

the electric current in the way indicated? (The diamonds are very expensive and are gradually lost by being detached from the pieces to which they are fixed.) Platina electrodes would not be necessary, for it is not here the metal of the electrode that is altered, but the silicious matter, in presence of the saline solution. Metallic points or rods distributed suitably at the end of the drill-stem, insulated in part of their length and animated by rotatory motion, would bring the electric current to the surface of the rock to be pulverised. The progress recently realised in the production of electricity by mechanical means might facilitate this application.

If perpetual motion be defined as that of a body which, after having received an impulse, continues to move indefinitely in virtue of its inertia alone, it is, M. Plateau considers, realisable. He introduces a foreign force of constant nature to destroy resistance, instead of (as in the case of a pendulum) restoring motion which resistance has withdrawn. Thus, conceive a horizontal disk movable round a vertical axis fixed to the centre of its under surface. A small hemispherical cavity is made on the upper face. A motor force of rapid rotation is got from a reservoir below the lowest water of a river, giving a uniform intense flow by a lower orifice. Before letting the water act on the disk, a top, previously set in very quick rotation, is deposited with its point in the middle of the hemispherical cavity; then the top is covered with a glass bell jar, which is fixed with its axis coinciding with that of the apparatus. The disk with the bell jar is then set rotating by means of the water in the same direction as the top. After a certain time (it may be supposed) the movements of disk, top, and inclosed air will be equalised; then the top will no longer experience resistance at its point, for the support turns as quickly as it and in the same direction; nor will it, from surrounding air, for this also has the same angular velocity. Thus we should have the curious spectacle of a top remaining indefinitely in equilibrium on its point, presenting a case of perpetual motion in the sense defined. Of course the water would have to be let off after action on the apparatus, also the surplus water of the reservoir.

WE have received from Messrs. Dent and Co. an interesting summary of the principal works executed by that house since its foundation in 1814. The last noted is the commencement in 1879 of the great galvanic chronographic apparatus of the Imperial Observatory of Japan.

Two other volumes of the "Natural History Rambles" series have been sent us by the S.P.C.K.—"Mountain and Moor," by Dr. J. E. Taylor; and "Lakes and Rivers," by Mr. Groom Napier.

THE Asiatic Society of Japan are showing considerable activity in the issue of their publications, for another number of their *Transactions* has lately come to hand. This opens with some curious notes on the analysis of bamboo-shoots, which are much used as an article of food in Japan. Dr. Dwars arrives at the conclusion that the shoots examined at that period of their development must be considered a nourishing vegetable, and that they may even rival the cauliflower and asparagus. Mr. Satow supplies the first of a series of papers on ancient Japanese rituals, as well as some instructive notes on the vicissitudes of the Church at Yamaguchi from A.D. 1550 to 1586.

A NOTABLE change has taken place in the Jardin des Plantes of Paris, and should be noticed by foreigners. All the galleries and houses are open every day from one to four without any ticket of admittance being required from visitors. The plant-houses only are closed on Sunday.

A MUNICIPAL SCHOOL has been recently established in Paris for apprenticeship in the work of wood and iron.

A PART of the buildings of the Universal Exhibition has been purchased by the French War Office for the use of the aeronautical school at Meudon. It will be utilised for building and inflating balloons.

THE large Giffard Captive Balloon is ready for inflation, and the gas will be passed into it as soon as the state of [the weather will permit the operation to begin.

THE additions to the Zoological Society's Gardens during the past week include a White-thighed Colobus (*Colobus bicolor*) from West Africa, presented by Dr. H. Hart; two Silky Marmosets (*Midas rosalia*) from South-East Brazil, presented by Mrs. Hector; a Capybara (*Hydrochærus capybara*) from South America, presented by Mr. H. B. Whitmarsh; a Puff Adder (*Vipera arietans*) from West Africa, presented by Surgeon F. Speer; a Brown Hyæna (*Hyæna brunnea*) from South Africa, an Argus Pheasant (*Argus giganteus*) from Malacca, purchased; a Michie's Tufted Deer (*Elaphodus cephalophus*) from China, deposited; and an Axis Deer (*Cervus axis*), born in the Gardens.

PREHISTORIC INVESTIGATIONS IN AUSTRIA¹

I. *Lower Austria*.—At Mount Calvary, near Pellichsdorf, on the Marchfeld, a plain east of Vienna, explorations conducted by F. Heger, from June 26th, to July 28th, 1878. A great number of urns, pateræ, &c., of peculiar forms, not known from any other locality. Although broken by pressure, thirteen were more or less susceptible of reconstruction. Most of them were found in a space inclosed with strong beams of wood. A broken bronze armlet was also met with.

II. *Carniola*.—Explorations conducted by von Hochstetter and Ch. Deschmann, Superintendent of the Provincial Museum of Laibach.

1. Terszisce, near Zirknitz, July 16th, 1878, Prehistoric Fortified Station, and burial-ground, with human bones, more or less burnt, and many objects of bronze and iron, like those of the Celtic burial-ground of Hallstadt in Upper Austria.

