

col. 205), but it escaped observation both in 1889 and 1895; the next return will be due towards the end of 1900.

It should also be mentioned that the comet discovered by Mr. E. Swift in California, on the 20th of November, 1894, was found to be moving in an elliptic orbit, with a period which Dr. Schulhof (*Ast. Nach.* No. 3267, vol. cxxxvii. col. 37) determined to be about 5·8 years, so that a return would be due towards the end of next summer. This is a very interesting body, owing to the circumstance of its probable identity with De Vico's of 1844, and with La Hire's of 1678. Dr. Schulhof thinks it probable that the object seen once by Goldschmidt at Paris, on the 16th of May, 1855, was really the same, and adds:—"Sa distance périhélie est devenue depuis 1855 sensiblement plus grande qu'auparavant, et elle augmentera encore notablement en 1897, époque à laquelle la comète sera plus voisine de Jupiter qu'en 1885. Cette circonstance rendra fort difficile la découverte de la comète à son prochain retour." It would seem that, like Holmes's comet, it is subject to fluctuations of brightness, and that one of these caused its comparative brilliancy and visibility to the naked eye in 1844.

Yours faithfully,

W. T. LYNN.

Blackheath, 1899, Dec. 4.

NOTES.

COMET NOTES.—Herr Winther gives in *Ast. Nach.* 3605 the following formulæ for the corrections required by his ephemeris of Giacobini's Comet (1899 e):—

Corr. in R.A. $+2^s + 0^s\cdot12$ (t —Nov. 10)

Corr. in Decl. $+0^{\circ}\cdot4 + 0^{\circ}\cdot023$ (t —Nov. 10)

The comet is probably now beyond the reach of any telescope, but we give an ephemeris for the beginning of January, with the above corrections applied (for Berlin midnight):—

R.A.				N. Dec.	R.A.				N. Dec.
h	m	s			h	m	s		
Jan. 3	19	3	59	22° 36'	Jan. 11	19	18	44	25° 19'
7	19	11	19	23 56	15	19	26	13	26 42

Prof. Barnard observed Holmes' Comet (1899 II.) on Oct. 30 and Nov. 4; the correction required by the ephemeris deduced from Zwiers' corrected elements was $+0^s\cdot77$ in R.A., $+8''\cdot8$ in Decl. (*Ast. Nach.* 3604). The comet is probably now too faint for further observation.

Ast. Nach. 3605 contains an article by Dr. E. Strömgren on the cosmogony of comets. He quotes Herr Thraen's researches on the Comet 1886 II., which had a decidedly hyperbolic orbit while in the neighbourhood of the Sun, but which Thraen showed

had been moving in a parabola four years before, and earlier still in an ellipse. He gives reasons for supposing that a similar result would be obtained if the planetary perturbations for a long period were computed for other comets for which hyperbolic orbits have been deduced. Hence he considers it probable that no comets have hyperbolic orbits before entering the planetary system, and that comets belong originally to our own system, and do not, as a rule, approach it from other systems. He points out that the planets can influence cometary orbits in two ways, viz.: (1) by their direct action; (2) by their action on the Sun. Some computers appear to have overlooked the latter point. Jupiter and Saturn may sensibly affect a comet's orbit in this manner, even when the comet does not approach them at all closely.

Mr. Frederick H. Seares has investigated in *Ast. Nach.* 3606-7 the definitive orbit of Comet 1894 IV. (E. Swift), whose identity with De Vico's Comet is probable. The comet was discovered on 1894 Nov. 20, and observed till 1895 Jan. 29. The following are the final elements after applying planetary perturbations:—

Epoch 1894 Dec. 10; Osculation 1894 Dec. 10.0 Berlin M.T.

M		8° 22' 58".2	± 4".2	
π		345 23 11.1	± 4.4	} 1900.0
ω		48 48 23.4	± 27.7	
i		2 57 55.8	± 1.4	
ϕ		34 51 37.3	± 7.1	
μ		605".9999	± 0".0665	

Mr. Seares proposes to re-examine the question of the identity of this comet with that of De Vico, taking the above definitive elements as his starting-point.

Ast. Nach. 3607 also contains some observations of Tuttle's Comet, 1899 III., made at the Cape Observatory by Mr. Innes. The following are some of the observed positions:—

G. M. T.					Appt. R. A.			Appt. S. Dec.			
d h m s					h m s			° ' "			
1899	June	26	5	24	17°5'...	7	59	30.21	17	3	8.8
	July	1	5	16	44.4'...	8	17	55.64	19	25	31.8
		2	5	25	21.7'...	8	21	40.86	19	52	45.5
		6	5	16	14.2'...	8	36	35.18			
		10	5	25	52.9'...	8	51	41.28			

The comet was exceedingly faint and the observations are not considered good. On several days the only possible way of observing it was by using the field of the eyepiece as a ring-micrometer.

