

Astronomical Publications.*

“Monthly Notices of the Royal Astronomical Society.”

Vol. LIII., No. 6. 1893, April 14.

REPRODUCTION OF PHOTOGRAPHS.

Arrangements have been made with Messrs. Eyre and Spottiswoode by which Fellows, and the public at large, will be able to obtain reproductions of photographs in the possession of the Society, by purchase at a fair price.

PHOTOGRAPH OF THE CLUSTER M. 34 PERSEI. *Isaac Roberts.*

Taken 1892, December 26, with exposure 60 minutes. It is No. 584 in the “General Catalogue,” and is described by Sir J. Herschel and Lord Rosse as large, bright, and scattered. The photograph confirms the general descriptions. Several of the stars have faint stars like *comites* near them. Stars down to the 14th magnitude are shown. Neither Herschel nor Rosse have published drawings of the cluster, and the value of the photograph will chiefly be in the future when other photographs have been taken and compared with it.

PHOTOGRAPH OF THE NEBULA HERSCHEL II. 240 PEGASI. *Isaac Roberts.*

Taken 1891, December 2, with an exposure of 2^h 36^m. The nebula is No. 5,046 in the “General Catalogue,” R.A. 23^h 58^m, Dec. 15° 33' N. Earl Rosse describes it as bright, pretty large, elongated, gradually much brighter in the middle, and states that a decided dark lane runs through it in the direction of its major axis. Sir J. Herschel describes it as bright, large, irregularly round, no nucleus, 2' or 3' diameter, but does not mention the dark lane.

The photograph very fully confirms the observations. The dark lane is conspicuous, and divides the major axis into two equal parts. The central part of the nebula is a globular mass, and measures 41 seconds of arc in diameter, but it differs from a star in not having a central condensation. Dr. Roberts infers that the dark lane is a ring seen edgewise, surrounding the globular mass, and that there is another very wide nebulous faint ring surrounding the central mass, between it and the dark outer ring.

TELESCOPIC OBJECTIVES FOR PHOTOGRAPHIC PURPOSES. *H. Dennis Taylor.*

It was decided at the Paris Convention that the standard objective for celestial photography should be so corrected as to have its minimum, or most intense focus for the G ray to which

* This Section of the “Journal” is under the Editorship of H. Seward, B.A., F.R.A.S.

the ordinary rapid bromide plate is most sensitive. This, together with the focal length and aperture, was about all which the Convention prescribed. It did not, says Mr. Taylor, seem to be widely enough recognised that the form of the objective would have a great deal to do with its sufficiency as regards the size of the field yielded by it. Dr. Steinheil, however, conscious of the importance of the *form*, made two recommendations which were accepted by the Convention, and were intended to ensure that the objective should give the best possible lateral image, and make the images of two colours of the same size. Mr. Taylor says he must confess that he does not grasp the necessary relation between Dr. Steinheil's two conditions and the two advantages aimed at, but granting the relations to be correct, it cannot be said that these two conditions would facilitate a direct calculation of the curves, &c. necessary to fulfil the third and fourth of the several conditions following, the first three being indispensable, and the last two very desirable:—

1. The proper colour correction.
2. Freedom from spherical aberration.
3. The largest possible field of fair definition (Dr. Steinheil's first condition).
4. The images of different colours to be of the same size (Dr. Steinheil's second condition).
5. Freedom from distortion; all great circles on the celestial sphere should be represented as straight lines on the sensitive plate.

The writer deals specially with the third condition, and endeavours by a train of mathematical reasoning to ascertain the form of objective required to fulfil it.

It may be stated broadly that the characteristic of the objective which determines whether its field of fair definition shall be small and confined to a few minutes of arc only, or extended to two degrees or more square, is the degree in which it is free from the defect of "coma," or what may be called unsymmetrical or eccentric oblique refraction.

The result deduced states that the radius of the first surface of the crown lens should be to the radius of the second surface as 5 to 3, broadly speaking, and this calculation the writer declares to be verified by practical results.

GALACTIC LONGITUDES AND LATITUDES OF THE BRIGHTER STARS IN A ZONE OF THE HEAVENS CONTAINING THE MILKY WAY. *A. Marth.*

Mr. Marth continues this Catalogue, and also gives the galactic longitudes of the points at which the equator, the ecliptic, and the parallels $+30^\circ$ and -30° of declination cross the parallels of galactic latitude. Also the galactic latitudes of the points at which his longitude circles are crossed by Gould's great circle, &c. Gould's investigation places the pole of the galactic circle in R.A. $12^h 41^m 20^s$, Dec. $+27^\circ 21'$ for 1875, and that of the belt of bright stars in R.A. $11^h 25^m$, Dec. $+30^\circ$, the median line of the belt being $92^\circ 3'$ from the pole. ("Uran. Arg.," pp. 356, 362, 371.)

