the history of eclipses. He has not made one reference to the late Mr. Cowper Ranyard's monumental contribution to the subject, but he has referred largely to the Rev. S. J. Johnson's book. It may be added in passing that he rather takes the edge off this compliment by spelling Mr. Johnson's name incorrectly eight times out of seventeen. He mentions Mr. Lynn's name in the following manner: "both these theories have been called in question by Johnston (*sic*), because he cannot find an eclipse which, in his view of things, will respond as regards date . . . . and by Lynn on the same and on other grounds *more suo*." What the words *more suo* imply is not obvious. If it is a sneer it is a rather badly advised one, for all astronomers know that there is no one who knows more about the history of eclipses, or takes more care in his references, than Mr. Lynn.

Mr. Chambers's emendation of Shakespeare, "*shivered* in the Moon's eclipse," for *silvered*, is hardly an improvement; also in the legend of Ho and Hi, the second line of the verse is generally written:

"Whose fate though sad was risible."

Mr. Chambers prefers to write "visible." But these are small points, and may be merely typographical. Our quarrel with the book is for a larger reason. Mr. Chambers evidently has a reputation as a book-compiler, or publishing firms would not ask him to contribute to a series of works such as this; it is no concern of ours whether he loses or retains this reputation, but we are concerned to think that the world, or such part of it as reads this book, should be told, as they are told by it, that the chief part of astronomy is its ancient history, and that nothing is being done in the present day to advance the science.

NOTES.

Comet Notes.—The discovery of a faint comet by M. Giacobini on Sept. 29 was announced last month, but owing to haste the motion was erroneously given. The following are the best elements available, the first by Herr Winther from observations on Oct. 3, 6, 9 (Ast. Nach. 3598), the second by Mr. Perrine from observations on Oct. 1, 7, 16:—

	Winther.	Perrine.	
T	1899 Sept. 18·27.	1899 Sept. 15·04 Greenwich M.T.	
ω	12° 47′	10° 52′	1899·0.
Ω	272 5	272 13	
i	76 33	76 55	
log q ..	0·25273	0·25174	

Ephemeris for Berlin midnight.

	R.A.			N. Dec.			R.A.			N. Dec.	
	h	m	s	°	′		h	m	s	°	′
Nov. 2....	17	18	59	4	42	Nov. 14....	17	38	10	7	57
6....	17	25	18	5	47	18....	17	44	43	9	2
10....	17	31	42	6	52	22....	17	51	21	10	7

Brightness 0·63 on Nov. 5, 0·52 on Nov. 22.

We may notice a singular error in 'Nature' for Oct. 5, p. 551, where the three comets discovered by M. Giacobini (1896 Sept., 1898 June, 1899 Sept.) are spoken of as one and the same comet. They are, of course, entirely distinct and separate.

Herr Zwiers sends a post-card stating that he has received altogether nine observations of Holmes' Comet from Mr. Perrine, and five from Mr. Aitken. The observations were all made with the 36-inch at the Lick Observatory, and extend from June 10 to Sept. 9. They indicate that the adopted value of the mean anomaly in Herr Zwiers' corrected elements requires correction by 8″ (he does not say in which direction). The comet is very faint and only visible in the most powerful instruments.

Continuation of the ephemeris (for Greenwich noon) (Ast. Nach. 3595).

	R.A.			N. Dec.			R.A.			N. Dec.	
	h	m	s	°	′		h	m	s	°	′
Nov. 2....	2	36	37	49	14	Dec. 8....	2	5	30	45	35
8....	2	29	21	49	2	14....	2	4	28	44	42
14....	2	22	32	48	37	20....	2	4	43	43	50
20....	2	16	32	48	1	26....	2	6	10	43	0
26....	2	11	36	47	17	Jan. 1....	2	8	43	42	14
Dec. 2....	2	7	53	46	28						

The brightness reached a maximum about Oct. 15, when it was 1·8 times that at re-discovery. On Dec. 26 it will have sunk again to that at re-discovery.

Tempel's Second Periodic Comet was observed by Signor Cerulli at Teramo on Oct. 2, the corrections required by Schulhof's ephemeris being $-1^{s}\cdot9$ in R.A., $+3''$ in Decl. It had a nucleus of the 14th magnitude.

