substances employed, viz., sodium salicylate, the benzoates, phytolaccin, physostigma, cionymin, sanguinarin, ipecacuan, &c., have not hitherto been known to stimulate the liver; and definite information has now been obtained regarding the influence of a number of other substances whose effects have been hitherto altogether doubtful. He has also proved that if a purgative agent has no direct stimulating power on the liver it diminishes the secretion of bile, and the importance of this fact is indicated. The results of the experiments which were performed on dogs are in complete harmony with every fact that has been perfectly ascertained in the human subject. The experiments with every substance supply a precision of knowledge regarding the effect of that substance on the liver which has not previously existed. In indicating the place for such experiments in medical science, Prof. Rutherford said :—"We all know how excessively complicated the analysis of the effects of drugs becomes when they are administered to a bodily system distorted in its action by the effects of disease. Of necessity the influence of a drug upon a diseased state is the ultimatum of pharmacology; and every experiment upon a healthy bodily system, whether of man or animal, is merely ancillary to experiments with the drug in disease. If we discover that a drug stimulates the healthy liver of a dog, we do not conclude that it must also stimulate the human liver in health, and still less do we conclude that it must have this action in disease. The experiments on the healthy liver of the dog, on the normal and on the abnormal human liver, are three sets of experiments, closely related, but still distinct. The results of any one of the three series cannot be substituted for those of the other two. Each set of facts has its own proper place, and must be carefully kept there. When, therefore, we show by our physiological method of experiment that such a substance as sodium salicylate or sodium benzoate powerfully stimulates the liver of a dog, we do not for a moment say to the clinical observer—You will find that these things act thus in man; but we merely say this: Experiment with these agents on man, and tell us whether or not you find that they stimulate his liver, and tell us also in what diseased states you find the employment of this or of that substance most advantageous. The clinical experimentalist has a far more difficult task to discharge than the physiological investigator, and he urgently requires all the assistance that physiological methods can render him; and the more so because it is now admitted by all competent thinkers that the actions of medicinal agents in diseased conditions cannot be rightly understood unless we also know their effects in a healthy condition of the bodily system." He further showed that although therapeutics can never be brought within the sphere of exact science, it is nevertheless very urgently our present business not to fold our hands in a despairing nihilism, but to search for every fact that can throw light on the function of every bodily organ, the nature of its diseased conditions, and the manner in which it is influenced by medicinal agents in its normal and abnormal states; and all we desire is that those who don't comprehend our methods of procedure, although they are ever ready and eager to profit by its results, will, instead of throwing obstacles in our way, leave us to do what we can to alleviate not only the sufferings of human beings, but also those of animals.

At the conclusion of the paper Sir Robert Christison characterised the professor's communication as of the greatest importance, and as one which would hand his name down to a very distant future. The professor deserved the commendation of the Society for his courage in going on, in spite of a sentimental opposition, with his researches. He thought that the time would come when the public would wake up from the delusion in this regard in which it now was. Sir Wyville Thomson, in intimating the thanks of the Society to Prof. Rutherford, said that, in his opinion, if a man in a public position felt that he had knowledge and nerve sufficient to perform these experiments for lessening the suffering and prolonging the lives of men, even though they should involve a certain amount of suffering to the lower animals, he was not only entitled but was bound to peform them.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 16.—"On the Spectra of Metalloids. Spectrum of Oxygen." By Arthur Schuster, Ph.D., F.R.A.S. Communicated by J. Clerk Maxwell, F.R.S., Professor of Experimental Physics in the University of Cambridge.

The many unexplained phenomena attending the passage of electricity through gases will probably for some time to come occupy the attention of experimental physicists. It is desirable that the subject should be approached from as many different sides as possible. One of our most powerful instruments of research is the spectroscope, but before it can be applied to the study in question we have to settle the chemical origin of the different spectra, which we observe in vacuum tubes, and to discuss in what way such spectra are liable to change under different circumstances. I have chosen oxygen as a first subject of investigation. Though Plücker and Wüllner have, as far as their experiments went, accurately described the phenomena seen in oxygen tubes, the following contains much that is new, and will put some of the older facts on a firmer basis.

