

tribution to Mrs. Richard Burton, British Consulate, Trieste, Austria.

OWING to the outcry caused by the sale to a private person of the Katoomba Falls, in the Blue Mountains, the New South Wales Government, according to the *Colonies and India*, has set apart for public use large tracts of land round Dangar's Falls, near Armidale, the Great Falls in the same district, and Moona Falls, near Walcha, in imitation of the reserves or national parks in the United States of America.

A REMARKABLE frost is said to have occurred in Guatemala on February 10, doing great damage to the tropical vegetation.

IN the review of Messrs. Fison and Howitt's "Kamilaroi and Kurnai" that appeared last week, we should have mentioned that the book is published in England by Messrs. Macmillan and Co.

FROM Glasgow we have received two satisfactory Reports—that of the Industrial Museum, presided over by Mr. James Paton, and that of the Mitchell Library, under Mr. F. T. Barrett.

TWO HUNDRED AND TEN school teachers nominated on purpose by the 30,000 public teachers of elementary schools in France, and travelling at the expense of the Government, were summoned to Paris in order to hold a Pedagogic Congress, which came to a close on the 24th. At the same time the Ligue de l'Enseignement, founded by M. Jean Macé, held a series of meetings at the Trocadéro. The concluding sitting, which took place last Thursday, was attended by all the school teachers and an immense number of political leaders. M. Gambetta delivered a speech praising the advantages of education, commending school teachers as a body, and advocating the importance of interesting ladies in the general diffusion of knowledge.

MESSRS. MARSHALL JAPP, AND CO., have published a useful little Half-Holiday Handbook of Geological Rambles around London, which will be found to add much interest to a Saturday afternoon walk into the country.

MR. H. L. JANSSEN VAN RAAJ writes to us from Batavia, March 21, that in the enumeration of the different geographical societies of the world in *NATURE*, vol. xxiii. p. 299, the Geographical Society at Samarang (Java), founded in 1879, was omitted.

FIDELIS BUTSCH SOHN of Augsburg has issued a priced catalogue of the extensive library of the late Prof. W. P. Schimper of Strassburg.

THE new number of the *Proceedings* of the Bristol Natural History Society contains some good papers:—Some Optical Illusions, by Prof. S. P. Thompson; Underground Temperature, by Mr. E. Wethered; The Structure and Life-History of a Sponge, by Mr. W. G. Sollas; On some Cases of Proliferation in *Cyclamen Persicum*, by Mr. A. Leipner; The Ethnology of the Paropamisus, by Dr. J. Beddoe, F.R.S.; Catalogue of the Lepidoptera of the Bristol District, by Mr. A. E. Hudd, and of the Fungi, by Mr. C. Bucknall; The Pomarine Skua, by M. H. Charbonnier.

THE additions to the Zoological Society's Gardens during the past week include three Short-tailed Wallabys (*Halmaturus brachyurus*) from West Australia, presented by Sir Harry St. George Ord, C.B., H.M.Z.S.; three Green Lizards (*Lacerta viridis*) from Jersey, presented by Mr. E. H. Bland; a Rufous Rat Kangaroo (*Hypsiprymnus rufescens*) from Australia, presented by Mr. A. W. Wyatt; a Lion (*Felis leo* ♀) from Africa, deposited; three Entellus Monkeys (*Semnopithecus entellus* ♂ ♂ ♀) from India, purchased; a Lion (*Felis leo* ♀) from Africa, a Common Otter (*Lutra vulgaris* ♀), British, received in exchange; a Collared Fruit Bat (*Cynonycteris collaris*), a Vulpine Phalanger (*Phalangista vulpina*), born in the Gardens.

## CHEMICAL NOTES

IN *Journal pract. Chemie*, Herr Cech, in the course of a paper on the decompositions which occur during the rotting of eggs, describes experiments which he thinks establish the possibility of obtaining a good soap free from smell, by saponifying with soda the residue obtained by evaporating to dryness rotten eggs, freed from their shells. Such a dried residue yields about 10.5 per cent. of oil, fresh eggs giving about 11 per cent.

THE changes undergone by grain when stored in underground magazines have been recently studied by M. Müntz (*Compt. rend.*). The magazines of the Paris Omnibus Company are partly underground; the grain in the upper parts is, however, exposed to the influence of atmospheric changes; it is found to contain much more moisture and to be at a higher temperature than that in the lower parts. The relative amounts of deterioration in grains may be measured by the quantities of carbonic anhydride exhaled. When grain is freely exposed to air about ten times as much carbonic anhydride is given off as when the grain is kept in closed receptacles; less oxygen is absorbed than corresponds with this evolution of carbon dioxide. Normal grain contains from 11 to 19 per cent. of moisture; the greater the moisture the greater the exhalation of carbon dioxide. The amount of the gas evolved also increases with increase of temperature until a point is reached at which true chemical combustion of the carbon begins, as distinguished from the physiological combustion which has preceded it. Grain which is to be kept for any time ought to be very dry, the receptacle containing it ought to be completely closed, and all parts of this receptacle ought to be at approximately the same temperature.

