

lished, specially adapted for the northern hemisphere and tropics, the southern hemisphere and tropics, and the United States. Those who have not yet taken advantage of the valuable aid this pocket-book is when travelling about the world, or even staying at home, should make the experiment now and use one. The writer has for several years always possessed himself of a copy, and while he has had the occasion to employ all the three editions, he has found them most valuable in making the exposures, in recording the data, and in many other useful ways.

SOME novel conclusions in reference to the osmotic pressure of colloids are given by Messrs. Moore, Roaf, and Webster in the October issue of *The Biochemical Journal*, in a paper on the osmotic pressure of casein in alkaline solutions. It has sometimes been suggested that the osmotic pressure of such substances is due to the presence in them of small quantities of ash. But it is found experimentally that alkali moves against the osmotic pressure to the same side of the membrane as the colloid, with which it enters into combination. The authors conclude that the supposed impermeability of the membrane to ions is fictitious, and that its function is merely to hold together the colloidal aggregates by which the crystalloid is attracted and made to traverse the membrane. The thirst of the casein for alkali illustrates the manner in which the colloids of living cells can extract and concentrate crystalloids for their purposes from infinitesimally low amounts in the fluids bathing them, such, for example, as bone formation from the excessively low concentration of calcium ion in the blood, the formation of calcareous and siliceous shells in fresh-water and marine organisms, and many similar cases. Such concentrations arise from affinities of a molecular type between colloids and crystalloids, which vary from time to time, so causing periods of uptake and deposition in a rhythmic manner.

THE Patent Office Library is well known to all scientific workers in London. The liberal yet careful manner in which additions are made to the library, the wide range of scientific periodicals and journals, and the fact that it is available from 10 a.m. to 10 p.m., places the library in a unique position in London. The bookshelves are open to the visitors, a much appreciated privilege, but one requiring an intimate knowledge of the system of classification adopted if the time of the visitor and officials is not to be wasted. The new series of subject lists now being issued, while preserving the same form and general arrangement as the former one, is arranged so that the headings contain certain marks indicating the location of classes of books in the library. The most recent subject list in the new series deals with works on peat, destructive distillation, artificial lighting, mineral oils and waxes, gas lighting, and acetylene. It forms a pamphlet of 104 pages, and is obtainable at the Patent Office for 6d.

THE causes of variations in the mineral oils of the United States and other countries have given rise to many investigations and discussions. Not only do these differences exist in oils found in separate regions, but there are extreme variations in many oils occurring in adjacent localities. It is a plausible hypothesis that the transport of the oil from the lower strata may have been effected, or at least assisted, by capillary action, and during the passage upwards a fractionation of the oil will take place. Day showed that the unsaturated hydrocarbons are less diffusible than the paraffin hydrocarbons, and Gilpin and Cram confirmed and extended this view by showing that when petroleum is allowed to diffuse through tubes packed with Fuller's earth, the unsaturated hydrocarbons collect in the

earth of lower sections of the tubes, while the paraffins tend to accumulate in the lightest fraction at the top of the tube. Similar experiments have been made by other observers. Additional evidence is given in Bulletin 475 of the United States Geological Survey, on "The Diffusion of Crude Petroleum through Fuller's Earth, with Notes on its Geologic Significance," by J. Elliot Gilpin and Oscar E. Bransky. They show that when mixtures of benzene and a paraffin oil are allowed to diffuse upward through a tube packed with Fuller's earth, the benzene tends to collect in the lower sections, and the paraffin oil in the upper, sections of the tube. Crude petroleum under similar conditions also undergoes a fractionation, and repeated fractionation showed that there is a tendency to the production of mixtures which will finally pass through the earth unaltered. Fuller's earth tends to retain the unsaturated hydrocarbons and sulphur compounds in petroleum, thus exercising a selective action upon the oil.

