

layers in Mollusca. He especially calls in question the observations of Ray Lankester, Haeckel, and Ganin, and approves the modified form of the Gastræa theory no more than the original.—F. E. Helm describes in detail the silk-glands of Lepidoptera, and their retrogressive changes after full function.—Herbert Ludwig, giving an account of the formation of the blastoderm of spiders, states that his observations are in entire accordance with Haeckel's views.

Gegenbaur's Morphologisches Jahrbuch.—Part 3 opens with a long and important communication by Oscar Hertwig on the formation, fecundation, and division of the ovum in the Echinid *Toxopneustes lividus*. He considers chiefly the fate of the germinal vesicle and the connection between it and the subsequent development of the ovum. From his observations he supposes that when the germinal vesicle is resolved the germinal spot is saved and gets to the centre of the ovum; he finds that a nuclear body which may be the head of the spermatozoon approaches this and coalesces with it, and that the resulting body assumes an hour-glass shape and finally divides into two, and really originates the cleavage of the ovum. Unfortunately the author has to make assumptions at the most critical points, and consequently his views cannot be accepted without confirmation.—Dr. G. Born has a contribution on the sixth toe of Anura, referring to the cartilages considered by Cuvier and Meckel as a rudiment of a sixth member of the hind limb. Another lengthy memoir in this part is by R. Wiedersheim on the anatomy of *Phyllodactylus europæus*, a member of the group of lizards of which the gecko is the type, found in the Island of Sardinia, as well as in the islet Tinetto, on the western horn of the Gulf of Spezia. He considers very fully the relation of the *aqueductus vestibuli* to the *sacculus endolymphaticus* in the Ascalabota generally.

In Part 4 Dr. B. Gabriel describes a new genus and species of Rhizopod living in moist earth about the roots of mosses. This form, which he names *Troglocladites zoster*, has a shell-like investment and emits pseudopodia at one pole only. The life-history of this form has been traced, and it is of great interest. Two adult specimens conjugate by their pseudopodia and afterwards separate; this is followed by an encysted stage, during which a large number of minute granules grow up into germs which are liberated from the investment, and grow up into a minute monostigma form. These germs subsequently conjugate in pairs constituting a diplostigma, and ultimately they slowly coalesce, and then assume the parent form.—T. W. Engelmann has an elaborate article on development and reproduction in Infusoria, in which he gives an account of the stages of *Opalina ranarum* and of budding and conjugation in *Vorticella* and *Epistylis*. He further examines and criticises many observations of other authors, and some of his principal conclusions are as follows:—That the conjugation of Infusoria does not lead to reproduction by means of ova, but to a peculiar development of the conjugated individuals, which he terms reorganisation; that the nucleus, neither in conjugation nor in any other circumstance, plays the part of a germ-producing organ; that its significance is merely that of an ordinary cell-nucleus.—Max Fürbringer continues his monograph on the comparative anatomy of the shoulder-muscles, by a chapter of 180 pages, on the bony shoulder-girdle and sternum, the brachial plexus, and the muscles related to the shoulder in *Lacertilia* and *Crocodylia*.

SOCIETIES AND ACADEMIES

PHILADELPHIA

Academy of Natural Sciences.—Session 1875-6.—Prof. Cope's contributions to paleontology and philosophic biology have been numerous and important. In successive communications he has given accounts of the Eocene mammals of the Rocky Mountains, possessing characters which at first led to their being assigned to the Carnivora. Prof. Cope has demonstrated their insectivorous affinities, but finds that the definition of existing insectivora is insufficient to include them. Other forms supposed at first to be lemurine affinities are found to be yet more generalised, and to range with the previously mentioned animals. He proposes the name *Bunotheria* for the order, with sub-orders *Creodonta*, *Mesodonta*, *Insectivora*, *Tillodonta*, and *Tæniodonta* (*Proc.* 1876, p. 88). Prof. Cope has also endeavoured to equate the North American Eocene to the European zones. The Bridger formation of S.W. Wyoming he calls Middle Eocene, characterised by *Palæosyops*, *Tillodonta*, and *Dinocerata*; and the Wahsatch group in N.E. New Mexico and S.W. Wyoming

