SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 16.—"On the Perception of the Direction of Sound." By Prof. C. S. **Myers** and Prof. H. A. **Wilson**, F.R.S.

Lord Rayleigh (*Phil. Mag.*, 1907, xiii., 214) has shown that the determination of the apparent direction of a sound is influenced by phase-differences between the vibrations at the two ears. In the present paper this influence is experimentally further investigated, and a theory is advanced which offers a possible explanation of the effects ultimately in terms other than phase-difference.

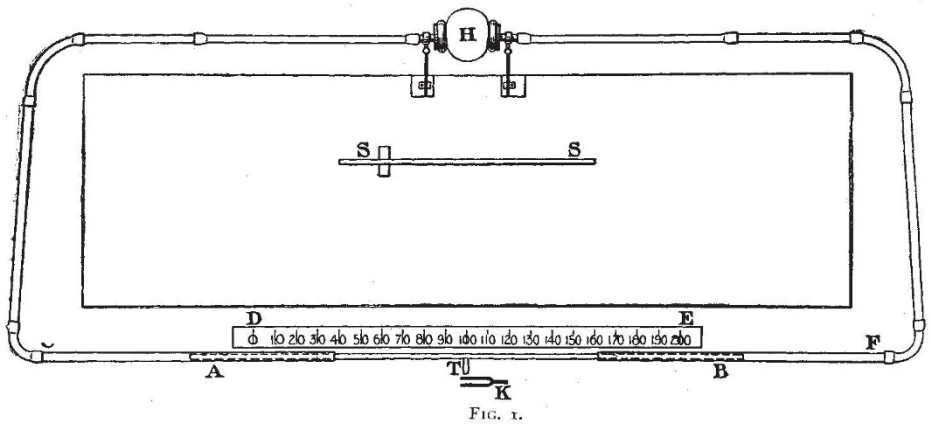

FIG. 1.

The apparatus (Fig. 1) used in these experiments consisted of a brass tube AB about 2·5 m. long and 2·5 cm. in diameter, at the centre of which a short T-piece T was soldered. This tube was freely movable within the two slightly larger tubes CD and EF, from the ends of which tubes were led to two softly padded caps, supported on retort stands, and applied to the ears of the observer H. Beside the tube AB was placed a graduated scale DE, which recorded the position of the T-piece. The sound entered the T-piece from a vibrating tuning-fork K held near it. By sliding the tube AB, so that the T-piece at different times pointed to different divisions of the scale, every kind of phase-difference between the vibrations reaching the two ears could be produced. A screen SS concealed the position of the T-piece from the observer. One of the authors varied the position of the T-piece, sounding the tuning-fork before it at each position, while the other, acting as the observer, stated on which side the fork appeared to be sounding. The answers of the observer could be graded—"full right," "half right," "middle or half right," "middle," "middle or half left," "half left," "full left." At "half right" the lateral direction of the sound was only moderately clear; at "middle" or "half right" it was doubtful, while at "middle" there was no lateral effect at all.

If we call the lateral effect ϕ, considering right effects positive and left effects negative, then, according to Lord Rayleigh's results, $\phi = A \sin(4\pi nx/v)$, where A is constant, x is the distance in cm. of the T-piece from the middle point of the scale, n is the number of vibrations per second, and v the velocity of sound.

The results of the observations can be conveniently expressed in the form of curves, the abscissæ expressing the scale-readings and the ordinates the lateral effects. For this purpose a "full right" is reckoned as 1, a "half right" as a $\frac{1}{2}$, a "middle or half right" as a $\frac{1}{4}$, a "middle" as 0, the corresponding left effects having equal, but negative, values. Figs. 2, 3, 4 show the curves obtained with forks of frequencies 512, 384, 128. The dotted line in each figure is the curve $\phi = \sin(4\pi nx/v)$.

It is at once apparent that the theoretically and the experimentally obtained curves agree with one another remarkably well. The discrepancies which were sometimes met with were, with the aid of manometric flames, traced to the occurrence of resonance in one or other side of the tube. Interesting results were obtained from experiments conducted when the tubes were partially blocked or gradually pinched on one side. Other observations, of psychological rather than physical or physiological interest, are reserved for a future communication.