Herr Adolf Hnatek, of Vienna, proposes to compute the definitive orbit of Comet 1898 V. (Giacobini), and requests that unpublished observations may be sent to him (Ast. Nach. 3597).

A. C. D. C.

Minor Planet Notes. — Ast. Nach. 3597 contains a new determination of the orbit of (433) Eros, by Hans Osten. About

220 observations are employed, extending from 1898 Aug. 14 to 1899 March 17, but no use is made of the photographs of 1894 and 1896.

The following are the elements:—

Epoch and osculation 1898 Oct. 1·0 Berlin M.T.

M	238°	39′	44″·6	±15″·8	1900·0.
ω	177	39	21 ·0	±15 ·2	
Ω	303	31	53 ·4	± 2 ·6	
i	10	49	34 ·0	± 0 ·5	
ϕ	12	52	18 ·3	± 2 ·6	
μ	2015″·343			±0″·073	

A planet, EQ, discovered last month, proves not to be new, but identical with (161) Athor.

Three new planets, ER, ES, ET, were discovered on Oct. 27 by Wolf and Schwassmann. A. C. D. C.

Obituary.—James Carpenter. By the present generation of astronomers Mr. Carpenter's name will probably only be known as that of the joint author with Sir James Nasmyth of a celebrated book on the Moon, but some thirty years ago he was an active member of the Greenwich staff. Mr. Carpenter belonged to a Greenwich family and became an Assistant at the Royal Observatory in January 1859. He worked in various departments of the Observatory, and when the south-east equatorial was set up in 1868 he was put in charge of that instrument, and there are preserved in the Observatory records many excellent planetary drawings made by him from observations with the 12½-inch Merz. He married a daughter of Thomas Penn, cousin of John Penn the elder, and in 1872 gave up his Assistantship at the Observatory to take up a position in the famous engineering firm which his father-in-law had long held. Since that time, except for an occasional attendance at Burlington House, he has taken little part in astronomy, and he gave up work entirely some years ago. He died almost suddenly, as the result of heart-complaint, from which he had long suffered, on October 17, aged 59. Mr. Carpenter's wife pre-deceased him, and he leaves no family.

The Parallax of Σ 1516 A and AOe 11677.—Herr Osten Bergstrand in 1897 and 1898 took a number of photographs of the regions around these two stars with the idea of determining their parallax. The instrument was the 33-cm. photographic refractor of the Upsala Observatory. Previous researches on the parallax of Σ 1516 have been made by Winnecke, Berberich, and L. de Ball, who all used one star only for comparison, viz., Σ 1516 B, and deduced values ranging from 0″·1 to 0″·3. The

present determination depends upon four comparison stars, which give values as follows:—

B.D. +73°·518	gives parallax	+0″·06
B.D. +74 ·455	„	+0 ·19
Σ 1519 B	„	+0 ·04
B.D. +74°·457	„	+0 ·09

The definitive value for the parallax of Σ 1516 A from the four is

$$\pi = +0''\cdot080 \pm 0''\cdot011,$$

which agrees more closely with that of M. de Ball, viz., 0″·104.

The star AOe is remarkable by reason of its large proper motion (nearly 3″ per ann.). M. Geelmuyden has found a parallax of 0″·4, employing but one comparison star. M. Franz using two stars found 0″·1002. The present determination is based on eight stars. The separate values from individual stars are from

B.D. +66°·711	parallax	+0″·22
B.D. +66 ·712	„	+0 ·29
B.D. +66 ·714	„	+0 ·22
B.B. +66 ·715	„	+0 ·12
B.D. +66 ·716	„	+0 ·10
B.D. +67 ·694	„	+0 ·10
B.D. +67 ·694	„	+0 ·10
Anonymous	„	+0 ·18

which give a definitive value

$$\pi = +0''\cdot192 \pm 0''\cdot013.$$

The Figure of Mars.—In Ast. Nach. No. 3594 Dr. Ernst Hartwig gives his observations of diameters of Mars made in 1879 with the heliometers at Bamberg and Breslau. These observations he discusses at length and deduces for

Equatorial diameter	9″·445
Polar diameter	9 ·364

which gives $\frac{1}{116}$ for the compression.

