

"Heat." He sees "no ground whatever" for extending it from terrestrial to cosmic processes, and characterises it as a "scientific dogma" current at the present day because "any careful and systematic study of the principles of scientific method is considered unnecessary on the part of those who seek to solve physical problems." We should like to assure Mr. Shelton that the application of the law to molecular processes and to their interaction with the æther has received, and is receiving, the attention of physicists, who can deal with it without offence to the principles of scientific method. Whether their discussions are suitable for students' text-books is very doubtful.

SPECIAL interest attaches to a paper on the phthalylhydrazides, by Messrs. Chattaway and Wunsch, in the Chemical Society's Journal, on account of the fact that the authors have succeeded in preparing measurable crystals of the two varieties of a number of the compounds of this series: their crystalline properties have been examined by Mr. T. V. Barker, who has contributed to the paper complete data and drawings in the case of eight of the modifications. The occurrence of the two varieties is usually determined mainly by temperature, and the authors are therefore inclined to regard them as merely polymorphic. In this they agree with the conclusions arrived at by Piutti and Abati in reference to the substituted phthalimides, which exhibit a similar dimorphism. Later workers on the phthalimides have preferred to regard the two varieties as isomeric. The evidence in favour of this view is here very strong, because one of the varieties of the imides is colourless and the other yellow, and it is almost impossible to believe that the yellow colour could be produced by any process of remarrying the colourless molecules. In the case of the hydrazides, the difference of colour is less striking, but, as the authors point out, the possibility of isomerism is one that must not be overlooked.

It has long been known that depth of water on measured miles is a serious factor in determining speed results, and an article in *The Engineer* for January 26 gives prominence to recent investigations on this subject. Following experiments which have been made in this country on the Maplin and on the Skelmorlie measured miles, the first-mentioned having a depth of 45 feet and the second a depth of 240 feet, the United States Navy authorities have run trials with a battleship (the *Michigan*) and with two torpedo-boat destroyers (the *Flusser* and the *Reid*) over their three measured distances. The results show clearly the increase in power due to shallow depth, and it is probable that the two shallower courses will be discarded in future for high-speed trials, new courses being laid down.

THE first presidential address in the twelve years' history of the Society of Model and Experimental Engineers was delivered by Mr. Percival Marshall on January 22, the subject being "Model Engineering: Past, Present, and Future." That models have played a very important part in the development of real engineering practice is well known to those acquainted with the work of Newcomen, Watt, Murdoch, Nasmyth, and other early pioneers. Probably the most striking example of service rendered by a model is to be found in Watt's invention of the separate condenser, devised while repairing the Newcomen model belonging to Glasgow University. Since these times the art of model-making has been practised continuously, not only by those professionally engaged, but also by others whose tastes have led them to seek recreation in mechanical pursuits. Exhibitions have been very instru-

mental in stimulating interest in model-making, and the large and valuable collection at the South Kensington Museum has had great influence, both as an educational factor and in promoting interest in models. Models are now used by hundreds of firms to demonstrate the merits or principles of their manufactures, and are invaluable in the educational work of technical colleges. Models of inventions are also extensively employed, one firm specialising in this class of work turning out some 2500 models every year. Fully twenty thousand metal-turning lathes have been sold during the last seven years by the various firms who cater for amateur workers. The president urged that museums equipped with models representing the chief manufactures should be set up in large towns; these would be very valuable in the education of the rising generation, and would be a source of reference and stimulation for those with inventive minds.

A SECOND edition of Mr. C. T. Millis's "Technical Arithmetic and Geometry" has been published by Messrs. Methuen and Co., Ltd. The new edition has been revised; decimals now receive treatment before vulgar fractions are studied, and notes on factors, multiples, and drawing-office work have been added.

A SEVENTH edition, revised by Prof. F. W. Gamble, F.R.S., of "A Junior Course of Practical Zoology," by the late Prof. A. Milnes Marshall and the late Dr. C. H. Hurst, has been published by Messrs. Smith, Elder and Co. In this edition a new chapter, dealing with the chick, has been added to meet the needs of those who attempt elementary embryology in their junior course. The price of the volume is 10s. 6d.

