observer of the heavens. In the *Bibliographie Astronomique* we find an astronomical work printed in 1625, attributed to him as Willem Jansz Blauw.

It will be seen from the works of Kepler and Cassini that Blaeu's star (34 Cygni of our present catalogues) at no time rose higher than the third magnitude, though even Mädler (*Populäre Astronomie*) has so far overlooked its history as to tell us "it reached the first magnitude"; and he attributes its discovery to Kepler.

THE "ASTRONOMISCHE NACHRICHTEN."—Contrary to what has been lately stated, it appears that this periodical will still be edited by Dr. C. F. W. Peters, who has for some time conducted it, and we are informed there is a probability that Prof. Krüger may set afloat a new astronomical journal under his own management. Whether the multiplication of high-class astronomical journals to the extent we are likely to witness is a practical advantage may perhaps be doubtful. For many years the *Astronomische Nachrichten* contained almost all that bore upon the progress of exact astronomy; *sed tempora mutantur, et nos mutamur in illis.*

THE COMET 1880 *e* (SWIFT, OCTOBER 10).—The completion of the mounting of the large Merz-Repsold refractor at the Imperial Observatory, Strassburg, enabled Prof. Winnecke to observe this interesting comet as late as January 26, when unfavourable weather interfered, and he was not without the hope that it would be within reach after the next period of absence of moonlight. Even if this should not prove to have been the case, there will be more than fifteen weeks' observations available for the determination of the actual orbit of the comet, affording every reason to expect that its track in the heavens nearly eleven years hence, or at its next visible return, may be pretty closely predicted. The following positions are deduced from MM. Schulhof and Bossert's last elements:—

At Greenwich midnight

1881.	R.A. h. m. s.	Decl. °	Log. distance from Earth.	Sun.
Feb. 14	6 42 20	+21 21·4	9·9007	0·2147
16	6 44 54	21 10·4	9·9158	0·2192
18	6 47 29	20 59·8	9·9307	0·2236
20	6 50 5	20 49·7	9·9454	0·2280
22	6 52 41	20 39·9	9·9600	0·2323
24	6 55 18	+20 30·4	9·9745	0·2366

Prof. Winnecke reports that the Merz-Repsold refractor is a great success; *Mimas* is an easy object, and it may be hoped that the observation of the nebulæ, to which it is understood the instrument is to be chiefly directed, may not prevent attention being given to the closest of Saturn's satellites.

THE PERSEIDS IN AUGUST, 1880.—M. Baillaud, Director of the Observatory of Toulouse, has published the results of the watch for meteors, maintained by three observers on the nights of August 9, 10, and 11 in the past year: 1172 shooting-stars were observed, and 83 of the longest tracks were traced upon a chart; generally the tracks were very short, and their extremities pretty distant from the radiant. The meteors appeared to diverge from two points—the more numerous group from R.A. 42° 37′, Decl. 56° 39′; and a group of about one third the former, from R.A. 60° 39′, Decl. 62° 4′. The maximum occurred on August 10, between 14h. and 15h., in which interval 200 meteors were noted.

PHYSICAL NOTES

M. WIESNEGG has lately constructed for M. d'Arsonval a new steam-pressure regulator which deserves notice. It fulfils, according to the inventor, the following conditions:—(1) It maintains a perfectly constant pressure of steam in a boiler, whatever the actual output; (2) it maintains the consumption of fuel at a rate proportional to the output of steam; and (3) it is absolutely automatic, and therefore prevents all risks of explosion. This regulator is of very simple construction. A lead pipe from the boiler leads to a little apparatus somewhat resembling an ordinary lever safety-valve, but in which the valve-plug, instead of fitting into the usual conical seat, rests upon a thin disk of india-rubber. This disk rises when the pressure from below exceeds the downward pressure of the plug and the superincumbent lever, and of the weight which it carries. It cannot get hot, as it is far from the boiler, and the space below the disk is filled with water condensed from the steam. The upper surface of the valve-plug regulates by its movement the flow of gas, which comes in and goes out by two pipes leading to the upper part of the regulator. One of these comes from the gas mains, the other goes out to the burners under the boiler. By this arrangement, whenever the pressure in the boiler reaches any desired maximum, the apparatus itself reduces the supply and turns down the flame, thus maintaining the pressure constant and the consumption proportional to the output of vapour. It will be seen that the invention is only applicable to the case where the fuel employed is gas. The apparatus is also in itself an automatic safety valve, putting out the fire when the pressure exceeds the limit. M. Wiesnegg has had practical experience during three years of the working of the new regulator, which appears to leave nothing to be desired in its performance. The same gentleman has constructed a constant-pressure air-blast on the same principle.

