

ing; a portion cut out from the side of this plate served for the new trial plate. Its composition ranges from 924.6 to 925.1 parts of pure silver per 1,000 (925 being the standard). The author has also constructed supplementary plates of pure silver and gold. An interesting table of assays of trial plates from 1477 down to the present time is given.—Mr. J. Hannay contributes a description of a sp. gr. apparatus for temperatures other than atmospheric.—Dr. Gladstone and Mr. Tribe give the fourth part of their researches on the action of the copper-zinc couple on organic substances. They have now turned their attention to the series containing the C_nH_{2n-1} radicals, the first body acted upon being iodide of allyl, which yields with the dry couple a resinous body of the formula $n(C_3H_4)$, but when mixed with ether rapid decomposition sets in at ordinary temperatures, and the ethereal solution gives zinc oxide on mixing with water. All attempts to isolate zinc-allyl have, however, failed. Allyl iodide and water acted upon by the couple give propylene $C_3H_6I + H_2O + Zn = ZnI.HO + C_3H_6$. The iodide mixed with alcohol is acted upon violently by zinc alone yielding propylene $C_3H_5I + C_2H_6O + Zn = Zn \begin{cases} C_2H_5O \\ I \end{cases} + C_3H_6$.—On ferrous anhydro-sulphate, by T. Bolas. A mixture of 10 per cent. of a saturated aqueous solution of ferrous-sulphate with oil of vitriol deposits, on cooling, small white prismatic crystals having the formula FeS_2O_7 . When exposed to moist air the anhydro-sulphate yields granular crystals of the formula $FeSO_4.6H_2O$.—On tetranickelous phosphide, by Dr. R. Schenk. This substance (Ni_4P_2) was obtained by adding a sufficient quantity of tartaric acid to a solution of nickelous chloride, to prevent precipitation by potash, boiling the potash solution with phosphorus and then drying the precipitate in a stream of hydrogen. The remainder of the journal is devoted to the usual abstracts from other journals, British and foreign.

Poggendorff's Annalen der Physik und Chemie, No. 2, 1874.—In the commencing paper, by M. Hermann Herwig, it appears demonstrated that the conducting power of mercury, for heat, is perfectly constant between 40° and 160° .—A continuation of Julius Thomsen's Thermo-chemical Recherches treats of several agents of oxidation and reduction; and in the next paper, Dr. Röntgen discusses several points connected with M. Kundt's dust-figures (produced when a metallic plate, strewn with lycopodium, receives an electric spark): the dependence of the size of the dust-circle on the nature of the gas in which the discharge occurs; on the thickness of the lycopodium layer; on the distance of wire-point from plate; and on the kind of electricity that is in the plate. He also studies the mode of production of the figure, the nature of the discharge, and the phenomena to which Prof. Guthrie lately called attention.—The concluding portion of M. Braun's paper on elastic vibrations whose amplitudes are not infinitely small, is given. Various experiments were made with steel rods, and it is shown that the pitch of tone decreases if the amplitude increases, and that with high tones the influence of amplitude is greater than with low. The deadening is dependent on pitch of tone (being greater for higher tones), on amplitude (the influence of which is also greater the higher the tone), and on figure of vibrations (those in one direction being more deadened when there are simultaneous vibrations in the direction at right angles).—This article is followed by a translation of Prof. Roscoe's account of a self-registering instrument for meteorological measurements of light.—A paper by M. Friedrich C. G. Müller (first part) has for its subject galvanic polarisation, and the distribution of the current in electrolytes. The author's experimental plan was (1) to vary the section and length of a parallelepipedal electrolyte, and the size of the pole plates, and determine each time the resistance; (2) to insert metallic conductors of small resistance (e.g. thick copper-wire) in the long direction of the liquid conductor, but not touching the electrodes, and measure the increase of conduction; (3) to measure the current-density in different portions of any section by the electrolytic action taking place on a small plate brought to that part.—M. Avenarius has a paper On internal latent heat, in which he arrives at the conclusion that the temperatures (determined by direct observations) of the volatilisation of a liquid in a hermetically-closed space, perfectly agree with those calculated on the basis of empiric formulæ for internal latent heat. The experiments were made with ether, sulphide of carbon, chloride of carbon, and acetone.—Prof. Julius Kohn proposes a simplification of König's method of manometric flames, doing away with the membrane, and making the sound pass from the mouth of an organ-pipe, e.g. through a narrow glass tube,