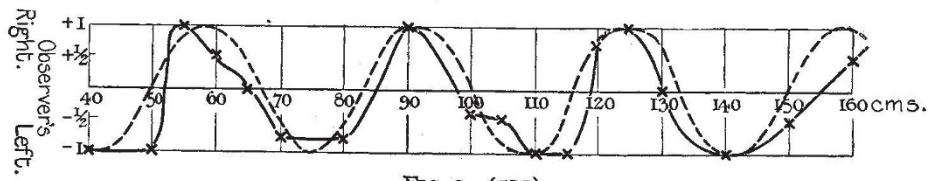

FIG. 2. (512)
(Observer facing towards fork)

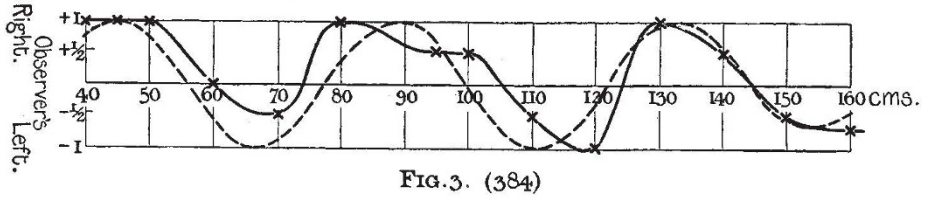

FIG. 3. (384)
(Facing towards)

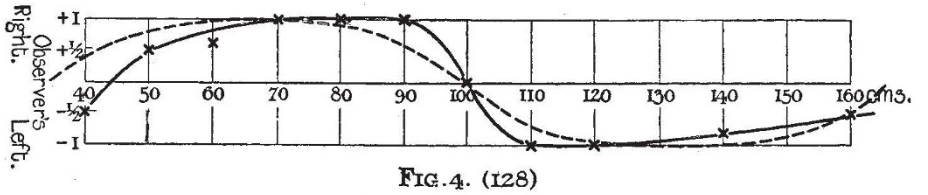

FIG. 4. (128)
(Facing towards)

It is here suggested that the lateral effects thus produced by differences of phase at the two ears are really and ultimately due to the binaural differences of sound-

intensity which must result, if the sound, entering one ear, is transmitted (as from psychophysiological data we know that it must be) across the head by bone conduction to the opposite ear. This suggestion receives support from a detailed mathematical consideration of the conditions. It may be added that the writers hope in a future paper to discuss the applicability of this explanation to the interesting experiments which Lord Rayleigh has brought forward.

March 5.—"The Relation between Wind Velocity at 1000 Metres Altitude and the Surface Pressure Distribution." By E. **Gold.** Communicated by Dr. W. N. Shaw, F.R.S.

It is a matter of common observation that the wind does not blow along the pressure gradient, but in well-exposed situations more nearly at right angles to it or along the isobars. It is equally well known that near the centres of anticyclonic or high-pressure areas the winds are very light, and it has been customary to attribute this fact to the coincident occurrence of small gradients of pressure. It appears, however, that these latter results, instead of being mutually explanatory, are both due to the effective centrifugal force arising from the earth's rotation, the admitted cause of the tendency to motion along the isobars.

If we express the fact that for steady horizontal motion in a path of curvature $1/r$, the part of the centrifugal force arising from the motion of the wind is balanced by the effective gradient of pressure, we obtain the equation

$$\frac{(wr\sin\lambda \pm v)^2}{r} = \frac{1}{\rho}\frac{\partial p}{\partial r} + \frac{(wr\sin\lambda)^2}{r},$$

where p is atmospheric pressure, ρ density, v velocity of moving air, λ latitude, and w the angular velocity of the earth about its axis. If there is no friction, the variation of p along the path must be zero or the path must be an isobar. If $\partial p/\partial r$ be negative, corresponding to a path concave towards the higher pressure, v and $wr\sin\lambda$ must have opposite signs, or the air must rotate in a clockwise direction. Further, in this case $\frac{1}{\rho}\frac{\partial p}{\partial r}$ cannot exceed $\frac{(wr\sin\lambda)^2}{r}$ numerically, and v cannot exceed $wr\sin\lambda$, so that for steady motion in anticyclonic regions there are definite limits to the gradient and velocity.

A general idea of the importance of this result is to be gained from the fact that at no point within 100 miles of the centre of an anticyclonic system of circular isobars in latitude 50° can the theoretical steady wind velocity exceed twenty miles per hour.

It is shown by analogy with the motion of a particle on the earth's surface that the time necessary for bringing about the state of steady motion is small enough for us to expect it to be the general state except where obstacles set up eddies. It is proved that the velocity calculated from the above equation is, for a given surface-pressure distribution, independent of the altitude provided there is no horizontal temperature gradient and the necessary corrections are given for the case of varying temperature when the direction of the horizontal isotherms does not change with altitude. The values of the theoretical steady velocity can by this means be calculated for any altitude from the surface observations. This was done for Berlin for 8 a.m. on each day of the year 1905, the temperature correction being disregarded. The results were compared with the actual velocities observed at 1000 metres' altitude in kite and balloon ascents. The theoretical and observed values showed a striking agreement both in direction and in magnitude, proving that the effect of surface irregularities on the horizontal air motion is practically obliterated at 1000 metres, and that we can obtain definite values for the wind velocity at moderate altitudes from the surface observations of pressure and temperature with a good degree of accuracy.