As some of the facts brought to light by the investigation bear directly on the question of double spectra, our knowledge on that point must be briefly referred to. We divide all known spectra into three orders—continuous spectra, channelled space spectra, and line spectra. With regard to continuous spectra, it is shown that the older statement which limited them to liquid and solid bodies is no longer tenable. Most gases give continuous spectra long before they condense. Two theories of continuous spectra are noticed. The one considers that the vibrations of a molecule always tend to take place in a fixed period, but that the impacts of other molecules may, when the pressure is great or in liquid and solid bodies, prevent complete oscillations taking place, and thus produce a continuous spectrum. The other theory considers that, when a gas condenses, molecular combinations take place, which make the molecular structure more complicated, and may produce channelled space spectra or continuous spectra. According to the latter theory such molecular combinations are possible before the gas condenses, and thus the state of aggregation of the gas only indirectly affects the spectrum. The latter theory seems to be more consistent with experiment than the former one. For instance, it is shown that oxygen gives a continuous spectrum at the lowest temperature at which it is luminous. If the temperature be raised, the continuous spectrum is replaced by a line spectrum. This seems to be inexplicable by theory of molecular impacts.

The chief difficulty in the way of a complete investigation of the spectrum of oxygen consists in the great disturbing influence of the presence of even a small quantity of any carbon compound. Amongst a great many oxygen tubes which were filled by various makers I only found one, which showed the spectrum of pure oxygen; all the others gave a spectrum of carbonic oxide. It is therefore necessary in filling oxygen tubes to avoid all greased joints and all india-rubber tubings. I have used a Sprengel air-pump which communicated with the vacuum tube by means of a ball and socket joint. The joint was kept air-tight solely by means of strong sulphuric acid. The vacuum tube was fused directly to the ball of the joint. To one end of the vacuum tube a piece of hard glass tubing had been fused. This was filled with different substances which, on heating, gave off pure oxygen. The oxygen, therefore, came only into contact with glass, mercury, and sulphuric acid, and the metal of the electrode. Permanganate of potash, oxide of mercury, and chlorate of potash, were used in turn, to prepare the oxygen, but no effect was observed which could be traced to the substance used. The effect of the electrodes was eliminated by varying the metals. Aluminium, platinum, silver, brass, and iridium were used as electrodes. Any possible effect of the glass was eliminated by finally repeating all experiments in a glass receiver six inches in diameter, so that no part of the spark came nearer than 2½ inches to the glass. In this way it is believed all possibility of error due to the presence of any possible impurities was avoided.

Four different spectra of oxygen must be distinguished. At the lowest temperature at which oxygen becomes luminous it gives a continuous spectrum. As the temperature is gradually raised the continuous spectrum is successively transformed into two distinct line spectra, which I call respectively the compound line spectrum and the elementary line spectrum. It is one of the principal objects of this paper to show that these two line spectra which have been much mixed up together have a separate existence. The generation of one always involves the destruction of the other. The fourth spectrum is that which is always seen in vacuum tubes at the negative pole.

The Continuous Spectrum.—The following facts prove the statement that at the lowest temperature at which oxygen is luminous it shows a continuous spectrum.

1. The wide part of a Plücker tube generally shines with a faint yellow light. When looked at by means of a prism the spectrum is perfectly continuous.

2. If a spark of an ordinary Ruhmkorff coil is taken in oxygen at atmospheric pressure, one of the line spectra generally appears, but when the break is put out of adjustment so as to weaken the spark, the lines disappear and are replaced by a continuous spectrum which has its maximum of intensity in the greenish-yellow, and gradually fades away towards both ends of the spectrum.

3. Becquerel mentions an observation according to which the point of the oxy-hydrogen flame takes a yellow colour when an excess of oxygen is present. The description of the somewhat characteristic colour which Becquerel gives coincides exactly with the colour of the spark in oxygen, when it shows the continuous spectrum. According to Plücker an excess of hydrogen shows the hydrogen lines, and it is therefore reasonable to suppose that in Becquerel's experiment the oxygen was sufficiently heated up to become luminous.

The continuous spectrum must not be confounded with the continuous spectrum, which under high pressure forms the background to the line spectrum.

The Elementary Line Spectrum.—This is the spectrum which is seen when a strong spark passes through oxygen at the atmospheric pressure. It can be seen at all pressures when a jar and air break are introduced into the circuit.

