

industry affords employment to upwards of 200 small vessels. A diving apparatus is used in fishing for sponges; the produce during the season is between 25,000 and 35,000 sponges. A duty of 40*l.* is levied by Government on each diving apparatus and 10*l.* on every vessel not carrying that appliance. The produce of the sponge fishery last year was estimated to be worth about 15,000*l.*, and was exported chiefly to England.

MESSRS. FRANCIS AND CO., of Hatton Garden, have recently devised an extremely useful telegraphic arrangement for ships, by which instant communication is given by the captain or officer of the watch to the helmsman. For the navigation of rivers and small waters such means of rapid telegraphing with the man at the helm must be invaluable, as in an instant an order can be given, and that, too, with absolute certainty. A leading and important feature in this new invention is that the signals to every part of the ship can be given from the one instrument, which is in form like a handsome capstan, with the commutators so arranged horizontally around its head that it may be worked by any one without the least instruction.

A COURSE of elementary lectures in continuation of a description of the solar system will be delivered in the theatre of Gresham College, Basinghall Street, London, E.C., on the evenings of November 11, 12, 13, and 14, by the Rev. E. Ledger, M.A., F.R.A.S., Gresham Professor of Astronomy. The lectures will be delivered at 6 o'clock P.M., and will be free to the public. They will be illustrated by means of a lime light.

As we have announced, the three Parisian telephonic companies have entered into a working arrangement, and are busy settling the details. In consequence of this fusion the subscriptions have ceased to be received, the future common price having not yet been agreed upon. It is certain that it will be dearer than the cheapest, and cheaper than the dearest. According to every probability 600 francs a year for a single line.

THE gold discoveries in the north of New Caledonia are reported to be turning out very valuable.

FROM Japan we hear that the manufacture of sulphuric acid is now being extensively carried on at the Osaka Mint, and large quantities are exported to China.

THREE boa-constrictors, found in the Chinese island of Hainan, have lately been presented to the Botanical Gardens at Hong Kong.

WE learn from a report on the trade and navigation of New York for 1878 that grape-sugar is being largely manufactured at Buffalo, three large factories have been established for the manufacture of glucose in a solid and liquid form, 200,000 to 300,000 bushels of corn being used in them per month. This product has a ready sale and is largely exported to Europe and other countries, and the business is said to be a very profitable one.

THE principal papers in the Thirteenth Annual Report of the Aeronautical Society are on the Flight of Birds, by Mr. Brearey and Mr. H. Sutton.

THE report of the meeting of October 17 of the Eastbourne Natural History Society contains a paper "On the Additions to the Fauna and Flora of the Cockmere District during the past year," by Mr. F. C. S. Roper.

THE additions to the Zoological Society's Gardens during the past week include a Weeper Capuchin (*Cebus capucinus*) from South America, presented by Mr. A. Sargent; a Silver Pheasant (*Euplocamus nyctemerus*) from China, presented by Mr. R. Moon; three Common Boas (*Boa constrictor*) from Bahia, presented by Mr. W. Young; a Bosman's Potto (*Perodicticus potto*) from West Africa, four Pied Wagtails (*Motacilla yarellii*), British, purchased.

OUR ASTRONOMICAL COLUMN

MINOR PLANETS IN 1880.—In the first half of the ensuing year three out of the four older minor planets, viz, *Ceres*, *Pallas*, and *Vesta* will come into opposition while not far from perihelion, and consequently their angular diameters and brightness will be about as great as they ever can be, thus:—

<i>Pallas</i>	in opposition on Jan. 12	will be in perihelion on Feb. 23.
<i>Ceres</i>	" " Feb. 12	" " Feb. 18.
<i>Vesta</i>	" " June 2	" " June 19.

At opposition the brightness of *Pallas* will be 6·8*m.*, that of *Ceres* 7·3*m.*, and that of *Vesta* 6·0*m.*

Perhaps advantage may be taken of the favourable conditions attaching to the positions of these planets to ascertain if they do really present measurable disks as has been stated by Lamont in the case of *Pallas*, and by Secchi in that of *Vesta*. Lamont, soon after the mounting of the 11-inch refractor at Munich, on a night of exceptional clearness, found that *Pallas* presented a defined disk, which at the mean distance of the planet from the sun would subtend an angle of 0"·51, which would correspond to 1"·41 at the distance unity. Again, Secchi observing on nights near the opposition of *Vesta* in 1855, noted a disk a little less than is presented by Jupiter's first satellite, or about 0"·8, which at the earth's mean distance from the sun would subtend 1"·01. There is a third instance in the case of one of the more-recently discovered planets, *Iris*, which at the close opposition in the winter of 1866, was measured by Mr. Talmage with Mr. J. G. Barclay's 10-inch refractor at Leyton; he found the apparent diameter 0"·96, or the diameter at distance unity 0"·89. Hence we should have for the real diameters 630 miles for *Pallas*, 450 miles for *Vesta*, and 400 miles for *Iris*, dimensions beyond those which have been attributed to them on other grounds. The south declinations of *Pallas* and *Vesta* will render them fitting objects for examination at Melbourne should Mr. Ellery be disposed to try the powers of his great reflector upon them. *Ceres* will be well observable in this hemisphere.