directly to the base of the flame (whose motions are mirrored in the revolving case, as usual).—In an article On the motion and action of glaciers, Dr. Pfaff describes some very delicate measurements he lately made on the Aletsch glacier, which seemed to prove that the progressive motion of the ice took place without any break. A minimum motion of 8 mm. per hour was observed at noon, and a maximum of 30 mm. about 5 P.M.; the latter being thus nearly four times the former. Dr. Pfaff also urges a number of considerations against certain theories of valley-formation by glaciers.—The only remaining paper is one On function of magnetisation of various iron bodies, by Prof. Stolewof, of Moscow.

Der Naturforscher, March.—In this number are described a series of experiments by M. Hansemann, who considers they demonstrate the production of a difference of temperature, in columns of air, by the attraction of the earth.—An account is given of recent observations by Dr. Boltzmann, on what he calls "dielectric action at a distance." If the hypothesis be correct (he argued), that in the molecules of an insulator, by electric forces, positive electricity is driven to one side and negative to the other, then an originally unelectricified, insulating body brought near one which is charged with electricity, must be attracted by it, simply through dielectric polarisation of the molecules, and without conduction; in fact, as a piece of soft iron is attracted to a magnet. Experiment confirmed this; and he determined, by his new method, the "dielectric constants" of several insulating substances.—We might here also call attention to M. Barthelemy's striking experiments in vibration forms, produced at the surface of liquids by means of vibrating tuning-forks. In square vessels containing mercury, systems of bright lines appear parallel to the sides, and the breadth of the waves is in inverse proportion to the number of vibrations. In this way is explained Prof. Tyndall's observation that many liquids are not set in wave-motion by vibrations. Such is the case when the breadth of the waves is greater than the breadth of the vessel; there can only then be a motion of the whole surface. The distance between two lines corresponding to the same pitch of fork is found to be independent of the density of the liquid. M. Barthelemy experimented also with round, three-cornered, and elliptical vessels, and on the rhythmical vertical flow of water from narrow orifices.—M. Spörer adduces evidence of the presence of ascending and descending currents in the atmosphere of the sun.—There are also, in the physical department, notes of Helmholtz's researches on galvanic polarisation in gasless liquids, Lockyer's on spectrum analysis of metals, Tyndall's on conduction of sound through the atmosphere, &c.—In geology, we find a summary of M. Laube's late observations as to the evidence of a much more intense Ice-period in Greenland than the present; while M. Fuchs describes the geological formation of the region about Nizza, south of the Maritime Alps.—Two curious cases of mimicry in the Articulata are discussed in a note by M. Gerstaecken, who theorises on the nature of the general phenomenon; and there is, in the same section, a paper by M. Milne-Edwards, in which the colour of birds is studied in relation to their geographical distribution.—In botany, lastly, the following topics are treated; immigration of a rust fungus, *Puccinia malvacearum* (from Chili); light and the regeneration of albuminous matter from asparagine; and the electrical phenomena in the leaves of *Dionæa*.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 30.—On Leaf arrangement, by Hubert Airy, M.A., M.D. Communicated by Charles Darwin, F.R.S. Received March 23, 1874.

The author is led to suppose:—

I. That the original form of leaf-arrangement was two-ranked.

II. That this original two-ranked form gave rise to forms with 2, 3, 4, 5, 6, 7, &c., ranks, by "sporting," as opposed to any process of accumulative modification.

III. That, of the orders so formed, those with an even number of ranks (except 2) have, as a rule, assumed a *whorled* arrangement, and those with two or an odd number of ranks have assumed an *alternate* arrangement, under the need of lateral accommodation of ranks in the bud (taken as type of close-packed forms).

