

Memoirs (Zapiski) of the Caucasian Branch of the Russian Geographical Society, vol. xviii., Tiflis, 1896.—Review of the atmospheric sediments fallen in Caucasia during the spring and summer of 1894, by A. Woznesensky, with four maps.—A journey to the mountain region of the district Tchernomorsk, by N. Albof, with a map of the district, 6·7 miles to the inch. The author has visited, for botanical purposes, some of the least-known valleys of the region, and now gives the diary of his journey.—Studies in the geographical botany of Western Transcaucasia, by the same author. The article is full of valuable data. Several interesting finds are mentioned, such as the new species *Amphoricapus elegans*, and a *Campanula*, which so much exceeds all known species of the same genus by its beauty, that M. Albof proposes for it the name of *Campanula regina*, and remarks that its general shape so much differs from all other now living *Campanula* species that it must be, without doubt, a remainder from a foregone geological flora.—On the Kumyks, an anthropological sketch, by J. Pantukhof.—The Pshaves and their land, by M. Khizanachwili.—A journey to the central part of the land of the Chechenes, by Mdme. A. Rossikof, with a map, three miles to the inch, of this very little part of the main ridge.—A statistical description of the governments of Baku and Kars, from the "Caucasian Calendar."—The state of the glaciers on the northern slope of the Caucasus, by K. Rossikof, being the results of the measurements of the motion of several glaciers in 1893 and 1894; and on the present state of the desiccating lakes of the northern slopes of the Caucasus, by the same author. The same volume contains, as a supplement, a most welcome atlas of ethnographical maps of Transcaucasia, drawn by the Secretary of the Society, E. Kondratenko. The maps are the result of many years' work. The classification of the more than sixty different stems which inhabit Transcaucasia is the result of the remarkable works of Baron Uslar and his follower, M. Zagursky; and the numerical data as to the numbers of inhabitants belonging to each stem are obtained from a census made in the years 1886–1891. The maps, on the scale of thirteen miles to the inch, are seven in number, and represent the governments of Tiflis, Kutais, Baku, Elizabethpol, Daghestan, Erivan, and Kars. The limits of each village community are indicated, and the nationality which prevails in each village is shown in different colours; while, on the borders of each map, special coloured diagrams give the ethnographical composition and the numbers of each nationality for each town and district, as well as for the whole government, so that one sees at a glance their numerical proportions. Full tables of figures are given by M. E. Kondratenko in the text of the *Zapiski*. The value of this work is enhanced by an ethnographical map of Turkish Armenia and Kurdistan, published in the same volume. It is based upon V. Cuinet's statistics, given in his work, "La Turquie d'Asie," and shows in different colours the percentage of Turks and Armenians in each *kaza*, or sub-district.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, April 30.—"The Total Eclipse of the Sun, April 16, 1893. Report and Discussion of the Observations relating to Solar Physics." By J. Norman Lockyer, C.B., F.R.S.

The memoir first gives reports by Mr. Fowler and Mr. Shackleton as to the circumstances under which photographs of the spectra of the eclipsed sun were taken with prismatic cameras in West Africa and Brazil respectively on April 16, 1893. These are followed by a detailed description of the phenomena recorded, and a discussion of the method employed in dealing with the photographs. The coronal spectrum and the question of its possible variation, and the wave-lengths of the lines recorded in the spectra of the chromosphere and prominences, are next studied.

Finally, the loci of absorption in the sun's atmosphere are considered.

The inquiry into the chemical origins of the chromospheric and prominence lines is reserved for a subsequent memoir.

The general conclusions which have been arrived at are as follows:—

(1) With the prismatic camera, photographs may be obtained with short exposures, so that the phenomena can be recorded at short intervals during the eclipse.

(2) The most intense images of the prominences are produced by the H and K radiations of calcium. Those depicted by the rays of hydrogen and helium are less intense, and do not reach to so great a height.

(3) The forms of the prominences photographed in monochromatic light (H and K), during the eclipse of 1893, do not differ sensibly from those photographed at the same time with the coronagraph.