MR. V. LEWES, in the same journal, describes barium pentathionate,  $Ba_5O_6 \cdot 3H_2O$ , and several potassium pentathionates, prepared by slow evaporation in a vacuum of "Wackenroder's solution." These experiments appear to establish beyond doubt the existence of pentathionic acid.

DRS. DUPRÉ AND HAKE have applied their method for the estimation of carbon (*Chem. Soc. Journ.*)—viz. burning in oxygen, absorbing carbonic anhydride in baryta water, converting the barium carbonate into sulphate, and weighing as such—to the estimation of carbon in air; their experiments apparently demonstrate the presence in London air of carbon in forms other than carbonic anhydride, and probably in the form of some volatile organic compounds, not as suspended matter. Drs. Dupré and Hake claim that their method of analysis enables them to estimate carbonic anhydride, carbon in the peculiar forms already noticed, and suspended carbonaceous matter in air.

IN the same journal there is a contribution to the history of ozone by Prof. Hartley of Dublin. The main conclusions drawn from experimental data are these: Ozone is a normal constituent of the higher atmosphere, and is present therein in larger proportion than near the surface of the earth. The limitation of the solar spectrum in the ultra-violet is readily accounted for by the absorptive action of atmospheric ozone, without taking into account the possible absorptive power of nitrogen and oxygen. The blue tint of the atmosphere is probably due to ozone. It is shown in the paper that the wave-length of the extreme ray capable of absorption by considerable quantities of ozone is about 316. A quantity of 2.5 mgm. of ozone in each square centimetre of sectional area of a column of air produces, it is said, a full sky-blue tint. Incidentally experiments are described in which one volume of ozone was distinctly detected by the sense of smell in 2,500,000 volumes of air.

MR. G. S. JOHNSON has obtained ammonia (*Chem. Soc. Journal*) by passing hydrogen and (presumably) pure nitrogen over cold or moderately heated spongy platinum: when however the mixed gases were passed over hot asbestos before traversing the spongy platinum, no ammonia was formed. Mr. Johnson thinks that nitrogen probably exists in two forms, an active and an inactive form, the latter being produced by the action of heat on the former.

DR. DUPRÉ has introduced (*Analyst*) a slight modification into the ordinary method for observing a colour change in titrating with standard solutions, which is said to render the perception of the change very sharp and accurate. He views the liquid to be titrated through a glass cell containing a solution of the same colour as, and about equal in intensity to, the liquid itself.

M. LONGUININE has recently determined (in *Compt. rend.*) the heats of combustion of various alcohols of the allyl series, and compared the numbers with those expressing the heats of combustion of metameric aldehydes. He finds very marked differences between the two series of numbers, showing once more a distinct connection between the energy lost by a carbon compound in passing from one state to another standard state, and the structure of the molecule of that compound.

M. BERTHELOT, in continuation of his researches on compounds of metallic halogen salts with haloid acids, describes in *Compt. rend.* the action of gaseous hydrochloric and hydrobromic acids on alkali chlorides and bromides; he shows that the gaseous acids are absorbed by the dry salts with disengagement of heat, and that the products of the actions are possessed of properties which distinguish them from mere mixtures.

M. BERTHELOT also considers the reciprocal actions between alkali haloid salts and haloid acids; he shows that as a rule alkali chlorides are decomposed by hydrobromic acid, but that in some cases and under special conditions of temperature, bromides are decomposed by hydrochloric acid. The general results are shown to be in keeping with the laws of thermochemistry. That action in which most heat is evolved occurs, but the products of the action may be unstable under experimental conditions, and hence the primary change may be modified, or even reversed.

M. MÜNTZ states that his investigations have shown that traces of alcohol exist in all natural waters, whether rain, river, sea, or snow water. He describes his method of applying the iodoform test for alcohol, whereby one part can be detected in 1,000,000 parts of water.

#### PHYSICAL NOTES

M. LAURENT of Paris has constructed "magic mirrors" giving similar effects to those brought from Japan, but of glass silvered at the back instead of metal. By engraving patterns at the back and silvering the front surface, the mirror has a perfectly plane surface only when the air-pressures at the front and back are equal. If the air behind be compressed or rarefied the thinner parts will have relatively a greater convexity or concavity than the rest, and in the disk of light which the mirror reflects on to a wall from a luminous point the pattern engraved on the back will accordingly appear dark or light.

FROM experiments on the radiation and conduction of heat in rarefied gases (*Wied. Ann.*, No. 13) Herr Graetz finds the results in much better agreement with Stefan's law of radiation than with that of Dulong and Petit, and "it may be affirmed that in the temperature-interval from 0° to 250° C. the radiation is very nearly proportional to the fourth power of the temperature." The factor of proportionality  $\sigma$  (in Stefan's formula  $Q = \sigma T^4$ ) is then that amount of heat which is radiated from one square centimetre of a substance of  $-272^\circ$  C. in a second towards a space of the absolute temperature 0° ( $-273^\circ$ ). By the method of least squares Herr Graetz finds

$$\sigma \text{ for glass} = 1.0846 \times 10^{-12} \frac{\text{gramme centigrade}}{\text{centim. seconds}}$$

Certain divergences at low temperatures suggest that while the intensity of radiation grows with rising temperature, it perhaps grows differently for different heat colours.