PROF. CASSANI invites attention in the *Rivista Sci. Ind.* (November 30) to some singular phenomena of geometrical optics, thus indicated:—The real images, presented by a concave mirror or by a convergent lens, of a plane or spherical mirror, a lens or a prism, may by a suitable arrangement be made to appear like a real mirror, lens, or prism respectively. An observer stands opposite a concave mirror supported (with slight slant) at a distance greater than the radius of curvature, and receiving no other light than that reflected from his face (illuminated by a dark lantern). A small plane mirror placed in a position nearer the concave mirror than the observer, and sloping in opposite direction (it is concealed from his eye). The effect is that, on looking obliquely upwards, the observer seems to see a plane mirror (which is of larger size than the other) with his direct image in it. The illusion is the more complete if the actual plane mirror have an ornamental frame, and this be illuminated by a special lamp. As the image in the ideal mirror is always rather small and too near the mirror, this may arouse suspicion, the more so when the image is seen to diminish on receding and increase on advancing; but a person not familiar with the phenomena of concave mirrors may easily be deceived, thinking he sees a real mirror.

IN the *Proc. R.S.E.* Sir W. Thomson describes a thermo-magnetic thermoscope of an ingenious nature. It is well known that the "permanent" magnetism of steel magnets is not constant, but changes slightly with changes of temperature, the magnet becoming weaker when warmed, and recovering its strength as it is cooled. The magnetic thermoscope is intended to indicate differences of temperature by showing differences between the magnetic moments of steel magnets. Two thin wires of hard steel, each one centimetre long, are arranged so as to form a *nearly* astatic couple, being magnetised to equal strength and set in opposite directions, but not quite parallel, so that they set at right angles to the magnetic meridian. Two other magnets, about twice the size of the former pair, are placed one on each side of this astatic couple as "deflectors," being laid in one line nearly along the magnetic meridian, with their similar poles facing one another at about two centimetres apart. When properly adjusted the little astatic pair suspended between them will be found to be excessively sensitive to the least change in the strength of either of the deflectors, and if they are at different temperatures will turn through an angle which if small may be regarded as a measure of the temperature-difference. A small mirror suspended from the lower needle of the pair serves to reflect a spot of light on to a scale in the usual way.

IN 1870 and 1871 MM. Leverrier and Crova experimented with an optical telegraph between Nîmes and Redessan. Their system of signals were made by means of oil lamps or petroleum lamps fed by oxygen from a supply that could be turned on or off at will by an operator, who thus produced intermittent brilliant outbursts of flame according to a pre-arranged code. During December, 1880, a similar device was conceived by M. Mercadier, against whom M. Crova now reclaims the essential principles of his invention. He adds that two of the requisites of success lay in the use of oxygen under *very low pressure*, feeding the flame by an orifice in the midst of the flame, and in the employment of keys opening and shutting the gas-passages very suddenly by means of strong springs, without which the changes in the intensity of the flame go on too slowly to be comfortably observed. In the experiments of 1870-71 the lights at Nîmes were visible at Redessan and *vice versâ*, even in broad daylight. The oxygen supply was contained in ordinary gas bags of caoutchouc and prepared in the usual manner.