(4) The undoubted spectrum of the corona in 1893 consisted of eight rings, including that due to 1474 K. The evidence that these belong to the corona is absolutely conclusive. It is probable that they are only represented by feeble lines in the Fraunhofer spectrum, if present at all.

(5) All the coronal rings recorded were most intense in the brightest coronal regions, near the sun's equator, as depicted by the coronagraph.

(6) The strongest coronal line, 1474 K, is not represented in the spectrum of the chromosphere and prominences, while H and K do not appear in the spectrum of the corona, although they are the most intense radiations in the prominences.

(7) A comparison of the results with those obtained in previous eclipses confirms the idea that 1474 K is brighter at the maximum than at the minimum sun-spot period.

(8) Hydrogen rings were not photographed in the coronal spectrum of 1893.

(9) D_3 was absent from the coronal spectrum of 1893, and reasons are given which suggest that its recorded appearance in 1882 was simply a photographic effect due to the unequal sensitiveness of the isochromatic plate employed.

(10) There is distinct evidence of periodic changes of the continuous spectrum of the corona.

(11) Many lines hitherto unrecorded in the chromosphere and prominences were photographed by the prismatic cameras.

(12) The preliminary investigation of the chemical origins of the chromosphere and prominence lines enables us to state generally that the chief lines are due to calcium, hydrogen, helium, strontium, iron, magnesium, manganese, barium, chromium, and aluminium. None of the lines appear to be due to nickel, cobalt, cadmium, tin, zinc, silicon, or carbon.

(13) The spectra of the chromosphere and prominences become more complex as the photosphere is approached.

(14) In passing from the chromosphere to the prominences, some lines become relatively brighter but others dimmer. The same line sometimes behaves differently in this respect in different prominences.

(15) The prominences must be fed from the outer parts of the solar atmosphere, since their spectra show lines which are absent from the spectrum of the chromosphere.

(16) The absence of the Fraunhofer lines from the integrated spectra of the solar surroundings and uneclipsed photosphere shortly after totality need not necessarily imply the existence of a reversing layer.

(17) The spectrum of the base of the sun's atmosphere, as recorded by the prismatic camera, contains only a small number of lines as compared with the Fraunhofer spectrum. Some of the strongest bright lines in the spectrum of the chromosphere are not represented by dark lines in the Fraunhofer spectrum, and some of the most intense Fraunhofer lines were not seen bright in the spectrum of the chromosphere. The so-called "reversing layer" is therefore incompetent to produce the Fraunhofer spectrum by its absorption.

(18) Some of the Fraunhofer lines are produced by absorption taking place in the chromosphere, while others are produced by absorption at higher levels.

(19) The eclipse work strengthens the view that chemical substances are dissociated at solar temperatures.


May 7.—"On the Occurrence of the Element Gallium in the Clay-Ironstone of the Cleveland District of Yorkshire." By Prof. W. N. Hartley, F.R.S., and Hugh Ramage.

The evidence of the existence of gallium in the ore and in the metal rests on the measurements of the wave-lengths of the lines in a large number of photographed spectra and upon the relative strengths of the lines in the different materials examined and in the precipitates obtained therefrom.

Examples are given showing the nature of this evidence.

Chemical Society, April 23.—Mr. A. G. V. Harcourt, President, in the chair.—The following papers were read:—The constitution of the cereal celluloses, by C. F. Cross, E. J. Bevan, and C. Smith. The cereal celluloses may be resolved by acids into a residue of normal cellulose and a soluble furfuroid con-

