the collective work of those who labour in the wide field of natural science, all most important advances in hygiene, being made by the researches of eminent specialists in natural science. Finally, Prof. Mendeleeff made the proposal to publish a new scientific periodical.

At the last public meeting of the Congress, Professors Sokhotsky and Kovalsky made a proposal to found a Russian Astronomical Society, and Prof. Tchebysheff proposed to solicit from the Government pecuniary help to the Moscow Mathematical Society; both proposals were agreed to. M. Severtsoff gave a very interesting lecture on the orographical structure of Central Asia and on its influence upon the geographical distribution of animals. Prof. Andreieff developed the idea as to the necessity of giving instruction in natural sciences in primary schools, and M. Gerd gave an address on the impulse which could be given to the study of nature in Russia, its flora, and fauna, by the teachers of the primary schools; he demonstrated by numerous facts that this help would be very effective, as a great number of teachers would be very glad to work on that field; therefore, he proposed to draw up good programmes for these studies, as well as simple manuals of the necessary elements of science. Both proposals were met with the warmest cheers of the numerous auditory, but we fear that they will meet, as have former proposals of that kind, with strong opposition from the actual Ministry of Public Instruction. After an address by Prof. Wagner, on the sociability of animals, the Congress closed its sittings; the next Congress to be held at Odessa.

In the Section of Astronomy and Mathematics we notice the following communications:—By Prof. Davidoff, on a new method for the exploration of functions, which method enables us to deduce various theorems from one general principle; by M. Preobrajensky, on the integration of Laplace's equation by means of quaternions, the communication having given rise to very animated discussion; and by M. Tchebysheff, on parallelograms, being a brilliant exposition of their importance in mechanics, together with a discussion of several points of theoretical importance. An interesting memoir was read by Prof. Bougaeff, on subtraction in the theory of numbers, which deals with several important philosophical points of mathematical investigation. Other communications were by MM. Markoff, Joukovsky, and Vasilieff, on Bernoulli's equation.

In the Section of Physics and Meteorology we notice the following communications:—By M. Ziloff, on the magnetisation of liquids; by M. Collin, on the luminous properties of electrodes; by Prof. Oettinger, on electricity; by M. Pantioukhoff, on the meteorology of Bulgaria as compared with South-Western Russia; by Dr. Woeikof, on the various causes of perturbations in the diurnal changes of temperature; and by Baron Wrangel, on changes of level in the Black Sea. This level has continuous fluctuations; it is always lower during the night, and reaches its maximum at mid-day in all sea-ports of the northern and the eastern coast; it is also at a minimum in October and a maximum in May, the difference between these two levels being 18 inches. The following communications of general interest were also made in the Section of Physics:—Dr. Woeikof exhibited a new map, showing the distribution of rainfall in all parts of the world; M. Borgmann made a communication on the influence of the inductive currents on the development of temperature during magnetisation; Prof. Lemström (Helsingfors) expounded his theory of terrestrial magnetism; Prof. Tchebysheff read a memoir on centrifugal regulators, and exhibited two of his invention; and M. Tchikoleff, on electric lighting.

In the Section of Geology and Mineralogy we notice communications by Prof. Lentz, on the level of the Amu-Darya; by Prof. Fr. Schmidt, on recent formations on the shores of the Gulf of Finland; and by M. Armatelsky, on diluvial formations in the Government of Chernigov.

In the Sections of Botany and Zoology we notice the communications by M. Tikhomiroff on the bacteria which cause disease of the bladder, and on the artificial production of these bacteria; by Prof. Ganin, on the development of fishes; and by M. Sidoroff, on the insects destroying corn in Russia.

A most interesting communication was made to the Section of Physiology by Prof. Setchenoff, on the absorption of oxygen and nitrogen by blood. Besides, we notice communications by Prof. Goloubeff, on the vibratile epithelium; by Dr. Tsiboulsky, on a new method of determining the amount of blood in animals; by M. Wedensky, on the innervation of the respiratory motions of the *Rana temporaria*; and by Prof. Tarkhanoff, on the amount of blood of man.