IV. That all these orders have been subject to vertical condensation, under the need of vertical economy of space in the bud (taken as type of close-packed forms).

V. (a) That such condensation operating on a 2-ranked or 3-ranked or 5-ranked alternate order $\left(\frac{1}{2}, \frac{1}{3}, \frac{2}{5}\right)$ has produced subsequent orders of series A $\left(\frac{1}{2}, \frac{1}{3}, \frac{2}{5}, \frac{3}{8}, \frac{5}{13}, \frac{8}{21}, \frac{13}{34}, \frac{21}{55}, \frac{34}{89}, \frac{55}{144}, \&c.\right)$.

(b) That condensation of a 7-ranked $\left(\frac{2}{7}\right)$ or rarely of a 3- or 4-ranked $\left(\frac{1}{3}, \frac{1}{4}\right)$ alternate order has produced subsequent orders of series B $\left(\frac{1}{3}, \frac{1}{4}, \frac{2}{7}, \frac{3}{11}, \frac{5}{18}, \&c.\right)$

(c) That condensation of a 9-ranked $\left(\frac{2}{9}\right)$ or rarely of a 4- or 5-ranked $\left(\frac{1}{4}, \frac{1}{5}\right)$ alternate order has produced subsequent orders of series C $\left(\frac{1}{4}, \frac{1}{5}, \frac{2}{9}, \frac{3}{14}, \frac{5}{23}, \&c.\right)$.

(d) That condensation of a 4-ranked whorled order (whorls of two) has produced successive orders of series α , with spirals in sets of 4, 6, 10, 16, 26, 42, &c.

(e) That condensation of a 6-ranked whorled order (whorls of three) has produced successive orders of series β , with spirals in sets of 6, 9, 15, 24, 39, &c.

(f) That condensation (if any) of an 8-ranked whorled order (whorls of four) would produce successive orders of series γ , with spirals in sets of 8, 12, 20, 32, &c. Higher numbers of ranks would lead to higher series.

The Structure of the Mucous Membrane of the Uterus and its Periodical Changes, by John Williams, M.D., Assistant Obstetric Physician to University College Hospital. Communicated by Dr. Sharpey.

On the Improvement of the Spectroscope, by Thomas Grubb, F.R.S.

The author refers to a statement appearing in the "Astronomical Notices" for March, viz. that the spectral lines can be rendered perfectly straight, simply by returning them (after their first passage through a series of prisms arranged for minimum deviation) by a direct reflection from a plane mirror; and further, that this has been accomplished in a spectroscope in construction for the Royal Observatory. He then shows reasons for doubting the accuracy of this statement.

The remedy, or means of producing straight spectral lines, which the author has alluded to is simply that of constructing the "slit" with curved edges instead of rectilinear. There is but little practical difficulty incurred in construction and no apparent objection to its use. It may be objected that for such variation of prism power in use there should be a special slit. It is, however, only in spectroscopes arranged for high dispersion that the curvature becomes objectionable; in such there is seldom a change required, and a single slit of medium balancing power would probably remove all practical difficulty or objectionable curvature of the lines. The author has found by trial, that when two compound prisms were in use, giving a dispersion from A to H of nearly 14° , that the spectral lines were straight in a field of one degree when the radius of curvature of the slit was made 1.25 inch.