stituent; the latter seems to be a pentosemonoformal of the

constitution $C_5H_8O_3$  CH_2 .—On a new compound of cobalt

and a rapid method of detecting cobalt in presence of nickel, by R. G. Durrant. On adding excess of an alkali bicarbonate, and then hydrogen peroxide, to a solution of cobalt salt, a green solution, which appears to contain a salt of cobaltic acid H_3CoO_4 , is obtained.—Ethereal salts of optically active malic and lactic acids, by T. Purdie and S. Williamson. The specific rotations of the ethereal salts of active lactic and malic acids vary with the method of preparation of the substances; the variations in rotatory power do not seem to be altogether due to the occurrence of partial racemisation.—Metadichlorobenzene, by F. D. Chattaway and R. C. T. Evans. A convenient method of preparing large quantities of 1:3-dichlorobenzene from acetanilide is described.—On the temperature of certain flames, by W. N. Hartley.—The determination of the composition of a white sou by a method of spectrum analysis, by W. N. Hartley. A photograph of the spectrum of a white sou coined during the French Revolution of 1798 was taken, and by comparison with the quantitative spectra of the constituent metals, the composition of the coin was determined within certain limits; alloys, the compositions of which varied within these limits, were then made, and their spark spectra photographed. An alloy, consisting of 13.93 per cent. of lead, 72.35 of copper, 0.85 of iron, and 12.70 per cent. of zinc, was ultimately obtained, which gave a spark spectrum identical with that of the sou; the coin consequently has the above composition.—Halogen additive products of substituted thiosinnamines, by A. E. Dixon.—Acidic thiocarbimides, thioureas, and ureas, by A. E. Dixon.—Apparatus for the detection of boric acid, by W. M. Doherty. A method is given for the detection of boric acid in milk, wine, or other substance, depending on the fact that when boric acid is heated in a current of coal-gas which is then burnt, a characteristic colouration is imparted to the flame.

Zoological Society, April 29.—Sir William H. Flower, K.C.B., F.R.S., President, in the chair.—After the Auditors' Report had been read, and other preliminary business had been transacted, the Report of the Council on the proceedings of the Society during the year 1895 was read by Mr. P. L. Sclater, F.R.S., the Secretary. The total receipts of the Society for 1895 amounted to £26,958 9s. 1d., showing an increase of £1851 8s. 6d. as compared with the previous year. This increase was attributable to the prevalence of fine weather during the summer and autumn of 1895, and also to the acquisition of a giraffe, and several other specially interesting additions to the Society's menagerie. A new edition of the list of animals in the Society's collection, of which the last (the eighth) was published in 1883, has been prepared under the direction of the Secretary. It contains a list of all the specimens of vertebrated animals that had been received by the Society during the past twelve years. This volume is now going through the press, and will, it is hoped, be ready for issue before the close of the present year. The number of visitors to the gardens in 1895 was 665,326, which was greater than it had been in any year during the past ten years. The corresponding number in 1894 had been 625,538. The number of animals in the Society's collection on December 31 last was 2369, of which 768 were mammals, 1267 birds, and 334 reptiles. Amongst the additions made during the past year, twelve were specially commented upon as of remarkable interest, and in most cases new to the Society's collection. Amongst these were a male lion from Somali-land (presented by her Majesty the Queen), a female South African giraffe, a pair of brindled gnus, a pair of sable antelopes, a Brazilian three-banded armadillo, a male Panolia deer from Southern China, an Alexandra parakeet from the interior of Australia, a frilled lizard from Western Australia, a martial hawk-eagle from British East Africa, and two examples of Forsten's lorikeet. The Report having been adopted, the meeting proceeded to elect the new Members of Council and the Officers for the ensuing year. The usual ballot having been taken, it was announced that General the Hon. Sir Percy Feilding, K.C.B., Prof. Alfred Newton, F.R.S., Sir Thomas Paine, Mr. E. Lort Phillips, and the Lord Walsingham, F.R.S., had been elected into the Council in the place of the retiring Members; and that Sir William H. Flower had been re-elected President, Mr. Charles Drummond Treasurer, and Mr. P. L. Sclater Secretary to the Society for the ensuing year.

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PARIS.