April 2.—"The Alcoholic Ferment of Yeast-juice. Part iii. The Function of Phosphates in the Fermentation of Glucose by Yeast-juice." By A. **Harden** and W. J. **Young.** Communicated by C. J. Martin, F.R.S.

(1) The addition of a phosphate to a fermenting mixture of glucose and yeast-juice not only produces a temporary acceleration in the rate of fermentation, but, in addition to this, an increased total fermentation.

(2) This last effect is due to the fact that the hexose-phosphate formed during the period of temporary acceleration is continually hydrolysed by an enzyme, with production of free phosphate, which again enters into reaction, and thus brings about an increased fermentation.

(3) It appears probable that the presence of phosphate is essential for the alcoholic fermentation of glucose by yeast-juice, the reaction which occurs being the following:—

$$(1)\quad 2C_6H_{12}O_6 + 2R_2HPO_4 = 2CO_2 + 2C_2H_6O + C_6H_{10}O_4(PO_4R_2)_2 + 2H_2O.$$

This reaction is only realised in the presence of the ferment and coferment discussed in previous communications, phosphate alone being unable, in the absence of coferment, to bring about fermentation in a mixture of ferment and glucose.

The hexosephosphate thus formed is then hydrolysed:—

$$(2)\quad C_6H_{10}O_4(PO_4R_2)_2 + 2H_2O = C_6H_{12}O_6 + 2R_2HPO_4.$$

The rate at which this second reaction occurs determines the rate of fermentation observed when glucose is fermented by yeast-juice.

(4) An optimum concentration of phosphate exists which produces a maximum initial rate of fermentation. Increase of concentration beyond this optimum diminishes the rate of fermentation.

Entomological Society, May 6.—Mr. C. O. Waterhouse, president, in the chair.—*Exhibits.*—A. H. **Jones**: An example of the melanic ab. *nigra* of *Tephrosia consonaria* bred from the ovum from a wild ♀ taken near Maidstone, and a living larva of *Sesia andreniformis* feeding in the stem of *Viburnum lantana.*—R. **Shelford**: Specimens of insects in amber showing several forms closely allied to those of existing insects, one orthopteron being very near to *Ectobia lapponica.*—**President**: A living example of Blatta found in bananas from Mexico. Mr. Shelford said he thought the species to be *Pandora niveus,* Lin.—H. M. **Edelsten**: A living larva of *Nudaria senex,* and living larva and pupa of *Calligenia miniata.*—O. E. **Janson**: A white aberration of *Epinephele jurtina,* taken in Holme Park, Sussex, in June, 1904.—Lieut.-Colonel N. **Manders**: A collection of butterflies from Bourbon demonstrating examples of mimicry and the effects of the interaction of species.—W. J. **Lucas**: (1) A glow-worm found at Oxshott on May 4, inside the shell of the snail *Helix cantiana.* There was no doubt that the larva was feeding on the snail, for on breaking away parts of the shell the moist remains of it were found near the apex. (2) The ♂, ♀, and nymph of the dragon-fly *Oxygastra curtisii,* first described by the late J. C. Dale, and at that time supposed to be confined to the British Islands.—H. St. J. **Donisthorpe**: An example of the beetle *Xantholinus distans,* Kr., taken at Helton, near Dumfries, on May 1, a species new to the British list.—*Papers.*—The British dragon-flies of the "Dale collection": W. J. **Lucas.**—The distinctness of several species of Everes, determined by their genitalia: Dr. T. A. **Chapman.** The author announced as the result of his investigations that *Everes argiades,* Pall., and the so-called var. *coretas,* were separate, though very nearly allied species.

Geological Society, May 6.—Prof. W. J. Sollas, F.R.S., president, in the chair.—Solution valleys in the Glyme area of Oxfordshire: Rev. E. C. **Spicer.** This area is part of the gently tilted great oolite limestone plateau, indented by sunken valleys, principally with a strike-and-dip trend, that appear to be subsidence valleys. They begin suddenly, and descend with sinuous curves to a main valley. The main valley likewise enters a stream valley. The stream valley develops into a broad, sinuous river valley, over which a small river stream meanders. The plateau area is free from drift and from marks of surface denudation; there are no marks of marine currents or of ice, no wind-gaps suggest beheaded streams, nor is there

