connection between the advance of a barometric depression and the sea-seiches observed at eight ports in Japanese waters.

THE new catalogue of physical apparatus issued by Messrs Baird and Tatlock (London), Ltd., is a quarto volume of 650 pages, and is well illustrated. It contains descriptions of several new pieces of apparatus, as, for example, the induction solenoids on p. 536, and Milner's automatic mercury pump. It would be an advantage if British instrument makers would in their new catalogues cease to figure and describe apparatus hopelessly out of date, like Lavoisier and Laplace's ice calorimeter.

THE theory of the universe which was propounded eight years ago by the late Prof. Osborne Reynolds in his "Sub-mechanics of the Universe" has found a popular exponent in the person of Mr. J. Mackenzie, a copy of whose lecture on the subject, delivered before the Minnesota Academy of Sciences and the American Association for the Advancement of Science at Minneapolis, has just reached us. It contains a clear account of a theory which is not by any means easy to follow in the original, and is illustrated by several figures of Prof. Reynolds's experiments, including that of the thin indiarubber bag partly filled with sand which supports 200 lb. on its edge. A good portrait of the late professor serves as a frontispiece.

SPECIAL PUBLICATION No. 9, 1911, of the U.S. Coast and Geodetic Survey contains a magnetic declination chart for the United States for the epoch January 1, 1910. It also gives secular change data—in continuation of similar data in earlier publications—for a number of selected stations. In the east, westerly declination is increasing more rapidly than in 1905. In the North Atlantic States, where the change is most rapid, it is now about 6′ a year. In the western territories easterly declination is increasing, also more rapidly than in 1905. The rise is now as much as 5′ a year in some places a little inland from the Pacific coast. The changes in progress at present throughout the United States are so complicated that it is impossible to predict their course even a few years ahead.

IT has long been known that traces of hydrogen peroxide are found in rain water and in snow, and that during the day the proportion is greater than at night. In 1909 it was shown by Miroslaw Kernbaum that the ultra-violet rays from a quartz mercury-vapour lamp decompose water according to the equation $2H_2O=H_2O_2+H_2$, a fact which suggests that the hydrogen peroxide in rain water owes its formation to the action of solar ultra-violet rays on water vapour in the upper region of the air. The correctness of this hypothesis has been since verified by M. Kernbaum (*Bull. International Acad. Sci. Cracovie*, 1911, p. 583), who finds that ordinary sunlight even at the earth's surface is capable of demonstrably producing the same result in water enclosed in a quartz flask, both hydrogen and hydrogen peroxide being formed in minute quantities after a few days' exposure to the rays of the sun in July. In such a case the action of the ultra-violet rays is necessarily less than in the upper atmosphere, owing to their absorption in passing through the air.

AN illustrated description of the Ljungström steam turbine appears in *Engineering* for April 12. This machine is of the reaction type, and has been designed by its inventor—a Swedish engineer—so as to avoid some of the defects which are inherent to this kind of turbine. The flow is radial, the steam being admitted between two discs, and in its passage from their centre to their circumference, passing between concentric blading rings carried alternately by the two discs. In the usual design, both the discs revolve, driving their shafts at equal speeds, but in opposite directions, and to each shaft is coupled an electric generator. The relative speed of each set of blades is thus twice as great as in a standard reaction turbine of equal revolutions and diameter, hence for equal efficiency the total number of blade rows is only one-quarter as great. By the disc arrangement distortion troubles are avoided, hence the machine lends itself to the use of steam superheated to the highest degree. The general design makes an astonishingly small turbine for the power developed. Experiments have been made with a 500-kw. machine, and one of 1000-kw. capacity has just been finished and thoroughly tested.

OUR ASTRONOMICAL COLUMN.

THE SOLAR ECLIPSE OF APRIL 17.—At the moment of going to press, the following telegram has reached us from Dr. Lockyer and Mr. F. Maclean, *viâ* Paris:—"Camp American line on road three-quarters mile north-east Chavenay practically central Bailey's Beads no corona prominences eight and two o'clock duration about two seconds. Weather perfect.—LOCKYER, MACLEAN."