2. Grad, near St. Michael, not far from Adelsberg, July 23rd, 1878. Separate skeletons, bronze objects, and Pre-Roman coins.

3. Slemschek, near Waatsch and Littai. Prehistoric Station of the "Hallstadt Period," with extensive burial-place. The graves are flat: some contain skeletons; others burnt remains. The latter are covered with heavy stone slabs, and contain large urns, of various forms, which have burnt bones within or underneath. Many objects, both ordinary and ornamental, of bronze, iron, amber, glass, bone, &c., were found, including a bronze helmet in excellent preservation. From July to October, 1878, about 200 graves were examined, mostly at the cost of the Provincial Museum of Carniola.

4. Dolle, near Gora and Waatsch. Separate graves, of the same character as those at Slemschek.

5. Vier, between Sittich and St. Veit, Lower Carniola. Above the village is a perfect ring-shaped earth-work; below it, on both sides of the high road a number of tumuli. Nearer St. Veit are flat graves, covered with slabs. This was probably the place of the *Acerones* of the Pentigerian Tables, or the Roman *ad Aceros*, which name, according to Prof. Müllner, is derived from these Pre-Roman tumuli.

6. Moratzch, near Heiligenkreuz. Flat graves and tumuli, August 1st, two skeletons were dug out, a male and a female, with earthen vases, iron knives, and a bone comb. These burials are probably later than those of Nos. 1-5.

7. Mariathal, south-east of Littai. Ancient castle surrounded with a rampart; also flat graves and tumuli containing skeletons August 2nd and 3rd, a male skeleton without arms, and with violently fractured skull was exhumed, together with many objects, including an elegantly ornamented urn, similar to those found at Slemschek.

8. Ober-Strascha, on the left bank of the river Gurk, above Rudolfsworth. Old ring-rampart and a few scattered tumuli.

¹ "Prehistorical Investigations in Lower Austria, Carniola, and Bohemia." By F. von Hochstetter, President of the Prehistorical Commission of the Imperial Academy, Vienna. (Imperial Academy of Sciences, Vienna, Meeting, January 16, 1879.)

9. Gradische, near Tepliz, Lower Carniola. Ancient castle with rampart.

10. Gsindeldorf, near Weisskirchen. Numerous tumuli, and traces of ancient dwelling-places; and some few bronze objects.

11. Landstrass, on the River Gurk. Many tumuli.

Besides the above localities of prehistoric dwelling and burial places, six others are known, but not yet explored.

12. Kreuzberg Cave, near Laas. This is very extensive, difficult to get at, and abounding with bones. In four days more than 2,000 bones of *Ursus spelæus*, besides more or less perfect skulls of the Bear, were taken out, belonging to at least from 40 to 50 individuals and possibly to a hundred and more. Most of the bones were scattered, but some remained together, so that a perfect skeleton was obtained for the Imperial Mineralogical Museum. Besides bones and teeth of the cave-bear, remains of *Gulo spelæus* and of a Marten (near *Mustela foïna*), also cervical vertebrae of *Lupus*, and coprolites of *Hyaena* were found in this cave.

13. Jellenza Cave, near Tepliz, Lower Carniola. Excavations, August 5th, 1878, showed that this cave had been inhabited by Man.

III. *Bohemia*.—Of late years many antiquities have been met with about Hradischte, near Beraun, probably dating from the Marcomans and their predecessors the Boyans, who lived here apparently for centuries. Their burial-places, the tumuli near Lisek, and the old cemetery near Althütten, with its urns, have to be further explored.

T. R. J.

SCIENTIFIC SERIALS

American Journal of Science and Arts, May.—Some experiments in cross-breeding plants of the same variety are here described by Prof. Beal, having been suggested by Darwin's book. The plants were Indian corn and black wax beans.—Prof. Young records observations of the spectrum of Brorsen's comet made on April 1 and 2. He is quite positive that the middle band of the spectrum now coincides sensibly (to a one-prism spectroscope) with the green band of the hydrocarbon spectrum.—Dr. Southworth demonstrates this theorem: If a hydrated salt be dissolved in a given volume of water, the volume of the solution will exceed the original volume of the water by a bulk equal to the bulk of saline water contained in the salt dissolved.—The first portion of a paper by Prof. Norton, on the force of effective molecular action, appears in this number, and the remaining papers deal mostly with geological subjects of more local interest, the Fox Hills Group of Colorado, the Hudson River age of the Taconic schists, the Wappinger Valley limestone of Dutchess County, N.Y., the Huronian series of Northern Wisconsin, the mineral locality in Fairfield County, Connecticut, &c.—Mr. Peters gives observations on the planet he discovered on March 21.