In the Section of Anthropology were the following communications:—By Prof. Stid (Dorpat), on the relation between the indexes of the skull and that of the head; by Dr. Lubinsky on the sight, being the result of numerous observations upon the crews of the Russian navy, which observations establish a certain connection, difficult to explain, between the power of sight and the breadth of the chest. The communication by M. Dokouchaeff, on the pre-historic man of the downs of the Oka river, deals with a subject of great interest, as he affirms that the range of downs which we see along the whole of the course of that river must afford a great amount of pre-historic remains, as is the case with the downs of Volosovo and Lviniy, both having yielded thousands of such remains. Prof. Inostrantseff discussed at length the various sub-divisions of the stone period, and M. Anoutchin gave an interesting note on the frontal suture, which seems to appear most frequently in races of a higher degree of civilisation.

An interesting feature of these Russian congresses is the existence of two special sections, those of scientific medicine and of hygiene; the latter section has assumed a great importance, thanks to the energy of several eminent hygienists, as Drs. Erisman, Dobroslavine, Vyrouboff, and others. A question being raised about the hygiene of railways, the section of hygiene had two special sittings on this subject, and a committee was appointed to draw up a programme of investigations on the dress of railway *employes*, the number of hours of work, the sanitary state of railway stations, and of dwellings of *employes*, accidents, the transport of cattle, &c. A great number of other questions, as to the disinfection of dwellings, epidemics, &c., were discussed, and we hope that the work of the section will be of great importance for this kind of investigation.

Several other important communications were made in the Physical Society, and in the St. Petersburg Society of Naturalists, which both have had their annual meetings during the Congress.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—On February 3 the question of the Natural Science Degree will again come on for discussion in congregation. Last term, it will be remembered, the proposal to grant a special natural science degree was defeated after a close division, the principal opposition to the motion coming from the scientific members of congregation. It was thought that a separate science degree, not carrying with it the privileges of the master of Arts Degree, would be regarded as an inferior degree, and tend to lower the position of science in the University. A clause is now proposed by an influential body of residents—including Prof. Odling, Dr. Mark Pattison, Rector of Lincoln, A. Vernon Harcourt, Prof. Green, Prof. Lawson, and Prof. Nettleship—to the following effect:—"Every person who shall have been admitted to the degree of Master of Natural Science, shall also be admitted to the degree of Master of Arts."

At the University Museum Prof. Clifton will continue his course on Statical Electricity and Magnetism; Dr. Odling will continue his lectures on Organic Chemistry on Mondays and Fridays at noon, instead of on Mondays and Thursdays as heretofore. The examination for the Radcliffe Travelling Fellowship will begin in the Museum on Tuesday, February 10, at 10 A.M. Candidates are requested to send in their names to Dr. Acland, at the Museum, on or before February 1.

At Christ Church Mr. Vernon Harcourt will form a class and lecture on Quantitative Analysis; Mr. Baynes will lecture on Thermodynamics and Electrodynamics.

M. ROUGET, Professor of Physiology in the Faculty of Medicine at Montpellier, is nominated Professor of General Physiology in the Museum of Natural History of Paris, in succession to the late Claude Bernard.

SCIENTIFIC SERIALS

Annalen der Physik und Chemie, No. 12, 1879.—Analogies between fluidity and galvanic conductivity, by O. Grotrian.—On the magnetisation of iron rings, by A. v. Ettingshausen.—The ball-shaped electro-dynamometer, by J. Frohlich.—On gradual passage of the band-spectrum of nitrogen into a line-spectrum, by A. Wüllner.—On Stokes's law, by S. Lamansky.—On a bi-constant dispersion formula, by E. Lommel.—On the dichroitic fluorescence of magnesium-platinum-cyanide; experimental proof of