is assigned to the Lower Eocene, with *Coryphodon*, *Tæniodonta*, *Phenacodus*, and *Diatryma*.—Mr. Robert Ridgway contributed (*Proc.* 1875, p. 470) a valuable monograph on the North American hawks of the genus *Micrastur*. An examination of the perplexingly-various plumage shows that there is no appreciable sexual difference; there are two well-marked growth-stages with plumage distinctions; certain species are notably dimorphous, some deeply rufescent, others clear plumbeous, without reference to age, sex, or season.—Other contributions to zoology include the establishment of a new genus of *Procyonidæ* from Costa Rica, by Mr. J. A. Allen; observations on the habits of manatees kept in confinement in the Zoological Garden at Philadelphia, by Dr. H. C. Chapman; Dr. Wilder on fishes' brains, and Prof. Leidy on Rhizopods, and Mr. H. K. Morrison on American Noctuidæ.—Dr. Isaac Lea has continued his researches on the microscopic structure of gems, and has found that in addition to the internal crystalline forms which they possess, there are in most gems, cavities, often tens of thousands in number.—Mr. George Hay, in his chemical contributions gives an account of the decomposition of stannous chloride vapour in a Geissler's tube; and of the solubility of tin, arsenic, and antimony in concentrated nitric acid at 36° F., when the oxidation is in the ratio of their several volatilities.—Prof. Persifer Frazer and Dr. Koenig have been the principal contributors in geology and mineralogy.—Mr. Thomas Meehan among several botanical notices has given accounts of interesting hybrids, of certain insectivorous plants, and of a certain maple tree which flourished although all its leaves became reversed, so as to expose its stomata to direct sunlight. The propagation of *Tillandsia usneoides*, the epiphytic, not parasitic Florida or Spanish moss was described as being principally by means of small branches scattered during storms or by other means, but very rarely by seeds.—An interesting observation was made on the large number of cases in which double Chinese peaches of the season 1875 bore two or three fruits on each flower; thus showing their solidarity with the polycarpellary *Rosacææ*.

VIENNA

Imperial Academy of Sciences, March 9.—On the nature of the soft or half liquid state of aggregation; on regelation and recrystallisation, by M. Pfaunder. After dividing the bodies in question into mixtures of small solid parts with true liquids, soft bodies proper, containing no dissimilar parts, and mixtures of the two classes, he gives a hypothesis on the process of melting and the soft state. The common ideal melting process, where the temperature remains the same from beginning to end, is not according to fact. The mean temperature of the body beginning to melt is about $t + t'$ lower than that of the already melted mass, if $\pm t$ and $\pm t'$ denote the amounts of divergence of temperature of the separate molecules in the solid and liquid condition. Hence the true melting point is different from the temperature at the beginning and the end of the melting process. M. Pfaunder extends his hypothesis to soft bodies of compound nature, and to regelation and recrystallisation.—On the difference of tension between the left ventricle and the aorta, by M. Gräde. The blood pressure in the aorta is usually higher than the maximal pressure in the left ventricle. The difference disappears when the points of the semilunar valves are torn through.—On the physical nature of vegetable protoplasm, by M. Velten. The retention of form (in hair cells, leaf cells, &c.) and simultaneous mobility of particles, indicate that at least two bodies with different aggregate states exist in protoplasm. The dense parts do not envelop the liquid parts, but solid and liquid particles are arranged beside each other in small spaces. In considering the ball formation of plasma, which is the principal argument for its liquid nature, M. Velten distinguishes normal and abnormal ball formations; the former could not prove the viscous nature of plasma, while the latter unmistakably point to a semi-liquid state of aggregation of the whole body.—On nitro-glycerine and the most important nitro-glycerine preparations, by M. Beckerhin.—On the condition of heat equilibrium of a system of bodies with reference to gravity, by M. Loschmidt. Gravitation affects only the vertical component of molecular velocity, leaving the horizontal untouched; this destroys the symmetry of distribution of velocity in gases.—Communications from the Mineralogical Museum of the University, by M. Schrauf. This relates to certain minerals from the graphite deposits of Mugrau.