Annalen der Physik und Chemie, No. 4.—Herr Kayser here arrives at the conclusion that the velocity of propagation of sound-waves is independent of the intensity of the tone. His final method (two others, with use of Kundt's dust-figures, having been rejected) was to note the phases of vibration of a piece of mica at the top of a vertical glass tube used for resonance to a tuning-fork above it, set vibrating with different intensities by electric means. Water could be admitted laterally at the bottom of the tube, so as to obtain the maximum resonance. As the water-stopper is displaced, the same figure of vibration always returns whenever the displacement has reached half a wave-length. Herr Kayser finds the velocity of sound in free space 332.5 m., calculated by Kirchhoff's formula from velocity in tubes, and making therein $\gamma = 0.0235$. (The case of explosion-waves is excluded from consideration, these being quite distinct in kind from sound-waves.)—Herr Wiedemann, in extension of a former research, takes up a number of points relating to torsion; repeated torsion in the same, or in opposite direction, permanent torsion of a wire often twisted a certain amount, influence of weighting during permanent and during temporary torsion, influence of oft-repeated weighting, rotation of molecules, action of vibrations, &c.—Herr Auerbach, considering (from the physiological, psychological, physical, and musical stand-points) what is the absolute number of vibrations required for production of a tone, thinks it is probably about twenty.—Herr Schmidt furnishes a new table of gas densities.—Herr Zöppritz continues his papers on hydrodynamic problems in relation to the theory of ocean currents.—Herr Sohneke replies to an objection by M. de Lapparent to his new theory of crystalline structure.—We have elsewhere referred

to Herr Elster's researches on the electromotive forces which occur in free water jets.

Atti della R. Accademia dei Lincei, March.—We note here the following:—On the secular variation of the magnetic needle at London since the year 1580, by Mr. Jenkins.—Researches on Cinchonine, by Prof. Fileti.—On the atmospheric disturbance of February 24 and 25 last, by S. Respighi.—On prenite and laumontite from the mines of Montecatini, by Prof. Bechi.

Reale Istituto Lombardo di Scienze e Lettere. Rendiconti. Vol. xii, fasc. vi.—We note here the following:—Influence of manures on the combustibility of tobacco, by S. Cantoni.—Considerations on the palatine bones, by Prof. Verga.—Some studies with reference to physiology and the expression of attention in man, by Dr. Riccardi.

Fasc. vii.—Rigid suspension bridges, by S. Clericetti.—On the area described by an invariable line moving in a plane according to a determinate law, by Prof. Bardelli.—On arithmetical hemeria, by Prof. Maggi.—Some reflections on a recent note of Jamin, on the theory of dew, by Prof. Cantoni.—Reflections on the theory of dissimulated electricity, by S. Serpieri.—A steel yard densimeter, by Dr. Chistoni.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 8.—“On the Results of the Magnetical Observations made by the Officers of the Arctic Expedition 1875-76,” by Staff-Commander E. W. Creak.

1. After leaving Portsmouth the first magnetical observations were made at Godhavn, Disko. On arrival at winter quarters, observatories were constructed where observations of the three magnetic elements and hourly observations of the differential declination magnetometers were made during the winter.

2. The diurnal variation or inequality of the declination formed one of the chief objects of interest at the winter quarters, as, although the period was remarkable for frequent magnetic disturbances, and an absence of brilliant auroras, no connection could be observed between appearances of that phenomenon and the movements of the declinometer magnet. This accords with the remarks of previous observers within the region comprehended between the meridians of 60° and 90° W., and north of the parallel of 73° N.

3. It has been established that 8 A.M. and 1 to 2 P.M. are the hours of the greatest easterly and westerly deflection of the declinometer magnet in middle latitudes. At the winter quarters, Discovery Bay, the westerly extreme was reached at 10 A.M., the easterly at 11 P.M.

4. An analysis of the disturbances of the declinometer magnet showed that the disturbing force never ceased, that it was at a minimum about the solstice, and a maximum at the equinox, and was greater during the day than the night.

5. Comparing the days of principal disturbance at Kew and at the winter quarters' observatories, it was found that for the most part the disturbances occurred on the same days. The two greatest disturbances or “magnetic storms” occurred on February 19 and March 25-26, 1876, during the same hours of Greenwich mean time as at Kew, but the magnets were often in opposite directions from the normal at the two stations.

6. An important result obtained was the evidence of but small secular change having occurred in the inclination and force since the observations of Kane and Hayes in 1854 and 1861 respectively. The declination is, however, more decidedly changing, especially about Godhavn, the needle moving towards the east as in England.

May 15.—“Note on a Recent Communication by Messrs. Liveing and Dewar,” by J. Norman Lockyer, F.R.S.

In my paper of last December¹ I called attention to the importance of discussing Young's observations of the chromospheric lines in connection with the spectra of the metallic elements. In subsequent communications I have given preliminary results of this discussion so far as it has already proceeded.

Since my paper was read Messrs. Liveing and Dewar have, in a paper printed in the last number of the *Proceedings*, given a table which professes to state the number of times various lines in certain metals were seen by Young in connection with certain reversal phenomena observed by themselves.

¹ *Proceedings*, No. 191, p. 172.