

the opinion expressed by Dr. Julius Schmidt from his earlier observations, the true period of this notable variable star, instead of being a little less than five days, appears to be a little less than half this interval, otherwise *minima* observed at Harvard College, will not accord with those of May and August observed in Europe.

It is probable that Schwed observed the star near a *maximum* at meridian transit at Speyer on March 11, 1828, when he estimated its magnitude 6.7, and near a *minimum* at transit on May 12 in the same year, when he rated it only 10m. If we compare the observation of March 11 with that of Dr. Schmidt, who fixed a *minimum* to August 12 at 6h. mean time at Athens, and assume 7662 periods to be included in the interval, we get for the duration of one period 2.49084d., or 2d. 11h. 46.81m., which closely accords with half the period assigned by Schmidt from his own observations and those of Ceraski. This reckoning from August 12.1841 Greenwich mean time, and correcting for the light-equation, will give the following times of geocentric minima observable in this country:—

	h. m.		h. m.
Oct. 28 ...	9 33	G.M.T.	Nov. 17 ... 7 47 G.M.T.
Nov. 2 ...	9 7	"	22 ... 7 21 "
7 ...	8 40	"	27 ... 6 54 "
12 ...	8 14	"	Dec. 2 ... 6 28 "

And for the times of visible maxima, supposing this phase to occur midway between the minima, we find—

	h. m.		h. m.
Oct. 29 ...	15 27	G.M.T.	Nov. 18 ... 13 40 G.M.T.
Nov. 3 ...	15 0	"	23 ... 13 14 "
8 ...	14 33	"	28 ... 12 48 "
13 ...	14 7	"	Dec. 3 ... 12 21 "

If S be the sun's longitude, and R the earth's radius-vector, the correction for the light-equation (geocentric—heliocentric) for 1880 may be found from

$$\text{Cor.} = 224.08 R. \sin(S + 19^\circ 17'4).$$

We have received from Lord Lindsay a circular containing the same information that is given in Prof. Pickering's letter, with the addition of a diagram showing the *Durchmusterung* stars in the vicinity of the variable, which for 1881.0 has R.A. oh. 51m. 48s., N.P.D. $8^\circ 46'0$.

[Mr. Knott's observation on October 23, received since the above was in type, as compared with Athens, August 12, seems to require a somewhat longer period, with minima a half hour or so later than we have computed.]

THE ROTATION OF JUPITER.—In No. 2,342 of the *Astronomische Nachrichten* (to which we refer for numerical details) Dr. Julius Schmidt has a communication wherein he finds, from observations of the red spot upon the disk of Jupiter by himself and others in 1879-80, an interval of 9h. 55m. 34.4s. for the time of the planet's rotation upon its axis, a result that he considers may be adopted until the observations generally have attained a greater degree of precision than they appear to possess at present. With due care and practice, however, he believes that such observations will be found to admit of much greater accuracy, and illustrates this by his own experience at Athens in the present year. In the same communication he also discusses observations of a dark oval spot (a more favourable object than any used by Airy and Mädler) during 104 rotations in 1862; these observations give 9h. 55m. 25.68s. for the period of rotation, a result closely agreeing with those of 1834-35.

CHEMICAL NOTES

A NEW method of preparing acetylene is described by Dr. W. Suida in *Wien. Akad. Ber.* The method consists in heating iodoform and mercury ethide in sealed tubes to 120° ; the products of the reaction are acetylene, ethylene, ethylic iodide, and mercury ethylidide.

THE same *Berichte* contains a paper by Herr v. Dumreicher on the relative stabilities of nitrous and nitric oxides, and of nitrous and nitric oxides when acted on stannous chloride. Nitrous oxide is not reduced even at 100° ; nitrous acid is reduced to nitrous oxide; nitric oxide and nitric acid are reduced to hydroxylamine, and subsequently to ammonia. The reaction may be applied to the estimation of nitric acid.