While writing upon minor planets it may be mentioned that their number has now been increased to 207; a circular from Prof. Peters, of Kiel, notifying the discovery of four new ones at Clinton (New York) and at Pola, by Prof. C. H. F. Peters and Herr Palisa.

THE RED SPOT UPON JUPITER.—Dr. O. Lohse, of the Physical Observatory at Potsdam, who has watched this planet regularly during the last nine years, mentions that on June 5, when his observations of the present year commenced, the red spot was of an intensity of colour to be perceived at the first glance at 15*h.* m.t., when it was near the eastern limb. The sharp outline and the form of the spot appearing to offer an advantageous opportunity for another determination of the time of rotation, numerous estimations and some measures of its position and size have been made at Potsdam. Dr. Lohse does not refer to any suspicion of proper motion, of which we have heard elsewhere, but, on the contrary, states that, with the rotation-period, 9^h·22*h.*, added on to the epoch 1879, September 27, at 9*h.* 48^m·3*m.*, Berlin M.T. (or 8*h.* 54^m·7*m.* G.M.T.), the successive times of transit of the middle of the spot over the central meridian may be obtained. From sensible variation in the intensity and tint near the centre and limbs of [the planet he conjectures the superposition of very dense gas or vapour. As the spot exhibits remarkable permanence, it may be also observable next year, and thus be the means of fixing the period of rotation with precision. Dr. Lohse further notes that this remarkable appearance upon the disk of Jupiter takes place at the time of recommencement of activity in the solar atmosphere.

A STANDARD CLOCK AT THE OBSERVATORY, STRASSBURG.—Those who give attention to horological matters will note with interest a communication from Prof. Winnecke, Director of the Imperial Observatory at Strassburg, on the performance of a clock constructed for that establishment by Hohwü, of Amsterdam. The observed rates between 1875 and 1878 are exhibited in tabular form, and are compared with rates calculated from a formula which Dr. Schur has investigated, viz. :—

$$\text{Daily rate} = 0\cdot000 + 0\cdot0125 (\delta - 750) - 0\cdot0110 (t - 20),$$

where δ is the height of the barometer in millimetres and t the temperature in the clock-case expressed in degrees of Celsius. The tabular statement (*Ast. Nach.*, No. 2,282) is much too long to be reproduced here, but we make the following extract showing the observed and computed rates applying to the two-months'

interval, May 3–July 3, 1877; in the first column are the daily rates given by the observations, and in the second those resulting from the above formula:—

	s.	s.
May 3–11	- 0'07	- 0'02
11–25	0'00	+ 0'01
25–31	- 0'04	- 0'04
May 31–June 8	+ 0'03	+ 0'06
June 8–15	- 0'04	+ 0'01
15–19	+ 0'20	+ 0'23
19–22	- 0'15	- 0'09
22–26	+ 0'10	+ 0'11
26–29	+ 0'09	+ 0'05
June 29–July 3	- 0'05	- 0'04

Dr. Winnecke remarks that upon the experience in the interval 1875–78 he believes the performance of the clock has not been hitherto excelled, and congratulates himself upon the possession of a work of art.

PHYSICAL NOTES

Who did discover the attraction caused by the vibrations of sounding bodies? Prof. Guthrie and Herr Schellbach of Berlin, discovered it independently of each other nearly ten years ago. But Guyot had observed the phenomenon before them; and in a paper in the *Philosophical Magazine* for 1849, by Mr. Reuben Phillips, on the "Electricity of Steam," the attraction caused by vibration is recorded as a new fact.

THE transverse vibrations of metallic cylinders open at one end have been recently studied by Herr Fenkner, at Marburg (*Wied. Ann.*, No. 9). The following results were arrived at: The vibration-numbers of the tones of such cylinders are independent of the height of the cylinder. The vibration-numbers of the corresponding tones of two such cylinders are inversely as the squares of the circumferences (or radii), and they are directly as the thicknesses of metal.

PROF. TÖPLER, of Dresden, is well known to physicists by his researches on singing flames and by the induction electric machine which bears his name. Toppler's machine, of which several examples were shown in the Loan Collection at South Kensington in 1876, resembles in form the more familiar machine of Holtz, and is based upon similar principles. Prof. Töpler is at present engaged upon the construction of a larger machine having twenty rotating plates; and which is capable of generating much larger quantities of electricity. This machine bears a close resemblance to the variety of Holtz machine shown before the Physical Society a few months ago by Mr. W. J. Wilson, and to that recently constructed by Mr. Ladd, which also had a number of plates rotating on a common axis.