WE have received a reprint from the *Rivista di Fisica Matematica e Scienze Naturali*, Pavia, of a suggestive memoir by Prof. P. Palladino entitled "Les Composés Chimiques dans l'Espace," in which some novel ideas as to the constitution of matter are put forward. The basis of the hypothesis is stated to be essentially "the unity of matter and its possible groupings," and the author believes he has arrived at the form and relative dimensions of the atomic groupings of the unit of matter, or "quantities of combination," of the chemical elements. The memoir is illustrated by seventy-two geometrical figures representing the structure of the atoms and molecules of the principal elements and their compounds, and the text is interspersed with numerous graphic symbols, which act as a convenient notation to represent these various geometrical shapes of the elementary atoms and the molecules of their compounds. Definite shape is attributed to the unit of matter, namely, that of a tetrahedron; thus, for instance, the atoms of oxygen and of phosphorus are supposed to be built up of five tetrahedra, while those of hydrogen are composed of five polytetrahedra, each in turn composed of five smaller tetrahedra. The unit tetrahedron is supposed to be, in turn, composed of a number of electrons. The tetrahedra may be arranged in either a closed or an open manner in many cases, such as in those of oxygen and phosphorus, the difference of structure accounting for the existence of two forms of the same element, the less stable form (such as yellow phosphorus) corresponding to the open arrangement, and the more stable (red phosphorus, for example) to the closed assemblage. Prof. Palladino traces numerous chemical reactions and physical relationships to the forms which he thus attributes to the elementary atoms and the molecules of their compounds, and the whole memoir is both ingenious and highly suggestive.

A SECOND edition of Dr. Arnold Berliner's "Lehrbuch der Experimentalphysik in elementarer Darstellung" has been published by Mr. Gustav Fischer, of Jena. The first edition of the work was reviewed in the issue of NATURE for August 4, 1904 (vol. lxxiv, p. 317).

UNDER the title "Abhandlungen über Dialyse (Kolloide)," three of Thomas Graham's papers have been issued as No. 179 of Ostwald's *Klassiker der Exacten Wissenschaften*. The translation has been made by E. Jordis, who has also added a biography and bibliography, together with a series of critical notes.

Erratum.—In the summary of Dr. Tutton's Cantor lectures on "Rock Crystal," given in NATURE of December 21, a line of type was unfortunately omitted.

After line 20 from the bottom of column 2 on p. 264, ending with the words "known as," and before the next printed line beginning "twins," there should have appeared a line reading "amethyst. There are two well-marked kinds of quartz". Also the adjacent Fig. 14 should be vertically inverted.

OUR ASTRONOMICAL COLUMN.

SCHAUMASSE'S COMET, 1911h.—MM. Fayet and Schaumasse publish a set of elements and an ephemeris for comet 1911h in No. 4542 of the *Astronomische Nachrichten*. The ephemeris gives the positions of the comet to the end of March, 1912, and shows that the object should attain its greatest apparent brightness about the beginning of February, when it should be of about the tenth magnitude; the following is an extract:—

Ephemeris 12h. M.T. Paris.

1912	h.	m.	°	'	δ	log r	log Δ	1/r ² Δ ²			
Jan. 1	15	17.5	...	1	49	...	0.1116	...	0.2008	...	0.24
„ 9	15	52.4	...	3	43	...	0.0953	...	0.1899	...	0.30
„ 17	16	27.7	...	5	28	...	0.0822	...	0.1835	...	0.30
„ 25	17	3.0	...	7	2	...	0.0732	...	0.1813	...	0.31
Feb. 2	17	37.5	...	8	21	...	0.0689	...	0.1830	...	0.31
„ 9	18	10.9	...	9	25	...	0.0696	...	0.1877	...	0.30

This path lies through the southern parts of Serpens and Hercules, then through Ophiuchus and Aquila; the comet will pass about 3° north of Altair on March 9, 1912, and will remain a morning object throughout.

BROOKS'S COMET, 1911c.—Prof. Millosevich publishes an ephemeris, extending to March 3, for comet 1911c in No. 4542 of the *Astronomische Nachrichten*. The comet is now too far south for observation in our latitude, but was observed by Dr. Ristenpart at Santiago on December 9; its magnitude then was 7.5, and the observed position gave corrections of +7.6s. and +3.0' to the ephemeris position.

In the same journal Dr. H. E. Lau records the magnitude observations made at the Treptow Observatory during the period August 26 to October 10. Comparing the observed with the calculated magnitudes, he finds that the former fit $1/r^2\Delta^4$ better than $1/r^2\Delta^2$; there is also a suggestion of a periodic oscillation in the observed magnitudes. Other magnitude observations are given, and Father Iniguez also gives the wave-lengths of the lines observed photographically and visually in the spectrum of the comet.

OBSERVATIONS OF MARS.—A telegram from M. Antoniadi to the *Astronomische Nachrichten* (No. 4542) states that the large telescope at Meudon revealed, on December 6, a singular brown spot to the areographic west of Argyre. On November 14 the same observer and M. Bosler were struck by the decided citron hue of the planet's surface, even the polar snows appearing yellowish. On December 4 and 6 the Solis Lacus region was seen, under good conditions, to be as it was in 1909, but the "lake" itself was more intense. It was on the second date that the large brown spot was seen situated in the western part of the M. Erythraeum. Such a spot, although much weaker and uncertain, has been seen during previous oppositions, but never so plainly as now; it is about 600 kilometres long, and its coloration is entirely different from that of any other feature on the planet.

