but one would expect in that case to find pyramidal rather than conical shapes, or at least to find some shaped so as to complement the cones. I failed to notice any indications of such shapes in the specimens (about thirty) which I examined. I should be inclined to believe that the soft, snow-like portions had been formed during the passage of the harder stranded stones through a moist and possibly clouded stratum of air.

"I was unable to see how they reached the ground, whether point or blunt end downwards. If in the latter way, one could account for the soft part, as being formed from previously unfrozen particles, cooled by contact with the nucleus, and, so to speak, sliding back to a position sheltered from the air, as it swept by the sides of the cone.

"But if the narrower end were foremost (and that would be the more natural position), then, unless the little mass—like an iceberg—could freeze particles in front of it before reaching them, it would seem that the snow point must have resulted from the accretion of small particles already frozen, and the pointed shape would be what we should expect. The only rotatory motion possible would be that in a plane perpendicular to the direction of the path through the air, and might account for the conical shape, the edges of any pyramid being rounded off."

M. A. Wentzil, of Izdebno, near Warsaw, writes to us of a hailstorm which occurred there on the 4th inst. "At 3 o'clock in the afternoon," he says, "hail began to fall, at first of small size, but in a few minutes the hailstones increased to the size of walnuts. Nine such which I picked up at hazard weighed together 13 lut (0·165 kilo). They were almost spherical with a mean diameter of $1\frac{5}{8}$ English inches. In the centre of each was a kernel of clear ice about the size of a pea, and from this kernel radiated conical masses of white ice, so that the surface of the hailstone was like that of a mulberry, the interspaces being filled with clear ice. The damage in the gardens and to glass panes was, as may be imagined from the size of the stones, considerable

On March 3 we printed a letter from Mr. C. S. Middlemiss, describing a fall of top-shaped hailstones near Ramnagar, in the North-West Provinces of India (NATURE, vol. xxxv. p. 413). Writing to us on March 7, Mr. T. Spencer Smithson said (p. 438) that a fall of hailstones, almost exactly similar to those described by Mr. Middlemiss, had taken place in the neigbourhood of Rochdale on August 6, 1885. Mr. Smithson, however, pointed out that besides the horizontal stratification in these hailstones there was a perpendicular one, giving each hailstone the appearance of being composed of alternate cylinders of clear and white ice; and he asked Mr. Middlemiss to state whether the hailstones seen at Ramnagar had this peculiarity. Mr. Middlemiss now writes to us, in reply to Mr. Smithson's question, that the broad end of the hailstones showed no trace of any divisional planes whatever, being perfectly amorphous as originally stated. "The banded portion, so far as my memory serves me," he says, "may have possessed a faint longitudinal *striation*, just sufficient to run the bands together and to induce me to shade the diagrams vertically rather than horizontally, but I cannot be certain of it. It was not a marked feature, I feel sure."

SCIENTIFIC SERIALS.

Rivista Scientifico-Industriale, February.—The total solar eclipse of August 19, 1887, by Prof. Cacciatore. Prof. Tacchini having at the last eclipse established the presence round the sun of delicate white protuberances different from the ordinary rose-coloured protuberances daily visible under the spectroscope, it is announced that the Minister of Public Instruction will send Prof. Tacchini and Prof. Riccò to observe the August eclipse in Siberia for the express purpose of studying these new manifestations.—On the origin of the variations of intensity in the dry pile, and on the means of preventing them, by Prof. Luigi Palmieri. The author's experiments lead to the conclusion that the dry pile is not only the most durable, but also the most constant, and that the variations of intensity are due to dispersions. These dispersions are independent of the moisture and temperature of the surrounding atmosphere, at least within certain limits, while the pile enveloped in a volume of air will preserve its force almost unaltered for years, and not only not diminished, but even slightly increased, by the atmospheric moisture.

March.—A new method of measuring the specific weights of fluids, by Dr. Alessandro Sandrucci. A new method is described, for which a single apparatus alone is needed, and for which the author proposes the name of areovolumeter, combining as it does the functions of the areometer and volumeter. Although somewhat less accurate than Marangoni's recently invented double volumeter, this process reduces the disturbing influence of superficial tension to a minimum, while completely dispensing with the empirical scales on the volumeters, the determination of which involves considerable difficulty.