IN the *Proceedings* of the Academy of Rome Signor Cossa communicates the results of experiments on didymium tungstate: he has determined the specific heat of this salt to be 0.0831—

temperature limits are not given. Taking the atomic heat of tungsten as 6.4, and that of oxygen as 4, this result points rather to the formula for didymium tungstate, DiWO_4 (Di = 98), than to that now generally accepted, $\text{Di}_2(\text{WO}_4)_3$ (Di = 147).

A NEW organo-metallic compound containing the divalent radicle $(\text{CH}_2)_2$ is described in the *Journal* of the Chemical Society by Sakurai; the formula of the new substance, for which the name *Monomericuric methylene iodide* is proposed is $\text{I}(\text{CH}_2)_2\text{HgI}$. This is the first known metallic compound containing a *divalent* hydrocarbon radicle.

G. BOUCHARDAT claims, in *Compt. rend.*, to have converted amylene, by successive removals of hydrogen, into cymene. Hitherto attempts to pass, by a simple series of reactions, similar to those by which the passage from one isologous group to another is effected, from the paraffin to the aromatic group of compounds, have not been successful.

ACCORDING to the experiments of Macagno (*Bied. Centralblatt*) the mellowness of old wine is due more to an increase in the amount of glycerine present, than to a decrease in the tannin; there must also be a certain proportion between the amounts of alcohol and tannin, in order that the wine may keep well.

IN the *Annales Chim. Phys.* Berthelot describes an apparatus in which the combination of two gaseous constituents to form a gaseous compound may be conducted, so as to allow of an accurate measurement of the thermal change which accompanies the chemical change.

A DISCUSSION as to the value to be assigned to the atomic weight of antimony is at present being carried on. From analyses of the bromide and other salts, Prof. Cooke of Harvard concludes that the generally-accepted number, 122, is too large, and that 120 is more nearly correct. Herr Schneider, whose experiments had been criticised by Cooke, replies in the *Journal für Pract. Chem.* He sharply criticises Cooke's methods, gives the details of new experiments, and asserts strongly that 122 is much more nearly correct than 120.

No results of special importance have lately been published regarding the densities of the vapours of the halogen elements. An objection made by Pettersson and Ekstrand to V. Meyer's method, viz. that solid bodies condense air on their surface, which air they again give up when strongly heated, has been shown by Meyer, in the last number of the *Berlin Berichte*, to have no weight against his experiments.

TWO important papers on atmospheric ozone have been published in the *Berichte* by E. Schöne. This observer, who has given much careful study to the subject of ozone, says that the smell of ozonised oxygen does not at all resemble the peculiar odour noticed after a lightning flash. The true smell of ozone is, however, frequently noticeable in ordinary air, and coming from the clothes of persons who may enter a room from the open air in winter. The ordinary potassium iodine papers are valueless as ozone measurers, according to Schöne. A small amount of ozone in moist air produces a greater depth of colour on these papers than a larger amount of ozone in dry air. The humidity of the air and the hygroscopic character of the material from which the paper is made therefore largely influence the depth of colour produced. It has been supposed that much ozone is produced in the neighbourhood of waterfalls, but the increased depth of colour of the potassium iodide papers is only due, says Schöne, to the great humidity of the air. Schönbein's "ozonometer" serves as a very rough hygrometer. Paper coated with thalious hydrate is recommended as a measurer of the relative amount of "oxidising principle" in the air: the paper is coloured brown—owing to production of thallic oxide—by ozone or hydrogen peroxide. A table is given showing the variations in "oxidising principle" during 1879. The general conclusions are briefly these:—1. The papers are coloured more deeply during the day than during the night; this difference is more apparent during the long days of the year. 2. Increased wind-force causes increased coloration, because a greater amount of oxidising substance is brought in contact with the paper during the time of exposure. 3. Cloudiness and rain especially influence the coloration; the heavier the rain the smaller the coloration of the paper. Direct determinations of hydrogen peroxide have shown that when the thalium papers are much coloured this compound is present in the atmosphere in comparatively large quantity. Herr Schöne regards the actual existence of ozone in the atmosphere as at present an open question.