A DAYLIGHT METEOR.—Mr. Hugh Ramage, organiser of higher education, Norwich, sends us some extracts from *The Eastern Daily Press* of April 3, 4, 6, and 8, containing observations of the daylight meteor of March 28, referred to last week (p. 147). Mr. W. F. Bushell, Gresham's School, Holt, states that the meteor was observed at about 2.45 p.m. It was seen by several observers, who agree in stating that "it left behind a yellowish-green track, which faded away almost directly. The meteor appeared in the northern part of the sky, and seemed to be travelling in an easterly direction. The sun was shining at the time."

THE NOVA, OR VARIABLE, IN PERSEUS, 87·1911.—The supposed nova discovered by Mr. D'Esterre is the subject of some further notes in No. 4564 of the *Astronomische Nachrichten*. This object is of especial interest at the present juncture, when so many attempts are being made to explain the appearance of novæ, for it appears to consist of several condensations, of changing aspects, surrounded by nebulosities, or themselves nebulous. Whatever the object itself may be, it is evident that the region is one of considerable interest, which should be carefully examined with more powerful instruments.

A NEW STAR CATALOGUE.—Astronomers are indebted to Mr. Backhouse for a valuable new star catalogue of 9842 stars, containing all stars very conspicuous to the naked eye. The catalogue is intended as a complement to a set of maps designed especially for the use of meteor observers, but should be found very useful by all astronomers. In addition to the various

designations of each star, Mr. Backhouse gives the magnitude as shown in eleven different publications, and then gives a weighted mean, the system of weighting being explained in the preface. Those amateur astronomers who have recently been struggling with the intricacies of various systems, in trying to understand the published magnitudes of Nova Geminorum No. 2, will appreciate the usefulness of such a catalogue. The work contains 186 quarto pages, and is published by Hills and Co., Sunderland.

THE PHOTOGRAPHIC TRANSIT.—The results of further experiments with a photographic transit, carried out by Prof. Hirayama during 1907–08, are published in the second fascicule of vol. v. of the *Annales de l'Observatoire astronomique de Tokyo*. They show that there is no change of the mean error either with the declination or with the photographic magnitude, and that the instrument is capable of producing very valuable results.

PHYSICS AND ASTROPHYSICS.—In No. 12 (1911) of *the Bulletin de la Classe des Sciences, Académie Royale de Belgique*, is published a most interesting lecture by M. J. E. Verschaffelt, in which the author shows how deeply the physical sciences are indebted to the results secured in astronomy for the suggestion, or the confirmation, of many of their fundamental concepts. For examples he quotes, *inter alia*, Newton's and Kepler's work on gravitation, Roemer's determination of the velocity of light reinforced by Bradley's discovery of aberration, and the idea of the pressure of light suggested by the solar repulsion of cometary matter. It is interesting to note that at the earth's surface the pressure of the solar radiation on each square metre of a black body amounts only to two-thirds of a milligram. In conclusion, M. Verschaffelt strongly expresses the hope that astrophysics may be officially included in the programme for the doctorate in the Belgian universities.

THE PARALLAX OF NOVA LACERTÆ, 1910.—From observations made at Yerkes Observatory during December, 1910, and January, 1911, Prof. Slocum finds the relative parallax of Nova Lacertæ to be $+0.013'' \pm 0.014''$. As the average parallax of his comparison stars, according to Kapteyn's table, may be taken as $0.005''$, the absolute parallax obtained for the nova is $+0.018''$. Too great an accuracy cannot be claimed for this result, but if it is correct the outburst producing the nova occurred some 180 years ago. (*Astrophysical Journal*, vol. xxxv., No. 2.)

NOVA GEMINORUM NO. 2.

AN account of the discovery of Nova Geminorum No. 2 is given by Herr Enebo in No. 4564 of the *Astronomische Nachrichten*. After observing the variable SV Tauri, at 8h. 32m. (M.E.T.) on March 12, Herr Enebo's eye, wandering over the neighbouring constellation, was arrested by the appearance of a companion to θ Geminorum which he had not noticed when observing that region four days earlier; the new object was then of magnitude 4·31 on the Potsdam scale. Herr Enebo's subsequent observations indicate that the nova was at its brightest when discovered, or on March 13, when he estimated the magnitude as 4·23, although other observers found it to be about 3·5 on March 14.