Bulletin de l'Académie Royale de Belgique, February.—Determination of the direction and velocity of the movement of the solar system in space, by M. P. Ubaghs. For the direction, the same method is adopted as that already known through the labours of M. Folie. For the velocity, use is made of three groups of stars of the second, third, and fourth magnitudes, the first group belonging probably to the solar nebula itself. The resulting velocity is only 16,500,000 kilometres for the year as compared with the 850,000,000 obtained by Homann working on the spectroscopic observations of Greenwich.—On the influence of diurnal nutation on the questions connected with the observations of γ Draconis made at the Observatory of Greenwich, by L. Niesten. By employing M. Folie's formula of diurnal nutation the author has determined a source of error long suspected in the calculations of Main and Downing. By introducing the necessary correction he arrives for the first time at a positive parallax for γ Draconis. He thus also, for the first time, determines beyond all doubt the real existence of diurnal nutation.—On the two tetrabromureted hydrocamphenes, by W. De la Royère. It is shown that by the action of the chlorobromide of phosphorus on camphor there are produced two tetrabromureted hydrocamphenes differing in their physical properties, specific weights, points of fusion, and molecular rotatory power. By subjecting them to the action of the nitrate of silver, heat, and chlorine, the author transforms the two isomeres into one and the same tribromureted camphene; while metallic silver reduces them to an identical bibromureted camphene, chlorine producing a bichlorureted and tetrabromureted hydrocamphene also identical for both.

Rendiconti del Reale Istituto Lombardo, February.—State of education in Italy, by Prof. A. Amati. The results of the recent official returns are given in tabulated form for the 284 circuits of the kingdom, showing in separate columns the percentage of "analfabeti" (illiterate) in each communal district and its chief town. The general result appears to be more unsatisfactory than had been anticipated, the disparity especially between the towns and rural districts being still excessive, even in Piedmont, Liguria, and some of the other best regulated departments.—Measurement of the muscular force in man, by Prof. G. Zoja. A brief account is given of the various instruments devised for determining scientifically the degree of muscular force in individuals, according to sex, age, and other conditions, from Regnier's dynamometer to the present time. The author also proposes a scheme of classification based on the degree of muscular energy possessed by the individual, and ranging from a given mean (Mesostheni) upwards and downwards through the Megastheni and Microstheni to the two extremes of Heraclestheni and Astheni.

March.—Observations on the luminous solar rays, by Giovanni Cantoni. The attention of meteorologists is called to the lucimeter recently constructed at Milan, which is stated to give more satisfactory results than the English heliograph with glass sphere or Craveri's chemical photometer. It determines with great accuracy the relative measure of the luminous rays at all hours of the day in relation to the altitude of the sun above the horizon of the place of observation. It also gives the integral of the successive and varying luminous influences of the sun during the course of a whole day. With regard to the instrument described by Clark in NATURE (vol. xxxii. p. 233) for measuring the radiant energy of the sun, its principle is stated to be based not so much on Wollaston, as on the discovery made many years ago by Bellani, and for some time applied by the author to agricultural meteorology.—Meteorological observations made at the Brera Observatory, Milan, for the month of February.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, April 21.—"Some Applications of Dynamical Principles to Physical Phenomena. Part II." By J. J. Thomson, M.A., F.R.S., Fellow of Trinity College and

Cavendish Professor of Experimental Physics in the University of Cambridge.

This is a continuation of a paper with the same title published in the Phil. Trans., 1885, Part II. In the first paper dynamical principles were applied to the subjects of electricity and magnetism, elasticity and heat, in order to establish relations between phenomena in these branches of physics. In this paper corresponding principles are applied to chemical and quasi-chemical processes such as evaporation, liquefaction, dissociation, chemical combination, and the like.

Many of the results obtained in this paper have been or can be obtained by means of the Second Law of Thermodynamics, but one of the objects of the paper is to show that there are other ways of attacking such questions, and that in many cases such problems can be solved as readily by the direct use of dynamical principles as by the Second Law of Thermodynamics.

A great deal has been written on the connexion between the Second Law of Thermodynamics and the principle of Least Action; some of these investigations are criticised in the first part of the paper, after this it is shown that, for a collection of molecules in a steady state, the equation (which for ordinary dynamical systems is identical with the well-known Hamiltonian principle)—

$$\delta(\overline{T} - \overline{V}) = 0,$$

is satisfied; where $\overline{T}$ and $\overline{V}$ are respectively the mean values of the kinetic and potential energies taken over unit time, and where the variation denoted by δ is of the following kind.