'Bulletin Astronomique' for November contains a discussion of the orbit of Finlay's Periodic Comet for the three returns 1886, 1893, 1899, by M. L. Schulhof. The following are the elements for 1899:—

Epoch 1899 Oct. 16 ^o Paris M.T.				
M	341°	24'	7"	} 1899 ^o .
ω	315	40	50	
Ω	52	23	7	
i	3	2	54	
φ	46	19	22	
μ	541"	235		

There is, unfortunately, no hope of seeing the comet at this return, as it is very unfavourably placed. But at the next return, in August 1906, it will be only some 18 millions of miles from the Earth, and should be conspicuous. After that it will make a close approach to Jupiter, and the orbit will be considerably modified.

The same publication contains an interesting article by M. L. Picart on a method of deducing a parabolic orbit from three observations of a comet without any previous assumption as to its distance being required.

There is in the same publication a list of all the principal works dealing with the computation of orbits from Newton to the present day.

A. C. D. C.

MINOR PLANET NOTES.—The new planet EX, discovered by Mr. Coddington on Oct. 2, appears to belong to that group whose period is approximately one-half of Jupiter's.

Another new planet, EY, of the 10th magnitude, was discovered by M. Charlois at Nice on Dec. 4.

The orbit of the new planet ER shows some resemblance to those of the lost planets (99) Dike and (155) Scylla. Identity with one or other of them is not impossible.

Another planet, EZ, was discovered by Mr. Coddington at the Lick Observatory in October, but this is considered to be almost certainly identical with planet (415), which was recently sought for by Palisa without success.

A. C. D. C.

OBITUARY.—NATHANIEL E. GREEN. The subject of this note, whose death was briefly announced in our last number, was born at Bristol on August 21, 1823, the third son of Benjamin and H. Green of that city. At the age of 17 he began to earn his living in a merchant's office in Liverpool, but finding this life not to his taste, and having a love for drawing, he came to London in 1844, and entered as a student at the Royal Academy. He married in 1847, and about a year after marriage settled down in St. John's Wood, where he lived for 49 years. Besides painting in oil and water-colours, he pursued the profession of an art teacher, and had the honour of numbering Her Majesty, the

Princess of Wales, and other members of the Royal Family among his pupils.

His astronomical work, which may be said to have begun in 1859, consisted chiefly in making drawings of celestial objects. His drawings of Mars, made at Madeira during the opposition of 1877, are considered by many the most trustworthy pictorial descriptions of the planet ever made. Twelve of his forty-one sketches were reproduced in the *Memoirs R. A. S.* vol. xliv. Another important contribution to astronomy by Mr. Green is his memoir on Jupiter (*Mem. R. A. S.* vol. xlix.), which gives results of his observations of the planet from 1859 to 1887, and deals with the general changes on the planet in these years. The memoir is illustrated by a series of beautiful drawings. His studies of Mars at the opposition of 1886 were not published, but his sketches are preserved in the rooms of the Royal Astronomical Society.

Mr. Green was elected a Fellow of the Royal Astronomical Society in February 1875, and served on the Council for the year 1888-89. He was President of the British Astronomical Association from 1896 October to 1898 October. Of late years he has not been seen much at the meetings of the Society, as, partly for the benefit of the health of Mrs. Green, and also for the purposes of his art, he has spent his winters at Cannes.

Not long before his death Mr. Green left St. John's Wood to live at St. Albans, where he died, after a short illness, on 1899 November 10, at the age of 76, leaving a widow and several children.

WE are informed of the death of Mr. Henry James Carpenter*, who was a member of the junior staff at Greenwich about thirty years ago. Mr. Carpenter left Greenwich in 1874 to take up the position of Assistant at the Durham University, which he held until a few years ago. His son now occupies the post at Durham. Mr. Carpenter died on Christmas Eve, 1899, aged 49.

THE ZERO MERIDIAN FOR UNIVERSAL TIME.—The claims of Jerusalem to be adopted as the prime meridian of the world have lately been revived by M. Tondini de Quarenghi, an old advocate of this point. His chief objection to Greenwich seems to be that the climate is there so bad that star-observations are impossible there on a large number of nights in the year. We are bound to say that we have never yet felt this to be a sufficient reason for making such a radical change as is suggested.

