not liable to definite changes with the seasons, but are irregular movements difficult to account for.

DR. OTTO NORDENSKJÖLD publishes a short preliminary account of the recent Swedish expedition to Tierra del Fuego, in *Petermann's Mittheilungen*. The expedition consisted of Dr. Nordenskjöld, Herr Dusén (botanist), Dr. Ohlin (zoologist), with two assistants and four porters, and its labours have extended over the summer seasons 1895-96 and 1896-97. From the brief notice published, we gather that contributions of considerable importance to various branches of science, especially, perhaps, geology have been made, the regions explored being of peculiar importance as a connecting-link with the great Antarctic continent.

IN our issue of September 30 (vol. lvi. pp. 520 and 521) we printed a short illustrated account of "The Progress of the Steam Turbine," and many of our readers may like to know that the current issue of the *Electrical Review* contains the first instalment of a lengthy paper on the same subject, which was read a few weeks ago by the Hon. C. W. Parsons before the Institute of Marine Engineers at Stratford.

PART 7 of "Among British Birds in their Nesting Haunts, illustrated by the Camera," by Mr. O. A. J. Lee, has just come to hand. It contains ten plates, and deals with the common guillemot, mallard, razorbill, puffin, crested tit, and red-breasted merganser. The work is published by Mr. David Douglas, of Edinburgh.

A NUMBER of new editions of scientific works have lately been received. First among these publications is the third revised edition of Prof. E. Strasburger's "Kleine botanische Practicum für Anfänger" (Jena: Gustav Fischer). In the four years which have passed since the appearance of the second edition, new knowledge has been obtained and is incorporated in the present issue. The work contains 121 figures reproduced from drawings made by Dr. Strasburger, and the text likewise represents the personal observations of the author. Students of structural botany therefore will find the book a trustworthy guide.—A second enlarged edition has been published of Dr. W. Ostwald's text-book of analytical chemistry, entitled, "Die wissenschaftlichen Grundlagen der analytischen Chemie" (Leipzig: Wilhelm Engelmann). The book was reviewed at length in NATURE (vol. li. p. 482) when it first appeared, and it has now been brought up to date. The chief addition refers to electrochemical analysis. The work is not intended for beginners, but to supply adequate theoretical support to the routine work of general analytical chemistry.—Messrs. J. and A. Churchill have published the third edition of "Elements of Human Physiology" by Dr. Ernest H. Starling. The first edition of the book was reviewed in NATURE in December 1892 (vol. xlvii. p. 146), and the chief changes which it has undergone are in the account of the coagulation of the blood, and in the section on the central nervous system.—The elementary stage of the examination in magnetism and electricity, held by the Department of Science and Art, is well covered by the "Elementary Manual of Magnetism and Electricity" by Prof. Andrew Jamieson. The fourth edition, which has just been published by Messrs. Charles Griffin and Co., provides teachers of the subject with a very helpful text-book.—Messrs. Cassell and Co. have sent us a copy of "Electricity in the Service of Man" by Dr. R. Wormell, revised and enlarged by Dr. R. Mullineux Walmsley. We notice that, though the title-page is dated 1897, the preface is dated November 1893. With one or two slight exceptions, the book appears to represent the state of knowledge at the latter epoch.—A revised and enlarged edition of "A Text-book of Physics," by Prof. Edwin H. Hall and Mr. Joseph Y. Bergen, has come to us from Messrs. Henry Holt and Co., New York. The book is an admirable text-book and laboratory manual for beginners in the systematic study of physics. The course covered is that required for admission to Harvard College, where Dr. Hall is professor of physics; and it comprises the leading elementary facts and principles of physics, and quantitative laboratory work referring to them. Teachers of elementary physics in this country would do well to provide themselves with a copy of the book, for it contains numerous ingenious and instructive experiments.—The second edition of "The Practice of Massage: its Physiological Effects and Therapeutic Uses," by Mr. A. Symons Eccles, has been sent to us by Messrs. Baillière, Tindall, and Cox. The first edition was reviewed at length in NATURE of September 3, 1896 (vol. liv. pp. 411 and 412), and we need now only say that the work has been revised and altered to make room for additional matter, especially with reference to the clinical uses of massage, without increasing the bulk of the volume.—The first part of the second edition of the serial issue of Mr. Howard Saunders's "An Illustrated Manual of British Birds" has reached us from Messrs. Gurney and Jackson. This well-known work, which has undergone revision, needs no recommendation from us.