the perpendicularity of the light vibrations to the plane of polarisation, by E. Lommel.—On a small alteration of the Bunsen grease-spot photometer, by A. Toepler.—On the refraction of sound-waves, by K. W. Schellbach and E. E. Boehm.—On the specific heat of water according to Dr. Baumgartner's experiments, by L. Pfaundler.—Reply to the observation of O. E. Meyer, by L. Boltzmann.—On the application of the telephone to measurements of resistance, by F. Niemöller.—On the motion of glaciers, by K. R. Koch and F. Klocke.—On hailstones with ice-crystals, by Ed. Hagenbach.—On hailstones of uncommon size, by P. Merion. (In a paper prefixed to this number, Prof. Clausius defends himself against some aspersions, by Herr Dühring, regarding his relations to Robert Mayer, *a propos* of the mechanical theory of heat.)

THE *Sitzungsberichte der naturwissenschaftlichen Gesellschaft Isis in Dresden* (1879, January to June) contain the following papers of interest:—On the recent geographical and geological investigations of the United States of America, by Dr. Geinitz.—On the coal flora of the Lugan coal-pits, by H. Krone.—On the constitution of dichlornitrophenol, by Dr. Schmidt.—On a new form of the influence machine, by Dr. Töpler.—On the action of chloride of lime upon absolute alcohol, by Dr. Goldberg.—On a gas-stove with arrangement for oxidation, by Dr. Hempel —On a new dye, by Dr. Schmitt.—On the isomerism of ethanes, by Dr. Goldberg.—On the tension of threads and Poggendorff's fall machine, by Dr. Amthor.—On a discovery from the later stone period made in Bohemia, by W. Osborne (with 5 plates).—On the prehistoric centres of culture in Schleswig, by Herr Michelsen.—On some objects found by Dr. Schliemann in his excavations in Greece and Asia Minor, by Dr. Fiedler.—On a discovery of urns at the Hradischt, near Stradonic (Bohemia), by W. Osborne.—On the occurrence of *Castanea vesca*, L., by Dr. Friedrich.—Various smaller botanical papers of minor interest.—On the theory of Watts's centrifugal regulator, by Dr. Ritterhaus.—On some galvanometric methods of multiplication, by Dr. Topler.—Remarks on Wallengren's work concerning Linnæus's species of the genus *Phryganea*, by M. Rostock.—On the Neuroptera of Saxony, by the same; a most elaborate treatise with complete list and catalogue.—On the Hemiptera fauna of Transcaucasia, by Dr. von Horvath.—Obituary notices of Dr. Eduard Losche and H. G. Ludwig Reichenbach.

Reale Istituto Lombardo di Scienze e Lettere, vol. xii. fasc. xvii.-xviii.—This number contains a survey of the year's work, announcements of prizes awarded (with abstracts of memoirs), and of prize subjects, &c.

Fasc. xix.—Stratigraphic observations on the precarboniferous formation of Valtellina and Calabria, by S. Taramelli.—On the dilatation of the heart in disorders of the ventricle, by Prof. de Giovanni.

Journal de Physique, December, 1879.—We note here the following:—Measurement of the wave-length of obscure calorific rays, by M. Mouton.—Displacement between oxygen and the halogen elements united with metals, by M. Berthelot.—A spectroscope for studying the phenomena of fluorescence, by M. Lamansky.

Journal of the Franklin Institute, December, 1879.—On a new theory of the retaining wall, by Prof. Du Bois.—A system of electrical storage, by Professors Houston and Thomson.—Steam boiler explosions, by Messrs. Corbin and Goodrich.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 15.—"On Chemical Repulsion," by Edmund J. Mills, D.Sc., F.R.S.

While engaged in some researches on the propagation of chemical change, I have incidentally encountered a new order of phenomena, which the title "chemical repulsion" may serve provisionally to designate. A brief outline of the experiments is given in the following paragraphs.