Zoological Society, May 5.—Dr. E. Hamilton, vice-president, in the chair.—The secretary read a report on the additions that had been made to the Society's Menagerie during the month of April 1874, amongst which were a Vigne's Sheep (*Ovis vignei*), presented by Capt. Archibald; a white-cheeked flying squirrel (*Pteromys leucogenys*), presented by Mr. A. Gower; a new kangaroo (*Halmaturus luctuosus*), deposited by Sig. L. M. d'Albertis, and four bladder-nosed seals, presented by Capt. D. Gray and Capt. Alexander Gray.—Mr. Sclater made some remarks on the cassowary, living in the Society's Gardens, hitherto called Kaup's cassowary, which, it appeared, ought to bear the name *Cassuarinus papuensis*.—Mr. Sclater announced that H.M. Government had consented to send a Naturalist to Kerguelen's Land to accompany the Astronomical Expedition shortly proceeding there, and that the Rev. A. E. Eaton had been selected by the Royal Society for the post.—Mr. Blandford exhibited and made remarks on a series of heads of the Ibex of

Persia, which he considered to be referable to *Capra agagrus*.—Mr. A. H. Garrod read a paper on the anatomy of the Columbæ, in which a new arrangement of that group of birds was proposed, based upon certain points not hitherto sufficiently investigated.—A communication was read from Dr. Julius Haast, containing the description of a new species of *Euphysetes* (*Euphysetes pottsi*), a remarkably small catodont whale, which had occurred on the coast of New Zealand.—A communication was read from Mr. Frederick Moore, containing a list of Diurnal Lepidoptera collected in Cashmere by Capt. R. B. Reed, 12th Regiment, with descriptions of new species.—A communication was read from Mr. A. G. Butler, containing a complete list of the known Diurnal Lepidoptera of the South Sea Islands.—Mr. Howard Saunders read a paper on the Grey-capped Gulls, in which several species hitherto confounded were distinguished.—A paper was read by Dr. A. Günther, F.R.S., entitled A contribution to the fauna of Savage Island, in which several new lizards peculiar to the island were described, and other animals found in it were mentioned.—A communication was read from Dr. J. S. Bowerbank, F.R.S., containing the sixth part of his "Contributions to a General History of the Spongiadae."—Mr. R. B. Sharpe read a paper on a small collection of birds made in Bulama, one of the Bissagos Islands, West Africa, by Lieut. Bulger.

Chemical Society, May 7.—Prof. Odling, F.R.S., president, in the chair.—A paper On the action of ammonia on phenylic and cresylic chloracetamide, was read in French by the author, Dr. D. Tommasi.—Researches on the action of the copper-zinc couple on organic bodies; Part VII. On the chloride of ethylidene and ethylene, by J. H. Gladstone, F.R.S., and A. Tribe, F.C.S. The authors find that these two isomerides behave differently when treated with the couple, the latter splitting up into ethylene and chlorine, whilst the former gives zinc chlorethylate, $\left. \begin{matrix} C_2H_5O \\ Cl \end{matrix} \right\} Zn$.—Mr. Charles E. Groves then read a note On the preparation of ethyl chloride and its homologues. He finds that when hydrochloric acid is passed into a boiling solution of zinc chloride in alcohol, the latter is completely converted into ethyl chloride; other alcohols, such as the methylic and amylic, under similar treatment yield the corresponding chlorides.—On a new mineral from NewCaledonia, by Mr. A. Liversidge.

Geological Society, April 29.—John Evans, F.R.S., president, in the chair.—The following communications were read:—On the Gault of Folkestone, by F. G. H. Price. The author divided the Gault into two great sections, Upper and Lower Gault, which he again subdivided into eleven well-defined zones, mostly named after characteristic ammonites. Each of these zones or beds is numbered, commencing with No. XI., the zone of *Ammonites interruptus*, which bed forms the base of the Gault, reposing upon the Folkestone beds of the Upper Neocomian. He found the thickness of the deposit at Copt Point to be 99 ft. 4 in.—On the Cretaceous Rocks of Beer Head and the adjacent cliff-sections; and on the relative horizons therein of the Warminster and Blackdown fossiliferous deposits, by C. J. A. Meyer. The author remarked that in advancing westward from the Isle of Wight the cretaceous rocks diminish steadily, although unequally, in thickness, and change slightly both in mineral character and fossil contents, while the base of the series rises gradually in the cliff-sections. The chalk-cliffs of Beer Head, the most westerly chalk promontory in England, owe their preservation, in his opinion, partly to a local synclinal arrangement of the strata. The cretaceous rocks of the district include the following, in descending order:—

- Upper Chalk (in part)?
- Medial Chalk.
- Lower Chalk.
- Chalk Marl.
- Chloritic Marl.
- Upper Greensand.
- Gault.
- (?)