SPURIOUS DAYLIGHT OBSERVATIONS OF THE LEONIDS.—Curious instances of the effect of the imagination on the senses have been

* Mr. H. J. Carpenter was no relation to Mr. James Carpenter, who died in October last.

related in *Nature* (Dec. 7) and in other places. A young lady in Wiltshire, looking out of a window in the afternoon of Nov. 15, thought she saw the air full of small bodies, which she supposed to be the Leonid Meteors, and on mentioning this to three other members of the household, these persons also convinced themselves that they were looking at a meteor-shower. Another correspondent in Essex made a similar statement, as did also a lady of Liverpool, who wrote to a local paper. Mr. Denning, writing in *Nature* of Dec. 14, says he has not the slightest doubt but that these observations were quite imaginary. Such effects can be easily produced by bending the neck and gazing intently at a bright sky. In two of the cases mentioned, the objects, if they were such, could not possibly have been Leonids, as the radiant-point was below the horizon at the time of the supposed observations.

THE BEGINNING OF THE CENTURY.—The Berlin correspondent of the *Standard* writes that the Federal Council has decided that the new century is to begin throughout Germany on 1900 January 1, and that the event is to be celebrated by special ceremonies. Since, however, there are in Germany many persons, as in other countries, who hold that the century does not begin till 1901 January 1, the paper war on the question is being vigorously revived. It is announced also that in Sweden the year 1900 is to be considered as belonging to the twentieth century.

THE LUNAR ECLIPSE OF DECEMBER 16.—The almost total eclipse of the Moon was observed under favourable conditions at Greenwich. As to the colour of the eclipsed Moon, the phenomenon may be considered normal, for at greatest phase the part of the disk in the shadow appeared of a dull copper, darkest and inclining to red in the centre. The unobscured part at this period appeared unusually brilliant, and larger than was to be expected from the computed magnitude, which was given in the 'Nautical Almanac' as 0.005 of the whole diameter. These effects were no doubt due to contrast and irradiation. At earlier and later stages of the phenomenon the part of the disk in the shadow appeared darker than it did at greatest phase; in fact from a black or dark grey just after first contact, it passed through various shades, being at one time almost dark red, until it reached the dark orange or copper of greatest phase, after which the colours recurred in reverse order. At Greenwich four telescopes were employed for observations of occultations of faint stars during the eclipse. Observations of 19 of the phenomena given in the list in the *Companion* and some others were obtained, most of them by two or more observers, making 74 observations in all.

ERRATUM.—Mr. Lynn asks to call attention to the following in his letter of 1899 Nov. 1, published in our December number:—Page 441, line 14, for “much” read “not.”

ERRATA in the *Companion*, 1900.—We regret that by inadvertence the epochs of Minima for Variable Stars are given in Greenwich Civil Time. To make these continuous with the year 1899, 12^{hrs} must be subtracted from the times given. In the Table of Magnetic Elements on p. 28, last line, for 67° 40' read 67° 10'.

PROF. H. H. TURNER will give three lectures on “Modern Astronomy” at the Royal Institution before Easter.

THE next Meeting of the Royal Astronomical Society will be on Friday, January 12; of the British Astronomical Association on January 31.

FROM AN OXFORD NOTE-BOOK.

THE Royal Society dines on St. Andrew's Day. There is a preliminary meeting to hear the President's Address, and to present medals to those whom the Society delights to honour; but the real event of the day is the dinner in the evening at the Whitehall Rooms of the Hôtel Métropole, when distinguished visitors are present and there are speeches. It has been remarked in previous years that the *Times* report of these speeches seems to be drawn up with a view to the exclusion of anything interesting that may have been said, and the present year was no exception to the rule. There was a veil of gentle dullness over the whole proceedings, possibly due to untoward events in South Africa; but Lord Rayleigh told an excellent story which was apparently considered unfit for publication. He replied to the toast of the Medallists, having himself received the highest honour the Society can bestow, and after most gracefully doing justice to his brother Medallists, modestly remarked that his own interest in science had at any rate begun very early, for at the age of five he had bothered his nurse to tell him why two locomotives were ever put on to the same train. “I argued in this way,” he said. “Of the two, one must be faster than the other, and that being the case, what was the good of the slower one?” The Chinese Ambassador also made an excellent speech in English, and this is a specimen of what the *Times* said he said: “No one could predict the new gifts which the Royal Society would confer on the human kind.” What he actually said was (and the beautiful quaintness of it is worth keeping intact): “With regard to the new gifts which this great Society is going to confer on human kind at large, nobody could predict.”