Similar observations made at the oppositions 1890 and 1899 give for

1890 .... Equatorial diameter 9″·435, polar 9″·303
1899 .... „ „ 9 ·370, „ 0 ·270

and values $\frac{1}{71}$ and $\frac{1}{94}$ respectively for compression.

A Determination of the Constants of Aberration and Nutation.—In German Universities it is generally required of candidates for the degree of Doctor that they make an original

research on some scientific subject, and this is naturally sometimes on an astronomical subject. We have recently received such a one from Herr Johannes Kniesche, of the University of Gottingen. This is a discussion of the Greenwich observations of the Right Ascension of Polaris from 1851 to 1888 to determine the constants of aberration and nutation. We need say nothing of the method, except that account was taken of the Variation of Latitude, and that it evidently involved an immense amount of arithmetic. The results evolved are :—

Aberration constant	$=20''\cdot537$	$\pm 0''\cdot003$
Nutation constant	$9\cdot236$	$\pm 0\cdot003$
Parallax of Polaris	$+ 0''\cdot1518$	$\pm 0''\cdot0041$

Relative Star-density on Photographs and by Visual Observation.—In a notice in our July number of a volume of the Potsdam Astrographic Catalogue, mention was made (p. 280, line 16) of the relative number of stars in the same area as counted on the Potsdam photographs and as given in the Bonn Durchmusterung. Prof. Scheiner had called attention to this some months previously in an article in Ast. Nach. No. 3505, and this gave rise to remarks on the same subject by Dr. Kapteyn and Prof. Newcomb. Prof. Scheiner, in speaking of relative density on equal areas, wrote : "In one case the ratio (d) of the star-density between Potsdam and the D.M. is unity. In another, in the Milky Way, it reaches 11·7. But for the whole series of plates the facts can be represented graphically as follows :—If abscissæ represent the number of stars on a plate and the ordinates are taken proportional to d, the resulting locus is very nearly a straight line, the conclusion from which is that the density ratio between Potsdam and the D.M. is proportional to the density itself."

An interpretation of this last statement would be that stars are equally distributed throughout any direction in space, which would give roughly such a law for star-density as Scheiner's, assuming that the photographic plate comprehends a sphere of the universe, the ratio of whose radius to that of the sphere to which visual observations extend is constant in all directions ; but it may be well to consider whether the law is borne out by other investigations. In the Cape Photographic Durchmusterung, for reasons which Dr. Gill points out, no detailed accounts of this kind are given, but it is stated that this catalogue is richer in the rich regions and poorer in the poor regions of the sky than Schönfeld's continuation of the B.D., which is a somewhat similar statement to that quoted above. Prof. Newcomb, however, seeing the interest of the subject, made a count of the stars in the Cincinnati catalogue of Ormond Stone, of the zone $-23°$. Comparing the number of stars in this with those of the Cape Durchmusterung, he found that the greater the number of stars in any

region the greater the excess of their number in the Cape work over that in the work of Stone. In the denser regions Kapteyn's work shows a little more than twice as many stars as Stone's, whereas in the whole work the number is greater by not quite fifty per cent. So far Dr. Scheiner's proposition is supported, but the figures deduced from Greenwich catalogue plates given in our July number show only a faint trace of such a law.

There is another question which has been treated of side by side with this of star-density; that is, the magnitude of stars in the region of the Milky Way relative to that of stars in the other parts of the sky as determined by visual and photographic methods. In the recently published volume of the Harvard Annals* it is shown that, both in the B.D. and in the Uranometria Argentina, stars near the Milky Way are faint as compared with accurate photometric determinations. Dr. Scheiner evolves a similar fact from the Potsdam photographs; he finds that of the stars about magnitude 9·0 to 9·5, those in the Milky Way are about half a magnitude fainter than they would be in a poorer region. Dr. Kapteyn also agrees that the visual magnitudes of stars in the Galaxy are faint in comparison with their photographic magnitudes, and states as a possible reason that stars in the Milky Way are bluish. On the other hand, in the comparison above mentioned Prof. Newcomb could detect no difference in relative magnitude depending on the density of the stars.