March 16.—On the influence of temperature on galvanic conduction of tellurium, by M. Exner. The alteration of conductivity through heat is due to a change of molecular structure;

thus too are explained the turning points Matthiessen found in the curve representing resistances of tellurium at different temperatures.—On the geometric-symmetric forms of the earth's surface, by M. Boué. The rotation force of the earth forbids comparison of the clefts on its surface to those of a clay-lump produced by contraction. The earth took its present form under several forces, especially the centrifugal force of rotation, wave-motion of the still plastic and hot zones under the crust, and infiltration of water. The orography of the earth is somewhat similar to a chess-board.—On the relation of the coefficient of internal friction of gases to temperature, by M. Obermayer. The coefficient of friction of the permanent gases is approximately proportional to the $\frac{2}{3}$ power of that of the coercible gases, and to the 1 power of the absolute temperature.—Researches on the relations of nutritive matters to transpiration of plants (first part), by M. Wiesner. Dilute acids accelerate, dilute alkalies retard, the transpiration. Very dilute solutions of the salts that were employed (0.05, 0.1, 0.2, 0.25 per cent.) accelerate the transpiration; more concentrated solutions (0.5, 1 per cent.) retard it. In solutions of nutritive matter, even with such a degree of concentration as, where solutions of the separate salts were used, accelerated the transpiration, the latter was less than in distilled water. Aqueous humus extracts also diminish the transpiration.

March 23.—On elevation of animal temperature after section of the spinal cord, by M. Schöff.—New propositions of the mechanical theory of heat (second part); on forces determining the volume of bodies, by M. Puschl. Theory leads him to conclude, that at the end of a cycle-process in a body, not only the heat, but also the other forms of force present and jointly determining its volume have done a positive or negative external work. The results of Edlund's experiments on the heating of contracting metallic wires are a first experimental proof of this theoretical deduction.—On æthyl propylcarbinol, by M. Völker.—On the ground-forms of linear geometry, by M. Frombeck.

April 20.—The principle of dissimilar molecular states applied in explanation of supersaturated solutions, superfluid bodies, retardation of boiling, spontaneous explosions, and crystallisation of amorphous bodies, by M. Pfandler.—The theoretical basis of the Foucault pendulum experiment, by M. Pick.

GENEVA

Physical and Natural History Society, May 4.—Prof. F. A. Forel, of Morges, described the traces obtained by him in his native town, situated on the north shore of the Lake of Geneva, by means of a registering limnimeter. This automatic apparatus indicates constantly the height of the water of the lake on an endless paper band, which is unfolded at a rate of about a millimetre per second, by means of clock-work. By means of the tracings thus obtained may be investigated the oscillations of level known as *seiches*. M. Forel has thus verified, in a very satisfactory manner, the theory which maintains that these *seiches* are rhythmic isochronous movements, waves of fixed oscillation (the stationary, mononodal waves of Guthrie). He proves that the water of lakes oscillates almost constantly from one bank to the other, and that in two principal directions, along the great axis and along the smaller diameter of their surface. These two movements, which are often simultaneous, are what M. Forel calls longitudinal *seiches* (lasting for seventy minutes on the Lake of Geneva) and transversal *seiches* (ten minutes induration). The comparison of these tracings with meteorological circumstances will show what relations exist between the movements of the *seiches* and the variation of atmospheric pressure.

