

NEW SOUTHERN DOUBLE-STARS.—Mr. H. C. Russell, Government Astronomer at Sydney, has circulated a list of newly-detected double-stars, some found by himself with the large instrument, and others by Mr. Hargrave with the $7\frac{1}{4}$ -inch equatorial. In most cases the components belong to the tenth and eleventh magnitudes.

THE TOTAL SOLAR ECLIPSE OF 1816, NOVEMBER 19.—The first total eclipse of the sun in the present century in which the central line passed over Europe took place on the morning of November 19, 1816. Maps of its track appeared in the *Berliner Jahrbuch* for 1816, and in the first part of Hallaschka's *Elementa Eclipsium*, where the full computation of this eclipse is given as an example. In Lindenau and Bohnenberger's *Zeitschrift für Astronomie*, vol. v., Hagen gives the moon's place deduced from Burckhardt's Tables, with the horizontal parallax and semi-diameter: if we combine these with similar quantities for the sun, taken from Carlini's Tables of 1833, we find the following elements of the eclipse:—

G. M. T. of Conjunction in R. A. 1816 Nov. 18 at 21h. 46m. 57s.

R. A.	234 42 20
Moon's declination	18 37 9 S
Sun's " " " " " " " "	19 30 29 S
Moon's hourly motion in R. A.	36 58
Sun's " " " " " " " "	2 37
Moon's " " " " Decl.	11 37 S
Sun's " " " " " " " "	0 38 S
Moon's parallax	60 15
Sun's " " " " " " " "	0 9
Moon's semi-diameter	16 25
Sun's " " " " " " " "	16 12

In the *Berliner Jahrbuch* Bode makes the eclipse total at both Dantzic and Warsaw; the above elements do not show totality at either place, but give the magnitudes 0.990 and 0.992 respectively. They indicate, however, a total eclipse at Bromberg, duration 1m. 22s. Possibly there may be other observations of the totality on record, but the only one we have found was made by Hagen at Culm in Bohemia, where he observed its commencement but not the ending. It would appear that the weather at this season was an impediment to observation, or more details of the total phase in its passage over Germany might have been expected. Before the eclipse of July 1842 there was only one in which the line of totality approached near the European continent, viz. that of July 17, 1833, which was total in Iceland; on Mount Hecla the total eclipse commenced at 4h. 56m. 37s. a.m., and continued two minutes, the sun at an altitude of 13° ; but the days of physical observations had not then arrived, and we do not find it recorded that a midsummer expedition to Iceland was organised.

CHEMICAL NOTES

THERE has of late been a considerable amount of work done on the relations between the composition and structure of chemical compounds and various physical constants of these compounds; and also on the relations between the conditions of chemical change and some of the physical properties of the constituents of the changing systems. Among the more important work on the former class of relations are to be mentioned Perkin's researches on the *magnetic rotatory polarisation* of compounds (*C. S. Journal*, *Trans.* for 1884, p. 421 *et seq.*); and Schiff's researches on the *coefficients of capillarity* of liquid carbon compounds (*Annalen*, ccxxiii. 47). The investigations of Raoult on the connections between the freezing-points of solutions and the distribution of the salts therein form an important contribution to the study of the second group of relations (see especially *Ann. Chim. Phys.* (6), ii. p. 66, *et seq.*). Perkin has measured the rotations of the plane of polarisation of a ray of monochromatic (sodium) light, produced by passing the ray through columns of various liquid carbon compounds placed between the poles of a large electro-magnet. Then, by the use of the formula $\frac{r \times M}{d}$, where r = observed rotation, d = density, and M = molecular weight (as gas), of the given compound, he has calculated the magnetic rotatory effect of unit-length of the liquid obtained by condensing unit-length of the vapour of the same liquid. The observed results are thus referred to lengths of liquid related to each other in the ratio of the molecular weights of the various compounds examined.