THE additions to the Zoological Society's Gardens during the past week include two Sloth Bears (*Melursus ursinus*, ♂ ♀) from India, presented by Sir Henry D. Tichborne, Bart.; a Macaque Monkey (*Macacus cynomolgus*, ♂) from Tonquin, presented by Miss Rachel Hunt; two Palm Squirrels (*Sciurus palmarum*) from India, presented by Dr. G. H. Nowell; a Long-eared Owl (*Asio otus*), British, presented by Major-General Alex. A. A. Kinlock; a Salt-water Terrapin (*Malaeoclemmys terrapin*) from North America, presented by Mr. H. Arthur Clifton; five Tesselated Snakes (*Tropidonotus tesselatus*) from South-east Europe, presented by Herr Carl Hagenbeck; a Mediterranean Peregrine Falcon (*Falco pincus*), captured in the Mediterranean, presented by Captain Watson; ten Paradise Whydah Birds (*Vidua paradisea*), three Pin-tailed Whydah Birds (*Vidua principalis*), four Crimson-eared Waxbills (*Estrelda phænicotis*), two Red-bellied Waxbills (*Estrelda rubriventris*), two Yellow-rumped Seed-eaters (*Crithagra chrysopyga*), a Singing Seed-eater (*Crithagra musica*) from West Africa, a One-wattled Cassowary (*Casuarius uniappendiculatus*) from New Guinea, two Jackass Penguins (*Spheniscus magellanicus*) from the Falkland Islands, a Black Wood-hen (*Ocydromus fuscus*) from New Zealand, deposited; a Levaillant's Darter (*Plotus levaillanti*) from West Africa, purchased.

OUR ASTRONOMICAL COLUMN.

THE COMING TOTAL ECLIPSE OF THE SUN.—We must congratulate the British Astronomical Association on the energy they have displayed with regard to the coming eclipse in India. We hear that, in addition to the three official expeditions, a fourth, but unofficial, expedition under their auspices will be sent, and that no less than twenty-six observers have come forward to take part in it. It must not be forgotten that considerable expense is attached to such undertakings, and so large a number of observers shows that the general interest taken in such an event is very considerable.

Those who wish to combine an enjoyable winter's cruise in warm climes, with a view of the eclipse thrown in, may have noticed that the Orient Liner's steamer *Orotava* is timed to leave Colombo on January 20 next, and on her homeward voyage from Australia she will be navigated with a view to being on the line of central eclipse at the time of total obscuration. Passengers can thus proceed to Colombo, and after a short stay there, allowing sufficient time to see Ceylon, return by this vessel home, seeing the eclipse on the way. Particulars can be obtained from the Company's offices in Fenchurch Avenue, E.C.

THE BINARY β 395 = 82 CETI.—Dr. T. J. J. See has found a most interesting double system in the binary β 395, which Burnham was the first to detect (1875) and the last to measure (1891·8). The object was detected with Dr. See's usual sweeping power, namely 500, but before the components could be well divided he had to employ a power of 1500. At first the system was supposed to be new, owing to the great difficulty of observing it, but a search showed that it was none other than the system mentioned above, its cordinates being

$$\alpha = 0h.\ 32m.\ 9{\cdot}9s.\ \delta = -25^\circ\ 18'\ 37''{\cdot}3\ (1900{\cdot}0).$$

The most striking feature of this binary is that since its last measurement the orbital motion has been so great that the whole aspect of the system is changed. Nearly one and a half revolutions have been performed since 1875, and, curiously enough, as the companion returned to the same general position in 1886, the "observers of that and the following years failed to recognise that any sensible motion had intervened."

Dr. See has calculated from all the published observations the orbit of this binary (*Astr. Nachr.*, No. 3455), and he finds it of great eccentricity and revolving in the short period of 16·3 years.

Thus 82 Ceti becomes an important system, and should be carefully watched during the next eight years. Only three other systems revolve more rapidly, namely, β 883 in 5·5 years, κ Pegasi in 11·42, and δ Equulei in 11·45 years.

TELESCOPIC SEEING.—The Lowell Observatory is not of a fixed but of a migratory nature. Like a bird which at some period of the year changes its locality for warmer climes, so this observatory is moved to a region where the air is more suited at that time for better telescopic seeing. Oscillating between Flagstaff, Arizona, and Tacubaya, Mexico, Mr. Lowell is able to take advantage of the periods of good seeing at each of these stations. Both localities satisfy the now well-known geographical and meteorological conditions, and while Flagstaff is rather too far north, bordering on the great cyclonic movement in the north temperate zone in winter, the neighbourhood of the city of Mexico is not affected by this disturbance. The latter station is not, however, found to be ideal, owing to conditions of local topography. What these conditions are will be found stated by Mr. Lowell in his discussion on the capabilities of these two stations (*The Observatory* for November, No. 259).