Herr Jost publishes a list of comparison stars, ranging from 4·6 to 8·3 in magnitude, and gives the colour of each so that comparisons with the nova may be facilitated. Dr. Wolf publishes a photographic chart of the nova region taken in January, 1909, and gives the magnitudes of surrounding stars down to about 9·5.

Dr. Guthnick reports a brightening of 0·4 mag. on March 22, accompanied by a diminution in the redness of the star. The red colour is quite marked, and makes the nova stand out from the other stars in a field of 1½ degrees; the Rev. T. E. R. Phillips is of the opinion that it is one of the reddest stars he has ever seen.

A communication from Prof. E. C. Pickering, published in No. 4565 of the *Astronomische Nachrichten*, states that Dr. Curtiss found the magnitude on March 13·7 to be 3·9, the spectrum then being like that of Nova Aurigæ. The Harvard photographs of March 13, however, showed only dark lines, and Prof. Pickering suggests that the bright lines seen with a slit spectroscope at the Ann Arbor Observatory may have been too narrow on that date to appear on the Harvard objective-prism spectra. Dr. Curtiss's observations showed a recessional velocity of 5 kms. for the dark reversals of the H and K lines.

Prof. Pickering also states that on March 16 the spectrum was of the normal novæ type, and the nebular lines were first seen. Better weather evidently prevailed in the United States than in England on March 13 and 14, for Prof. Pickering reports that seven good photographs of the spectrum were secured on each of those nights.

At the Hamburg Observatory spectrograms were obtained on March 20, 23, and 27, and many broad bright lines, especially the hydrogen series Hβ to Hη, are shown. Prof. Schwassman identifies two of the other bright lines with lines at $\lambda\lambda$ 4230 and 4176 in Vogel's spectrum of Nova Aurigæ, while a third lies halfway between $\lambda\lambda$ 4315 and 4288. On March 27 the bright K line was indistinct, but other bright lines were more marked than on the previous dates. Prof. Schwassman identifies three of these, at $\lambda\lambda$ 4583, 4557, and 4525, with lines of Fe, Ba, and Ti.

Greenwich observations on March 15, reported in *The Observatory* (No. 447, April) showed the visual brightness to be one-quarter of a magnitude, and the photographic one magnitude, fainter than θ Geminorum. The photographic magnitudes were secured by placing a grating, made of zinc strips, with spaces of equal width, in front of the object glass, and are as follows:—March 20, 5·5; 21, 6·0; 26, 6·1; 28, 6·3; 29, 6·5; 31, 6·0, and April 1, 6·5.

At Cambridge, reports Prof. Newall, the nova on March 14 was at least one magnitude brighter than θ Geminorum; as the estimated magnitude on March 15 was 4·2, it would appear that the nova lost 1½ magnitudes in 24 hours. A series of photographs of the spectrum shows interesting changes in the relative brightness of the lines, in the structure of the hydrogen lines, and in the appearance on March 22 of a second pair of broad bright and dark lines on the more refrangible side of each hydrogen line.

According to observations by M. Luizet, published in *L'Astronomie* for April, the nova decreased in brightness to the extent of one magnitude between 10h. on March 15 and 7h. 50m. on March 16.

M. Baume Pluvinel's spectra observations on March 21 show each of the hydrogen lines Hβ to Hϵ doubled or trebled, and all displaced towards the red.

Dr. Easton reports a second recrudescence of brightness on April 9, when, at 9h. 15m. (G.M.T.), the H.P. magnitude was 6·0, but the brightening probably occurred earlier than this, although bad weather prevented Dr. Easton observing it. A secondary maximum is plainly shown, in Dr. Ebell's series of observations, for March 30 (*Astronomische Nachrichten*, No. 4564). Dr. Strömgren's series shows that on March 24, the previous maximum, the colour became bluish instead of red as previously.