

A BOOKLET on "Pattern Making," by Mr. J. E. Dangerfield, has been added by Messrs. Dawbarn and Ward, Ltd., to their "Home Workers' Series of Practical Handbooks."

A NEW edition of Mr. W. Woods Smyth's "Divine Dual Government" has been published by Messrs. Horace Marshall and Son. The present issue has been revised and illustrated with new matter, some of which has already appeared in earlier books, now out of print, by the same author.

MESSRS. LONGMANS, GREEN AND CO. have published a new edition of "Telegraphy," by Sir W. H. Preece, K.C.B., F.R.S., and Sir J. Sivewright, K.C.M.G. The book has been revised and enlarged, and now includes descriptions of recent devices used in telegraphy, in relation to fast-speed recorders, to automatic and translating apparatus for submarine circuits, to Murray's improvements in the Wheatstone automatic apparatus, and to the new telegraph switching system. A chapter on wireless telegraphy considered theoretically and in its most recent application has been added.

MR. HENRY FROWDE has sent us two pages of the "New English Dictionary on Historical Principles," edited by Dr. J. A. H. Murray, to show how the word refraction and its congeners are defined and traced. The number of references to uses of these words is astonishing; and a vast amount of research must have been necessary to bring so much material together. We extract a few early references of historical interest:—REFRACTING, causing refraction, refractive; 1704, Newton, "Optics" (1721), 4 def. iv., "the perpendicular to the reflecting or refracting surface at the point of incidence"; 1764, Hornsby, in *Phil. Trans.*, liv., 145, "an excellent refracting telescope of 12 feet focus." REFRACTION; 1603, Holland, "Plutarch's Mor.," 1295, "the rainbow is . . . distinguished by sundry colours, by the refraction of our eye-sight against a cloud"; 1646, Sir T. Browne, "Pseud. Ep.," 347, "the colours are made by refraction of light, and the shadows that limit that light"; *Astron.*: 1603, Heydon, "Jud. Astrol.," 137, "there lieth a deceit or fallacie in the refraction of beams, which chiefly happeneth about the horizon, where the aire is alwaies thickest"; 1669, Sturmy, *Mariner's Mag.*, ii., 118, "the refraction of the sun, moon and stars, causeth them to appear higher above the horizon than they are." REFRACTIVE; 1673, Flamsteed, in Rigaud's "Corr. Sci. Men" (1841), ii., 168, "the refractive air reaches some height above our heads"; a 1691, Boyle, "Hist. Air" (1692), 190, "the air . . . was filled with vapours and exhalations, that made it much more refractive than formerly."

OUR ASTRONOMICAL COLUMN.

COMET 1905 a (GIACOBINI).—A further extract from Dr. Strömngren's daily ephemeris for comet 1905 a, as published in No. 4009 of the *Astronomische Nachrichten*, is given below. A set of elements and an ephemeris similar to those obtained by Dr. Strömngren have been computed at the U.S. Naval Observatory, from observations made on March 26, 27, and 28, and are published in the same journal.

Ephemeris 12h. (Berlin M.T.).

1905	h.	m.	s.	δ	$\log r$	$\log \Delta$	Brightness
April 15	7	8	22	+ 33 47.9	0.0590	9.8855	0.87
17	7	18	24	+ 35 38.6			
19	7	28	42	+ 37 22.7	0.0638	9.8988	0.80
21	7	39	16	+ 35 59.8			
23	7	50	6	+ 40 29.8	0.0699	9.9139	0.73

Brightness at time of discovery (March 26) = 1.0.

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The following magnitudes have been estimated by various observers at the times named:—

	h.	m.	mag.
March 28	7	59.6	(Geneva M.T.) ... 11.5
29	8	28.2	(Vienna ,,) ... 13.0
April 1	9	6.3	(Bamberg ,,) ... 11.0

On the last mentioned date Prof. Hartwig found that the comet was circular, about 3' in diameter, and had a scattered nucleus.

VARIABILITY OF A MINOR PLANET.—A telegram from Prof. Pickering, published in No. 4009 of the *Astronomische Nachrichten*, announces that Prof. Wendell has discovered a variation of 0.5 magnitude in the brightness of the minor planet (15) Eunomia.

This is one of the asteroids situated at an intermediate distance from the sun, and having a revolution period of 1570 days.

VISUAL OBSERVATION OF JUPITER'S SIXTH SATELLITE.—A further visual observation of Jupiter's sixth satellite has been made at the U.S. Naval Observatory with the 26-inch refractor.

Observing on January 8, Mr. Hammond made a search for the recently discovered satellite in the position computed from the Lick photographs, and there found a very faint object, which, from its movement in relation to a neighbouring star, proved to be the object sought.

REAL PATH OF A BRIGHT METEOR.—From a large number of observations made in south-west Germany, Herr H. Rosenberg has calculated the real path of an exceptionally bright meteor which was seen at 8h. 22m. (central European time) on March 21, 1904, and emitted about one-quarter of the light given by the moon at full.

After giving the details of the times and places of the various observations, he deduces the following values for the actual path of the object. Length of path 385 km., duration of flight about 9 seconds, mean velocity 42.8 km. per second, mean velocity relative to the earth 41.4 km. per second. The average absolute height of the path above the earth's surface was about 30 km. Other deductions are made concerning the actual size, brightness, parabolic velocity in space and actual path, and the following value is obtained for the radiant point:—long. = 23° 8', lat. = +9° 10' (*Astronomische Nachrichten*, No. 4008).

A NEW 24-INCH REFLECTOR AT HARVARD.—In No. 93 of the Harvard College Observatory *Circulars* Prof. E. C. Pickering announces that the construction of the new 24-inch reflector—one of the chief acquisitions with the Anonymous Fund of 1902—is now so far advanced that the instrument may be used for visual observations. The mirror was made by Messrs. Alvan Clark and Sons, and the mounting has been designed and constructed in the observatory workshop.

Magnitude observations of three of the variable stars discovered by Miss Leavitt near the Orion nebula have been made with this instrument, and their variability confirmed, by Mr. L. Campbell, and the results are set out in detail in the *Circular*.

STARS WITH VARIABLE RADIAL VELOCITIES.—A list of nine spectroscopic binaries discovered with the Mills spectrograph, in addition to the forty-eight previously announced, is given in No. 70 of the Lick Observatory *Bulletins*. Amongst them we find α Andromedæ, which was announced as a binary by Mr. Slipher in 1904, and which the Lick spectrograms show to have a negative radial velocity varying from 2 km. (October 5, 1903) to 36 km. (November 30, 1903). ζ Ceti has a small but undoubtedly real variation, whilst γ Geminorum shows a variation from -17 km. (on October 24, 1899) to -4.7 km. (on January 27, 1904). Twenty-five spectrograms of the brighter component of Castor, α^2 Geminorum, indicate a variation of about 26 km. in the radial velocity. Applying the values determined to Prof. Doberck's orbit of Castor, a preliminary value of 0".05 is found for the parallax of this star; but this has not very great weight, owing to the uncertainty in the elements of the visual system. η Bootis with a period of several years, ξ Serpentis with a probably short period, ζ Lyræ, τ Sagittarii, and γ Aquilæ are the other stars for which variable radial velocities have been discovered.