MR. A. VILLIERS publishes in the September number of *Annales Chim. Phys.* a lengthy and important paper on the

conditions of equilibrium of mixtures of alcohols and mineral acids. He considers in detail the velocity, and limits of etherification of the more important mineral acids, and arrives at many valuable results.

GEOGRAPHICAL NOTES

AT the last meeting of the Berlin Geographical Society news was received through a German trade house in Tangier that Dr. Lenz had reached Timbuctoo, and that he hoped to be at St. Louis, in Senegal, in the month of July. If this is correct Dr. Lenz has made a rapid journey in this direction, as he only left Tangier on December 22 last. Caillé, however, in 1828, travelled from Timbuctoo to Fez in four months. The last letter received from him by the Society was from Tenduf, in the beginning of May, twenty days' journey from Timbuctoo.

THE *Zeitschrift* of the Berlin Geographical Society, Nos. 88, 89, has a valuable map by Herr Richard Kiepert, showing the work done in Angola in 1876 by Dr. H. von Barth in the region of the Bengo and Lucalla, and of Herr Otto Schütt in 1877-79 on the Lower Quanza. Dr. von Möllendorff discusses the methods of transcribing Chinese geographical names, and concludes that the Pekin form of the Guan-hua, or so-called Mandarin dialect, would be best for general purposes. But Dr. von Möllendorff asks whether, while selecting this form generally, it is advisable to make exceptions in certain cases. Such names, for example, as already exist in familiar forms might be excepted, as Pekin, Canton, Hongkong, Swatow, &c. With other names, especially for special maps, a change from the uniform method of writing might be adopted. Maps of districts for the use of travellers would evidently be of greatest service when the local forms of names were given. Perhaps the Guan-hua might be used for the names of great towns, large rivers, and mountains, while smaller places might have the local forms of their names. For a map of the whole of China, or of the greater part of it, containing little more than the district towns, evidently the Guan-hua would be the preferable form. In books it would perhaps be best to give both forms. It is, no doubt, high time that some attempt at uniformity should be made, but the difficulty is by no means easy of solution, owing partly to the letters of the alphabet not being sounded uniformly in all European languages. Herr von Möllendorff instances the absurdity of the present want of system by the ways in which the Chinese name of the Yellow River is spelled. These are confusing enough, but what will he say when he sees "Houan Hé" (for Hwang-ho) at the head of the interesting communication just received from Col. Prejevalsky? We cannot entirely concur in Herr von Möllendorff's definition of "Kwan-hwa," popularly translated "Mandarin dialect," and he himself makes the orthographical jumble much worse by writing "Guan-hua," which we should imagine few sinologues would attempt to defend. The vexed question, however, may find a solution before long in an unexpected quarter, for the Statistical Department of the Chinese Maritime Customs at Shanghai, we believe, have under consideration a system of spelling for adoption in their reports and other publications, and this, if adopted, will probably come by degrees into general use. Dr. Hildebrandt gives an account of a visit he made to the Amber Mountains in the north of Madagascar; Herr K. Himy continues his elaborate paper on the region around the Kara-Kul, and much of the number is occupied with the journal in North Africa of the late Dr. Erwin von Bary.

THE new number of the Lyons Geographical Society's *Bulletin* contains several items of interest. M. Morice's paper on French Cochinchina is published with a sketch map, followed by some notes by the Abbé Desgodins on the hydrography and orography of Tibet, and a communication by the Abbé Faure on Potosi in Bolivia. Among the other contents are Père Brucker's notes on the geographical positions in Eastern Turkistan and Jungaria determined in 1876 by two Jesuit missionaries, and the report on Col. Flatters' explorations in the Central Sahara last spring.

M. VENUKOFF has just published at Geneva an historical sketch of the geographical discoveries made in Asiatic Russia from the most remote times to our own days, illustrated by Perthes' map of North and Central Asia.