A Star Position Finder.—In Sir H. Grubb's catalogue (see p. 378), on the page devoted to miscellaneous apparatus, we noticed an illustration of an accessory to an equatorial for reading the N.P.D. and hour-angle at which the telescope is set without leaving the eye-end. As this little instrument is probably not well known, and the geometry is ingenious, it may be worth while to attempt an explanation. Everyone is familiar with the method of setting a small transit by means of a bubble and small graduated circle, the circle being attached near the eye-end at the side of the telescope with its plane at right angles to the axis. Now on an equatorial put a similar circle with plane at right angles to the declination axis. In the usual case the rotating radius which carries the verniers for reading the circle is furnished with a level-bubble parallel to the line of verniers; in the present case the radius is furnished with a circular level with its plane making an angle with it equal to the latitude of the place. Now if the telescope be in any position and the level set horizontal, since the rotating radius is at right angles to the axis through the circle (*i. e.* the declination axis) and makes an angle with the horizon equal to the latitude, it must be parallel to the polar axis, and the angle that the telescope makes with this (*i. e.* the N.P.D.) is read off on the circle.

* See p. 402.

Further, the circular level is mounted on the rotating radius, which may be considered as a polar axis of the contrivance, so that it has means of rotation about the radius as axis, and is furnished with a circle to read the angle through which it is turned. Now suppose the telescope set to the meridian, and the circular level adjusted, the circle reads o. The equatorial being turned on its polar axis, the bubble is displaced, but can be brought back by rotating the circular level about the small polar axis of the position finder, and hence the hour-angle read on the circle.

The readings given are therefore those of the position of the telescope. Consideration will show that in only that position of the telescope could these readings result.

The Sun's Rotation.—It is found difficult to give a satisfactory explanation of the difference in the time of rotation of the solar surface in different latitudes, but it is usually accepted as a fact in solar physics. Herr Schultz-Steinheil, of the Lund Observatory, pointed out some time ago (Ast. Nach. No. 3543) that the velocities as determined by Duner's spectroscopic observations did not show these anomalies if values of the solar elements different from Sporer's were adopted. He has followed this up by determining recently the values of these elements which would give a uniform period of rotation, and finds that the inclination of the Sun's axis to the axis of the ecliptic should be 18° 12′ instead of 7° 15′ as hitherto adopted, and that the longitude of the intersection of the Sun's equator with the ecliptic should be +28° instead of +75°.

There is not sufficient reason to think that Sporer's elements are beyond correction, but at first sight it seems that Herr Schultz-Steinheil's figures differ by more than is at all consistent with sun-spot observations.

The Election for Council of the British Astronomical Association for the Session 1st October, 1899, to 30th September, 1900, has resulted as follows:—*President*: W. H. Maw. *Vice-Presidents*: N. E. Green, G. M. Seabroke, Dr. G. Johnstone Stoney, W. H. Wesley. *Treasurer*: W. H. Maw. *Editor*: E. Walter Maunder. *Secretaries*: James G. Petrie, William Schooling. *Librarian*: F. W. Levander. *Directors of the Observing Sections*: *Sun*, Rev. A. L. Cortie; *Moon*, Walter Goodacre; *Mercury and Venus*, Henry MacEwen; *Mars*, E. M. Antoniadi; *Jupiter*, Arthur Cottam; *Saturn*, G. M. Seabroke; *Comets*, A. C. D. Crommelin; *Meteors*, W. F. Denning; *Star Colours*, G. F. Chambers; *Variable Stars*, J. E. Gore; *Double Stars*, G. M. Seabroke; *Spectroscopy*, J. Evershed; *Photography*, R. Wilding; *Zodiacal Light*, Capt. P. B. Molesworth, R.E. *Other Members of the Council*: Rev. J. M. Bacon, A. M. W. Downing,

Arthur Kennedy, G. J. Newbegin, Capt. W. Noble, Miss M. A. Orr, A. A. Rambaut, S. A. Saunder, David Smart, C. Thwaites.

