The Glow-worm

ALTHOUGH in several Natural History Encyclopædias Scotland is excluded from the list of countries containing the glow-worm, I can aver that in Nithsdale and in the parish of Tynron, Dumfriesshire, they are quite plentiful. Yestreen, in Tynron, I observed one, to my surprise, shining by the wayside. It is a proof of the mildness of the season, no doubt, as I never saw them in December before, but have seen them several times as late as October.

When carrying one home one evening in my open hand it contracted itself and leaped out of my hand. This is a power they possess which I have seldom seen mentioned. The light in winter is much feebler than in summer, but the time was ten o'clock, or more than six hours after sunset that I saw it, whereas I never witnessed the glow of one in summer so long after dusk. Some that died with me forcibly reminded me of the poet's remark that between the rose's shadow and the very rose there was not a greater contrast than that between "the dead glow-worm and the worm that glows." J. SHAW

Tynron Schoolhouse, Dec. 26, 1875

OUR ASTRONOMICAL COLUMN

ENCKE'S COMET.—By the calculations of Encke and others who have continued them, we are in possession of the dates of perihelion passage of the comet which bears his name, from 1786 to 1875. If these be arranged and the intervals taken between the successive dates, it will be found that in the course of these ninety years the effect of perturbation has not changed the period of two successive revolutions by a hundredth part. The revolution 1819-1822 was 10·1 days longer than that between 1815 and 1819, and the revolution 1845-1848 was 11·1 days shorter than the preceding one, and these are the largest variations exhibited. In the same period, the longest interval between two successive arrivals at perihelion is 1215·6 days, 1842-1845, and the shortest 1200·2 days, 1868-1871.

In aphelion the distance of the comet from the orbit of the planet Jupiter by the elements of 1875 is 0·915, too great to allow of any violent perturbation. In about 123½° heliocentric longitude, and 6°·50′ north of the plane of the ecliptic the comet approaches the orbit of Mercury within 0·038; to bring the bodies into closest possible proximity it is necessary that the planet shall arrive at perihelion 12½ days before the comet, and we know that a very close approach to this condition took place in November 1848, whereby, on the 22nd of that month, the comet was brought within 0·0378 from the planet, a distance of about fifteen times that which separates the moon from the earth. A close encounter with Mercury appears hardly possible before the year 1904.

If the orbit of Encke's comet was fixed within its present comparatively restricted limits by planetary attraction, it seems quite as likely that this may have been occasioned by an extremely close approach to Mercury as that Jupiter at some distant period should have been the disturbing agent.

OCCULTATIONS OF THE PLANET SATURN.—We are not very fortunate in this country as regards the circumstances of the batch of eleven occultations of Saturn by the moon, which take place in successive lunations, commencing on the 22nd of March next; the only one visible in England being that on the morning of the 7th of August, and this will be a daylight phenomenon, the sun rising, at Greenwich, more than half an hour before the immersion. Of the ten occultations of the planet in 1870, three were visible here, and the occultations of that year possessed greater interest from the circumstance of the wider opening of the rings, than those of 1876 are likely to be attended with, wherever witnessed. The near approach of Saturn to the moon's limb between 1 and 2 A.M. on July 11, as viewed at Greenwich, does not appear to be converted into an occultation in any part of these islands.

While writing upon occultations, a word may be said of the close approach of the planet Jupiter to the star β^1 Scorpii, on the morning of February 28, which is entered as a possible occultation in the American Ephemeris. β Scorpii is a double star, the components being of 2 and 6½ magnitudes, distance about 13″, or according to the "Melbourne General Catalogue" of 1870, the smaller star follows in R.A. 0·40s., and is 11″·95 north of the brighter one. The apparent position of β^1 Scorpii on Feb. 27 is in R.A. 15h. 58m. 14·41s., and N.P.D. 109° 28′ 2·1″. The *Nautical Almanac* place of Jupiter, which is from Bouvard's Tables, will probably require a correction of about + 0·90s. in R.A., in which case the conjunction of planet and star would take place a few minutes after meridian passage at Greenwich on the morning of the 28th or about 5h. 40m. A.M., and the north limb of Jupiter is brought close upon the star, but there still seems likely to be a difference of some three or four seconds in N.P.D., by which small quantity the star may escape occultation. The companion is too far north to be occulted. This judgment is formed by a comparison of the latest published corrections of Bouvard, given by the Greenwich observations, and the differences between Le Verrier and Bouvard at the end of 1877.

A close approach of Jupiter to this star is recorded by the Chinese as early as the year A.D. 73; on the 12th of February the planet was very near the star, four days afterwards the star was seen having been previously hidden by the superior brightness of Jupiter; and the Chinese also report that the planet which had been very near to β Scorpii A.D. 512, January 12, occulted it on the 17th of April following.

PROF. STOKES ON THE EARLY HISTORY OF SPECTRUM ANALYSIS

THE following extract from a letter, relating to the early history of spectrum analysis, from our highest English authority on physical optics, cannot fail to interest, apart from its intrinsic importance, a wide circle of readers. I have therefore obtained permission from Prof. Stokes to forward it to NATURE.

C. T. L. WHITMELL

"CAMBRIDGE, *Dec.* 23, 1875

. . . . "I felt that the coincidence between the dark D of the solar spectrum and the bright D of a spirit-lamp with salted wick could not be a matter of chance; and knowing as I did that the latter was specially produced by salts of soda, and believing as I did that even when such were not ostensibly present, they were present in a trace (thus alcohol burnt on a watch-glass and a candle snuffed close, so that the wick does not project into the incandescent envelope, do not show bright D), I concluded in my own mind that dark D was due to absorption by sodium in some shape. In what shape? I knew that such narrow absorption-bands were only observed in vapours; I knew that as a rule vapours agree in a general way with their liquids or solutions as to absorption, save that in lieu of the capricious absorption of the vapour, we have a general absorption attacking those regions of the spectrum in which the vapour-bands are chiefly found. Hence as the sodium *compounds*, chloride, oxide, &c., are transparent, I concluded that the absorbing vapour was that of sodium itself. Knowing the powerful affinities of sodium, I did not dream of its being present in a *free* state in the flame of a spirit-lamp; and so I supposed that the emitting body in the case of a spirit-lamp with salted wick was volatilised chloride of sodium, capable of vibrating in a specific time, or rather two specific and nearly equal periods, by virtue of its sodium constituent; but that to produce absorption the sodium must be free. I never thought of the extension of Prevost's law of exchanges from radiation as a whole to radiation of each particular refrangi-