The Compound Line Spectrum.—Plücker, in his first investigation of oxygen, says it consists of four lines, one in the red, two in the green, and one in the blue. In his later drawing of the spectrum of oxygen, he gives a great number of lines of which these four form a part. Wüllner says that the four lines in question are always the first to appear in oxygen tubes. Thalèn and Angström do not give these lines; Huggins does not give them; Salet does not give them. Plücker and Wüllner are the only observers who experimented under the circumstances under which the lines appear. They come out equally well whatever way the oxygen is prepared, whatever the nature of the electrode, and I have seen them under the large glass receiver already mentioned. The following is the appearance of the spectrum of oxygen as it undergoes gradual exhaustion.

When the pressure is sufficiently diminished to allow the spark to pass, it shows a yellow colour and the spectrum is perfectly continuous. Almost immediately, however, the four lines are seen in the capillary part of the tube above the continuous spectrum. The continuous spectrum in the wide part is stronger than in the narrow part. The four lines seem to have taken away part of the energy of the continuous spectrum. As the exhaustion proceeds, the spark spreads out in the wide part, and the continuous spectrum is therefore diminished and becomes less intense than in the capillary part; but it gradually loses in intensity also in the narrow part, until the four lines stand out on a perfectly black background. If under these circumstances the jar and air break are inserted in the circuit, everything will disappear and the elementary line-spectrum will come out. We have here as complete a transformation as from the band-spectrum of nitrogen to the line-spectrum of nitrogen taking place under precisely the same circumstances; and it is therefore not unlikely that the two phenomena are due to the same cause. There are two reasons why the existence of the compound line-spectrum of oxygen as a separate spectrum may have escaped previous observers. There is a blue line in the elementary line spectrum which is nearly coincident with the blue line of the compound line spectrum. It requires considerable dispersion to notice the difference; the complete disappearance of the compound line-spectrum has therefore escaped notice. The two green lines and the red line of the compound spectrum widen easily at higher pressure and as has been remarked by Wüllner, even fuse together to a continuous spectrum. If the experiment is therefore made at a pressure at which oxygen has a continuous back-ground, the disappearance of these lines might be taken for their widening and fusing together. No such mistake is possible when the vacuum is good. I have not been able to determine with certainty whether the red line seen at atmospheric pressure is a remnant of the compound line-spectrum, or whether it is a line of the elementary line-spectrum closely coincident. I am inclined to the former view, although it often seemed as if the line seen at atmospheric pressure was less refrangible than the red line of the compound line-spectrum. I have drawn attention in a letter to NATURE (vol. xvii. p. 148), to the fact that the compound line spectrum of oxygen seems to be reversed in the sun. I have no further information to add on that point, and the wave-length of the lines will be found in that letter.

The Spectrum of the Negative Pole.—This spectrum has first been correctly described by Wüllner. It consists of five bands, one of which is too weak to be measured. Careful measurements of the bands have been taken. With regard to the explanation of the separate spectra found at the negative pole in nearly all gases, I incline to the view that they are due to separate molecular compounds which are formed at the pole. The following experiments seem to support that view. When the pressure is very small the spectrum of the negative pole extends throughout that half of the tube which incloses the negative pole, and which I shall call the negative half. If the current be suddenly reversed the spectrum of the negative pole will still be seen at first, in that part which was the negative half and now is the positive half of the tube; but it will gradually disappear and a permanent state will be established, in which the spectrum of the negative pole is, as before, only seen in the negative half. That it is the reversal and not the interruption of the current which produces the result is easily proved by interrupting the current and at once closing it again the same way, when no difference will be seen. If, however, the current be left interrupted for some time, say one minute, so that any compounds which may have been formed in the negative half may diffuse into the other half, and if then the current is closed, either the same or the opposite way, the negative spectrum will be seen at first throughout the tube, but gradually disappear in the positive half.

If the current be rapidly reversed in succession, after a little while, when the effect of the first reversal has disappeared, the permanent state will always be established at once, and the spectrum of the negative pole will appear only in the negative half.

If after the last experiment the current be interrupted for some time and then closed, the spectrum of the negative pole will at first be seen throughout the tube, and gradually disappear in the positive half.