evidence of vanished heights. At the mouths of the dry valleys issue streams impregnated with carbonate of lime. It is suggested that percolating water, forming an underground course along joint-lines, removes enough material in solution to weaken a long, winding area over which the surface subsides. Solution widens the stream banks into bowls of soakage, and leaves insoluble material to build up a level valley floor, which rises above and obscures the valley outlet streams, these then forming marshes.—The stratigraphy and structure of the Tarnthal mass (Tyrol): Dr. A. P. **Young**; with a note on two cephalopods collected on the Tarnthal Köpfe (Tyrol): G. C. **Crick.** The occasion for this paper is the discovery of fossils which appear to throw new light on the relations of the rocks of this mountain. The rock series is divided into three parts, and the succession summarised. An explanation of the structure is then suggested. A petrographical note is furnished on the amphibolite of Gufidann.

Physical Society, May 8.—Dr. C. Chree, F.R.S., president, in the chair.—A modified theory of gravitation: Dr. C. V. **Burton.** If we are to regard gravitational attraction as exerted through the medium of the æther, it appears to the author difficult to avoid the conclusion that the very great (or possibly infinite) velocity with which such attractions are propagated is due to the very great (or complete) incompressibility of the æther. This conception is embodied in the pulsatory theories of Hicks and of subsequent writers; the chief outstanding difficulty has lain in providing for that agreement of phase which must be assumed to subsist amongst the centres of pulsatory disturbance associated with the mutually attracting masses. This difficulty is avoided if we suppose that primary waves of compressional-rarefactional type are being propagated through the æther with a velocity enormously transcending that of light. These primary waves may be travelling in directions indifferently distributed, or predominantly or exclusively in one direction; but an essential point is that all effective wave-lengths should be very great, measured even by astronomical standards. Thus the pressure changes will be sensibly in the same phase over considerable regions, and if the ætherial compressibility is locally increased (or diminished) by the presence of electrically neutral matter, every particle of such matter will act as a centre of pulsatory motion. For the electron, so far as concerns this modification of ætherial compressibility, a specification is assumed which involves no restraint on the free mobility of the electron through the æther. Incidentally, the dynamics of the problem assumes a relatively simple form, and a value which could be quite insignificant attaches to a "gravitational (or non-electromagnetic) term" appearing in the expression for the total inertia of an electron.—An examination of the formulæ for the grading of cables: C. S. **Whitehead.**—Illustrations of geometrical optics: R. M. **Archer.** Light from a narrow rectilinear source is allowed to pass through a slit and fall upon a flat white surface at almost grazing incidence. It is easy to obtain upon the surface a long narrow streak of light with sharp edges, and if a mirror be placed with its plane approximately normal to the surface another streak corresponding to the reflected ray can be seen. Similarly, the path of the beam after its emergence from a glass block or prism may be traced. Interesting effects can be obtained by using many slits and casting the beam from a distant optical lantern upon them. This mode of illumination is useful in demonstrating the formation of caustics. Quantitative results can be obtained comparable in accuracy with those given by an ordinary optical bench.

Zoological Society, May 12.—Dr. F. DuCane Godman, F.R.S., vice-president, in the chair.—*Exhibits.*—Preparations of a new gland found in certain teleostean fishes: W. **Woodland.** This new gland is quite distinct from the gas-gland, and consists of rows of huge columnar cells, which are situated in close connection with the blood-vessels, which possess large nuclei and nucleoli, and are packed with numerous large spherical granules derived from the red-corpuscle disintegration concerned in the generation of the oxygen contained in the swim-bladder. These granules, thus abstracted by the gland-cells from the blood, are carried away by special ducts appertaining to the gland. The discovery of this gland confirms Jæger's view as to the mode of generation of the bladder oxygen. This gland exists in Gobius, Syngnathus, Peristedion, Box, and some other genera.—Specimen of a petrel, *Œstrelata neglecta*, Schleg., picked up dead, yet in a quite fresh condition, at Tarporley, in Cheshire, on April 1, 1908: T. A. **Coward.** This bird is a native of the southern Pacific, and has almost certainly never been recorded from the northern hemisphere, and certainly never from Europe before.—The tanned skin of a wild cat, obtained by the Hon. Mason Mitchell, of the American Consular Service, in Sze-chuen: R. **Lydekker.** Mr. Lydekker had compared the skin with a light-coloured skin of *Felis temmincki* from Sikkim, and described it as a new local race of that species.—Specimen of chert from the Middle Culm-measures (Carboniferous) of Christon Down, near Doddiscombe Leigh, Devonshire, showing numerous large and well-preserved Radiolaria: C. Davies **Sherborn.**—*Papers.*—The Cyril Crossland collection of Calcarea from Zanzibar and Wasin (British East Africa): C. F. **Jenkin.** Notes on the Australian fossorial wasps of the family Sphegidæ, with descriptions of new species: R. E. **Turner.** Eighty species were described as new, and the absence of the genera Oxybelus and Philanthus, otherwise of world-wide range, from Australia was commented on.—The heredity of secondary sexual characters in relation to hormones; a contribution to the theory of heredity: J. T. **Cunningham.** The paper contained an examination and criticism of the most important recent investigations and theories on the subject by evolutionists of various schools, namely, the theory which attributes such characters to constitutional causes, such as male katabolism, Prof. Karl Pearson's biometrical investigation of sexual selection in man, Castle's Mendelian theory of the heredity of sex, and Geoffrey Smith's views on dimorphism of males and parasitic castration in Crustacea. The author maintained that all these contributions were more or less inconsistent with the known facts concerning the connection between the development of secondary sexual characters and the functional activity of the primary gonads. He directed attention to the recent discovery and experimental proof on the part of physiologists that the development of the characters was due to the stimulus of a chemical substance or hormone produced by the testis or ovary, and passed into the blood, and suggested that conversely hormones from parts of the soma might affect the gametes in the gonads. In this way the hypertrophy of a part of the body due to external stimulation might modify the corresponding determinants in the gametes so as to produce some hereditary effect in succeeding generations. Mr. Cunningham added that his theory was an interpretation in terms of modern physiology of Darwin's theory of pangenesis.