The co-ordinates fixing the configuration of any physical system, consisting according to the molecular theory of the constitution of bodies of an immense number of molecules, may be divided into two classes:—

(*a*) Co-ordinates, which we may call molar, which fix the configuration of the system as a whole; and

(*b*) Molecular co-ordinates which fix the configuration of individual molecules.

We have the power of changing the molar co-ordinates at our pleasure, but we have no control over the molecular co-ordinates.

In the equation—

$$\delta(\overline{T} - \overline{V}) = 0,$$

only the molar co-ordinates are supposed to vary, all velocities remaining unchanged. Hence in applying this equation we need only consider those terms in $\overline{T}$ and $\overline{V}$ which involve the molar co-ordinates. Expressions for these terms for gases, liquids, and solids are given in the paper; the rest of the paper after these have been obtained consists of applications of the above equation.

The density of a vapour in equilibrium with its own liquid is obtained as a function of the temperature, and the effect upon the density of such things as the curvature or electrification of the surface of the liquid is determined.

The phenomenon of dissociation is next investigated, and an expression for the density of a dissociated gas obtained which agrees substantially in form with that given by Prof. Willard Gibbs in his well-known paper on the "Equilibrium of Heterogeneous Substances."

The effect of pressure upon the melting-point of solids and the phenomena of liquefaction are then investigated, and the results obtained for the effect of pressure upon the solubility of salts are shown to agree with the results of Sorby's experiments on this subject. The effect of capillarity upon solubility is investigated, and it is shown that if the surface-tension increases as the salt dissolves then capillarity tends to diminish the solubility, and *vice versâ*.

The question of chemical combination is then considered, particularly the results of which is called by the chemists "mass-action," and of which a particular case is the division of a base between two acids.

The general problem investigated is that in which we have four substances, A, B, C, D, present, such that A by its action on B produces C and D, while C by its action on D produces A and B. The relation between the quantities of A, B, C, D present when there is equilibrium is obtained and found to involve the temperature; when the temperature is constant it agrees in some cases with that given by Guldberg and Waage, though in others it differs in some important respects. Thus, if ξ, η, ζ, ϵ be the number of molecules of A, B, C, D respectively, when there is equilibrium, θ the absolute temperature, H the amount of heat given out when the chemical process which results in the increase of ξ by unity takes place, and k a quantity which is the same for all substances, then it is proved that—

$$\frac{\xi^p \eta^q}{\zeta^r \epsilon^s} = CE^{k\theta},$$

where C is a constant; p, q, r, s are quantities such that if (A) represents the molecule of A, with a similar notation for the other molecules, then the chemical reaction can be represented by the equation—

$$p\{A\} + q\{B\} = r\{C\} + s\{D\}.$$

Thus if A, B, C, D be respectively sulphuric acid, sodium nitrate, nitric acid, and sodium sulphate, in which case the reaction is represented by—

$$H_2SO_4 + 2NaNO_3 = 2HNO_3 + Na_2SO_4,$$

then, if the molecules of sodium nitrate and nitric acid be represented by $NaNO_3$ and HNO_3—

$$p = 1, \quad q = 2, \quad r = 3, \quad \text{and } s = 1.$$

If, however, the molecules of sodium nitrate and nitric acid are represented respectively by $Na_2N_2O_6$ and $H_2N_2O_6$, then since the chemical reaction may be written—

$$H_2SO_4 + Na_2N_2O_6 = H_2N_2O_6 + Na_2SO_4,$$

$$p = 1, \quad q = 1, \quad r = 1, \quad \text{and } s = 1.$$

According to Guldberg and Waage the relation between ξ, η, ζ, ϵ is—

$$\xi\eta = k\zeta\epsilon;$$

this, when the temperature is constant, agrees with the above expression if $p = q = r = s$.

We see that the state of equilibrium will vary rapidly with the temperature if H be large, that is, if the chemical process is attended by the evolution of a large quantity of heat.

The effect of alterations in the external circumstances such as those which may be produced by capillarity, pressure, or electrification are investigated, and it is shown that anything giving rise to potential energy which increases as the chemical combination goes on tends to stop the combination.