THE TOTAL SOLAR ECLIPSE OF APRIL 17, 1912.—In a paper read before the British Astronomical Association, and published in the current *Journal* (vol. xxii., No. 2), Mr. G. F. Chambers gives a number of interesting particulars he has collected concerning possible facilities for seeing the total solar eclipse of April 17, 1912. According to the different almanacs, maximum duration, which occurs in Portugal, will be from 0.6s. to 8.0s., the former being given by *The Nautical Almanac*, the latter by the *Berliner Jahrbuch*; the *Connaissance des Temps* gives 6.3 seconds. Mr. Chambers gives the times of sailing of ships to various ports in the peninsula, particulars as to methods of reaching, and accommodation in, the towns near to the eclipse path, and some idea of the cost. From figures supplied by Father Iniguez, the meteorological conditions at the

Spanish stations would probably be unfavourable; and, on the whole, Ovar in Portugal, about eighteen miles south of Oporto, seems to promise the best chance of seeing the transitory phenomena. A party is being organised by Mr. Chambers, and intending participants should communicate with him.

PLANETARY ATMOSPHERES.—An interesting study of the production, the effects, and the disappearance of the atmospheres of planets is published by Prof. Arrhenius in the *Publications de la Société de Chimie Physique*. Starting with each planet as a separated portion of the solar nebula, the author traces out the general method whereby the metals, the hydrocarbons, &c., would become solidified parts of the planet's crust, and then shows how this would operate in the case of the earth. Carbonic acid would be the most resistant impurity of the atmosphere, and under the action of plant life and light would become decomposed. With less CO₂ the radiation would increase and the temperature of the earth's crust would decrease. Volcanic action would then interfere by producing more CO₂, and so an oscillation of temperature and climate would ensue. Prof. Arrhenius is unable to accept the long-period rotation of Venus, and describes a development on that planet which will be richer and more brief than it has been on the earth. Turning to Mars, he likens the conditions there to those obtaining in certain desert districts, e.g. parts of Persia, only the temperature is some 30° below zero according to him. The Martian "lakes" are analogous to the semi-solid *khévirs* found in Persia, and Prof. Arrhenius shows how the colours and the changes on Mars can be fitted with terrestrial equivalents of this type.

INTERNATIONAL SOLAR RESEARCH.¹

THE interesting volume referred to below gives evidence of so much progress since the last meeting of the Solar Union at Meudon in 1907 that it is not possible in a limited notice to do more than mention some of the chief contents.

After giving a list of members of the scientific bodies constituting the union, and the names of those who attended the fourth conference at Mount Wilson, the minutes of each of the four meetings held on August 31, September 1 and 2, 1910, are given verbatim. At the first meeting, with Prof. E. C. Pickering in the chair, Dr. G. E. Hale gave a lengthy address on the recent developments of solar investigation. The preparation of the new sunspot map has been delayed by the necessity of arranging for spectra of greater dispersion to allow of the proper analysis of the Zeeman effect in spot spectra. It was decided that the scale should be not less than 5 mm. to 1Å the separate sections not exceeding 60 cm. in length. In the progress of work on comparisons between centre and limb, solar chromosphere and other allied problems, the question of the Tertiary standards is important, and it is proposed to undertake their determination in the near future. Dr. Hale also gave a very lucid description of the details of the new large tower telescope and spectrograph. Certain changes detected in the spectra of sunspots were outlined, the differences found being due to the varying strengths of magnetic field in the spot vortices, giving different separation of the components. An important statement is that the record of eruptive phenomena can be carried on with H α better than with the calcium lines, and these eruptive phenomena are likely to be associated with magnetic storms on the earth.

A number of important resolutions by the Wave-length Committee were adopted, from which it is apparent that there is a good prospect of spectroscopists being provided in the near future with a trustworthy table of wave-length standards showing all the lines of most of the known elements on a uniform system. These will be referred to a number of "secondary standard" iron lines which have been determined by Fabry, Eversheim, and Pfund.

At the second sitting, Prof. W. W. Campbell in the chair, reports were presented dealing with solar radiation, spectra of sunspots, eclipse observations, &c. From an exhaustive

¹ "Transactions of the International Union for Cooperation in Solar Research." Vol. iii. (Fourth Conference). Pp. viii+231. (Manchester: University Press, 1911.) Price 7s. 6d. net.