Messrs. Cooke and Son's New Catalogue.—This firm of instrument makers, which we notice has now a branch at Cape Town, as well as at York and in London, has anticipated the date by a month or two, and issued a Catalogue for the year 1900. Messrs. Cooke make leading features of two classes of work. First they have a monopoly of the achromatic objectives made according to Mr. Dennis Taylor's patents, which, it will be remembered, are made up of three lenses of three different sorts of glass, and so form an object-glass free from achromatism and from spherical aberration, which gives a large field with good definition, with little liability to the optical effects of flexure. A 3-inch object-glass of this kind costs £20, a 6-inch £90, and a 15-inch £800. Messrs. Cooke also make special lenses for photography. Other features of the catalogue are the pictures of the large domes put up by Messrs. Cooke; the two large domes at Greenwich, of 30 and 36 feet diameter respectively; the 36-foot dome at the Royal Observatory, Cape of Good Hope; and an 18-foot dome erected at Seapoint, Cape Town. The prices of "Standard" Domes, which are hemispherical with double-shutter giving an opening from the base to rather beyond the zenith, covered with *papier-mâché*, run as follows: 15-foot, £230; 30 foot, £590; 40-foot, £975.

An equatorial telescope of best quality, with a patent object-glass of 6-inch diameter fitted for both photographic and visual work, with driving-clock and usual accessories, including camera and plate-holders, costs at Messrs. Cooke's works £500. A similar instrument, but with object-glass of 15-inches aperture, costs £1950. The cost of a best-quality transit-instrument, with $3\frac{1}{2}$-inch O.G., complete, would be about £100, but a smaller instrument can be bought for less than half that sum. The firm acknowledge that their prices are high, but they deprecate the modern tendency to sacrifice good workmanship to cheapness.

Erratum.—Mr. Lynn writes:—"Some of your readers may be surprised that I should speak, in my letter of August 18 (p. 366, line 6), of so large a year of Rome as 7045. But doubtless most of them will perceive that what I really wrote was 704–5, meaning that Cæsar began his march from Gaul towards the end of 704 (B.C. 50), and came to Rome early in 705 (B.C. 49)."

The death is announced, at the age of 86, of the Rev. E. L. Berthon, the inventor of the collapsible boat. It will be remembered that he was admitted, for the second time, a Fellow

of the Royal Astronomical Society at the meeting in June last, when he was paradoxically described as the Senior Fellow, although he had only just been admitted.

It has been announced in the daily press that the Lincolnshire County Committee has accepted the offer of a complete set of astronomical instruments, valued at nearly £1000, from the executors of the late Canon Cross, and propose to erect a suitable observatory at the north-west corner of the castle keep.

A Reuter's telegram from New York, published in the papers of October 30, states that Biela's Comet has been observed from Santiago, Chile, and is visible to the naked eye. A cautionary note is added to the telegram, saying that the statement must be accepted with reserve, as Biela's Comet has not been seen since 1852.

We call attention to the Occultation of Neptune by the Moon on November 19. The circumstances are given in the 'Companion.'

Prof. Simon Newcomb has been elected President of the recently established Astronomical and Astrophysical Society of America. Prof. G. C. Comstock is the Secretary.

A note in 'Nature' states that the highest observatory in Germany is now completed. It is situated on the Schnee Koppe, the highest summit of the Silesian Mountains, at an elevation of 5216 feet. It will be managed as an institution of the Prussian State.

M. Bouquet de la Grye, at a meeting of the Paris Academy, when a paper on meteor-observations was read, suggested that the observations of shooting-stars might be utilized for determination of longitude when the telegraph is not available.

The Meeting of the Royal Astronomical Society is on Friday, November 10; of the British Astronomical Association on Wednesday, November 29.

From an Oxford Note-Book.

At the Meeting of the British Association at Bristol last year, Prof. H. L. Callendar showed a beautiful apparatus for recording sunshine (see *Observatory*, vol. xxi. p. 391). Although the details had been then worked out with great completeness, several improvements have since been made by the Cambridge Scientific Instrument Company, who supply the machines; and as a pre-

liminary to setting one (or perhaps two) up in Oxford, I had the pleasure of looking at the improved pattern at University College, London, the other day. It is quite delightful to watch the apparatus at work. There is a recording pencil which draws the curve of radiation, and a planimeter wheel which integrates the area automatically. When the contact is made which puts the instrument in action, little wheels buzz round, and the pencil runs along to its proper place with great promptitude in a charming way. The apparatus is one of the best of that class of instruments which add to scientific accuracy and refinement all the pleasures of a beautiful mechanical toy. When one adds that the instrument cleans itself as it goes, and so works all the better for use, it will be fully realized that it is a desirable possession.