The last part of the paper is taken up with the consideration of irreversible effects such as those accompanying the passage of electric currents through metallic conductors or electrolytes. These are looked upon as the average of a large number of discontinuous phenomena which succeed each other with great rapidity. The ordinary electrical equations with the usual resistance terms in, represent on this view the average state of the system, but give no direct information about its state at any particular instant. It is shown that if we take this view we can apply dynamical principles to these irreversible effects, and the results of this application to the case of electrical resistance are given in the paper.

"On Parts of the Skeleton of *Meiolania platyceps*." By Sir Richard Owen, K.C.B., F.R.S.

The subjects of the present paper are additional fossil remains of *Meiolania platyceps* from Lord Howe's Island, transmitted to the British Museum since the author's previous paper on that extinct reptile. Additional cranial characters are defined and illustrated by drawings of more or less perfect specimens of the skull, of vertebræ of the neck, the trunk, and tail, of limb-bones, and portions of the dermal skeleton.

The author sums up the affinities, deducible from the above parts of the skeleton, to the orders *Chelonia* and *Sauria*, with grounds for the conclusion, mainly based on the absence of evidence of a carapace and plastron, that the genera *Megalania* and *Meiolania* are more nearly akin to the Saurian division of the class REPTILIA; in which he proposes to refer those extinct genera to a sub-order called *Ceratosauria*.

"Conduction of Heat in Liquids." By C. Chree, B.A., King's College, Cambridge. Communicated by Prof. J. J. Thomson, F.R.S.

Linnean Society, April 21.—Mr. W. Carruthers, F.R.S., President, in the chair.—Mr. E. M. Holmes exhibited specimens of various species of *Shorea* from Borneo and Sumatra, which plants yield vegetable fats used for technical purposes. Several species of *Dichopsis* affording gutta-percha from the bark and fat from the seeds were also shown. Mr. Holmes pointed out the importance of the cultivation of the more valuable of these trees, among others, *D. oblongifolia* and *Ceratophorus*

Leerii, since they are being rapidly destroyed by the natives. Their cultivation has already been commenced by the Dutch, but not a day too soon, as the trees take at least twenty years ere they are productive and valuable.—Mr. Patrick Geddes read a paper on the nature and causes of variation in plants and animals. The fact of organic evolution is no longer denied, but its physiological factors have not yet been adequately analyzed. Even those who regard natural selection as at once the most important and the only ascertained factor of the process admit that, such an explanation being from the external standpoint—that of the adaptation of the organism to survive the shocks of the environment—stands in need of a complementary explanation which shall lay bare the internal mechanism of the process, *i.e.* not merely account for the survival, but explain the origin, of variations. The relative importance of the external and internal explanations will, moreover, vary greatly in proportion as variations are found to be "spontaneous," *i.e.* in any direction indifferently, or "determinate," *i.e.* in some given direction continuously. Avoiding any mere postulation of an "inherent progressive tendency," common to both pre- and post-Darwinian writers, the definite analysis of the problem starts with that conception of protoplasm which is the ultimate result of morphological and physiological analysis, viz. to interpret all phenomena of form and function of cells, tissues, organs, and individuals alike in terms of its constructive and destructive ("anabolic and katabolic") changes. While the external or environmental explanation of evolution starts with the empirical study of the effect of human selection upon the variations of animals and plants under domestication, the internal or organismal one as naturally commences with the fundamental rhythm of variation in the lowest organism in nature. It also investigates the nature of the simple reproductive variation upon which the origin of species as well as individuals must depend, before attempting that of individual variations. The interpretation of all the phenomena of male and female sex as the outcome of katabolic and anabolic preponderance is shown largely to supersede the current one of sexual selection, and in some cases at least that of natural selection, *e.g.* the specially important one of the origin of such polymorphic communities as those of ants and bees. In such cases natural selection acts not as the cause of organic evolution, but as the check or limitation of it, and acquires importance rather as determining the extinction than the origin of species. The process of correlation, especially that between individualization and reproduction, is mooted by the author, and its application to the origin and modification of flowers, &c., outlined. A discussion is given of the embryological and pathological factors of internal evolution, with an application of the whole argument to the construction of the genealogical tree of plants and animals.—A report on the Gephyreans of the Mergui Archipelago, by Prof. Emil Selenka, of Erlangen, was read; this communication dealing chiefly with a technical description of species.