It is not quite easy to see the explanation of the last two experiments.

The experiments were all made in the Cavendish Laboratory, Cambridge, and I am much obliged to Prof. Clerk Maxwell for the kindness with which he has placed the resources of the Laboratory at my disposal.

Linnean Society, May 24.—Annual General Meeting.—Prof. Allman, F.R.S., president, in the chair.—The anniversary address of the president dealt with a *résumé* of the principal recent discoveries in the anatomy and development of the Polyzoa, and of the resulting important features in their systematic grouping. Much had been due to the labours of Busk and Nitsche. It was maintained that investigations were mainly in favour of the so-called "brown bodies" being merely the residuum of degraded and withered polypides, and that they have no real morphological or physiological importance. He coincided with the views of Nitsche, Joliet, and Busk, that the supposed "colonial nervous system" is but an irregular plexus of cellular and protoplasmic cords and filaments derived from the walls of the zoœcium or polypide cell, and not a true nervous system. Joliet's idea of its being the origin of new polypide buds and of certain minute free corpuscles found in the zoœcium is, however, too exclusive. *Cyphonantes* is a singular little free-swimming marine creature, of pyramidal form, the soft body of which is contained within a bivalve shell. Schneider has regarded it as a larval Polyozoon, and announced the startling fact that before its transformation into the adult it becomes totally disorganised and reduced to a homogeneous protoplasmic mass, though previously its structure had been complex. Thereafter arises a new polypide, and the whole is metamorphosed into the adult form. Strange as this history may seem, it has been confirmed by the researches of Nitsche and Joliet. Finally, the question of "individuality," or the relation to the polyzoal colony was taken up by the president, and the following opinion enunciated—that the zoœcium or cell in which the polypide is lodged must be regarded as having a zooidal individuality independently of the polypide, which has a zooidal individuality of its own, and that the two thus form a compound element which becomes associated with similar ones in order to form the colony. This compound element is thus composed of two zooidal individuals—zoœcium and polypide; on the zoœcium devolving the functions of sexual and nonsexual reproduction, and on the polypide that of nutrition.—Prof. Allman

also called passing attention to some living tree frogs (*Hyla arborea*) which he had obtained in the South of Europe. Those now exhibited to the Fellows showed the remarkable change of colour which this species of frog is known to possess, some being green, others bright blue. This change of hue is due to certain pigment corpuscles the precise nature of which he at present is investigating.—The Report on Publications was read by the Secretary, and that of the balance-sheet by Dr. R. C. A. Prior. Afterwards the Treasurer (Dr. J. Gwyn Jeffreys) laid his statement of accounts, &c., for the year 1877, before the meeting. This showed a very satisfactory financial position, a balance of 46*l.* 13*s.* remaining in hand, after all current expenses had been paid, while 700*l.* had been invested since the last Annual Report. The alterations in the bye-laws relative to an increase in the rate of payment for Fellows compounding, previously read at two successive general meetings, was put to the ballot and confirmed by the Fellows at large in the terms of the Charter. —The Secretary gave a notice of the Fellows and Foreign Members who had died during the past twelvemonth; of the former there were ten, and of the latter four, viz., fourteen in all. Among these Mr. Henry Adams, Dr. Elias M. Fries, Mr. Andrew Murray, Prof. Parlatore, Mr. Fox Talbot, Dr. R. Visiani, Dr. H. A. Weddell, and Mr. T. V. Wollaston, deserve mention as of considerable repute in the scientific world. During the year thirty-eight Ordinary Fellows and five Foreign Members had been elected.—At this meeting also the following Fellows were elected into the Council:—Mr. J. Ball, Dr. T. Boycott, Mr. F. Du Cane Godman, Dr. A. Günther, and the Rev. G. Henslow, in the place of Mr. J. G. Baker, Dr. W. B. Carpenter, Mr. Henry Lee, Prof. W. K. Parker, and Mr. S. I. A. Salter, who retired by rotation. The President and Officers were re-elected.