“English Mechanic.”

Vol. LVII., Nos. 1465-1467. 1893, April 21—May 5.

April 21. JUPITER. *A. Elvins.*

Showing the probable existence of a sixth satellite at a distance from the planet of 166,000 miles, and with a period of $21\frac{1}{2}$ hours.

BINARY ORBITS. *W. S.*

A method of determining the real elements and orbit of a double star when its apparent orbit is given. A graphic construction of the orbit of γ Ophiuchi is added.

METEOR. *D. Maxwell.*

An observation of a meteor which appeared a little N.E. of Capella and passed in a south-westerly direction past Procyon.

A POSSIBLE GIGANTIC TELESCOPE. *G. Whittle.*

A continuation of Mr. Whittle's previous papers on this subject.

April 28. THE LARGE METEOR OF APRIL 15.

A series of observations by *W. F. D., Capella, Jas. Coleman,* and *G. T. A.*

CLOCK STARS. *W. J. R.*

A suggestion that observers who get their time by star transits might do so by using the “Nautical Almanac” list of apparent places of stars.

SATURN.

Sketches of the planet are given by Arthur Henderson and N. D. T. Mr. Henderson also gives a series of observations made during the months of March and April.

BRADLEY AND THE REFORMATION OF THE CALENDAR IN ENGLAND.

A correction by *Dr. Downing* of his statement, made at the meeting of the British Astronomical Association held on March 29, that *Dr. Bradley* died a few days after the reformation of the calendar in 1752. The death of *Dr. Bradley* did not occur until 1762.

May 5. THE MOON. SATURN. *W. Godden.*

The writer inquires whether there is any terrestrial analogue to the hexagonal lunar craters mentioned by *Mr. Elger* at the British Astronomical Association meeting on April 26. He also refers to the specially white appearance of Saturn's equator on April 15 between 8.30 and 9.20.

SATURN'S SATELLITES. *W. London.*

A table of the *W.* elongations of *Mimas* and *Enceladus*.

SATURN.

Observations of the planet from March 30 to April 26.

“Nature.”

Vol. XLVII., No. 1222 to Vol. XLVIII., No. 1227.
1893, March 30—May 4.

April 13. THE PLANET MARS. *W. T. S. Lockyer.*

A review of Camille Flammarion's monograph on our near neighbour.

MAGNETIC OBSERVATIONS IN THE NORTH SEAS.

Captain Schück has for several years been making observations at sea of the three magnetic elements. His results are illustrated by drawings of his instruments and by charts of curves of equal value for each magnetic element.

April 20. THE AFTERGLOWS AND BISHOP'S RING. *T. W. Backhouse.*

There has been a marked increase in the amount of dust present in the upper regions of the atmosphere. At sunrise on Nov. 28 “Bishop's ring” and its attendant phenomena were visible in a manner similar to the days of the Krakatoa eruption. The segment below the rosy glow was visible on Nov. 28 at sunset, and continued until Dec. 15 in the S.W. of Europe, and was visible, though not remarkable, in England until Feb. 14. “Bishop's ring” still continues conspicuous at sunset. The second pink glow in the western sky—another feature of the Krakatoa sunsets—has also been visible of late.

THUNDERSTORMS AND AURORAL PHENOMENA. *J. Ewen Davidson.*

On Feb. 4, Mr. Davidson in latitude 21° S. saw a succession of clouds or patches of rosy light 5° or 6° in diameter rise from a thunderstorm in the southern horizon, and disappear at an elevation of 40° or 45° . The sky was almost quite clear overhead, and these clouds bore a remarkable resemblance to auroral phenomena.

April 27. THE SOLAR ECLIPSE.

An account of the telegrams sent to the President of the Royal Society, to the “Times,” to Prof. Holden, and from Prof. Pickering from the stations in Senegambia and in Chili.

May 4. THE APRIL METEORS. *W. F. Denning.*

Observations of the Lyrids on April 18, 20, 21, and 22. Mr. Denning's observations confirm the shifting of the radiant point towards the east during successive nights, but the amount of displacement is not so great as was found in April 1885.

THE GENESIS OF NOVA AURIGÆ. *Richard A. Gregory.*

A review of all the theories that have been advanced on this subject since the appearance of the new star in Feb. 1892.

“ Knowledge.”

1893, May.

STELLAR SPECTRA AND STELLAR VELOCITIES. *Miss A. M. Clerke.*

The first spectroscopic review of the heavens, begun by Secchi in 1863, showed fairly clearly that the geometrical and physical relations of the stars are, to some extent, interdependent. In the Draper Catalogue, the absence of settled criteria of classification gives rise to doubt. It is impossible to rely altogether on a system which recognises no spectroscopic distinction between Capella and Rigel, both being comprised in the same sub-class, and, indeed, most of the stars designated in the Draper Catalogue as of the Capellan type. Sub-classes F. and G. rank visually, according to Vogel, as of the Sirian type. The best available test would seem to lie in the relative strength of the K line.