Chemical Society, May 21.—Sir William Ramsay, K.C.B., F.R.S., president, in the chair.—Hydro-aromatic ketones, preliminary note: A. W. **Crossley** and C. **Gilling.** A description of the condensation products obtained from 5-chloro-1 : 1-dimethyl-Δ^4-*cyclo*hexenone-3, with ketonic esters.—The sulphides and oxysulphides of silicon: I. G. **Rankin** and S. M. **Revington.** Berzelius's sulphide is shown to be SiS_2, and the compositions of the monosulphide and the oxysulphides, SiSO and $SiSO_2$, have been definitely established.—Apparatus for experiments at high temperatures and pressures, and its application to the study of carbon: R. **Threlfall.** A simple and comparatively inexpensive steel apparatus for the investigation of reactions at high temperatures and pressures was described, and the results obtained by melting carbon under a pressure of about 100 tons per square inch were detailed. In every case soft, crystalline graphite was obtained, and the view is taken that for the formation of diamond under these conditions other substances must be present, and the nature of these will probably be determined by the constituents of diamond ash.—Acids as accelerators in the acetylation of amino-groups: Miss A. J. **Smith** and K. J. P. **Orton.** It was shown that minute quantities of sulphuric and other mineral acids greatly accelerate the acetylation of such substances as anilines with two negative groups in the ortho-positions with respect to the amino-group.—The chemical action of radium emanation, part iii., on water and certain gases: A. T. **Cameron** and Sir W. **Ramsay.** The decom-

position of water and the re-combination of hydrogen and oxygen under the influence of radium emanation have been confirmed. Carbon dioxide decomposes into carbon, oxygen, and the monoxide, and the last is changed into carbon, oxygen, and the dioxide. Ammonia breaks up into its components, as does also hydrogen chloride. The rate of change in these reactions is in all cases proportional to the rate of change of the emanation.—The chemical action of radium emanation, part iv., on water: A. T. **Cameron** and Sir W. **Ramsay.** The formation of neon from radium emanation in presence of water is confirmed.—Titani-dihydroxymaleic acid, and the detection of titanium: H. J. H. **Fenton.** Dihydroxymaleic acid in aqueous solution gives an intense red-brown colour with quadrivalent titanium compounds. The reaction is sensitive enough to be used as a test for titanium, and serves to distinguish it from vanadium.—The preparation of diselenides. Dibenzyl diselenide, preliminary note: T. S. **Price** and L. M. **Jones.** The diselenides are prepared by the addition of a solution of sodium selenosulphate to a solution of the alkyl chloride.—The optical and sensitising properties of *iso*cyanine dyes: S. E. **Sheppard.** The results of an examination of the absorption spectra, &c., for gelatinobromide plates are given.—The polarimetric study of intramolecular re-arrangement in inactive substances: T. S. **Patterson** and A. **McMillan.** The authors have applied their method (Trans. Chem. Soc., 1907, xci., 504) to measure the rate of inversion of piperonal*syn*oxime and similar substances.—Mercuric zinc cyanide: W. R. **Dunstan.** The formula $Zn_3Hg(CN)_8$ is now given to this substance instead of $Zn_4Hg(CN)_{10}$, as formerly proposed (Trans. Chem. Soc., 1892, lxi., 666).—Ethyl 6-methyl-2-pyrone-3 : 5-dicarboxylate and its derivatives: J. L. **Simonsen.**—Contributions to the chemistry of the amidines, part ii., 2-anilinobenzoxazole and the supposed anilodihydrobenzoxazole: G. **Young** and A. E. **Dunstan.**—The slow decomposition of ammonium chromate, dichromate, and trichromate by heat: W. C. **Ball.** The dichromate evolves nitrogen, water, and ammonia, and leaves eventually a black compound, $3CrO_2,H_2O$. At an intermediate stage a black product having the formula $2CrO_3,Cr_2O_3,2NH_3,H_2O$ is formed.