Each result is divided by the number obtained, by the same method, for water, and the quotient represents the *molecular rotatory power* of the given compound. The molecular rotatory powers of a great many compounds belonging to twenty-six series have been determined, and the results show that the constant in question is closely connected with the valencies of the atoms, and with the distribution of the interatomic actions, in the molecules of the compounds examined. Schiff has made an extended series of determinations of the *coefficients of capillarity*, that is the capillary elevations in tubes 1 mm. radius, of many liquid carbon compounds. By multiplying this constant by the density of the compound, and dividing by 2, another constant is obtained which represents the weight of liquid raised by capillary action through unit-length of the line of contact between the liquid and the containing vessel. Lastly, by dividing the coefficient of capillarity by twice the "molecular volume" (*i.e.* $\frac{\text{molecular weight of gas}}{\text{density of liquid}}$), a quotient is obtained

which represents the relative number of molecules raised along the line of contact between the liquid and solid surfaces. Schiff's results, although very numerous, do not yet allow very definite conclusions to be drawn regarding the connection between the three constants and the molecular structure of the compounds examined; but that a definite connection exists is rendered very probable by these investigations. Raoult has made many determinations of the *molecular lowering of the freezing-point*—that is, the lowering of the freezing-point produced by the solution of 1 gramme-molecule of substance dissolved—of various solvents by acids, bases, and salts. The solvents employed were water, benzene, nitro-benzene, ethylene dibromide, acetic and formic acids. In each case the molecular lowering of the freezing-point is approximately equal to one of two values, of which one is double the other. The acids examined may be divided into two groups as regards their effect on lowering the freezing-point of water. The value of the constant measured by Raoult is approximately 40 for one of the groups, and 20 for the other group. The bases examined likewise fall into two groups; the mean values of the constants being 39 and 19 respectively. Raoult states that the acids with the higher value (40) almost completely displace the acids with the lower value (20) from their combinations with bases, when the acids and salts react in equivalent quantities. The bases of the first group almost completely displace those of the second from their combinations with acids. Measurements of the molecular lowering of the freezing-point of water by the action of acids, bases, and salts, present us with data from which, according to Raoult, the distribution of the various acids, &c., in a changing chemical system may be deduced.

AMERICAN ORNITHOLOGISTS' UNION

THE second annual meeting of the American Ornithologists' Union was held in the American Museum of Natural History, New York City, September 30 to October 2, 1884, the President, Mr. J. A. Allen, in the chair.

The Active Members present were: J. A. Allen, H. B. Bailey, Chas. F. Batchelder, Eugene P. Bicknell, William Brewster, Montague Chamberlain, Dr. Elliott Coues, D. G. Elliot, Dr. A. K. Fisher, Col. N. S. Goss, Dr. J. B. Holder, Dr. C. Hart Merriam, Robert Ridgway, Thomas S. Roberts, John H. Sage, George B. Sennett, Dr. Leonhard Stejneger.

Dr. Philip Lutley Selater, Mr. Howard Saunders, and the Rev. E. P. Knubley, of the British Ornithologists' Union, were also present, and were cordially invited to take part in the proceedings of the Union.

The Associate Members in attendance were William Dutcher, Fred T. Jencks, and Dr. Howard Jones.

On the recommendation of the Council the following persons were elected to Foreign Membership:—Heinrich Gätke, Heli-goland; Dr. W. Taczanowski, Russia; Henry Seebohm, England; Howard Saunders, England; Dr. H. Burmeister, Brazil.

The following among others were elected Corresponding Members:—Dr. John Anderson, F.R.S., India; W. T. Blanford, F.R.S., London; Major H. W. Feilden, London; Dr. Hans Gadow, England; Col. H. H. Godwin-Austen, London; Dr. Julius von Haast, New Zealand; Dr. E. Holub, Austria; Dr. C. F. Homeyer, Germany; E. L. Layard, New Caledonia; Dr. A. B. Meyer, Germany; Dr. A. von Mojsisovics, Gratz; Dr. A. J. Malmgren, Finland; Dr. A. von Middendorff,