attached a safe and solid car, capable of containing seats for at least eight persons. A steam-engine is to regulate the ascent and descent, and it will rise to a height of about 900 feet, affording a splendid view of Milan and the plains of Lombardy. The balloon will be constructed at Milan, M. Henri Beudet, the well-known and experienced aëronaut, having been sent for to direct the work.

THE coal-beds on the Souris River, Manitoba, have proved very rich, and are to be developed during the winter.

THE Japan papers call attention to the almost limitless mineral wealth lying dormant in the country, and which is only waiting for development to become a profitable source of revenue. Of coal there is an abundant supply, but only the Takashima mine has been fitted with modern appliances. There are several other coal mines which are only unprofitable because improperly worked, and now it is averred that Prof. Atkinson during a sojourn in the Mitake Mountains of the Koshu Province has discovered another valuable deposit of coal.

MR. NORTH, who was sent by the Natal Government to examine the Newcastle coal-fields, has reported favourably on the quantity and quality of the coal.

ON Friday evening, October 22, previous to distributing at the Manchester Mechanics' Institute the prizes and certificates gained by the students at this year's Science and Arts, Society of Arts, City and Guilds of London Institute, and Union of Lancashire and Cheshire Institute's examinations, Prof. Ayrton delivered an address on Technical Education and on the future of Mechanics' Institutions. Of the two original objects for which Mechanics' Institutions were established fifty years ago, to provide clubs for artisans and places for giving popular scientific lectures, it was shown that the latter had to a great extent been abandoned; also that the mere novel utility of such institutions in furnishing the means for the holding of science and art classes would also be taken away from them when the teaching of elementary science became the duty of our elementary schools. There remained, however, for Mechanics' Institutions a great new field of activity in the teaching of applied science to mechanics, not the teaching of abstract scientific principles and the applications only perhaps afterwards, but the teaching of these scientific principles *through* the apparatus in use in daily life; in fact, that Mechanics' Institutions could well furnish the machinery by means of which numerous technical classes throughout the country which were so much needed could be rapidly established, the money voted by the City and Guilds of London Institute as payment on the results of the technological examinations, together with funds locally subscribed, furnishing the motive power. What the lecturer thought technical teaching should consist of was illustrated by the kind of work now going on at the temporary laboratories of the City Guilds Institute at Finsbury; stress was laid on the fact that there were no distinct students' fees there for laboratory work and for lectures, but that every fee, small as it was, entitled each student to at least two hours' practical work in the laboratories for every one hour of lecture; so that in fact all the 150 students had laboratory work which did not consist in the mere repetition of qualitative lecture experiments, but in the making of accurate quantitative measurements, all bearing as far as possible directly on each student's trade. Of this practical illustrations were given. Prof. Ayrton concluded by warning technical instructors from attempting to follow ordinary college methods of *synthetical* teaching, which, although most valuable for a young lad prepared to spend several years at college, was quite unsuitable for an artisan engaged all day in following his trade. Technical education, he considered, must be distinctly *analytical*—the complete machine as the artisan knew it must be taken at once, and the science developed, so to say, from the machine itself; and that it was men with a good practical knowledge of their trade and with an aptitude for science rather than men versed in science, but with only a mere book knowledge of industries, that were wanted both as candidates for the technological examinations and as students to be trained up as technical instructors.

IN the note on the late Dr. Sparks in NATURE, vol. xxii. p. 591, for Dr. King's "Therapeutics" read Dr. Binz's "Therapeutics."