Prof. Kapteyn lately found that the solar stars are, on the whole, more distant, and more swiftly moving than the Sirian stars. A more searching investigation suggested an opposite inference, however; the result being that the Sirian stars appear to be further off, and quicker in the ratio of 37 to 31. It seems difficult to contest, in the present state of knowledge, Prof. Kapteyn's conclusion that stellar rates of travel are independent of spectral distinctions.

WHAT IS A STAR CLUSTER? *A. C. Ranyard.*

More than 50 years ago Sir John Herschel saw the extreme difficulty of imagining the conditions of conservation of such a system as that of ω Centauri, or 47 Toucani, without admitting repulsive forces on the one hand, or an interposed medium, on the other, to keep the stars asunder. But if we put such considerations on one side, and endeavour to consider the changes which will probably take place under the action of attractive forces such as we are familiar with in our region of space, it would seem that we are forced to admit that a spherical star-cluster cannot be a permanent system, and that the individual stars can only escape collision for a limited period. Prof. G. Darwin has pointed out that if two solid bodies were to collide with planetary velocities there would be a rapid development of gas between them at the region of contact, which would cause them to rebound from one another. If the moving bodies were gaseous or liquid, probably a similar thing would occur, and it is probable that within a short period after such a collision, the gaseous matter evolved at the region of contact would be distributed in space between the rebounding bodies.

It has long been noticed that certain globular clusters present a partially radiated appearance in their outer parts, and that streams of stars appear to spring from them, and to curve away into space. In the Pleiades cluster we have actual photographic evidence of a narrow nebulous stream of matter linking together an alignment of 6 stars; and Prof. Pickering has photographed in Orion a faint nebulous band of light which actually links together a stream of 16 faint stars. In a space closely crowded with stars, like the centre of a star cluster, we should expect frequent

collisions to take place, and, as the result, we should expect to find streams of nebulous matter associated with alignments of stars, radiating from the central mass; and many clusters show traces of nebulosity. A fine photograph of the cluster ω Centauri, taken by Dr. Gill, and five blocks from different photographs of clusters are shown. In some of these, curious projecting structures are visible, extending from the central mass of stars and nebulosity. More than one has the branching character which reminds one of the forms taken by the streams of heated gas which rush upward from the solar photosphere, but in this case the forms do not appear to be wholly gaseous, but are marked out by a series of stellar points. One such structure is shown; its form indicates the existence of a stream of matter on a colossal scale rushing outward from the central region of the cluster, and the broadened summit indicates the passage of the stream through a resisting medium.

“The Observatory.”

No. 201. May 1893.

THE DISTANCE OF THE PLEIADES. *Miss A. M. Clerke.*

The problem of estimating the distance of this star cluster has been attacked by Prof. Pritchard. Previous researches have prepared the way very effectually for determinations of the nature of those mapped out by the Savilian Professor. The triangulation by heliometer executed by Dr. Elkin in 1884-85, compared with Bessel's of 45 years earlier, has had the remarkable result of detaching some half dozen stars (7.9 to 9.2 magnitudes) from their visual companions whose physical independence is guaranteed by their immobility. They remain fixed while the true Pleiades drift slowly to the south-east. These six objects seem adapted to serve as fiducial points for the measurement of the rest. The proper motion of Alcyone with its cortège may be of purely parallactic origin brought about by the movement of the solar system. If this be so, assuming a velocity of the sun of 15 miles a second, the parallax of the cluster will be $0''.013$, corresponding to a light journey of 250 years.

THE TOTAL SOLAR ECLIPSE. *Miss A. Everett.*

This paper contains a summary of the various expeditions equipped for observations of the recent solar eclipse. All were fortunate in securing fine weather at the time of the eclipse, with the result that numerous photographs have been secured and spectroscopic observations made. Prof. Pickering remarks that his observation showed that the present condition of the sun is one of great disturbance.

Four streamers were seen proceeding from the corona, two of which extended over a distance of more than 435,000 miles. Several solar prominences were bright and distinct, reaching in some instances to a height of 80,000 miles.

"Astronomy and Astro-Physics."

1893, April.

General Astronomy.—EVOLUTION OF THE DOUBLE-STAR SYSTEMS.