Physical Society, May 25.—The President, Prof. W. G. Adams, in the chair.—The following candidates were elected Members of the Society:—W. Kieser, T. McEniry, W. R. Philips, G. M. Whipple.—Mr. D. J. Blaikley read a paper on brass wind instruments as resonators, describing an attempt he has made to carry into some detail certain acoustical investigations of the late Sir C. Wheatstone. A method by which the positions of the notal points in a cone and in a bugle had been fixed was shown, and it was then shown that a complete cone cannot be used by the lips as a wind instrument, that conic frustra cannot give resonance to the same series of notes as complete cones, and that therefore the conical form must be modified; and, as this modification of form makes the position of a node for every note required more or less coincide with that of the lips, so will the instrument be more or less perfectly in tune. As the number of quarter wave-lengths in a cone or wind instrument is not directly proportional to the vibrational number of the note, as it is in free space or in an open tube, so the velocity of the wave of a given note is not exactly the same as that of another note of different pitch. Experiments were shown to illustrate the effect of varieties of form in producing different qualities of tone, and evidence was given of the existence of very high harmonic or partial tones in the low notes of wind instruments. In the trombone the ninth partial tone (three octaves and a tone above its prime) was thus proved to be sounding, and partial tones up to the sixteenth have been heard.—Sir W. Thomson pointed out the connection between the range of a musical instrument and the phenomena observed in a trumpet-shaped bay between high and low water; he also considered that an investigation of the overtones due to the cavity of the mouth would well repay research in explaining the influence its shape has on the vowel sounds.—Lord Rayleigh observed that in a conical musical instrument, the correction to be made on account of the cone not being perfect to the apex is equal to six-tenths of the radius of the open end, and he pointed out that with a bell-mouthed instrument much of the sound is diffused as spherical waves.—Dr. Guthrie placed on the table a communication on salt solutions and attached water and on the separation of water from crystalline solids in currents of dry air, in continuation of his researches, which have already been published. The results could not be usefully abstracted, but as an instance of the important results obtained it may be mentioned that Dr. Guthrie finds that when dry air is passed over chloride of barium at a temperature just above 25° C., the β molecule of water is given off, and that the α molecule of water is only separated at a temperature just above 60° C. He also showed the effect of a steam jet in boring through a block, mainly with a view of obtaining suggestions as to the use of such a method in the commercial preparation of ice.—Mr. Rutherfurd then showed a photograph of the solar spectrum from the line E to H, taken by means of a grating. By means of a heliostat he concentrated the rays on a lens within a collimator, which in relation to the observing telescope was of considerable length, in order to admit as much light as possible, and the grating was movable. The enlargement was effected by inserting a lens near the focal point of the observing telescope, and he used a sensitive collodion which gave the greatest sharpness of definition about the line G.—Sir W. Thomson, in continuation of the communication made to the Society at its last meeting, described the effect of torsion on the electric conductivity of a tube of brass. We have already given an account of this paper.

Anthropological Institute, May 28.—Major-Gen. A. Lane Fox, F.R.S., vice-president, in the chair.—Mr. Hyde Clarke exhibited a carved stone object which was considered as having come from Central America.—Col. Paske read a paper on Buddhism in Little Tibet. After a brief description of the route through the Kangra and Kulu Valleys to the high mountain passes leading into Lahore and Spiti, he gave particulars of the physical features of these countries, their products, &c., with some account of the habits and customs of the people, concluding with observations on Buddhism. Col. Paske gave an explanation of the modified form of Buddhism prevalent in the provinces of Little Tibet, and brought to notice the ritual and religious customs of the Lamas or Buddhist priests; described his visits to Buddhist monasteries, exhibiting specimens of Buddhist ritualistic instruments, and other curiosities, with a small painting representing the "Triumph of Buddhism," executed by a Lama recently arrived from Llassa.—Mr. Brabrook read a paper by Mr. Alfred Simson, entitled Notes on the Piojés of the Putumayo. A tribe of Indians occupying the middle and lower Aguarico and a considerable stretch of the left bank of the Napo are known as the Santa Maria Indians or Piojés, from the word in their language, piojé, and speak the same language, and have several traits in common with the Indians inhabiting the borders of the Upper Putumayo, who seem to have no special appellation, but which Mr. Simson proposed to call the Macaguajes or Piojés of the Putumayo. Mr. Simson's experience of these Indians extended only to those living on the banks of the main stream, during long journeys with a number of them selected from different villages, and visits and sojourns in most of these villages. Their dwellings, religion, and customs were freely described. Mr. Simson also communicated a vocabulary of the Zaparo language.