Academy of Sciences, May 4.—M. A. Cornu in the chair.—On the theory of gases, by M. J. Bertrand. A critical examination of the well-known formula of Maxwell for the relation between the velocities of the gaseous molecules and their components in any arbitrarily chosen direction. This formula is described as necessarily absurd, since it gives an apparent solution of a problem insoluble from its very nature.—On the constitution and history of the lunar surface, by MM. Lœwy and Puiseux. The results of a study of a new series of lunar photographs tend to show that it is unnecessary to assume the action of natural forces other than those now at work on the earth to explain the condition of the surface of the moon.—On the birds and butterflies observed in the centre of an intertropical tempest, by M. H. Faye. The author shows that the occurrence of birds and insects in the calm centre of a cyclone, a fact frequently observed, is in full accord with his theory of storms.—Concerning hematozoa in marsh-fever, by M. A. Laveran. Although the presence of amoeboid parasites in the blood during marsh-fever is now well established, there is hardly any ground for the assumption of distinct species peculiar to each variety of the disease, one for tertiary ague, another for quaternary ague, and a third giving rise to irregular fevers. This assertion is supported both by the microscopical study of the parasite and by the clinical study of the disease.—Observations of the new Swift comet (b 1896 = 1896, April 13), made at the Observatory of Paris by M. G. Bigourdan.—On the approximate development of the perturbation function in the case of inequalities of a high order, by M. Maurice Hamy.—A property of movements on a surface, by M. Hadamard.—On the absorption of light by media possessing rotatory power, by M. E. Carvallo.—Electrostatic deviation of the cathode rays, by M. G. Jaumann. A reply to some criticisms and suggestions of M. Poincaré. By immersing the vacuum tube in oil forming the anode, the rays are much reduced in intensity, and in this state are strongly deviated by electrostatic forces.—Observations on the preceding communication, by M. Poincaré. The suggestion of M. Jaumann that inside a Crookes' tube the lines of force are rectilinear, is directly opposed to the conclusion drawn by Hertz from his experiments.—Apparatus for measuring currents of high frequency, by MM. G. Goiffe and E. Meylan.—Reply to some observations of M. Aug. Righi, by MM. L. Benoist and D. Hurmuzescu.—On the relation between the maximum production of the X-rays, the degree of vacuum and the form of the tubes, by MM. Victor Chabaud and D. Hurmuzescu. The pressure giving the maximum result varies with the shape of the tube. A form of tube is figured giving a choice of two anodes from which excellent results were obtained.—Radiography; some applications to the physiology of motion, by MM. Imbert and Bertin-Sans.—On a new method of preparing synthetically urea, and its symmetrical derivatives, by M. P. Cazeneuve. The carbonate of guaiacol, now easily obtained commercially, on treatment with alcoholic ammonia or amines, gives the corresponding urea in nearly theoretical yield.—Transformation of taric and stearolic acids into stearic acid, by M. A. Arnaud. This reduction, which is not effected by sodium amalgam, takes place readily with hydriodic acid and amorphous phosphorus.—On the presence, in the *Monotropa Hypopithys*, of a glucoside of methyl-salicylic ether, and on the hydrolysing ferment of this glucoside, by M. E. Bourquelot.—On maize, by M. Balland. Some analyses showing the superior nutritive power of Indian corn as compared with wheat.—On zeolites and the substitution of the water they contain by other substances, by M. G. Friedel. The dehydrated mineral readily takes up sulphuretted hydrogen, carbonic acid, hydrogen, and even atmospheric air, the last to such an extent as to render it impossible to determine the amount of water by loss or ignition.—On the Annelids at great depths in the Bay of Biscay, by M. Louis Roule. The results of soundings from the *Caudan* in April 1895.—On the first cause of potato-scab, by M. E. Roze.—On the age of the ophitic eruption of Algeria, by M. L. Gentil.—On a method of photographing the retina, by M. V. Guinkoff.—The fermentation of uric acid by micro-organisms, by M. E. Gerard. In the experiments cited the uric acid was split up into urea and ammonium carbonate.—Researches on the serotherapy of urinary infection, by MM. J. Albarrañ and E. Morny.—On the relations between the composition of the blood, the quantity of haemoglobin, and the general state of the organism, by M. P. Lafon.—Projection of a thermometer column on a sensitive plate, by means of the Röntgen rays, by M. H. Bentéjac.

AMSTERDAM.