IN a recent communication to the Munich Academy, Herren Nies and Winkelmann describe an inquiry into the volume-changes of various metals in solidifying. Of eight metals examined, six (*viz.* tin, zinc, bismuth, antimony, iron, and copper) were proved to undergo expansion in passing from the liquid to the solid state. For three of the metals approximate values for the amount of this expansion were obtained (tin showed an expansion of 0.7 per cent., zinc 0.2, and bismuth 3). Two metals (lead and cadmium) gave doubtful results; but the authors find some reason to believe that they also expand in solidifying. So far then the rule would appear to be general for metals.

M. TREVE describes in the *Comptes rendus* some curious observations from which it would appear that when light is admitted from a natural or artificial source through a slit, more light passes if the slit be horizontal than if it be vertical. M. Treve has produced photographs taken behind slits in various positions to prove that the effect is not an illusion of the

eye. The phenomenon appears to us inexplicable, but certainly requires further proof to substantiate its reality.

M. MERCADIER still continues to study radiophonic phenomena. He finds it possible to increase the effects by uniting in one tube the vibrations of several receiving disks. He also finds it possible to construct tubes whose length corresponds to the wave-length of the vibrations radiophonically excited, and which respond to the note emitted. M. Mercadier hopes by these means to re-determine with increased accuracy the velocity of sound in air and other gases.

WITH regard to the beats and beat-tones of harmonic intervals Dr. Koenig argues (*Wied. Ann.* No. 3) against Prof. Helmholtz's view, that these are due to harmonic tones of the lower primary sounding with the higher (Dr. Koenig, in his former experiments, having used strongly-excited tuning-forks). He shows how the phenomena may be studied with the aid of a "wave-syren," in which a blast of air is sent through a slit against the serrated border of a rotating disk, or of a ring-section of a thin cylinder. He has the border of the disk cut to represent accurately the curve produced by combination of the curves of two simple tones, giving an air motion, when blown against, quite like that from the two tones sounded together. The beats and beat-tones are then heard. With a mere wavy outline for the border and the slit at right angles one hears a quite simple tone, which however is at once changed to a "clang" with strong overtones, when the slit is slanted a little. Now, with two simple tones got thus the beat-tone heard when the slits are at right angles should (on Helmholtz's supposition) be less distinct than when, the slits being slanted, the overtones are brought out; whereas the reverse is the case.

DR. KOENIG, in the same number, describes a simple lecture-apparatus for producing beat-tones. It consists of two glass rods of different length, clamped in vertical position by the middle to a jointed frame, which, through an elastic contrivance, keeps their lower ends pressed against the cloth-covered periphery of a wheel which dips in water in a trough. The friction calls forth the longitudinal tones and the beat-tone.

AN improved form of the Töpler air-pump has been devised by Herr Bessel-Hagen (*Wied. Ann.* No. 3), with which considerably higher vacua can be reached than those Mr. Crookes obtains with the more complicated and fragile Sprengel-Gimingham apparatus. The average limit of rarefaction was found to be  $\frac{1}{10}$  millionths of an atmosphere ( $\frac{1}{10}$  in one case), while the other pump only gives  $\frac{1}{10}$  millionth. (It is noted that Prof. Ogden Rodd has obtained  $\frac{1}{10}$ , and in one case even  $\frac{1}{10}$  with a modified Sprengel.) With his highest vacua the author found electricity to pass (using plate-electrodes and a strong Holtz machine, with Leyden jars). He considers mercury-vapour an insulator for electricity; but shows that radiometric movements depend greatly on its pressure *in vacuo*. No diffusion of hydrogen through the glass could be detected.

AN artificially-formed body showing polar effects in the way of attraction and direction is produced by Herr Holtz (*Wied. Ann.*, No. 3) thus: To one end of a short glass rod is cemented a plane piece of glass, and to this a short narrow glass tube (in a line with the rod). In the tube is placed a sewing-needle longer than it, and carrying at its head a thin pasteboard disk (22 mm. across), which has attached on one half of its periphery, reaching over both above and below, a pasteboard strip (10 mm. broad); opposite this, on one of the surfaces, is fastened a small projecting point of tin-foil. Brought between hollow disks fixed to the rods of a Holtz machine, the tin-foil point always turned to the positive pole. Next, the glass rod with its disk was attached to the end of a light horizontal glass tube, hung bifilarly, and so brought between the hollow disks. The disk first turned into position, and was then attracted towards the negative pole. The phenomena are thought to illustrate unipolar conductivity.

THE simple tourmaline-pincette, by reason of its small field, can be used with only a small number of crystals. To enlarge the field M. Bertin has applied to it a part of the lenses of the polarising microscope. This, it is known, consists, first, of a polariser and focus; second, of a microscope and analyser. The polariser and analyser, at the extremities, are pretty large pieces, and if replaced by two tourmalines placed between the focus and the microscope (of simplified form) the apparatus is rendered much smaller and handier. This is the principle of M. Bertin's new tourmaline-pincette (of which details will be found in the