MESSRS. CONSTABLE AND CO., LTD., will commence the publication, in April next, of a new quarterly scientific review to be entitled *Bedrock*, "a quarterly review of scientific thought." The editorial committee consists of Sir Bryan Donkin, Prof. E. B. Poulton, F.R.S., Prof. H. H. Turner, F.R.S., and Mr. G. Archdall Reid. The acting editor will be Mr. H. B. Grylls. The first number will contain the following amongst other contributions:—Value of a logic of method, Prof. J. Welton; recent researches on alcoholism, G. Archdall Reid; Darwin and Bergson as interpreters of evolution, Prof. E. W. Poulton; social and sexual evolution, the hermit of Prague; notes on current research; the interaction of passing ships, Prof. A. H. Gibson.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR FEBRUARY:—

- Feb. 1. 1h. 36m. Neptune in conjunction with the Moon (Neptune $5^{\circ} 39' S.$).
3. 8h. 0m. Saturn at quadrature to the Sun.
6. 17h. 54m. Mercury in conjunction with Uranus (Mercury $0^{\circ} 55' S.$).
11. 9h. 21m. Jupiter in conjunction with the Moon (Jupiter $4^{\circ} 37' N.$).
14. 10h. 30m. Venus in conjunction with the Moon (Venus $5^{\circ} 44' N.$).
15. 9h. 21m. Uranus in conjunction with the Moon (Uranus $4^{\circ} 36' N.$).
23. 20h. 28m. Saturn in conjunction with the Moon (Saturn $4^{\circ} 23' S.$).
24. 9h. 29m. Venus in conjunction with Uranus (Venus $0^{\circ} 39' N.$).
25. 15h. 32m. Mars in conjunction with the Moon (Mars $1^{\circ} 43' S.$).
26. 7h. 0m. Venus in the descending node.
28. 10h. 5m. Neptune in conjunction with the Moon (Neptune $5^{\circ} 46' S.$).

MARS AND SATURN.—M. Jarry-Desloges reports (*Astronomische Nachrichten*, No. 4549) that the southern white polar cap on Mars appears to be reforming, particularly on Thyle I., and that the insular area which he reported to the west of Novissima Thyle is still apparent, and forms a background to the dark, sharply defined M. Australe.

On Saturn he has remarked many changes in the southern regions. The dark polar cap has not been seen again, but the pole is occupied by a bright area surrounded by a very thin dark band; three other bands were also seen on the disc.

SEARCH-EPHEMERIDES FOR WESTPHAL'S COMET, 1852 IV.—The period for Westphal's 1852 comet is rather uncertain, but, according to a new calculation by Dr. Adolf Hnatek, which is published in No. 4549 of the *Astronomische Nachrichten*, it is not unlikely that perihelion will be reached in October of this year.

This is on the basis that the period is sixty years, but Dr. Hnatek gives search-ephemerides, for the first half of this year, taking 60.0, 60.1, 60.2, 60.3, 60.4, 60.5, 61.0, 61.5, and 62.0 years as the period; for the first six values the computed brightness, on June 19, would lie between magnitudes 7.5 and 10.0, but until later in the year the comet is considerably south of the equator.

OBSERVATIONS OF JUPITER'S GALILEAN SATELLITES.—In Circular No. 12 of the Transvaal Observatory, Mr. Innes records a large number of eclipses, transits, &c., of the four Galilean satellites of Jupiter, and gives some interesting notes concerning the more uncommon phenomena observed. On April 4, 1911, a partial transit of J. III. was observed, and Mr. Innes remarks that the possibility of a partial transit does not appear to have been recognised hitherto. A table is given showing the differences between the observed times and those computed by Dr. de Sitter, those given in the "Nautical Almanac," and those computed from Prof. Sampson's tables; the differences range between -0.6 and -12.5 minutes. Peculiar shapes of the satellites and their shadows, e.g. the shape of a figure 8, were noted during several transits, and on May 24, 1911, before the commencement of the ingress of a transit by J. III., a bright spot, with a dark band skirting it on the south side, was seen in the N.f. quadrant of the satellite.

STAR CALENDARS, CHARTS, AND GUIDES.—From the publishers we have received copies of the H.P.H. series of annuals. The "Star Calendar" for 1912 is an improvement on that of former years, and has the aperture, which enables the star chart on the under card to be seen, oval instead of circular; the price is 1s. net. The "Star Almanac," 6d. net, is, as in previous years, intended to display on the observatory or study wall, and it contains a large amount of useful information. A number of notes discuss the aether, the corona, &c., and in addition to four circular star charts there are reproductions of Father Cortie's 1905 corona and Max Wolf's photograph of the North America nebula. The above are published by Messrs. Simpkin, Marshall and Co., Ltd.

In "Stars and Constellations: a Little Guide to the Sky," Miss Agnes Fry describes the constellations and their relative positions, &c., in rhyme. For the instruction of young people the work will probably prove useful, and may be obtained from the publishers, Messrs. Baker and Son, Clifton, price 6d. net.