T. J. J. See.

The effects of tidal friction on a system of two nearly equal suns are discussed. It is found that the principal result is to increase the major axis and the eccentricity of the orbit. The general elongation of all the known double-star orbits seems, therefore, to show that tidal friction has been a very powerful agent in their evolution. The result would be to form a system in which the two bodies moved as though rigidly connected, after which the eccentricity would decrease. In this last condition the stars would be dark and therefore invisible. The process by which a nebula under accelerating axial rotation breaks up into two comparable masses is next considered. It has been shown by Poincaré and Darwin that when equilibrium breaks down in a rotating mass of fluid, the detached portion has usually a far larger ratio to the main mass than is the case with the solar system, and while the separation may take place in the form of a ring, masses of a globular form will generally be produced. The drawing showing how an ellipsoid should break up according to this theory has a very strong resemblance to many drawings of double nebulae, which are thus very probably on the way to become double stars.

It is not advisable to base theories on facts observed in the solar system, in which the revolving bodies are very small relative to the central mass, and the orbits are nearly circular. These peculiarities seem not to occur in most double-star systems, in which tidal friction must therefore play a much more important part. The theory of ring formation is not generally applicable, even in our own anomalous system.

SOME EFFECTS OF A COLLISION BETWEEN TWO ASTEROIDS.

S. J. Corrigan.

Continuation of the discussion of this subject; the motion of particles projected from the central body is considered. The appearance of the comet according to theory is found to agree fairly well with actual observations.

THE NEGLECTED FIELD OF FUNDAMENTAL ASTRONOMY. *J. R.*

Eastman.

Continuation of this paper. The necessity of a new fundamental star catalogue is strongly insisted on.

Astro-Physics.—A NEW TABLE OF STANDARD WAVE-LENGTHS.

H. A. Rowland.

A table of wave-lengths of lines from 2152 to 7714.

NOTE ON THE SPECTRUM OF NOVA AURIGÆ. *W. Huggins.*

The brightest band of the spectrum was resolved into a group of lines extending through about 15 tenth-metres, brighter at the blue end, and without any trace of fluting.

VISUAL OBSERVATIONS OF THE SPECTRUM OF β LYRÆ. *J. E. Keeler.*

Description of visual observations made from 1889, June 6, to 1891, May 7, at the Lick Observatory. An attempt was made to connect changes in the spectrum with the period of light-variability. The observations are somewhat contradictory, but appear to show that the bright lines C, F, and D₃, and the dark D lines are always visible; the variations are principally due to changes in the brightness of the continuous spectrum; the bright lines are brightest when the continuous spectrum is brightest, and are always broad and diffuse, especially at minima. No remarkable change seems to occur at the secondary minimum, but at a principal minimum the bright lines become dimmer, and the fainter ones disappear, the D lines become darker, and strong dark lines appear on the more refrangible side of some of the bright lines in the green.

In the next paper similar observations of the spectrum of P Cygni are described by Mr. Keeler.

In a *Note*, Mr. Holmes considers that Mr. Corrigan's hypothesis of the origin of his comet by collision is not tenable.

An editorial note suggests the issue of a monthly publication to be called "Popular Astronomy," intended for students and amateurs, and promises to start such a magazine, provided that one thousand subscribers at about 10s. annually can be obtained.

"Bulletin Astronomique."

1893, March—April.

Reviews are given of the 47th Report of the Harvard College Observatory, and of the Report for 1892 of the Wolsingham Observatory.

Papers by *J. C. Kapteyn*, "On the Systematic Differences between the Visual and Photographic Magnitudes of Stars in Different Regions of the Heavens" and "On the Distribution of Stars in Space" are discussed. The actinic light of stars in or near the Milky Way is much greater than that of those at a distance from it. After rejecting the effects of different special causes, such as meteorological influences, systematic errors, &c., there seems to be little doubt that the light of stars in or near the Milky Way is richer in violet rays than the light of other stars.

As to the distribution of stars, Prof. Kapteyn concludes: 1. That stars whose proper motion exceeds 0".055 show no aggregation towards the plane of the Milky Way. 2. Stars of very small or insensible proper motion show a very considerable aggregation towards this plane, and a considerable thinning out towards the poles of this plane. 3. Stars of the same magnitude in the Milky Way and elsewhere are not at the same mean distance. 4. The stars in the immediate neighbourhood of the sun are almost exclusively of the second type, and are very probably condensed towards a centre not far from the sun, in R.A. 0°, Dec. +42°, coinciding

approximately with the apparent centre of the Milky Way ring. 5. Stars of the two first types having equal proper motions are at approximately equal mean distances. 6. The absolute luminous power of the first-type stars is about seven times greater than that of those of the second type.

THE LATITUDE OF THE OBSERVATORY OF PARIS. *F. Boquet.*

An historical sketch of the determinations that have been made of this important latitude. Owing to the imperfections of their instruments the early astronomers believed the latitude had undergone, or was undergoing, a change. They even thought a change in the position of the pole was the cause of certain extraordinary seasons and earthquakes. Cassini, however, concluded that no variation was shown by the observations. The latest mean value is $48^{\circ} 50' 10''\cdot 9$.