THE China Inland Mission have been informed by Mr. Samuel Clarke, one of their agents in the Chinese province of Szechuen, that, in company with Mr. Mollman, of the British and Foreign

Bible Society, he lately made a journey from Chungking, on the Upper Yangtze-kiang, to Chêngtu-fu, the capital of the province, on which he travelled by unfrequented roads, where, so far as he could learn, no foreigner had ever been seen before; several previously unvisited towns were also entered. Mr. Clarke calls especial attention to the commercial activity prevailing along his route, and the frequency with which markets were held.

THE Asiatic Society of Bengal have just published, as an extra part of their *Journal*, a "Vocabulary of the Language of Eastern Turkistan," by the late Mr. R. B. Shaw, the well-known traveller, supplemented by two Turki vocabularies of birds and plants by Mr. J. Scully, lately on special duty at Kashgar.

FROM the Vienna *Allgemeine Zeitung* we gather that Dr. Emil Holub contemplates undertaking another lengthened journey in Central South Africa, provided that he can obtain the necessary funds. It is estimated that 50,000 florins will be required for the purpose, and it is proposed to raise this sum by a public subscription, the Austrian Geographical Society heading the list.

THE September number of the *Boletín* of the Madrid Geographical Society contains a detailed account of the Marquesas Islands, with map, by D. Ricardo Beltrán de Rózpide.

It is stated that the *Gulnare*, with Capt. Howgate's expedition, landed at Rittenbank in Greenland, Dr. Pavy and Mr. Clay, whose intention is stated to be to make natural history collections and explore the northern limits of Greenland. This, we believe, is the same M. Pavy (a Frenchman) whose projected polar expedition suddenly collapsed in San Francisco seven years ago.

THE Austrian *Monatsschrift für den Orient* for October contains an article by Prof. Vambéry on the commercial importance of the Upper Oxus, in which he endeavours to show that there, and not on the Lower Oxus, is trade likely to be developed. Dr. Paulitschke gives an interesting sketch of the progress of African exploration during the past seventy years.

ON MAXIMUM AND MINIMUM ENERGY IN VORTEX MOTION¹

I. A FINITE volume of incompressible inviscid fluid being given, in motion, filling a fixed, simply continuous, rigid boundary, the fact of its being in motion implies molecular rotation, or (as it may be called for brevity) vorticity. Helmholtz's law of conservation of vorticity shows that, whether the boundary be kept fixed as given, or be moved or deformed in any way, and brought back to its given shape and position, there remains in every portion of the fluid which had molecular rotation a definite constant of vorticity; and his formula for calculating energy for any given distribution of vorticity allows us to see that the energy may be varied by the supposed operation on the boundary.

II. The condition for steady motion of an incompressible inviscid fluid filling a finite fixed portion of space (that is to say motion in which the velocity and direction of motion continue unchanged at every point of the space within which the fluid is placed) is that, with given vorticity, the energy is a thorough maximum, or a thorough minimum, or a minimax. The farther condition of *stability* is secured by the consideration of energy alone for any case of steady motion, for which the energy is a thorough maximum or a thorough minimum; because when the boundary is held fixed the energy is of necessity constant. But the mere consideration of energy does not decide the question of stability for any case of steady motion in which the energy is a minimax.

III. It is clear that, commencing with *any* given motion, the energy may be increased indefinitely by properly-designed operation on the boundary (understood that the primitive boundary is returned to). Hence, with given vorticity, there is no thorough maximum of energy in any case. There may also be *complete annulment* of the energy by operation on the boundary (with return to the primitive boundary), as we see by the following illustrations:—

1. The case of two equal, parallel, and oppositely rotating vortex columns terminated perpendicularly by two fixed parallel planes, which, by proper operation on the boundary, may be so

¹ By Sir William Thomson, British Association, Swansea, Section A, Saturday, August 28.