Royal Academy of Sciences, March 28.—Prof. van de Sande Bakhuyzen in the chair.—Prof. Kamerlingh Onnes exhibited a series of extremely clear photographs, obtained with Röntgen rays by Prof. Haga at Groningen. The exposure did not last longer than one minute.—Prof. Kamerlingh Onnes presented, on behalf of Dr. Siertsema, a paper to be published in the report of the meeting, on measurements of magnetic rotation dispersion in gases.—Prof. Franchimont on the action of nitric acid upon methyl and dimethyl amides at the ordinary temperature. The author showed to what extent the action depends upon the acid-residue of the amides, and proved that the same rules also hold good for the piperidides. For this purpose the author, in conjunction with Dr. van Erp, examined oxal-piperide, which enters into an unstable compound with nitric acid, but is not otherwise influenced, resembling in this tetramethyloxamide, previously studied in conjunction with Mr. Rouffaer. The author and Dr. Taverne examined (1) trichloracetpiperidide, a beautifully crystallised substance, fusing at 45°; (2) benzolsulphonpiperidide; (3) picrylpiperidide; and, as they had expected, they found that the first was not influenced, the second yielded nitropiperidine, and the third a picryldehydronitropiperidide as a red, beautifully crystallised body, fusing at 95°.—Prof. Franchimont further treated of the action of alkalis upon nitramines, in examining which action Dr. van Erp found that a great quantity of nitrous acid is formed. With some nitramines, as nitrohydantoin, nitromethylhydantoin, nitrolacetylureum, nitroamidoacetamide, when treated with baryta-water, the formation of nitrous acid already takes place at a low temperature; others, as nitroacetyl-urea, ethylenedinitro-urea, dinitroglycoluril, &c., behave differently.

Prof. Ramsay, F.R.S., and Dr. Collie.—On the Amount of Argon and Helium contained in the Gas from the Bath Springs: Lord Rayleigh, Sec.R.S.
 ROYAL INSTITUTION, at 3.—The Art of Working Metals in Japan: W. Gowland.
 CHEMICAL SOCIETY, at 8.—The Diphenylbenzenes. I. Metadiphenylbenzene: F. D. Chattaway and R. C. T. Evans.—Derivatives of Camphoric Acid: Dr. F. S. Kipping.—Some Substances exhibiting Rotatory Power both in the Liquid and Crystalline states: W. J. Pope.
 FRIDAY, MAY 22.
 ROYAL INSTITUTION, at 9.—Hysteresis: Prof. J. A. Ewing, F.R.S.
 PHYSICAL SOCIETY, at 5.—On Dielectrics: R. Appleyard.—The Field of an Elliptical Current: J. Viriamu Jones.—An Instrument for Measuring Frequency: A. Campbell.
 SATURDAY, MAY 23.
 GEOLOGISTS' ASSOCIATION (Paddington at 11.45).—Excursion to Chippenham, Calne, Kellaways, and Corsham.
 YORKSHIRE NATURALISTS' UNION, at Hellfield.—Four Days' Excursion for the investigation of Bowland.

BOOKS, PAMPHLET, and SERIALS RECEIVED.

BOOKS.—Alembic Club Reprints. No. 12. The Liquefaction of Gases: M. Faraday (Edinburgh, Clay).—Report on the Work of the Horn Scientific Expedition to Central Australia. Part 2. Zoology (Dulau).—Hausaland: C. H. Robinson (Low).—A Theoretical and Practical Treatise on the Manufacture of Sulphuric Acid and Alkali: Dr. G. Lunge, Vol. 3, 2nd edition (Gurney).—Electric Lighting and Power Distribution: W. P. Maycock, 3rd edition, 2 Vols., Vol. 1 (Whittaker).—The Whence and the Whither of Man: Prof. J. M. Tyler (Blackwood).—Graphical Calculus: A. H. Barker (Longmans).—A Handbook to the Order Lepidoptera: W. F. Kirby. Part 1. Butterflies, Vol. 2 (Allen).—Les Rayons X: Dr. C. E. Guillaume, deux édition (Paris, Gauthier-Villars).—Regenwaarnemingen in Nederlandsch-Indie, 1894 (Batavia).—Observations made at the Magnetical and Meteorological Observatory at Batavia, 1894 (Batavia).
 PAMPHLET.—On Germinal Selection: A. Weismann (Open Court Publishing Company).
 SERIALS.—Bulletin de L'Académie Royale des Sciences, 1896, No. 3 (Bruxelles).—Centralblatt für Anthropologie, &c., 1896, Heft 2 (Breslau).—American Journal of Science, May (New Haven).—Journal of the Franklin Institute, May (Philadelphia).—Psychological Review, May (Macmillan).