“Himmel und Erde.”

Vol. V., No. 8. 1893, May.

ENLARGEMENT OF THE EARTH'S SHADOW IN ECLIPSES OF THE MOON.

The coefficients given by Tobias Mayer, Cassini, Lambert, Mädler, and others differ much from one another, and of late years Brosinsky and Hartmann have, independently, investigated the question anew. The results would seem to indicate that the enlargement varies with every eclipse. Both of these astronomers deny that the phenomenon has any relation to the earth's atmosphere, and Prof. Seeliger, in a review of their work, emphatically agrees with them upon this point, giving a mathematical demonstration. He declares that the cause of the appearance is physiological, and due to the inability of the human eye to estimate the geometric boundary of the shadow.

OBSERVATIONS OF ST. ELMO'S FIRE AT THE SONNBLICK.

This mountain station is well adapted for such work, and Herr Lechner has undertaken a systematic series of observations, the strength of the phenomenon during displays being estimated at intervals of 5 or 10 minutes with the help of a Bohnenberger electroscope, and the meteorological accompaniments, as snowfalls, thunderstorms, and force and direction of the wind, being carefully noted. Wind had no effect on the phenomenon. Thunderstorms were by no means invariable attendants, but the displays were always connected with depressions, and never took place with a clear sky. The sign of the electricity was subject to change, especially during thunderstorms. In winter negative St. Elmo's fire is much more frequent than positive, and seems connected with falls of fine snow, the large-flaked snow which falls in summer being almost always accompanied by positive St. Elmo's fire.

“Comptes Rendus de l'Academie des Sciences.”

Vol. CXVI., Nos. 14-19. 1893, April 3—May 8.

OBSERVATIONS OF THE SOLAR ECLIPSE OF APRIL 16, MADE AT
PARIS, LYONS, AND ALGIERS.

The times of first and second contact obtained by several observers at each observatory are given. At Paris 6 photographs were taken by M. Henry, and at Algiers 32 by M. Trépid and M. Renaux. The latter were taken with an exposure of $\frac{1}{6000}$ of a second, the aperture of the objective being reduced to 10 centimetres.

At Lyons the observations were a good deal interfered with by cloud, but at Algiers the conditions were excellent. A despatch received at Paris from M. Deslandres announces that the latter made his observations at Fundium (Senegal) under fairly good conditions.

M. Spée, of Brussels Observatory, who was making a passing stay at Algiers at the time of the eclipse (which there only covered $\frac{43}{100}$ of the solar disk) took some observations to ascertain whether the lines of the spectrum in the neighbourhood of the horns underwent any change. The results were negative. The observations were made under the best conditions, with the Thollon spectroscope, and a solar image 6 centimetres in diameter. The moon's passage across the nucleus of a large sun-spot was watched, and no modification of the lines occurred even at the moment of contact. The region of F, that of magnesium, the D group and the C line were studied in succession. At the moment of greatest phase, the magnesium lines b^1 , b^2 , and b^4 , were more accentuated, and seemed to be bordered right and left by very fine lines.

THE SPECTRO-PHOTOGRAPHIC METHOD APPLIED TO THE SOLAR
CORONA. *Prof. George Hale.*

In “Comptes Rendus” of March 6, M. Janssen spoke of Prof. Hale's work in flattering terms, and at the same time recalled the fact that he (M. Janssen) had been the first to propose, in 1869, the method now actually adopted for obtaining monochromatic images of the sun. Prof. Hale hastens to congratulate the illustrious astronomer on having been the discoverer of a method which has already been the means of considerably increasing our knowledge of the sun's constitution. Prof. Hale has been engaged in attempts to examine the solar corona in full sunlight, and finds that the best results are obtained by making the black line K, or some other black line in the superposed spectra of the corona and terrestrial atmosphere, fall upon the second slit.

The coronal light is known to give three distinct spectra :—

1. A bright line spectrum (including the K line).
2. A continuous spectrum.
3. A feeble solar spectrum. The most intense part of the coronal light corresponds to the continuous spectrum. If the dark line K be made to fall on the second slit, the intensity of the atmospheric light will be greatly reduced, and will make a comparatively feeble impression upon the sensitive plate. (*Note.*—This method differs from that

employed for prominence observations, for in this case we do not require to diminish the atmospheric light by increasing the spectroscopic dispersion.) Again, the continuous spectrum of the corona will there have its normal brightness, and the chemical action will be stronger for the bright line K. On account of the feebleness of the coronal light, the dispersion employed should be very feeble and the motion of the slits slow.