Zoological Society, April 28.—Fifty-eighth Anniversary Meeting.—Prof. Flower, LL.D., F.R.S., President, in the chair.—Many members of the Council and other Fellows of the Society were present. After some preliminary business, the report of the Council on the proceedings of the Society during the year 1886 was read by Mr. P. L. Sclater, F.R.S., Secretary to the Society. It stated that the number of Fellows on January 1, 1887, was 3146, showing a decrease of 47 as compared with the corresponding period in 1886. The total receipts for 1886 had amounted to £25,787 0*s.* 4*d.*, showing a decrease of £22 9*s.* 9*d.* as compared with the previous year. This slight decrease was mainly due to the falling off of the number of Fellows, and consequently of the receipts for subscriptions. The balance brought from 1885 was £972 8*s.* 1*d.*, making a total of £26,759 8*s.* 3*d.* available for the expenditure of 1886. The ordinary expenditure for 1886 had been £24,438 17*s.* 9*d.* Besides that, an extraordinary expenditure of £129 15*s.* had been incurred, which brought up the total expenditure for the year to £24,568 12*s.* 9*d.* The usual scientific meetings had been held during the session of 1886, and a large number of valuable communications had been received upon every branch of zoology. These had been published in the annual volume of Proceedings for 1886, which contained 716 pages, illustrated by 60 plates. Besides this, five parts of the twelfth volume of the Society's Quarto Transactions had been issued, thus making up all the arrears in this branch of the publications. A new edition of the Library Catalogue had also been prepared and issued. The Society's library now contained about 15,000 separate volumes. The "Zoological Record," which consisted of an annual volume containing a summary of the work done in the various branches of zoology in each year, would in future be published by the Society under the superintendence of a committee of the Council appointed for the purpose, and edited by Mr. F. E. Beddard, Prosector to the Society. The visitors to the Society's Gardens during the year 1886 had been altogether 639,674. The corresponding number in 1885 was 659,896. A slight alteration in the arrangements for the Davis Lectures on zoological subjects had been made for the present year. Mr. F. E. Beddard, Prosector to the Society, had been appointed Davis Lecturer, and had commenced a course of ten lectures on the Classification of Vertebrate Animals. The lectures were a continuation of a series given last year in connexion with the London Society for the Extension of University Teaching. The number of animals in the Society's collection on December 31 last was 2609, of which 777 were mammals, 1429 birds, and 403 reptiles. Amongst the additions made during the past year, 15 were specially commented upon as of remarkable interest, and in most cases as representing species new to the Society's collection. About 30 species of mammals, 20 of birds, and 3 of reptiles had been bred in the Society's Gardens during the summer of 1886. The report concluded with a long list of the donors and their various donations to the Menagerie during the present year.—A vote of thanks to the Council for their report was then moved by the Hon. J. S. Gathorne-Hardy, M.P., seconded by Mr. H. Berkeley James, and carried unanimously. The report having been adopted, the meeting proceeded to elect the new members of the Council and the Officers for the ensuing year. The usual ballot having been taken, it was announced that Sir Joseph Fayrer, K.C.S.I., F.R.S., Mr. John P. Gassiot, Col. James A. Grant, C.B., C.S.I., F.R.S., Prof. A. Newton, F.R.S., and Mr. Joseph Travers Smith, had been elected into the Council in place of the retiring members; and that Prof. W. H. Flower, F.R.S., had been re-elected President, Mr. Charles Drummond, Treasurer, and Dr. Philip Lutley Sclater, F.R.S., Secretary to the Society for the ensuing year. The meeting terminated with the usual vote of thanks to the Chairman, proposed by Sir Joseph Fayrer, K.C.S.I., and seconded by Mr. Herbert Druce, and carried unanimously.

Chemical Society, April 21.—Mr. William Crookes, F.R.S., President, in the chair.—The following papers were read:—The atomic weight of gold, by Prof. T. E. Thorpe, F.R.S., and Mr. A. P. Laurie.—The atomic weight of silicon, by Prof. T. E. Thorpe, F.R.S., and Mr. J. W. Young.—Note on substitution in the benzene nucleus, by Dr. H. Foster Morley.—Reply to the foregoing note, by Prof. Henry E. Armstrong.