The well-known observer, Dawes, always used to judge the "goodness" of the night by the size of aperture that could be satisfactorily used; thus he would speak of a one-inch night, three-inch night, up to an eight-inch night, his largest aperture being of eight inches. We are now finding out how accurate this system was, for, owing chiefly to the work of Mr. Douglass, the controversy between large and small apertures seems to be a question of the wave-lengths of the air-waves. An idea of the nature of these small air-waves will be gathered from Dr. See's interesting article in the *Astronomische Nachrichten* (No. 3455), and the diagrams shown illustrate the main conditions for good and bad seeing. These waves vary in different currents from half an inch to several feet. In cases where they move in the same direction and at a great rate the seeing is very bad. With moderate-sized waves moving slowly the definition is generally very fair. Often cross-currents occur, and when fine waves move in all directions the definition is never good, but for cases of very fine seeing only very slight traces of gently moving waves can be discerned. Theoretically for the best seeing there should be no trace of movement at all. Dr. See points out, in another article in the same journal, that the scintillation of the fixed stars can be very easily explained on this wave theory, and the experiments which he has carried out tend to corroborate this view.

THE NOVEMBER METEORS.—At the latter end of this week the earth passes through that stream of meteors which gives us a yearly display on about the 14th of this month. Mr. Denning, who is our chief authority on this subject, and whose admirable memoir on this special swarm should be carefully absorbed, tells us that the morning hours of the 14th should be more especially devoted to their observation, although watches should be commenced a day beforehand and prolonged until the 16th. It is not, however, until the year 1898 that we expect to meet the most dense parts of the swarm, but on former occasions striking displays have been witnessed a year or two previous to the chief one, and this year we hope will be no exception. Let us trust that the weather will not be so unfavourable as it was last November.

THE CONNECTION BETWEEN THE CHARACTERS OF ISOMORPHOUS SALTS AND THE ATOMIC WEIGHT OF THE METALS CONTAINED.

IN order to assist in elucidating the question of the relationship between the chemical composition of solid substances and the nature of the crystals which they are observed to form, both as regards the exterior geometrical configuration and the interior physical character of such crystals, a series of researches were commenced by the author six years ago, having for their immediate object the exact determination of the differences presented by certain well-defined series of isomorphous salts. The differences in question, due to the different nature of the interchangeable chemical elements, belonging to the same family group, which by their mutual replacement give rise to the series, are so small in the case of the morphological constants, that extremely refined methods of investigation are requisite in order to detect and determine them. A large amount of detached data had previously been accumulated in crystallographic literature, but a very small proportion was characterised by the requisite degree of accuracy, and no organised attempt had hitherto been made to investigate any definitely related series of crystallised compounds in a sufficiently detailed and accurate manner. The care and precision demanded will be at once apparent when it is pointed out that the use of slightly impure or imperfect crystals, or the occurrence of slight errors of orientation in grinding out of the crystals the section-plates or prisms requisite for the optical portion of the work, would be sufficient to render the results valueless for the purpose in view. In fact such sources of error have in certain cases been shown by the author during the progress of the work to have led previous observers to conclusions diametrically opposed to the truth.

It was decided to choose, as most suitable for such a study, certain series containing in their different members the three alkali metals potassium, rubidium, and cæsium, on account of the very definite relationship and considerable intervals between their atomic weights, and the extreme electro-positive nature of the group, which latter fact rendered it likely that the differences in question would be here at a maximum. These three metals belong in the strictest sense to the same family group, and their atomic weights are respectively 39, 85·2, and 132·8, the atomic weight of rubidium being thus almost exactly the mean of the values for potassium and cæsium. The particular salts chosen, on account of the general excellence of their crystals, were the normal sulphates and selenates, and the double sulphates and double selenates which these salts form with the sulphates and selenates of magnesium, zinc, iron, manganese, nickel, cobalt, copper, and cadmium. The work on the sulphates, double sulphates, and selenates has at length been completed and presented to the Chemical Society (*Journ. Chem. Soc.*, 1893, 337; 1894, 628; 1896, 344; 1897, 846), and the investigation of the double selenates is now in hand. The choice of the double salts has proved equally as fortunate as that of the simple salts, inasmuch as the influence of the alkali metal is found to be of a vastly preponderating character compared with that of the dyad metal, and hence the eight groups of these salts have furnished so many independent examples of the influence of the atomic weight of the alkali metal. No effort or expense has been spared to render the work absolutely trustworthy and of a final character. The goniometers and other optical instruments employed have been without exception the most accurate that could be constructed, and the observations have been more numerously repeated upon different crystals than has ever before been attempted. Moreover, great care has been bestowed upon the preparation of perfectly pure specimens of the salts, no material being accepted which did not yield absolutely satisfactory results upon both spectroscopic and ordinary gravimetric analysis. Besides goniometrical and optical investigation, the work has included exceptionally careful determinations of the relative density of the salts in the crystallised condition, in order to afford data for the calculation of the volume relationships and of the molecular optical constants. Moreover, the observations have been extended to other than the ordinary temperatures, in order that the deductions shall not be subject to the objection that they may be simply fortuitous for a particular temperature.

Before commencing the optical part of the work attention was concentrated upon devising an instrument which should enable a section-plate (slice), or a 60° prism, to be ground out of