ONE of M. Mercadier's recent experiments in radiophony deserves a note. A disk of thin copper about 4 centims. in diameter, heated at its back by an oxyhydrogen blowpipe, was placed behind a rotating wheel with apertures, and the intermittent heat-rays were received upon one of his sensitive disks of thin metal blackened at the surface. With a bright red heat the customary note was well heard from the intermittent beams. On putting out the flame the sound gradually fell off in intensity, but was still audible after the copper disk had ceased to emit visible rays. All that this experiment proves, however, is that the dark rays, when they fall intermittently upon an absorbent surface, can cause it to undergo rapid expansions and contractions; while Graham Bell's earlier experiment showed that visible rays could produce this result.

M. CORNU discusses in the *Comptes rendus* the propositions of M. Gouy concerning the velocity of propagation of light proceeding from a source of variable amplitude, on which we lately published a note. He denies the truth of M. Gouy's fundamental assumptions, and concludes that since all our appliances can only change the amplitude of the waves by quantities which may be regarded as constant during a great many successive waves, the formula of waves of persistent type will still hold good, and the velocity of propagation of the amplitudes will be identical with that of the waves themselves.

M. CHAPPUIS thinks that the blue of the sky may be due to ozone present in the upper regions of the air. He argues that the electrical discharges constantly taking place will produce ozone; and the recent researches of himself and M. Hautefeuille have shown that ozone, at any rate when near its condensation point, is of a blue tint. He has examined the absorption-spectrum of ozone and finds nine dark bands in it, three at least of which correspond with known bands in the telluric spectrum.

To obtain enlarged impressions from the phonograph, MM. Roig and Torres (*Cronica cientifica*, No. 4) substitute for the metallic membrane which bears the indenting style a plate of mica, quite free at the border, and supported at the centre by an axis of caoutchouc fixed to a small spring. This axis carries, besides the short style for acting on the tin sheet, a small metallic piece in a plane perpendicular to the axis of the style, and this supports a second style, long and thin, the vibrations of which are inscribed on a cylinder blackened with smoke. The same angular velocity is imparted (by means of clockwork) to the cylinder of the phonograph and the blackened cylinder, and while the short style makes its usual marks on the tin, the long one produces a larger tracing on the cylinder, which the authors have tried to decipher. They have succeeded easily in recognising the different vowels, some consonants, and even some syllables, but they have not been able to read entire phrases. The curves are more characteristic if the voice be used with ordinary intensity; on forcing it they are deteriorated.

PROF. AVENARIUS, of Kiew, has taken out an Austrian patent for a new method of division of the electric light. The method is that of insertion of a polariser in a secondary circuit, connected with each electric lamp. The polariser, consists of several voltameters connected together. The current, supplied by an electrodynamic machine, divides before entering each lamp: one part goes through the lamp, while the second goes through the secondary circuit and the polariser and then back to the primary circuit. By insertion of a considerable resistance, *e.g.* increase of the voltameters, the light-intensity of the lamps may be varied. The individual lamps are independent of each other, and lamps of different systems may be simultaneously used.

WE notice in the minutes of meetings of the Russian Physical and Chemical Society (vol. xii. fasc. 9) the researches, by M. Glasenap, on refraction. The want of concentricity of sheets of air of equal density produces a certain variation in the normal refraction given in the tables; the surfaces of equal density being as a rule inclined to some degree instead of being horizontal, and the degree of inclination being submitted to a certain periodicity during a whole year, there necessarily arises from this cause a certain correction to be applied to the observed position of a star, much like to that of the annual parallax and aberration, and which might be described as "parallax of refraction." As this correction must obviously affect the values of the annual parallax and of aberration, it is easy to understand the necessity to determine its true value with much accuracy. The values deduced by M. Glasenap for the stars of the Ursæ Majoris, ι and O Draconis, are $-0''\cdot04$, $-0''\cdot11$, and $-0''\cdot11$, which figures would explain to a certain extent the negative parallaxes received by M. Nyrén ("Nutation der Erdaxe"), and which respectively are $-''\cdot03$, $-0''\cdot05$, and $-0''\cdot16$. The whole work of M. Glasenap on this subject will soon be published.