OBSERVATIONS OF COMET BROOKS, 1892 VI., COMET HOLMES, AND COMET BROOKS, 1893 I., MADE WITH THE LARGE EQUATORIAL AT BORDEAUX, 1892-3.

The notes to the tabular matter inform us that Comet Brooks, 1892 VI., in September was feeble and diffused. In October and November it was fairly bright and round, with a feeble nucleus fairly well defined.

Comet Holmes, feeble and diffused during the first days of January, took the appearance of a nebulous star between January 14 and 16, with a nucleus of 8th or 9th mag. On January 27 the comet was diffused. Its nucleus, fairly sharp and elongated, presented the same appearance as at the beginning of November. On January 30 the comet was faint, the central condensation still visible. February 4 a diffused nebulosity with a slight eccentric luminous condensation of elongated form. The comet, in fact, during this series of observations appears to have passed through phases analogous to those shown in November and December, its nucleus at first condensed, gradually expanding and becoming less dense as the diameter increased.

The changes of this comet were regular and followed a normal course. In the middle of December the comet was round, with a fairly well-defined nucleus. Its apparent diameter then gradually increased until perihelion passage. The comet was then fairly bright, with a nucleus of the 13th magnitude, which remained visible till the end of January. During the months of February and March, the comet remained round and condensed, its apparent diameter diminishing, till on March 8 it was not more than 15" of arc.

SOLAR OBSERVATIONS FOR THE FIRST QUARTER OF 1893.
M. Tacchini.

The frequency of spots and groups has been nearly equal to that of the last quarter of 1892, the spot extension greater. Several spots have had a veiled appearance, and the faculæ have been less extended and less definite, a fact which drives M. Tacchini to assume a certain amount of nebulosity in the solar atmosphere, a view confirmed by his prominence observations. The prominence phenomena have been less marked than during the preceding quarter. No remarkably fine prominence was seen. Once only in March one exceeded 2' in height. The mean height showed a decrease since last quarter.

On April 16 observations of the chromosphere and prominences were made at Rome, Palermo, and Catania, which will be published in "Mem. degli Spettroscopisti."

“L’Astronomie.”

MAY 1893.

THE PROGRESS OF ASTRONOMY. *F. Tisserand.*

This, the annual address of the President of the Astronomical Society of France, is an able resumé of the work of the year; it deals, among other matters, with Variability of Latitude, the 5th moon of Jupiter, the Nova in Auriga, and Celestial Photography.

PROGRESS OF THE ASTRONOMICAL SOCIETY OF FRANCE. *C. Flammarion.*

An address by the Secretary of the Society, in which is noticed briefly the work of members; the preface is charming. Here is a passage: “Generally, it is useful to believe in one’s work—“ we are not speaking of politics, be it understood—but in “ science, one cannot be insincere . . . if you meet a savant “ who has no faith in the ideal which he is pursuing, mistrust “ him; he is capable of political ambition.”

CELESTIAL PHOTOGRAPHY WITH COMMON APPARATUS AND SMALL TELESCOPES. *Dr. Lorin.*

The writer’s object is to show that with modest apparatus amateurs may obtain photographs of the phases of the moon, the sun, and star groups. With an ordinary photographic camera, suitably attached to a stand, 50 seconds’ exposure enabled the trails of about 20 stars in Orion to be recognised. Illustrations with descriptions are given of simple apparatus to be applied to the eye-end of a small telescope, whereby lunar and solar photographs of from 1 to 4 centimetres in diameter may be obtained.

“Astronomische Nachrichten.”

Nos. 3158–3161. 1893, April 4 to May 1.

No. 3158. REMARK ON THE ARITHMETICAL MEAN. *H. Seeliger.*

A short discussion of the theoretical foundation of the mode of reducing photometric observations. Such observations cannot be reduced in the ordinary way, as with them the arithmetical mean does not furnish the most probable value.

ON THE ROTATION OF THE SUN DEDUCED FROM THE OBSERVATION OF FACULÆ. *A. Belopolsky.*

This note refers to an investigation printed in the “Memorie degli Spettroscopisti Italiani,” (Vol. XXI.), and is directed against a criticism of it by Dr. Wilsing. The author maintains that no disagreement exists between the law for the solar rotation deduced from the observation of spots and faculæ respectively, and points out the desirability of observations of the latter and their reduction.

"Sirius."

1893, April—May.

April. LANGRENUS. *Dr. L. Weinek.*

Two enlargements of the region were examined. One was exposed on 1890, August 31^d 14^h 27^m, Pacific standard time; the other was exposed two minutes later. A comparison of these was made for the identification of faint details, and showed that, 1st, the photographic conditions varied from plate to plate; 2nd, the atmospheric conditions also varied; 3rd, in taking positives, the method of illumination and the exposure must be taken into account. An example of this is shown in a faint crater which lies to the east of a central large crater. This was well marked in the first photograph, but in the second was scarcely recognisable as a crater-like object. A detailed description of the plate, and a print of Langrenus follows.