Royal Astronomical Society, May 8.—Sir G. B. Airy, vice-president, in the chair.—Prof. Otto Struve read a paper On the irregularities in the proper motion of Procyon. He said that last year Prof. Auwers of Berlin had expressed grave doubts as to the possibility of the minute companion of Procyon being sufficiently large to account for the observed irregularities in the motion of the principal star; he had calculated that it would be

necessary to assume for Procyon a mass eighty times as great as that of our sun, and for the perturbing companion a mass at least five times as great as that of our sun. He had further calculated that if the minute companion were the perturbing body, it should, at the beginning of this year, occupy a position-angle 9° or 10° greater than that occupied by it last year, whereas if it were only a small star, situated in the neighbourhood, the observed proper motion of Procyon would carry it forward so as to diminish the position-angle of the companion by about 4° —on recently examining Procyon he had found that the companion had moved forward during the year from a position-angle of $87\frac{1}{2}^\circ$ till it now occupied a position-angle of 96° . He was therefore disposed to think that there could now no longer be any doubt that the minute companion is the perturbing body, which accounts for the irregularities in the motion of the primary.—Mr. Glaisher gave an account of some MS. volumes of twelve figure-logarithms which have recently been presented to the Society by the executors of the late Mr. Thompson of Greenock, the table of logarithms of numbers extends as far as 120,000. No account has been left of the way in which Mr. Thompson obtained the logarithms of the prime numbers, but from internal evidence Mr. Glaisher was inclined to think that they had been independently calculated. He attached great value to the manuscripts. No table of twelve-figure logarithms has as yet been published. Mr. Glaisher estimated that the cost of printing these tables would be about 1,000*l*.

Royal Microscopical Society, May 6.—Charles Brooke, F.R.S., president, in the chair.—A paper by Dr. Anthony, On the suctorial organs of the blow-fly was read to the meeting. The paper suggested that the so-called pseudo-tracheæ were really sucking or pumping organs.—A paper was read by Mr. Slack On certain silica films artificially produced, in which the results of a number of interesting experiments and observations were detailed; and Mr. W. T. Read communicated to the meeting the results of similar researches, in which he had recently been employed.—A paper by Dr. Royston-Pigott was taken as read, On the use of black shadow markings, and on a black shadow illuminator.

Entomological Society, May 4.—Sir Sidney Smith Saunders, president, in the chair.—Mr. Butler exhibited an example of arrested development in a Peacock butterfly caused by the tail of the pupa having become detached during the process of emerging, the right wings being completely developed, whilst those on the left side were not developed at all, the pupa case remaining attached to the left side of the body of the butterfly.—Mr. W. C. Boyd exhibited specimens of *Solenobia inconspicua*, taken in St. Leonard's Forest, and amongst them a specimen of a remarkably pale colour, which might possibly be an Albino variety; but it had a very different appearance from the ordinary form.—Mr. Boyd also exhibited some leaves of the common Comfrey (*Symphytum officinale*), gathered at Cheshunt, the undersides of which were found to be completely covered with specimens of *Brachycentrus sub-nubilus*. All were said to be males, but on close examination a single female specimen was discovered amongst them.—Mr. C. O. Waterhouse read a note by Dr. Lamprey, Surgeon-Major 67th Regiment, On the habits of a boring beetle, one of the *Bostrichida*, found in British Burma. It belonged to the genus *Sinoxylon*. Dr. Lamprey did not know the name of the tree on which it was found; but he described the insect as making a small hole in a stem that was about $\frac{1}{2}$ in. in diameter; and by devouring the wood completely round, severed it with a clean cut, so that it was only kept together by the thin outer layer of bark, the first gust of wind snapping off the weakened branch. The beetle turned on its side while boring, its back being towards the bark, and in this way its form appeared to adapt itself to the circumference of the stem.