After examining the recording apparatus (which can be used not only to record sunshine, but temperature or any other elements which can be reduced to terms of electrical resistance) in the laboratory, we mounted to the roof of the building to see the situation of the plate exposed to sunshine. We stepped out of a window on to the slates, worked our way along copings, and clambered over roofs by the aid of ladders set at all sorts of angles, and so ultimately found ourselves commanding a nearly clear horizon from the top of a disused chimney communicating with the laboratory, down which the wires pass from the sunshine-plate to the recording apparatus. The chimney could scarcely have been more appropriate if it had been built for the purpose. But Prof. Callendar has the luck of a successful man in such matters. He showed me, on the way, a disused spiral stone staircase which he has obtained possession of, and intends to devote to a series of physical experiments, for which it might have been designed. What an opportunity for a cynic to compare the man who finds his laboratory or observatory ready-made in odd corners of an existing building and works therein, with the man who builds carefully-designed structures and forgets to do any work in them!

The clambering over the roofs of University College reminded me of an amusing little book lately introduced to my notice by an eminent astronomer, and called the *Roof Climber's Guide to Trinity* *. It has apparently been the practice of certain daring spirits for many generations of undergraduates to roam over the roofs of the many Courts of Trinity College, Cambridge; not with any intention of breaking bounds or rules ("Unconventional roads in and out of College are purposely left unmentioned," says the preface; "they are an all too popular abuse of a noble science"), but simply from the desire to scale places difficult of scaling. The 'Guide' tells of achievements to the present date in a way

* Cambridge: W. P. Spalding, 43 Sidney Street. Price 1s.

calculated to fire the ambition of even the quite casual reader, and it cannot fail to amuse him, as perhaps a couple of extracts may illustrate :—

NEW COURT.—Complete circuit; time 45–60 mins.; guide superfluous, but rope necessary; expense, repair of pipes and possible doctor's fees (p. 3).

(The I Court climbs) were originally undertaken with a view to finding some ascent from ground to roof without the use of the customary window; the only other two known being unpopular — the Library traverse chimney ("the Library") on account of its severity, and the Chapel ascent by reason of its early locked gate ("the Chapel").

A PAPER by Dr. C. A. Schultz-Steinheil on the "Elements of the Sun's Rotation" * seems worthy of attention. Dunér made a series of spectroscopic observations on the limb of the Sun for velocity in the line of sight, and found that the time of rotation was different in different heliographic latitudes, taking the Sun's axis as determined from sun-spot observations, viz.,

$$i = 7^\circ, \qquad \Omega = +74^\circ.$$

Dr. Schultz-Steinheil re-determines the position of the axis from the spectroscopic observations themselves, and finds that a position

$$i = 18^\circ, \qquad \Omega = +28^\circ$$

will remove the apparent anomalies of rotation. It is scarcely credible that an adopted position of the Sun's axis which gives such good results for sun-spot observations (as a glance at any of the recent Greenwich volumes, for instance, will show) can be so much in error as 11°; nor yet does it seem likely that while the general surface of the Sun is rotating like a solid body about one axis, the spots should appear to be rotating about a different axis. But the paper cited seems to require either explaining or explaining away.

THE following poem from a weekly paper seems to show that some misconception still exists, in spite of numerous popular lectures, as to the probable fate of our planet, and as to the nature of shooting stars :—

To-morrow, or ——?

It came with a horrible rumbling roar
In the deathly still of the night;
A crash, and all was chaos;
And the world, its little allotted course
In the mighty universe run,
A sizzling, seething ball of flame,
Dashed downward toward the Sun.
And away on another planet
In the firmament, gleaming afar,
A little child cried: "Oh, mamma, look!
See the pretty shooting star!"

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* Öfversigt af K. Sv. Vet.-Akad. Förhandl. 1899, No. 2.