Upon a glass plate, laid in a horizontal position, is poured enough solution of baric chloride to cover it completely to a considerable depth. On this solution is placed another glass plate, provided with a small central perforation; when the two plates are firmly pressed together with the hands, most of the solution is extruded, and only a very thin layer of it left between the plates. All excess of the solution having been removed from the outer surfaces of the plates as well as from the perforation, some dilute hydric sulphate is now introduced into the perforation. This reagent attacks the baric chloride, throwing down a white precipitate of sulphate; and, proceeding partly by diffusion, partly by flow, does not cease to widen in every direction its figure of advance, until the edges of the plates are attained. If the perforation is circular, the figure of advance is circular; in other words, the chemical development of a circle is a circle.

Let us now suppose the two plates to be square and equal, and let the upper one have two circular perforations, equidistant from the centre of the square, and situated upon its diagonal. Let also two circular developments of baric sulphate be caused to proceed, as before, from the two perforations simultaneously. At first nothing remarkable is observed, but in a short time, the two growing circles begin to exercise a visible retardation on each other's progress; so that the figure of advance is no longer circular, but oval. [This retardation is of course observed only between the perforations; and not outside them, where the motion is entirely free.] As the development of the figures continues, so also does the retardation at their neighbouring edges increase; the final result being (however long the experiment may be prolonged), that the other diagonal of the square is completely and permanently traced out in a line of no chemical action.

The above experiments are of fundamental importance, and they obviously admit of endless variety. Of this, a few illustrations may suffice.

If the upper plate have three perforations, situated on the points of a central equilateral triangle, there are three repulsion lines; these end at the centre of the triangle, where they form a trilocular point, and traverse its sides midway at right angles.

When the upper plate has four perforations, situated on the points of a central square, there are four repulsion lines; these end at the centre of the square, where they form a quadrilocular point, and traverse its sides midway at right angles.

A very beautiful modification of the preceding experiment consists in simultaneously developing a circle from a (fifth) central perforation. This last circle has no means of escape from the surrounding four. The result is, that it eventually forms a square figure bounded by repulsion lines, and having four symmetrically situated repulsion lines at its corners.

It is easy to demonstrate that the chemical repulsion in these experiments does not depend upon flow. Two superimposed triangular plates, for instance, in neither of which is any perforation, give three repulsion lines on immersion in dilute hydric sulphate. From each corner a line proceeds midway (if the triangle be equilateral) to the centre. In this effect diffusion is alone concerned.

In addition to hydric sulphate and baric chloride, other pairs of reagents may be used with success; and I anticipate no difficulty in obtaining results in which precipitation is not concerned. A beginning has also been made with experiments in tridimensional development.

The complete explanation of what I have termed "chemical repulsion" will probably demand a varied and considerable amount of experimental work. From some incidents of the investigation, so far as it has hitherto proceeded, I am disposed to believe that the motion in any plane chemical figure is not along the radius, but at right angles to the radius; and this supposition will, if verified, explain the repulsion. The existing results afford proof of the following propositions, viz.:—(1) *Chemical action can take place at a distance;* and (2) *Two or more chemical actions, identical except in position, completely exclude one another.*

Chemical Society, January 15.—Mr. Warren De La Rue, president, in the chair.—The following papers were read:—On the effects of the growth of plants on the amount of matter removed from the soil by rain, by Dr. J. H. Prevost. Soil 3 inches deep was placed in two glazed earthenware pans 17 inches in diameter on July 21; 4 grm. of white clover seed was sown in one, the other being blank. The pans were exposed till October 4. The drainage-water was collected and analysed; that from the clover soil contained 48·1 grains of solid matter per gallon, the other 220. The author concludes that rain removes much more matter from an uncropped than from a cropped soil.—Mr. Wynter Blyth described a simple apparatus for the treatment of substances in open dishes to volatile solvents. The dish is placed inside a cast-iron pan, and covered with a glass bell-jar, with condenser attached, the joint between the bottom of the pan and the bell-jar being made tight with