CHEMICAL NOTES

THE influence of time on processes of chemical change has not yet been thoroughly investigated. In a recent number of *Comptes rendus* Berthelot makes a contribution to this subject which is scarcely likely to be accepted by chemists without further investigation. From the results of many thermo-chemical measurements Berthelot states that the chemical change, which occurs when an acid soluble in water acts on a soluble base or salt, or *vice versâ*, or when two soluble salts mutually react, is completed in a space of time not appreciably greater than that required for completely mixing the two solutions.

FROM experiments on the evolution of carbon dioxide from the roots of plants, detailed in the *Bull. de la Soc. botanique de France*, M. Cauvet concludes that carbon dioxide is certainly evolved from plant-roots; that the quantity evolved is less during night than during day; and that the quantity evolved increases at sunrise, decreases towards midday, and again increases in the evening.

HERR SALLERON describes in *Naturforscher* an instance of the modifying influence of moderately heated liquids on glass. An aræometer used in a sugar-work lost about 0·5 grm. in weight after immersion for eight days in a sugar syrup at 95°. The syrup contained 115 grm. sugar and 91 grm. ash per litre. After a few more days the glass split off in splinters.

MR. A. A. NESBIT has recently patented a very ingenious process for preventing fraudulent alterations of bankers' cheques. Mr. Nesbit prints his cheques with a dye or dyes, the colour of which is differently changed by acids and by alkalies; the inscriptions on the cheques are apparent by virtue of the alkalinity or acidity of the dye. Immersion in dilute acid—for the purpose of dissolving out the written part of the cheque—causes the whole inscription to become acid tint; as subsequent treatment with alkali changes the whole inscription to alkaline tint, the original inscription cannot be restored. If the acid part of the inscription be printed with a dye which is more strongly acid than the alkaline part is alkaline, treatment of the cheque with a neutral solvent of writing ink suffices to blur the inscription, and this blurring cannot be removed. Various modifications of the invention, and details of the processes of printing, colours used, &c., are given in the specification.

M. ÉTARD thinks that boron shows certain analogies with vanadium; in endeavouring further to illustrate such analogies he has obtained indications, although not yet positive proof, of the existence of an acid containing more oxygen than boric acid. He has also obtained, by the action of a saturated solution of boric acid on hydrated barium dioxide, a salt to which he gives the formula $B_2O_4 . BaO . 3H_2O$, and the name *barium perborate*. This salt dissolves in acids with evolution of oxygen; it is very deliquescent (*Compt. rend.*).

IN continuation of his investigation into the compounds of sulphur and nitrogen M. Demarcay describes (*Compt. rend.*) various bodies which he regards as compounds of the radicle—$(S_4N_3)'$—called by him *thiotriazyl*. The more important of the new compounds are formulated as $(S_4N_3)Cl$, $(S_4N_3)NO_3$, and $(S_4N_3)HSO_4$.

LIEBEN describes (in *Wien. Akad. Ber.*) several compounds of calcium chloride with fatty acids, more especially the three compounds with butyric acid, viz.:—

$$CaCl_2 . C_4H_8O_2;\ CaCl_2 . 2C_4H_8O_2 . 2H_2O;\ \text{and}$$
$$CaCl_2 . Ca(C_4H_7O_2)_2 . 4C_4H_8O_2.$$

M. BYASSON states (*Compt. rend.*) that if every trace of sulphurous acid be removed from chloral, the latter retains its liquid condition for an indefinite time, and that the change into solid metachloral, which soon takes place in chloral purified only by distillation, may be thus prevented. To remove the last traces of sulphurous acid M. Byasson agitates the chloral with $\frac{1}{100}$ of its weight of finely-powdered caustic baryta, decants the liquid, and distils.