DIARY OF SOCIETIES.

LONDON.

THURSDAY, MAY 14.

ROYAL INSTITUTION, at 3.—The Art of Working Metals in Japan: W. Gowland.
 SOCIETY OF ARTS, at 4.30.—Tea Planting in Darjeeling: G. W. Christison.
 MATHEMATICAL SOCIETY, at 8.—On the Application of the Principal Function to the Solution of Delaunay's Canonical System of Equations: Prof. E. W. Brown.
 INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Influence of the Shape of the Applied Potential Difference Wave on the Iron Losses in Transformers: Stanley Beeton, C. Perry Taylor, and I. M. Barr.

FRIDAY, MAY 15.

ROYAL INSTITUTION, at 9.—Cable-laying on the Amazon River: Alexander Siemens.
 EPIDEMIOLOGICAL SOCIETY, at 8.
 QUEKETT MICROSCOPICAL CLUB, at 8.

MONDAY, MAY 18.

SOCIETY OF ARTS, at 8.—Applied Electro-chemistry: James Swinburne.
 ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Journey from Talifu to Assam: H. R. H. Prince Henry of Orleans.
 VICTORIA INSTITUTE, at 4.30.—Climate in India: Grant "Bey."

TUESDAY, MAY 19.

ROYAL INSTITUTION, at 3.—Ripples in Air and on Water: C. V. Boys, F.R.S.
 SOCIETY OF ARTS, at 8.—Bronze Casting in Europe: George Simonds.
 ZOOLOGICAL SOCIETY, at 8.30.—On an interesting Variation in the Pattern of the Teeth of a Specimen of the Common Field-Vole: G. E. H. Barrett-Hamilton.—Contributions to the Anatomy of Picarian Birds. No. III. The Anatomy of the Alcedinidæ: F. E. Beddard, F.R.S.
 INSTITUTION OF CIVIL ENGINEERS, at 8.—The Magnetic Testing of Iron and Steel: Prof. J. A. Ewing, F.R.S.—Magnetic Data of Iron and Steel: Horace F. Parshall.
 ROYAL STATISTICAL SOCIETY, at 5.
 PATHOLOGICAL SOCIETY, at 8.30.—Annual Meeting.
 ROYAL PHOTOGRAPHIC SOCIETY, at 8.—Photo-mechanical Methods in Austria: Ignatz Herbst.
 ROYAL VICTORIA HALL, at 8.30.—A Visit to Armenia: Prof. A. V. Markoff.

WEDNESDAY, MAY 20.

SOCIETY OF ARTS, at 8.—Orthochromatic Photography: Captain W. de W. Abney, F.R.S.
 ROYAL METEOROLOGICAL SOCIETY, at 7.30.—The Exposure of Anemometers: Richard H. Curtis.
 ROYAL MICROSCOPICAL SOCIETY, at 8.

THURSDAY, MAY 21.

ROYAL SOCIETY, at 4.30.—On the Changes produced in Magnetised Iron and Steels by cooling to the Temperature of Liquid Air: Prof. J. Dewar, F.R.S., and Dr. J. A. Fleming, F.R.S.—Note on the Larva and of the Post-Larval Development of *Leucosolenia variabilis*, n. sp., with remarks on the Development of other Arconidæ: E. A. Minchin.—Helium and Argon. Part III. Experiments which have yielded Negative Results:

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