PARIS

Academy of Sciences, Aug. 21.—Vice-Admiral Paris in the chair.—The following papers were read:—Meridian observations of small planets, made at the Observatory of Greenwich (sent by the Astronomer-Royal, Sir G. B. Airy) and at the Paris Observatory, during the second trimestre of 1876, by M. Le Verrier.—Theorems relating to curves of any order and class, in which are considered couples of rectilinear segments having a constant length; examples of the variety of different solutions furnished, in each question by the principle of correspondence, by M. Chasles.—Thermal formation of hydroxylamine or oxyammonia, by M. Berthelot. Thermal observations confirm and define the unstable properties of oxyammonia, an instability due to the exothermal character of its different modes of decomposition.—An effect of lightning during the storm of Aug. 18, by M. Trécul. While writing at his open window between even and eight A.M. he observed, simultaneously with some

loud thunder, small luminous columns descending obliquely on his paper; about 2 metres long, 1½ decimetre broad at the widest part, obtuse at the further end, but gradually thinning towards the table. They had mostly a reddish yellow tint; near the paper the colours were more intense and varied. In being extinguished, they left the paper with a slight noise like that made by pouring a little water on a hot plate. M. Trécul felt no bad effects.—Results obtained by the treatment of phylloxerised vines, by means of sulpho-carbonates and the distributing pale, by M. Allibert.—On the invasion of winged phylloxeras at Mancey (Saône-et-Loire) on June 25. They deposit their pupæ in the down of the leaves. Four or five could be counted on a single leaf.—Observations of the planet (165) Peters, made with the equatorial of Paris Observatory, by MM. Paul and Prosper Henry.—Observations of planet (165) at Leipsic, by M. Bruhns.—Discovery of the planet (166); despatch from Mr. Joseph Henry, of Washington, to M. Leverrier.—Electric regulator to maintain the motion of pendulum, by M. Bourbouze. To the upper part of the pendulum is fixed a magnetised bar which can oscillate freely within a rectangular bobbin with two wires like that of a galvanometer. At each oscillation a current of constant intensity is passed into the bobbin, but alternately in different directions; and this maintains the motion. The reversal is effected by means of a beam having at each of its ends a bridge which dips in two cups containing mercury.—On chaplet (or beaded) flashes of lightning, by M. Planté. This name is given to a phenomenon observed in Paris on Aug. 18. The lightning, coming from the cloud to the ground, described a curve like an elongated S, having the aspect of a chaplet of brilliant grains along a very thin luminous thread. This results from passage of the electric fluid through a ponderable medium. The case is analogous to that of the chaplet of incandescent globules presented by a long metallic wire fused by a voltaic current, or to the swellings and nodes in the flow of any liquid vein. Such agglomerations, naturally, are dissipated more slowly than the line collecting them. We have here a transition form of lightning between that of the ordinary sinuous and straight lines and the globular form. Fulminating globes may be considered as derived from a chaplet flash.—On equivalent substitution of mineral matters which enter into the composition of plants and animals, by MM. Champion and Pellet. In the ashes of flesh of different animals and hen's eggs the phosphoric acid is nearly constant, as also the quantity of acid capable of saturating the bases. With different compositions of ashes the weight of sulphuric acid saturating the bases is higher the more there are of bases with small equivalents. The ashes of veal contain more soda than those of beef, so do those of hen's eggs and the adult hen.—On the fermentation of urine; reply to M. Pasteur, by Prof. Bastian. M. Pasteur explains his negative result by the potash having been heated to 110° C., Prof. Bastian only by the fact that the potash has been added in excess. That all Bacteria germs are killed in potash solutions heated to 100° appears from two facts: (1) boiled potash solution has not a fertilising influence if only two or three drops of it be added to a demilitre, at least, of boiled urine; (2) the boiled potash solution is also inactive if it be introduced in strong enough proportion to render the boiled urine a little alkaline.—Researches on the gases contained in fruits of the bladder-nut tree, by MM. Saintpierre and Magnien.—Observations of falling stars during the nights of August 9, 10, and 11, by M. Chapelas.

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