THE SUN AND THE ACCUMULATION OF EARTH MAGNETISM.

This is an embodiment of Lord Kelvin's statements on the subject at the Royal Society. If the magnetism of the earth is principally due to its rotation, so also must Venus, Mars, and the sun itself be magnets by the same cause. We do not know, however, in what respects cold, rigid, rotating bodies like the earth or Mars would differ from a hot fluid rotating body like the sun. If we neglect the slight inclination of the sun's equator to the ecliptic, we have a magnetic force perpendicular to the equator at each point of the earth's path which varies inversely as the cube of the distance. The components of this force parallel and perpendicular to the earth's axis would be 0.92 and 0.4 of the whole force, and in these we should find respectively a yearly and a daily period owing to the earth's orbit and its rotation by observing the movement of the terrestrial magnetic needle from an imaginary star whose Dec. = 0 and R.A. = 270°. The writer proceeds to discuss the connexion between the variation of the magnet and the periodicity of sunspots, but decides that this supposed connection is only a coincidence.

THE MOTION OF THE SOLAR SYSTEM DEDUCED FROM THE SPECTROSCOPIC OBSERVATIONS OF MOTIONS IN THE LINE OF SIGHT.

This is a reproduction of Dr. Vogel's and Dr. Kempf's results given in "Astronomische Nachrichten," No. 3150.

THE STRANGE APPEARANCE OF COMET HOLMES.

A history of the comet since its discovery, and a discussion of the various theories respecting it, especially of that of Mr. Corrigan who assigns its origin to a planetary collision.

S. W. BURNHAM'S DOUBLE STAR MEASURES OF 1891.

A discussion of the distances in seconds of arc and position angles of 10 or 12 binaries.

OBSERVATIONS OF THE PHOTOGRAPHIC SPECTRUM OF THE PLANETARY NEBULÆ AND OF THE NEW STAR. *Eugen von Gothard.*

In September and October a photograph of the Dumb-bell Nebula was taken by means of the 10-inch object prism attached

to the $10\frac{1}{4}$ -inch reflector. A drawing of the nebula was made at the same time. Also photographs of the ring nebula and of seven planetary nebulae, and of Nova Aurigæ. Herr von Gothard gives a detailed account of these observations and a summary of the results. The physical and chemical appearance of the new star was very similar to that of the planetary nebulae.

May. ENLARGED LUNAR PHOTOGRAPH FROM THE LICK OBSERVATORY. *Dr. Klein.*

A description of a photograph enlarged 69 times and taken on 1891, July 13^d 8^h 27^m, Pacific time. The crater Hyginus was in the centre of the field. A small crater was easily seen on its lower border. Zneckenberg was characteristic in its shape, and the new crater Hyginus N., was very round and clear.

THE SPECTROSCOPIC RESEARCHES AT THE PARIS OBSERVATORY.

A note on the report issued by the Director of the Paris Observatory on this subject.

SPECTROSCOPIC OBSERVATIONS AT THE O'GYALLA OBSERVATORY.

Observations of Nova Aurigæ and Comet Swift communicated by Dr. N. von Konkoly at the meeting of the Academy on 1892, June 20.

THE BIELIDS OF 1872, 1885, AND 1892. *Th. Bredichin.*

During the near approach to the sun of Biela's comet, in 1846, it was dissociated into several portions which pursued henceforward different paths intersecting that of the earth. A similar division is seen in Comet 1, 1889. The cause of the disruption may be summarily spoken of as an impulse, and at the moment of separation the primary and secondary paths intersect. If we suppose that the impulse is directed towards the sun, the primary velocity will have a positive sign. Herr Bredichin adds a table of the elements of the derived paths in the three years.

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No. 295 (Vol. XIII., No. 7). April 28, 1893.

OBSERVATIONS AND PERIODS OF SOME SOUTHERN VARIABLES.

A. W. Roberts.

Star.	P.	E.
<i>L₂ Puppis</i> , Max.	137 ^d .21	1893, April 5.9.
<i>R Carina</i> , Max.	310 ^d .98	" Sept. 20.28.
<i>R Muscæ</i> , Max.	0 ^d .882405 ± 0 ^d .0002	" Jan.9.515 ± 0 ^d .011
" Min.	"	" " 9.224 ± 0 ^d .012
<i>R Trianguli Australis</i> , Max.	3 ^d .3893	" " 19.564
" " Min.	3 ^d .38921	" " 22.092
<i>κ Pavonis</i> , Max.	9 ^d .1014	" " 2.377

Astronomy in the Monthlies.