Royal Microscopical Society, April 13.—Rev. Dr. Dallinger, President, in the chair.—Mr. T. C. White exhibited a series of photomicrographs which he had recently taken, showing the result of the method of cutting off some of the superfluous light by means of a sliding diaphragm so as to be able to admit just enough to bring out the detail and nothing more. The specimens shown were printed on Eastman's bromide paper instead of silver paper which he found brought out the character of the detail very much better.—Mr. F. R. Cheshire called attention to some specimens of bees, known as "fertile workers." It was generally well known that in the bee-hive all the eggs were usually laid by the queen, and in her absence no oviposition occurs until they have taken some of the eggs remaining in the hive, and by a special feeding of the larvæ have been able to produce fresh queens. If, however, it should happen that in a hive which has lost its queen there are not eggs available for this purpose it was found that some of the workers under some special circumstances which could not be very clearly explained, became capable of laying eggs, but that such eggs produced drones only. These bees were known as fertile workers, and though there could be no doubt as to their frequent existence, they were very difficult to catch, owing to their being the same in appearance as the ordinary workers. He now exhibited two of these fertile workers having the ovaries drawn out of the bodies and attached to the stings and abdominal plates so as to show that they really were workers. There was a remarkable peculiarity to be observed in connexion with the ovarian tubes of these insects—every ordinary worker possessed an undeveloped ovary which it was very difficult both to detect and dissect, but when under the influence of some stimulus the worker became fertile, a number of points began to appear in the tubes which afterwards became developed, and it would seem that the eggs were

developed in alternation, an examination of the tubes showing them to contain developed eggs alternating with others in an undeveloped condition and of which some very curious instances were seen in the specimens before the meeting.—Mr. Crisp called attention to some photomicrographs of animalcules sent by Mr. J. B. Robinson; and to photographs of snow-crystals sent by Mr. Waters, from Davos Platz; also to a specimen of one of the earliest forms of the compound microscope by Campani, of Rome, made some time prior to 1665.—A new form of adjustable nose-piece, by Dr. Zeiss, was exhibited, in which the objective was made to slide in a groove in an inclined plane which insured its not scraping along the surface of the cover-glass when being changed.—A paper by Mr. P. H. Gosse, on twelve new species of Rotifera, was read.

Liverpool.

Biological Society, March 12.—Prof. Herdman, Vice-President, in the chair.—A paper was read by Mr. I. C. Thompson on some new and little known Copepoda of Liverpool Bay. The paper included the description of several new points in the anatomy of several species new to British seas.—Dr. Collins communicated some observations on anatomical abnormalities.—Mr. Harvey Gibson (Secretary) read the first of a series of notes on floral morphology, dealing with the angle of insertion of the petals on the thalamus in the *Polypetalæ* and the form of the flower as a whole in the *Gamopetalæ*, in their relation to the protection of the essential organs.

April 23.—Prof. Herdman, Vice-President, in the chair.—The Secretary (Mr. Harvey Gibson) read a preliminary paper on a research into the nature and function of the so-called "hepatic cells" of *Lumbricus terrestris*, by himself and Mr. A. J. Chalmers. The results so far tend to show that the so-called "cells" are rather digestive glands and not "vasifactive tissue" as suggested by some biologists.—Mr. G. F. Moore read a note on a new tank for the maceration of osteological specimens.—Dr. Herdman read a preliminary paper by Miss F. Palethorpe and Miss C. Wilson on a collection of Ascidians from Australian seas, sent by the Sydney Museum authorities to the Fisheries Exhibition, and containing a number of new species.—Dr. Bruce exhibited a collection of surface animals from Maltese seas, and Mr. R. McMillan exhibited a specimen of a pile from the works of the Canadian Pacific Railway, destroyed by the borings of *Teredo*.—Mr. G. H. Morton exhibited the spicules of sponges that he recently found in several places in the chert-beds of the Cefn-y-Fedw sandstone of Denbighshire and Flintshire, on the horizon of the millstone grit. Mr. Morton's observations have been confirmed by Dr. Hinde. The spicules probably belong to a genus of *Hyalonema*, and have not been recorded previously from North Wales.

Berlin.