RECENT EARTHQUAKES.

SEVERAL shocks, supposed to be due to earthquakes, were felt in this country towards the end of last week. On January 26, at 4 a.m., a shock was felt at Dunblane strong enough to awaken sleepers, but not strong enough to affect the Milne seismograph at the Royal Observatory, Edinburgh. On January 28, at about 3.35 a.m., a tremor was felt in Glenfruin, a valley lying between the Gareloch and Loch Lomond. Early in the morning of January 26 there were three distinct shocks in the colliery district of Llanhilleth, in Monmouthshire, strong enough to make the miners leave their work. On January 20, shortly before 2 a.m., a sharp tremor was felt at Lennoxton and Campsie, in Stirlingshire, again without affecting the Edinburgh seismograph. Of the four disturbances, the

first two were apparently of seismic origin. Dunblane lies close to the district on the south side of the Ochil Hills, where so many earthquakes have resulted during the last twelve years from slips of the great fault which forms the southern boundary of the hills. The Glenfruin shock seems to be a successor of two other earthquakes in the same part of Scotland—the Dunoon earthquakes of September 18, 1904, and July 3, 1908. The Llanhilleth and Lennoxton shocks bear a close resemblance to those which are often felt in colliery districts, and which are probably caused by small fault-slips precipitated by the working in the mines.

A severe earthquake occurred at 6 p.m. on January 24 in the island of Cephalonia, which, with the neighbouring islands of Zante and Santa Maura, forms one of the most important seismic zones in Europe. Buildings in Argostoli, the capital, were injured; considerable damage was caused in the villages at the southern end of the island, as well as in the island of Zante. The villages in the north-east of Cephalonia seem to have suffered most. Altogether, five villages are reported as destroyed and eight persons as killed. Though hundreds of shocks have been felt in the district during the last twenty years, the earthquake of January 24 is apparently the most severe since the disastrous Zante earthquakes of January 31 and April 17, 1903.

The director of the Meteorological Office reports that on January 25 he received a telegram from the superintendent of the Eskdale Observatory, in Dumfriesshire, as follows:—"Fine earthquake 24th at 16½ hours 3000 km. S.E." More exact measurements of the records have given the epicentre as 2570 kilometres distant, 56° 34' E. of S., that is, at lat. 39° 16' N., long. 21° 53' E. The position of the earthquake is thus placed in S.W. Thessaly, near the border between Turkey and Greece, so that the Eskdale record would appear to have been derived from the earthquake in Cephalonia referred to above.

A NEW SYSTEM OF GUN SIGHTING.

THE new Remington negative angle system of sighting, which formed the subject of a lecture by Sir George Greenhill, F.R.S., to the Junior Institution of Engineers on Friday, January 19, is the invention of Mr. H. Ommundsen, worked out and applied to military and sporting rifles in collaboration with Mr. E. Newitt. The invention has for its object the elimination of the necessity for judging distance in sport and war by making use of the visual angle which proceeds from the shooter's eye and embraces the object aimed at. By inverting the back-sight, making it so that the object can be seen under it instead of over, as at present, the object can be callipered visually between the fore- and back-sight. The magnitude of the visual angle varies inversely with distance, and the further off the object is the smaller will be the visual angle, and consequently the higher the foresight has to be raised in order to calliper the object, the result being a suitable automatic increase of elevation. This automatic variation of elevation may be obtained simply by selecting a point of aim at a predetermined depth below the objective. This predetermined depth creates a visual angle, which varies in precisely the same way as above described, and being below the objective the angle automatically subtracts from the fixed angle of elevation on the rifle, and is thus called the "negative angle." The fixed angle of elevation on the rifle is calculated beforehand to give appropriate results within limits which depend upon the power of the cartridge. Applied to sporting rifles, the negative angle sight gives astonishing results. With the comparatively old 0.303 deer-stalking rifle, or with, say, the 0.400 big-game rifle, animals can be shot through the heart at any distance between, say, 30 and 230 yards, without in any way altering the aim or adjusting the sight. Some tests have been carried out by the Remington Arms-U.M.C. Company, of New York and London, who have acquired the whole patent rights. In the military tests the skirmishing results bounded up from less than 20 per cent. under the old style of sights to 95 under the negative angle method. On "stag" targets with the ordinary 0.303 sporting rifle, 7-inch "heart" groups were made with unflinching regularity at varying distances between 50 and 250 yards.