian Naturalist, Vol. vi. No. 4.—Popular Science Monthly, October.—Preliminary Description of New Tertiary Mammals: O. C. Marsh.—Notice of some new Tertiary and Post-tertiary Birds: O. C. Marsh.—Proceedings of the Academy of Natural Sciences, Philadelphia, January—April 1872.—Washington Observations for 1870: Appendix II. Report on the Observations of Encke's Comet during its return in 1871: Hall and Harkness.—The Curious History of a Butterfly: S. H. Scudder.—Proceedings of the Asiatic Society of Bengal, August.

FOREIGN.—Verhandlungen der k. k. geologischen Reichsanstalt zu Wien, August 30.—Sulla incinerazione dei Cadaveri: G. Polli.—Zeitschrift für Meteorologie, September.—Sur la mesure des sensations physiques: J. Plateau.—La Belgique horticole, July—October.—Om Echinoidermis byggnad: S. Loven.

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