Royal Microscopical Society, May 20.—Mr. A. N. Disney in the chair.—A series of lantern-slides of old microscopes that the society will exhibit at the Franco-British Exhibition was shown on the screen. Mr. **Rousselet,** the curator, in giving a description of the instruments, said the collection was illustrative of the history of the microscope, and would consist of twenty-eight microscopes mostly taken from the society's collection, several others being lent for the purpose by Sir Frank Crisp and Mr. E. M. Nelson. The collection included, with others, a model of Leeuwenhoek's microscope, date about 1673; microscopes by Musschenbroek, 1702; Wilson, 1702; Culpeper, before 1738; Lieberkuhn, 1738; John Marshall, 1744; John Cuff, 1744; Benjamin Martin, 1760, and one made for George III., 1771; Dellebarre, 1777; Jones's "Most Improved," 1798; Lister-Tulley, 1826; Cuthbert's reflecting microscope, 1827; Chévalier, 1834 and 1840; Hugh Powell, 1839 and 1841; Jas. Smith, 1841; Andrew Ross, 1842; Dr. Edwin Quekett, 1844; and Powell and Lealand, 1848.—An old photomicrographic apparatus designed by Dr. Maddox for Dr. Lionel S. Beale: J. E. **Barnard.** There were two points of interest about it, the first being the application of an arrangement between the objective and the stage for excluding extraneous light, the other was that the illuminating apparatus was carried on a triangular bar, which had the apex inverted, thus losing the advantage to be derived from the application of the principle of the triangular bar.

CAMBRIDGE.

Philosophical Society, May 4.—Dr. Hobson, president, in the chair.—The geographical distribution of the acarine family Oribatidæ: C. **Warburton.** It seemed likely that if ever the Oribatidæ of the world should be widely investigated they would prove to be a very characteristic fauna of the various zoological regions, for they seem to possess none of the facilities for extensive distribution exhibited by most of the other Arachnids or by insects. They are highly specialised mites, not parasitic on animals like the ticks and Sarcoptidæ, nor attaching themselves to other creatures for purposes of distribution like the Tyroglyphidæ. They are, of course, wingless, nor have they the power of spinning silken parachutes like spiders so as to utilise the wind. They are slow moving, vegetable-feeding mites, and in England their distribution is very local. Samples of moss containing the living mites have been received from certain widely separated localities, and the results are not at all what were expected. On the whole there is a great resemblance between all the collections, and some species seem to be practically cosmopolitan. Moreover, these species are not primitive in appearance, nor are they among the most active of the group. The almost world-wide distribution of certain forms seems difficult to account for unless the creatures have remained unaltered for a very long period of time.—Some new and obscure species of the genus Hæmaphysalis of the Ixodidæ: C. **Warburton.** This paper was an attempt to remove the confusion which had arisen with regard to the species *Haemaphysalis flava, H. bispinosa,* and *H. papuana.* Four species had been confused under the name of *H. flava,* and two of these were now described as new—*H. japonica* and *H. campanulata.* Neumann's *H. bispinosa* was restored and separated from *H. hystricis,* of which he considered it a synonym. A species confused by Neumann with *H. papuana* was described as new under the name of *H. crassa.*—The fauna of the Bradford coke bed effluent: Dr. A. **Meixner.**

MANCHESTER.

Literary and Philosophical Society, April 7.—Mr. Francis Jones, vice-president, in the chair.—The occurrence of quartz crystals in limestone, columnar coal, marble, &c.: R. **Pettigrew.** Photographs, microscopic and lantern-slides, were exhibited showing microscopic crystals of quartz obtained from mountain limestone, columnar coal from Airdrie, in Lanarkshire, and ordinary statuary marble.—Note on the action of oxalic acid on cellulose: Prof. E. **Knecht.** It appears that the action of oxalic acid on cellulose simply constitutes one example of a general mode of formation of acidyl celluloses.