Geological Society, June 5.—John Evans, F.R.S., vice-president, in the chair.—William Santo Crimp and Joseph Richard Haines were elected Fellows of the Society.—The following communications were read:—On the quartzites of Shropshire, by Charles Callaway, F.G.S.—On the affinities of the Mosasauridæ, Gervais, as exemplified in the bony structure of the fore fin, by Prof. Owen, C.B., F.R.S.—On new species of *Procolophon* from the Cape Colony, preserved in Dr. Grierson's museum, Thornhill, Dumfriesshire; with some remarks on the affinities of the genus, by Harry Govier Seeley, F.L.S., Professor of Geography in King's College, London.—On the microscopic structure of the Stromatoporidæ, and on palæozoic fossils mineralised with silicates, in illustration of eozoon, by Principal Dawson, F.R.S.—On some Devonian Stromatoporidæ, by A. Champernowne, F.G.S.—On a new species of *Loftusia* from British Columbia, by George M. Dawson, F.G.S., of the Geological Survey of Canada.

Chemical Society, June 6.—Dr. Gladstone, president, in the chair.—The following papers were read:—Analogies between the action of the copper-zinc couple and occluded and nascent hydrogen, by Dr. Gladstone and Mr. Tribe. The authors have observed that finely-divided copper charged with hydrogen converts nitre into potassium nitrite and ammonia, and reduces potassium chlorate to chloride. The copper-zinc couple converts nitrobenzol in aqueous solution into anilin, a reaction which the authors have utilised for the detection of small quantities of nitrobenzol. The action of palladium-hydrogen, platinum-hydrogen, and carbon-hydrogen on various substances have been investigated, and compared with the action of the copper-zinc couple. During the reading of the paper, Dr. Russell took the chair.—On the alkaloids of the aconites, Part 3, by Dr. Wright and A. P. Luff. The authors have continued their researches on these alkaloids, and in the present paper investigate the saponification, &c., of aconitin, picraconitin, and have obtained two new bases, aconine and picraconin; acetyl and ben-

zoyl derivatives of several of the bases have been formed. The authors draw an important practical conclusion from their work, that it is quite possible to obtain crystallised alkaloids of constant composition from *A. ferox* and *A. napellu*, instead of the amorphous preparations which are now sold, and which often contain forty or even ninety per cent. of bases more or less inert.—On the alkaloids of the Veratrums; Part I, Alkaloids of *Veratrum sabadilla*, by Dr. Wright and Mr. Luff. After discussing the conflicting statements which have been made by previous observers, the authors give details of the process of extraction, which consisted in percolating the crushed seeds with alcoholic tartaric acid, evaporation and extraction by numerous and prolonged shakings with ether. Three alkaloids were obtained: veratrine, $C_{37}H_{53}NO_{11}$, which, on saponification, splits up into veratric acid, and a new base, verin; cevadin, $C_{32}H_{49}NO_9$, splitting up, on saponification, into cevadic acid (methylcrotonic acid) and cevin; cevadillin, $C_{34}H_{53}NO_8$, which does not crystallise or form crystalline salts.—On the action of hydrochloric acid upon chemical compounds, by J. W. Thomas. The author has examined the action in several ways of hydrochloric acid on many salts, nitrates, sulphates, tartrates, citrates, chromates, oxalates, &c.—On the action of oxides on salts, Part I, by Dr. Mills and Mr. Wilson. The object of the authors was to determine the law in consequence of which the action of oxides on salts leads in general to the formation of other oxides derived from the salts in question. They have studied the action of tungstic, silicic, and titanic oxides on potassic carbonate at a high temperature.—On a new test for glycerin, by Dr. Senier and Mr. Lowe. This test is founded on an observation of Iles, that borax, when treated with glycerin, gives to a Bunsen flame the green colour characteristic of boracic acid. By means of the test, one-tenth per cent. of glycerin, was detected in beer after concentration, &c.—On ammonium triiodide, by G. S. Johnson. The author has prepared this substance by dissolving iodine to saturation in a strong aqueous solution of ammonium iodide, and by stirring crystals of ammonium iodide and iodine with a small quantity of water, till the resulting black liquid refused to dissolve more of either ingredient. The liquid, on evaporation over sulphuric acid, gave dark blue prisms of the substance in question slightly deliquescent; specific gravity, 3·749.