CONCERNING the ten-day Ephemerides of stars in various Nautical Almanacs, has it ever occurred to anyone to use second differences in the interpolations? This point came up for examination recently, and I was surprised to find that the use of first differences

only, which seems to be assumed as the proper course in the "Explanations" to the Nautical Almanacs, is practically equivalent to a diminution of the Constant of Aberration by $0''.05$. This throws a curious side-light on the decisions of the Paris Conference of 1896. After a good deal of discussion the Constant of Aberration was altered from $20''.445$ to $20''.470$; and yet no one seemed to be aware that the usual practice of computers is equivalent to the use of a constant less than $20''.40$. If anyone likes to verify the fact he can do so by various methods, of which the following is one:—Take the R.A.'s of any star as given in the ten-day ephemerides and interpolate in the ordinary way for the second day, getting a new series of ten-day values; repeat this process five times, which should bring back the original numbers if the process is exact; if, on the other hand, the process is faulty, we shall get in the five operations five times the error of one operation. This error will be found to be $0''.02$ (equatorial) where aberration has its maximum effect, so that in each operation we make an error of $0''.004$ or $0''.06$ (approximately).

OF course the error considered in the preceding paragraph is a small one, but it is larger than many quantities which have been very seriously discussed. It can be avoided *either* by the use of second differences in the interpolations *or* by the use of an increased constant of aberration in the ten-day ephemerides. If these are calculated with a constant increased (for this purpose only) by $0''.05$, then the use of them with simple interpolation will be equivalent to the use of the non-augmented constant on the average—i. e. those who prepare the ephemerides could in this way save those who use them the trouble of using second differences. This would mean that if $20''.47$ is adopted as the true constant of aberration, then $20''.52$ should be used in forming the ten-day ephemerides. At first sight the device seems arbitrary and misleading, but I suggest it for consideration. I don't think it is a bad plan on examination.

WHILE on the subject of avoiding small errors by conventions, I should like to mention a suggestion made by Mr. W. E. Cooke, Director of the Perth Observatory (W. Australia), with regard to raising figures. The usual practice is to "raise" the figure 5 and all above it; thus $.035$ is written $.04$ when two figures are retained, and $.045$ is written $.05$. This involves, as is well known, a small systematic error. The mean of the twenty quantities $.030, .031, .032, \&c \dots .048, .049$, is $.0395$; but the mean of their "raised" representatives, viz. five times $.03$, ten times $.04$, and five times $.05$, is $.0400$, which exceeds the accurate result by $.0005$. Now Mr. Cooke suggests that we should not raise *all* the fives, but only half of them, which would give the correct result, and his rule is "always make the last digit *even*." Thus,

$\cdot 035 = \cdot 04$, and $\cdot 045 = \cdot 04$. It would do equally well, of course, to make the last digit always *odd*; but there is no reason to alter his definite proposal, which seems a sound one.

A FINE volume recently published by Dr. L. de Ball, Director of the von Kuffner Observatory at Vienna, contains, among other excellent work, two papers by Dr. Schwarzschild on photographic star-magnitudes. He adopts the plan (which has been for some years tried independently at the Harvard Observatory: I am flattered to find that this fact first became known to Dr. Schwarzschild through the medium of these notes in 1896) of taking stars *considerably out of focus*, and estimating the blackness of the discs. His work seems good, but, to tell the honest truth, I have not had time to read his papers completely; may I add that they run to something like 100,000 words—German words—plus 40 huge pages of tabular matter? The letterpress alone is a good deal longer than Prof. Darwin's recent book on Tides, and not much shorter than Miss Clerke's 'History of Astronomy,' and these are in English. I have looked with some anxiety for a summary of the memoirs, but without success. Having made this confession in the first instance, if I say that the author's treatment of simple facts seems rather ponderous—he brings a heavy battery of integration and formulæ to bear on one or two elementary principles—I leave it open for him to reply that this is the shallow criticism of one who has not read his papers.

ALTHOUGH the Leonids were given up as a bad job some weeks ago, there are still sporadic stories concerning them. One was sent me with a definite request for "polishing up," but I find myself unable to add any embellishments and prefer to repeat it *verbatim*:—

A lady, on November 15 last, went into a second-rate grocery at Rathmines, near Dublin, and while the shopman was tying up a parcel of sugar, remarked that she hoped the night would be fine for the expected meteors. After cogitation he replied, "It is my belief, ma'am, that the public will be very hard to please in the matter of these shooting-stars"; and on being asked the reason for this possible fastidiousness, he explained, "Well! you see, ma'am, the fire-works now are so grand."

Another correspondent, from the north of England as in last month's notes, sends the following advertisement:—

LOST, STOLEN, OR STRAYED,

A family of Leonids, who left home in 1866, and have not since been heard of. They were expected to return to the Earth during the past week, but no trace of them has been found, and the worst fears are entertained. Anyone having information as to their whereabouts is requested to communicate at once with the Astronomer Royal, whose anxiety is almost more than he can bear.