April 28.—Prof. H. B. Dixon, F.R.S., president, in the chair.—Some observations on the chemical effect of tropical sunlight: Dr. G. J. **Fowler.** The results show that the greatest photochemical effect is obtained on the sea, the highest record being on the Arabian Sea (lat. 16° 31′, long. 54° 8′) in the vicinity of the Arabian coast. Here the chemical intensity of the sunlight was forty-two times what has been recorded on a bright sunny day in winter in Manchester, and three times the highest summer record in Manchester. The average record for Calcutta was about double the highest for Manchester in 1892. There does not appear to be any relation between the photochemical effect of sunlight and the liability to cause sunstroke, the records in the Mediterranean being as high as in Calcutta, and one record furnished by Dr. Bailey from Pontresina being higher than the average for Calcutta. Evidence is also mentioned which suggests that sunstroke is not purely a heat effect. In the same way sunburn does not seem to depend entirely either on the photochemical or heat intensity of sunlight. The full explanation of these phenomena has not, it is believed, been yet given. The results of the observations recorded show generally that the photochemical effects of tropical sunlight do not differ in kind from those observed under European conditions; indeed, in certain favoured European localities equally striking effects may be obtained.

PARIS.

Academy of Sciences. May 25.—M. H. Becquerel in the chair.—The recent eruption of Etna (Taormina, May 15, 1908): A. **Lacroix.** This eruption broke out in a region quite distinct from that of the eruptions of 1883, 1886, and 1892. Details are given of the formation and appearance of the new crater, of the lava, and the erosion phenomena caused by the lava.—The stimulating properties of the serum of healthy and tuberculous animals, and of animals treated with tuberculin, on cobra poison: A. **Calmette,** L. **Massol,** and C. **Guerin.** A description of experiments on the production of lecithin in blood serum by experimental tuberculosis.—A method of M. Goursat

in Monge's problem: P. **Zervos.**—The general problem of probabilities in repeated trials: L. **Bachelier.**—The secondary rays from the α rays: William **Douane.** The production of the secondary rays ceases almost entirely when the radium salt is removed more than 2 cm. from the slit; this distance is precisely that which was found in earlier experiments for the charge of the α rays.—The potential difference and stability of the alternating arc between metals: C. E. **Guye** and A. **Bron.** The contradictory results of earlier workers are largely due to the difficulty of maintaining the stability of the arc. The authors have obtained arcs of high stability by bringing the electrodes to a temperature near their melting points, and having a large reserve of potential (20,000 volts) in open circuit. For metals which are slightly volatile the potential difference, under equal conditions, tends to a lower limit, approximately the same (about 470 volts) for all metals.—The existence and origin of harmonics in the self-induction spark: G. A. **Hemsalech.**—The impossibility of diagnosing death by the radiography of the abdominal organs: Maxime **Ménard.**—Contribution to the study of the oxidation phenomena produced by iodic and bromic acids: H. **Baubigny.** Bromide of silver in ammoniacal solution is stated to be converted at 100° by iodic acid into silver iodide and ammonium bromide; this statement is now shown to be erroneous, the reaction in reality being quite different. A small proportion of the ammonia is oxidised by the iodate at 200°, nitrogen, water, and ammonium iodide being produced.—A new volumetric method allowing the simultaneous estimation of carbonic acid and other acids in atmospheric air: H. **Henriet** and M. **Bouyssy.**—The estimation of tungstic acid and its separation from other substances by the use of a mixture of chlorine and chloride of sulphur: F. **Bourion.** The method proposed is described in detail, and its accuracy proved by the results of analyses of sodium tungstate, silicotungstic acid, ytterbium, silicotungstate, and a mixture of silica and tungstic acid.—The triboluminescence of mineral substances: Adrien **Karl.**—The syncytial nature of the intestine of Rhabdocœles: Paul **Hallez.**—The comparative action of simple salt solutions and artificial serums with complex mineral contents on the blood and circulation: C. **Fleig.**—The action of acids on the coagulation of milk by vegetable ferments: C. **Gerber.**—The experimental study of the cutting of twigs for slips: A. **Imbert.**—The study of the bactericidal action of anti-virulent serum on the adventitious germs of vaccine: L. **Camus.**—The transmission of syphilis to the cat: C. **Levaditi** and T. **Yamanouchi.**—The different levels of alluvium at the confluence of the Yonne and the Cure: Paul **Lemoine.**—Two causes of error in experiments on fluorescein: F. **Dienert.** A fluorescent substance occurs naturally in certain waters, and this may cause difficulty when fluorescein has been used to trace the passage of underground water. The added dye may often travel very slowly, and by its appearance cause confusion when a second experiment is being carried out in the same district.—The temperature of the thermal waters of the eastern Pyrenees: O. **Mengel.**

DIARY OF SOCIETIES.