APPARATUS for projection, like the magic-lantern, always gives inverted images. Most commonly this causes no inconvenience, for one can invert the object; but there are cases in which this cannot be done, and the only resource is to rectify the image. To obtain this result, M. Dubosecq (*Journal de Physique*, October) has recently conceived the idea of receiving the rays which would go to form the inverted image on a prism with total reflection. Suppose an isosceles rectangular prism, placed with hypotenuse parallel to the optic axis of the lens by which the rays from the object are made convergent, and so as to receive the cone of rays on one side; refracted in the prism, the rays reach the hypotenuse at an angle greater than the limiting angle, are totally reflected, and sent to the second side of the prism, where they are refracted at the same angle as on entrance, and then go to the screen, forming an image which corresponds in position to the object. As it may be desired to rectify the image in some other plane than the vertical, it is found advantageous to mount the prism in a tube forming part of the projection apparatus, and capable of being turned round the direction of the ray.

IN a recent memoir on the plasticity of solid substances (*Rev. Scient.* xi, 1879), Signor Marangoni, with reference to Bottomley's experiment dividing ice with a wire, groups plastic substances in two classes. Those of the first class can be cut in two with a metallic wire like ice, and they can also be considerably deformed. Such are plastic clay, fresh soap, camphor, black pitch. Substances of the second group give two lamellæ on the two sides of the cutting wire, which then come out of the slit, become notched and bend over, resembling leaves; to this class belong vegetable Japanese wax, dry Marseilles soap, tallow and stearine, but above all, yellow wax and paraffin. The

occurrence of these phenomena depends largely on the diameter of the wire and on the temperature. For yellow wax, wires of $\frac{1}{4}$ to 1 mm. diameter, for paraffin $\frac{1}{2}$ to 0.9 mm. are necessary. With the former, the leaves are formed between -8° and 40° , with paraffin (melting at 43.5°) only up to 15° . To produce the lamellæ, different weights should be hung to the wire in different cases. The lamellæ are very similar to those separated from rails when a locomotive with strong brake applied, goes quickly down a steep incline.

THE forms produced in the phonograph by utterance of the Italian alphabet are studied in a recent paper by Signor Fautrier (*Atti del Aten. Ven.* [3], I., 1879). The vowels uttered in the A note of the violin (435 vibrations) gave generally three-pointed groups, presenting certain differences. With regard to the consonants, it appeared that with the exception of *l*, *m*, *n*, and *r*, which give characteristic impressions, they only modify the form of the impression of the following vowel, and especially at its limits. Signor Fautrier adds some general considerations, especially on the intensity of the "klangs" given by the phonograph, and the theoretical significance of the apparatus.

M. GASTON PLANTÉ, whose researches on voltaic electricity, especially on the construction of secondary batteries and on the phenomena of their discharge have been from time to time laid before the readers of NATURE, has just published the first instalment towards a second volume. The forty pages or so of this brochure treat of the effects obtained with M. Planté's rheostatic machine.

DR. KÖNIG, the well-known constructor of acoustical apparatus has just completed a new instrument which promises to be of great interest and importance. Dr. König has long maintained, in opposition to the theory of Helmholtz, that the "combinational" or "difference" tones produced by the simultaneous sounding of two simple tones of different pitch are the result of very rapid "beats." The new instrument, which has not yet been seen outside M. König's atelier, is a kind of modified syren which puts the question at issue to a direct and crucial test.

WE learn that Prof. Silvanus Thompson is engaged upon a monograph upon the subject of Binaural Audition, which will embrace the whole existing literature of the subject. The work will not be published before next spring.

THE magnets employed in Gower's form of the Bell telephone are of unusual strength. It is stated that the steel of which these magnets are constructed is made from the iron of Alvarre, which, though a particularly bad iron for most purposes, makes a steel unsurpassed for magnetic apparatus.

THE phenomena which occur when the retina is struck by intermittent coloured light (alternating with total darkness) have been recently studied by Signor Cintolesi (*Ann. di Ophthalmol.*, II. and III., 1879). With a certain velocity of intermissions the field of vision appeared at first still and regular in the colour of the active light. The state is gradually changed, and, e.g., red passes by orange, yellow, and green, into a saturated blue-green, after which there is a return by the same colours to red, and so on in periodic change. This phenomenon of a periodic change with the complementary colour the author also describes in the cases of green and blue. The velocity of intermissions must reach 0.11 sec. for red, 0.14 for green, and 0.15 for blue light. In his theoretical views Signor Cintolesi has recourse partly to the Young-Helmholtz hypothesis, partly to Plateau's oscillation theory, and partly also to the photo-chemical properties of the retina.

IT has been noted recently by M. Jannetaz that, if a fine needle be turned round on a cleavage plate of gypsum (1 mm. to 2 mm. thick) so as to produce a small hole, and then be gently pressed into the plate, a separation occurs, surrounded by Newton's colour-rings, and having the form of an ellipse. The major axis of this ellipse makes an angle of 49° with the fibrous fracture, and its length is to that of the minor axis as 1.247 to 1. This ellipse has the same orientation and relative size as that of the propagation of heat in gypsum. Further, the larger axis corresponds with the direction of greatest resistance to bending, and the greatest elasticity.

EDISON'S new electromotor, with which he proposes to drive sewing-machines, watchmakers' lathes, and other light machinery, has an armature resembling that of a Siemens dynamo-electric generator, but placed longitudinally between the limbs