THE additions to the Zoological Society's Gardens during the past fortnight include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. W. B. Tustin; two Polar Bears (*Ursus maritimus*), an Ivory Gull (*Larus eburneus*) from the Arctic Regions, presented by Mr. Leigh Smith, F.Z.S.; a Crested Porcupine (*Hystrix cristata*) from India, presented by Mr. W. Middleton; three Gaimard's Rat Kangaroos (*Hypsiprymnus gaimardi*) from Australia, presented by Mr. A. B. Gow; a — Brocket (*Cariacus sp. inc.*), a White-bellied Opossum (*Didelphys albiventris*), a Brazilian Hare (*Lepus brasiliensis*) from Quipapà, Pernambuco, a White-bellied Guan (*Ortalida albiventris*), a Black Tortoise (*Testudo carbonaria*) from Garanhuns, presented by Mr. W. A. Forbes, F.Z.S.; a Frigate Bird (*Fregata aquila*) from Fernando de Noronha, presented by the Rev. G. Bayldon; a Yellow-headed Conure (*Conurus jendaya*) from Pernambuco, presented by Mr. C. A. Craven; two American Black-backed Geese (*Sarcidiornis carunculata*) from the Sertoes of Pernambuco, presented by Miss Davis; a White-throated Finch (*Spermophila albogularis*) from Pernambuco, presented by Mr. S. Jones; a Herring Gull (*Larus argentatus*), British, presented by Mr. J. Palmer; a Horrid Rattlesnake (*Crotalus horridus*) from Quipapà, Pernambuco, presented by Mr. H. E. Weaver; a Bonnet Monkey (*Macacus radiatus*) from India, a Black Iguana (*Metopoceros cornutum*) from Galapagos (?), deposited; a Rock Cavy (*Ceredon rupestris*), a Green-winged Trumpeter (*Psophia viridis*), a White-bellied Parrot (*Caica leucogaster*), a Red-vented Parrot (*Pionus menstruus*), two Golden-headed Parrakeets (*Brotogerys tui*), two Toco Toucans (*Ramphastos toco*), an Orinoco Goose (*Chenalopex jubata*) from Brazil, a Rufous Pigeon (*Columba rufina*), a Yarrell's Siskin (*Chrysomitris yarrelli*), two Scaly Doves (*Scardafella squamosa*) from Parahyba, three Picazuro Pigeons (*Columba picazuro*), a Black Tanager (*Tachyphonus melaleucus*), a Black-headed Tanager (*Orchesticus ater*), a Passerine Ground Dove (*Chamœpelia passerina*), three Yellow-shouldered Hangnest (*Icterus tibialis*), from Pernambuco, a Brazilian Tanager (*Ramphocœlus brasilius*), a Blue and Black Tanager (*Calliste brasiliensis*) from Bahia, a White-eyebrowed Guan (*Penelope superciliaris*) from Panellas, four Cactus Conures (*Conurus cactorum*), two Banded Tinamous (*Crypturus noctivagus*), seven Tataupa Tinamous (*Crypturus tataupa*) from Garanhuns, a Great-Billed Rhea (*Rhea macrorhyncha*) from Agoas Bellas, Pernambuco, two Orchard Hangnests (*Icterus spurius*), a Baltimore Hangnest (*Icterus baltimore*) from North America, purchased; two Squirrel-like Phalangers (*Belideus sciureus*), born in the Gardens; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. F. W. Manley; a Dunlin (*Tringa cinclus*), a Sanderling (*Calidris arenaria*), British, presented by Mr. Edmund Elliot, M.R.C.S.; a Horned Lizard (*Phrynosoma cornutum*) from Texas, presented by Mr. W. C. Boyd; a Waxwing (*Ampelis garrulus*), European, deposited; a Black Saki (*Pithecia satanas*) from Lower Amazons, a Roseate Spoonbill (*Platalea ajaja*), a Great-billed Rhea (*Rhea macrorhyncha*) from South America, purchased.

OUR ASTRONOMICAL COLUMN

CERASKI'S VARIABLE OF SHORT PERIOD.—It will be seen from a letter which Prof. Pickering, the Director of the Observatory of Harvard College has addressed to us, that, contrary to

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 Schwerd 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

$$\text{Cor.} = 224^{\text{s}}\cdot 0 \, R \sin (S + 19^\circ\ 17'\cdot 4).$$

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. 0h. 51m. 48s., N.P.D. 8° 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 ethyliodide.

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—temperaturature limits are not given. Taking the atomic heat of tungsten as 6·4, and that of oxgen as 4, this result points rather to the formula for didymium tungstate, $DiWO_4$(Di = 98), than to that now generally accepted, $Di_2(WO_4)_3$(Di = 147).

A NEW organo-metallic compound containing the divalent radicle $(CH_2)''$ is described in the *Journal* of the Chemical Society by Sakurai ; the formula of the new substance, for which the name *Monomercuric methylene iodide* is proposed is $I(CH_2)HgI$. 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. Centralbatt*) 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 thallous 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 thallium 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