“Nineteenth Century.”

1893, April.

RECENT SCIENCE. *Prince Kropotkin.*

Halley, in 1735, and Dove, in this century, first elaborated theories explaining the laws of atmospheric circulation. Briefly, the heated air of the equator rises and flows towards the poles, suffering a deflection to the right in the northern hemisphere, on account of its greater speed of rotation than that of higher latitudes, and its place is taken by an undercurrent of air from the polar regions. The formulation of this theory gave a great impetus to meteorological observations, and some 35 years ago Leverrier and Fitzroy ventured to foretell the weather 24 hours in advance by laws chiefly empirical, and depending on the fact that wind will blow from a region of high barometric pressure (anti-cyclone), to a region of low pressure (cyclone), with a certain deflection to the right or left. In this theory a permanent upper warm west wind in our latitudes was altogether unaccounted for, and Ferrol, the American meteorologist, has revised Dove's theory, basing his new hypothesis on the motion of liquids and gases of different densities. In this, the air from the equator, preserves, not its velocity of rotation, but its energy of rotation, *i.e.*, it obeys the law of preservation of areas. The air flows in great spirals to the poles, both in the upper strata and also on the earth's surface beyond 30° of latitude, while the return current blows nearly perpendicular to the above spirals on the earth's surface in the zone between 30° N. and S., and in the middle strata. Siemens has objected to this theory on the ground that the energy of rotation of the atmosphere must remain constant. Helmholtz also has shown that there must arise air-waves between the upper and lower strata, similar to those raised on the sea by the wind. These we sometimes see in the moisture-laden lower stratum condensed as clouds. Bezold has attacked former theories in showing that a cyclone cannot be formed by local heating, being in fact cooler than the surrounding air, and conversely with anti-cyclones. The article concludes with a notice of Mr. Buchan's charts embodied in the last volume of the “*Challenger*” *Expedition Reports*.

“Fortnightly Review.”

1893, May.

IS THE UNIVERSE INFINITE? *Sir R. S. Ball.*

Bishop Butler has said that “Probability is the Guide of Life.” By its means the old theory of a “Central Sun,” located in the Pleiades, is shown to be a false one, since it is as improbable as it would be for a naturalist to assume that he would find a certain individual diatom inhabiting the Atlantic Ocean in the first drop

of water examined on the coast of Cornwall. By the same reasoning from probability we assume that θ Orionis and the great Orion nebula are intimately connected, and the theory affords us invaluable information as to the existence of numberless bodies in space that can never be visible to terrestrial observers. Not only must there be many more bright bodies than the longest exposure of a photographic plate will show us, but since the period of incandescence is a comparatively short and unique portion of a star's life there may be more dark bodies in the universe than the human mind can conceive. Is then the quantity of matter in the universe infinite? Probably not, for, if so, space must be infinite also. Now Kant has long ago shown that space is rather to be looked on as a form in which the human mind regards objects than as a self-existing fact of external nature. If we do not assume Euclid's 12th axiom, or what comes to the same thing, if we do not acknowledge that the three angles of a triangle together equal two right angles, it can be demonstrated that all known facts about space are reconcilable with the supposition that if we follow a straight line through space, after a journey which is not infinite we shall find ourselves back at the point of starting. For the word *straight* we use the definition which science has shown properly belongs to it. No rigid proof has ever yet been given that the three angles of a triangle are equal to two right angles.

"Contemporary Review."

1893, May.

THE RECENT ECLIPSE. *Sir R. S. Ball.*

The late eclipse was rendered remarkable by the great number of observing stations along its path. At its western extremity it was observed by Prof. Pickering in Chili at 1 p.m. Greenwich mean time. On the other side of South America, on the coast of Brazil, observers armed with cameras and spectroscopes watched it during the brief cloudless period that fortunately accompanied totality. In the dark belt on the Atlantic itself no astronomical observations could be made. In Equatorial Africa, in N. lat. 15° , near the River Gambia, both French and English astronomers were waiting to observe it, and about 4^h 15^m Greenwich mean time the total eclipse vanished at a point in the Desert of Sahara. There was no need to observe the prominences of the sun, as they can now be observed at any time by Janssen and Lockyer's methods. A matter of supreme importance was the corona which is yet only visible during eclipse. As this is the period of maximum solar activity its form should be that of a quadrilateral, and since photographs of it have been taken at widely separated stations we shall be able to judge if changes take place in short spaces of time. Much interest is attached to Mr. Fowler's photographs of the corona, produced by placing a glass prism in front of an object-glass of 6-inch aperture. By this means a distinct image will be impressed on the plate by each ray of different refrangibility. It may also be possible to judge to what extent the corona shares in the rotation of the sun's photosphere.