THURSDAY, JUNE 4.

ROYAL SOCIETY, at 4.30.—On the Aberration of Sloped Lenses and on their Adaptation to Telescopes of Unequal Magnifying Power in Perpendicular Directions: Lord Rayleigh, O.M., Pres. R.S.—The Optical Constants of Gypsum at Different Temperatures, and the Mitscherlich Experiment: Dr. A. E. H. Tutton, F.R.S.—On the Viscosity of Ice: R. M. Deeley.—The Effect of Temperature on the Neutralisation-Volume Change for Different Salts at Different Concentrations: Miss Ida Freund.—Note on a New Sounding Machine for Use on Lakes and Rivers without a Boat: Prof. E. J. Garwood.—The Electrical Qualities of Porcelain, with Special Reference to Dielectric Losses: H. F. Haworth.—On the Decay of the Radium Emanation when Dissolved in Water: R. B. Moore.

ROYAL INSTITUTION, at 3.—The Chemistry of Photography: Dr. Alexander Scott, F.R.S.

LINNEAN SOCIETY, at 8.—Note on the Spicules of *Chirodota geminifera*, Dendy and Hindle: Prof. A. Dendy, F.R.S.—Two New Fungus Diseases: E. S. Salmon.—The Caryophyllaceæ of Tibet: F. N. Williams.—Polychæta of the Indian Ocean: F. A. Potts.—The Stylasterina of the Indian Ocean: Dr. S. J. Hickson, F.R.S., and Miss Helen M. England.—A Contribution to the Mycology of South Africa: W. N. Cheesman and T. Gibbs.—*Exhibits*: Drawings prepared to illustrate Descourtilz's "Ornithologie brésilienne": C. E. Salmon.—Lantern-slides of the Life-history of a Wood-boring Wasp: F. Enock.

INSTITUTION OF MINING ENGINEERS, at 11 a.m.—Presidential Address by C. E. Rhodes.—The Mineral Resources of Trinidad: J. Cadman.—The Occurrence of Fluorspar in Derbyshire: C. B. Wedd and G. C. Drabble.—Calcining-kilns: G. Jones.—Cobalt and Northern Ontario: J. B. Tyrrell.

CHEMICAL SOCIETY, at 8.30.—Condensation Products from Pinene Aminodicarboxylic Acid: W. Godden.—A Delicate Test for Bromides alone, or in Solution with Chlorides: J. S. Jamieson.—Experiments on the Synthesis of 1-Methylcyclohexylidene-4-acetic Acid: W. H. Perkin and W. J. Pope.—The Triazo-group. Part iv., Allyl Azoimide: M. O. Forster and H. E. Fierz.

FRIDAY, JUNE 5.

ROYAL INSTITUTION, at 9.—The Nadir of Temperature and Allied Problems: Sir James Dewar, F.R.S.

INSTITUTION OF MINING ENGINEERS, at 11 a.m.—Winding-engine Tests, with Notes and Suggestions on the Design and Testing of Plant: S. L. Thacker.—The Utilisation of Sewage for the Production of Crude Oil and Ammonia: M. F. Purcell.—The Oil Prospects of Central British South Africa: Dr. C. Sandberg.—Oil-mining: D. M. Chambers.—Mining in the Boundary District of British Columbia: F. Keffer.

TUESDAY, JUNE 9.

FARADAY SOCIETY, at 8.—The Utilisation of Atmospheric Nitrogen in the Production of Calcium Cyanamide and its Use in Agriculture and Chemistry: Dr. R. A. Frank.

THURSDAY, JUNE 11.

MATHEMATICAL SOCIETY, at 5.30.

FRIDAY, JUNE 12.

ROYAL ASTRONOMICAL SOCIETY, at 5.

ARISTOTELIAN SOCIETY (at Cambridge).—Symposium: The Nature of Mental Activity: Profs. S. Alexander, James Ward, Carveth Read, and G. F. Stout.

PHYSICAL SOCIETY, at 8.—Experiments on a Directive System of Wireless Telegraphy: Messrs. Bellini and Tosi.—On the Lateral Vibration and Deflection of Clamped Directed Bars: Dr. Morrow.—On the Resistance of a Conductor of Uniform Thickness whose Breadth Suddenly Changes, and on the Shapes of the Stream-lines: Prof. Lees.—On the Self-inductance of Two Parallel Wires: Dr. Nicholson.—On Homogeneous Secondary Radiation: Dr. Barkla and Mr. Sadler.—Notes on the Motion of a Corpuscle and on Cloud Formation: Prof. Morton.

GEOLOGISTS' ASSOCIATION, at 8.—Origin of Mountain Tarns: Prof. E. J. Garwood.

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