

information on fixing, hardening, imbedding, sectioning and staining, also on selecting diatoms, in the chapters on "mounting" now at the end of the book. The number of pages has been increased from 132 to 186.

A NEW method of attacking the problem of determining the degree of ionisation of complex solutions is given by Prof. J. G. Macgregor in the *Transactions* of the Nova Scotian Institute of Science just issued. The number of free ions per unit volume can be studied in the case of the two simple salts separately by means of the conductivity. These numbers are functions of the dilution, and can be expressed graphically in the form of curves. From these two curves, by a neat graphical construction, Prof. Macgregor deduces the concentration of the ions in the solution resulting from the mixture of the two simple solutions, a complicated algebraical process being thus avoided. The method is applied, in a subsequent paper in the same volume by Mr. J. Barnes, to solutions containing a common positive ion, potassium chloride and sulphate. It was found to be possible in this way, given the dissociation theory and data obtainable from simple solutions, to predict the electrical conductivity, specific gravity and surface tension of fairly dilute solutions of potassium chloride and potassium sulphate within the limits of experimental error.

NOTHING can be more striking testimony to the advance of physical chemistry than the manner in which isolated phenomena, long known but previously unexplained, fall into line when attacked by modern methods. An excellent example of this is afforded by the paper of Messrs. Cohen and Van Eijk in the current number of the *Zeitschrift für physikalische Chemie* on physico-chemical studies of tin. As early as 1851 a curious molecular transformation of some tin organ pipes was noticed by Erdmann, and the same fact was rediscovered eighteen years later by Fritzsche at St. Petersburg, the tin crumbling to a grey powder. Since that time this phenomenon has been repeatedly studied by various observers, the causes being variously ascribed to low temperature, effect of shocks upon the crystalline structure, and velocity of cooling of the tin when originally cast. A preliminary dilatometric study of a grey tin showed the existence of a transition temperature at about 30° C., hence a transition element was constructed, having grey tin as one electrode and ordinary white tin as the other. A study of the electromotive force of this cell with varying temperatures showed that the reaction



was a reversible one with a transition point at 20° C. A careful determination of the same point by the dilatometric method gave the same value. All the observations of early workers are brought into line by this work. The authors point out that, except during a few warm days, all tin is in a metastable equilibrium, and tends to transform itself slowly into the grey powder modification.

THE additions to the Zoological Society's Gardens during the past week include a Geoffroy's Cat (*Felis geoffroyi*) from Paraguay, presented by Mr. W. A. Gillett; a Woodcock (*Scolopax rusticula*), British, presented by Mr. C. E. Lambert; a Common Snake (*Tropidonotus natrix*), British; a Tesselated Snake (*Tropidonotus tessellatus*), a Dark Green Snake (*Zamenis gemonensis*), European, presented by Miss Ash; a Black-headed Lemur (*Lemur brunneus*) from Madagascar, a Blue-tongued Lizard (*Tiliqua scincoides*) from Moluccas, a Bare-eyed Cockatoo (*Cacatua gymnopsis*) from South Australia, two Undulated Grass Parrakeets (*Melopsittacus undulatus*, var.) from Australia, two Common Teguexins (*Tupinambis teguexin*) from South America, an Eyed Lizard (*Lacerta ocellata*), European, deposited; a Black-headed Bunting (*Emberiza melanocephala*), bred in the Gardens.

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OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN FEBRUARY.

- February 2. 6h. 56m. to 7h. 43m. Occultation of κ Piscium (mag. 5.0) by the moon.
 2. 11h. 44m. Minimum of Algol (β Persei).
 2. 13h. 5m. Transit (Ingress) of Jupiter's Sat. III.
 5. 8h. 33m. Minimum of Algol (β Persei).
 6. 8h. 36m. to 9h. 24m. Occultation of δ Arietis (mag. 4.5) by the moon.
 7. 14h. 3m. to 14h. 49m. Occultation of ζ Tauri (mag. 5.4) by the moon.
 8. 15h. 50m. to 16h. 29m. Occultation of η Tauri (mag. 5.2) by the moon.
 14. Venus. Illuminated portion of disc = 0.801.
 15. 13h. 20m. to 14h. 40m. Occultation of ζ Leonis (mag. 6.0) by the moon.
 19. Saturn. Outer minor axis of outer ring = 16".13.
 22. 16h. Jupiter in conjunction with moon. λ 1° 31' N.
 25. 10h. 15m. Minimum of Algol (β Persei).
 28. 7h. 4m. Minimum of Algol (β Persei).

UNITED STATES NAVAL OBSERVATORY.

CAPTAIN C. H. DAVIS, Superintendent of the United States Naval Observatory at Washington, has forwarded a copy of his report for the fiscal year ending June 30, 1899.

The great equatorial, 26 inches aperture, has been devoted to work beyond the reach of smaller instruments, and in particular to the spectroscopic determination of the motions of stars in the line of sight. Many measures were made of the diameters of Mercury and Venus, to determine the irradiation error, and it was established that this was a function of the magnifying power employed.

The spectroscopic observations were almost all made by the photographic method, the wave-lengths being obtained from measures taken with the large Harkness comparator made for eclipse reduction in 1869. The probable error in the velocity, as determined from a single plate, was about ± 0.71 mile per second. Good plates with well exposed comparison spectra have been obtained of α Tauri, α Aurigæ, α Canis Majoris, α Canis Minoris, α Cygni and ϵ Cygni, but many others have been failures, owing to the difficulties involved in the use of a lens only visually corrected. This has recently been remedied by the purchase of a correcting lens of 2.09 inches aperture, which alters the minimum focus from λ 5270 to λ 4341 without materially disturbing the total focal length from the object-glass. Extensive alterations have been made in the endeavour to remedy the air currents produced in the equatorial building on account of its connection with other rooms. The 12-inch equatorial has been employed in the systematic observation of minor planets, comets, occultations of stars and eclipses of Jupiter's satellites, the whole of which have been reduced and published. This telescope has also been used for the exhibition of celestial objects to the public on Thursday evenings. Including those admitted during day working hours, the number of visitors during the year has been 1623.

Transit observations have been continuously made throughout the year. The 9.14-inch instrument was dismantled on June 5, 1899, the whole observing staff being immediately transferred to the new 6-inch transit circle. The temporary fittings supplied at the installation of the 9.14-inch transit in 1893 are being replaced by permanent ones of new design. A meridian mark has been provided for the 6-inch instrument, and the performance of both this and the new steel altazimuth have given every satisfaction.

The new 5-inch altazimuth and the prime vertical instrument have been employed for determining variations of latitude and the constants of aberration and nutation.

The 40-foot photoheliograph was installed, for obtaining sun pictures, on October 11, 1898, and from this date to June 30, 1899, negatives were taken on 122 days. The sun's disc on these plates is 4.3 inches in diameter. The publications of the Observatory are well in hand. Volumes of observations for 1891 and 1892 are almost ready for distribution, and these will complete the record of work done at the old Naval Observatory. The American ephemeris for 1902 is issued, and it is hoped that the volume for 1903 will be issued in February 1900. In this, the adopted value of the apparent diameter of the sun will