PARIS

Academy of Sciences, June 24.—M. Fizeau in the chair.—The following among other papers were read:—On the displacement of the bubble in spirit-levels, by M. Plantamour. Movements were observed (both from day to day and in the course of single days) in levels placed on the massive table of the author's limnograph, at Geneva, on the beton covered ground beside it, on the ground in a tent, and also in the author's cellar, some distance from the lake. In certain periods there is a gradual rising in the east without notable return to the west; in others there is a certain horizontal immobility, and in others, lastly, of longer or shorter time, the ground undergoes oscillations both from east to west and from north to south, more or less pronounced and regular, the limits being, however, always narrow (the greatest movements did not reach twenty seconds). M. Plantamour does not at present try to explain these movements; (they are indicated graphically).—M. D'Abbadie recalled similar observations he had formerly made, and thought this phenomenon might be an important source of error in astronomical calculations (*e.g.*, in determining latitudes and the declination of stars).—M. de Lesseps presented a stone from Chalouf, 10m. above the sea, believed to belong to the tertiary epoch, and having incrusted on it a large shark's tooth, three times the size of teeth of sharks now caught in the Red Sea, and probably belonging to a species now gone.—The death of M. Ehrman, correspondent at Strasburg, was announced.—Results of application of sulphocarbonate of potassium to phylloxerised vines, by M. De la Vergne. He considers it indispensable for very young plants with small root system, and for all vines grown in a very thin layer of mould.—On the depolarisation of electrodes by solutions, by M. Lippmann. The property of depolarising a metal belongs exclusively to salts of that metal. Hence a method of detecting the presence of a particular metal in a solution. Thus, for copper; put a copper wire as negative electrode of a weak current in the liquid; it will be polarised if there is no copper dissolved in the latter, and it will not be polarised if the liquid contain $\frac{1}{500}$ of sulphate of copper. For silver the sensibility seems to be greater.—On a new dielectric constant, by M. Neyreneuf. In comparing different dielectrics in a condenser, he finds that for glass of the same nature the ratio $\frac{e}{n}$, of the thickness to the number of sparks corresponding to a given quantity of electricity, is constant. For more insulating substances, as ebonite, caoutchouc, &c., this ratio or *condensing constant* increases considerably with the thickness; the condensing constant of air is much greater. There is no similarity between the condensing constant and the ordinary dielectric constant.—On an experiment in magnetism relative to the telephone, by M. Luvini. He filled a hollow electromagnet with water which he inclosed, a capillary tube being connected to show any variations in the capacity; but no such variations appeared with any kind of current. (The arrangement would have indicated a change of volume of $\frac{1}{10}$ cub. mm.) He infers that the changes caused by magnetising action in a magnetic mass are wholly molecular. The sounds in resonant electro-magnetic rods discovered by Page are due to reactions of the two magnetic movements, and the current.—On the telepone, by M. Des Portes. This relates to experiments on board the *Desaix*; a telephone being at one end of the circuit and a telephone magnet, with coil uppermost, suspended vertically by silk thread. The latter magnet was struck with various substances, wood, soft iron, &c., and the sounds were heard. Peculiar effects were got on striking with a magnet or speaking. M. du Moncel added an account of similar experiments.—On electro-magnets, by M. Bisson. He winds in a new way: after each row he brings the wire in a straight line to the starting-point and recommences. He thus obtains a third more power.—On the efficacy of a vibratory movement for causing decomposition of explosive liquids and ebullition of superheated liquids, by M. Gernez. He rubs the tubes with a wet cloth, producing vibration and sound.—On organic dust in suspension in the air, by M. Miquel. The average number of microbes of the air, small in winter, increases rapidly in spring, remains nearly stationary in summer, and diminishes in autumn. Rain always causes their recrudescence.—On the pressure of the cephalo-rachidian liquid, by M. Bochefontaine.

CONTENTS

ERRATA.—Vol. xviii. p. 215, 1st col., 33rd line from bottom, for "sea" read "Lea." P. 216, 2nd col., 15th line from top, for "489 mm" read "4 mm. square."