PARIS

Academy of Sciences, May 4.—M. Bertrand in the chair.—M. Jamin presented a communication on the depth of the magnetised layer in a steel bar. The author announced as the result of his experiments that in a thick steel bar there is no magnetisation in the centre, and that the elemental bars composing the magnet do not begin to appear till 3 or 4 millimetres from the surface, but become more and more numerous and contracted against the free surface.—Study of and experiments upon the metallic sulphides, by M. Berthelot, a continuation of former thermo-chemical researches.—Observations on the fecundation

of the urodelous batrachians, by M. Ch. Robin. The fecundation of the oviparous urodelous batrachian (*Siredon, Triton*), like that of the *Anoura*, is internal.—Observations concerning a recent communication by M. Faye relating to a calculation by Pouillet of the cooling of the solar mass, by M. A. Ledieu. The author has arrived at a result not quite in accordance with that obtained by M. Faye in his recent calculations.—M. Favre presented the continuation of his researches on hydrogen. The condition of this gas when absorbed by palladium and by platinum black is in no way comparable in these two cases. In platinum black the condensed gas is not chemically modified, but in palladium it undergoes an allotropic modification before combining with the metal. The author in concluding called attention to the importance of thermic measurements of chemical phenomena; notably of the allotropic changes of bodies.—On the action of distilled water on lead by M. Is. Pierre. Water condensed in a leaden worm was found to contain about 0.00375 grms. of Pb. per litre.—Report on the apparatus intended for the operation of the transfusion of blood, presented to the Academy by MM. Moncoq and Matthieu.—On the illumination of opaque bodies by neutral or polarised light, by M. A. Lallemand.—Determination of clay in arable soil, by M. T. Schloesing.—On gravitation, cohesion, and the distances of the centres of molecules, by M. G. West.—M. Ad. Chatin presented a continuation of his researches on "organogenesis compared with androgenesis in its relations with natural affinities." The classes treated of were Polygalacæ and Æsculinacæ.—Influence of vernal heat on *Phylloxera vastatrix*, by M. M. Cornu. The insect changes from brown to bright yellow and becomes larger.—On the integrals of the differential equations of curves which have an even polar surface, by M. l'Abbé Aoust.—Phenomena observed on Jupiter's satellites, by M. C. Flammarion. The author's observations lead to the hypothesis of the existence of an atmosphere surrounding the second and third of the planet's satellites.—On the reflecting power of flames, by M. J. L. Soret. Experiments have shown that carbon preserves its reflecting power at very high temperatures, thus confirming Davy's theory of the luminosity of flame, since a ray of sunlight reflected from a bright flame is polarised in precisely the same manner as when reflected from non-luminous smoke.—Study of the properties of explosive bodies, by M. F. A. Abel. Third memoir.—Note on a process for determining phosphoric acid, by M. F. Jean. Influence of the presence of nitrogen in the textile fibre on the direct fixation of the aniline colours, by M. E. Jacquemin.—On the physiological phenomena observed in the high regions of the atmosphere, by M. Barral.—On the study of the fumeroles of Nisgros and of some of the products of the eruption of 1873, by M. H. Gorceix.—Partial resection of the calcaneum; absolute anaesthesia produced by an intravenous injection of chloral; immediate cessation of anaesthesia after the operation by the application of electric currents, by M. Oré.—On the mechanical aptitude of horses, by M. A. Sanson.—On the occurrence of a Cycada in the Miocene deposit of Koumi (Eubée), by M. G. de Saporta. This insect (*Encephalartos gorceixianus*) is the first fossil Cycada that is capable of being referred without anomalies to a living genus. The discovery enables the author to affirm that a Cycada belonging to a genus now confined to South Africa inhabited Miocene Europe: in the same manner this region supported at a somewhat later period the African type of rhinoceros, giraffes, and antelopes, thus giving greater probability to the hypothesis of a union between Austro-oriental Europe and Africa, during the Miocene period.

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