Physiological Society, April 15.—Prof. Du Bois Reymond, President, in the chair.—Dr. Prause spoke on the degeneration of nerves resulting from sectional injuries. According to Waller, when a nerve is cut through, the peripheral parts degenerate, whereas the central remain intact. The result of a thorough investigation of the nerves in cases of amputation, which the speaker carried on some years ago in conjunction with Dr. Friedländer, has however shown that the central parts of the divided nerves had degenerated even right up to the spinal cord. Quite recently, Dr. Prause has repeatedly examined the nerves in cases where, owing to gangrene of the foot, the leg had been amputated close below the knee. Here the degeneration of the nerves extended up to, and probably beyond, the surface of amputation, having in such cases started from the gangrenous parts, and progressed centripetally. Side by side, however, with the larger number of degenerated fibres a few normal fibres were also found. From experiments on animals in which nerves of very different kinds, both sensory and mixed, were cut through, it appeared that in the peripheral parts by far the larger number of the fibres degenerate, while at the same time a not inconsiderable number remain unaltered; similarly degenerated and normal fibres were found in the central part of the nerve, only in this case the relative number of each kind is in an inverse proportion to that in which they are found in the peripheral part. It follows from the above that, starting from the point of section of a nerve, one set of fibres degenerates towards the periphery, the other towards the centre. It seemed right to assume that those fibres which degenerate towards the periphery have their trophic centre in the spinal cord or brain as the case may be, while those which degenerate centripetally are dependent for their nutrition on some centre at the periphery, such as presumably the tactile corpuscles of Meissner. Were this not so, Waller's law would again hold good, since only those parts of a nerve degenerate which are cut off from their trophic centre: only sensory nerves degenerate centripetally.—Dr. Grunmach communicated the results of some experiments on the relation between the curve of distension of elastic tubes and the rate of the pulse-wave in the same. These experiments were carried out with various gutta-percha tubes and with the aorta of horses; the internal pressure being varied from 0 to 200 mm. of mercury, the alteration of volume of the tubes and the rate of transmission of the pulse-wave were both measured. The results showed that the rate of the pulse-wave is most markedly dependent upon the distension-curve or coefficient of elasticity of the tube; this coefficient is, however, very variable with different tubes. The behaviour of a horse's aorta approximated to that of an india-rubber tube wrapped round with linen. The thickness of wall of the tubes and the size of their lumen was very slightly, if at all, altered by the varying pressure, and their influence upon the relationship of pressure and rate of pulse-wave was quite subordinate.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

La Cytodiérèse chez les Animaux: J. B. Carnoy (Peeters, Louvain).—Report on the Mining Industries of New Zealand (Wellington).—Gold Fields of Victoria; Reports of the Mining Registrars for the Quarter ended December 31, 1886 (Ferres, Melbourne).—Elements of Dynamics, part 1, book iv.: W. K. Clifford (Macmillan).—Lessons in Elementary Practical Physics, vol. ii.: B. Stewart and W. W. H. Gee (Macmillan).—Pioneering in New Guinea: James Chalmers (R.T.S.)—Eastern Geography: Prof. A. H. Keane (Stanford).—Systematic Lists of the Flora, Fauna, Palæontology, and Archæology of the North of Ireland, vol. i. (Belfast Naturalists' Field Club).—Proceedings of the Linnean Society of New South Wales, 2nd series, vol. i., part iv. (Trübner).—*Challenger* Reports—Zoology, vol. xix. (Eyre and Spottiswoode).—Beobachtungen der Russischen Polarstation auf Nowaja Semlja, ii. Theil.; Meteorologische Beobachtungen: K. Andrejeff.—Beobachtungen der Russischen Polarstation an der Lenamündung, ii. Theil.; Meteorologische Beobachtungen, i. Lief.; Beobachtungen v. Jahre 1882–83: A. Eigner.—A Classification of Animals: E. T. Newton (Philip).—Botanische Jahrbucher für Systematik, Pflanzengeschichte und Pflanzengeographie, Achter Band, iv. Heft (Leipzig).—Journal of the Society of Telegraph-Engineers and Electricians, vol. xvi. No. 66 (Spon).—Journal of the Royal Agricultural Society of England, April (Murray).—Beiblätter zu den Annalen der Physik und Chemie, No. 4, 1887 (Leipzig).

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