Annales des Sciences Naturelles. It will well repay the study of microscopists.—Rev. E. O'Meare continues his researches on the Diatomaceæ, describing the *Achnantheæ*, *Gomphonemeæ*, *Amphipleureæ* and their allies.—Dr. Bowditch, of Harvard University, gives a new method of injecting the Lymph Spaces in fasciæ, by stretching fascia over the neck of a bottle; and injecting in several places a turpentine solution of alcannine with the point of the syringe partially perforating the fascia; allowing the whole to dry, during which process the fluid penetrates the finest lymph spaces.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Dec. 18, 1873.—"On the Nervous System of *Actinia*," Part I., by Prof. P. Martin Duncan, F.R.S.

After noticing the investigations of previous anatomists in the histology of the chromatophores, the work of Schneider and Rötteken on these supposed organs of special sense is examined and criticised.

Agreeing with Rötteken in his description, some further information is given respecting the nature of the bacillary layer and the minute anatomy of the elongated cells called "cones" by that author. The position and nature of the pigment-cells is pointed out, and the peculiarities of the tissues they environ also. It is shown that the large retractile cells, which, according to Rötteken, are situated between the bacilli and the cones, are not invariably in that position, but that bacilli, cones, and cells are often found separate. They are parts of the ectothelium, and when conjoined enable light to affect the nervous system more readily than when they are separate. Further information is given respecting the fusiform nerve-cells and small fibres noticed by Rötteken in the tissue beneath the cones, and the discovery of united ganglion-like cells, and a diffused plexiform arrangement of nerve is asserted. The probability of a continuous plexus round the *Actinia* and beneath each chromatophore is suggested, and the nature of the physiology of the structures in relation to light is explained.

The nature of the minute construction of the muscular fibres and their attached fibrous tissue in the base of *Actinia* is noticed; and the nervous system in that region is asserted to consist of a plexus beneath the endothelium, in which are fusiform cells and fibres like sympathetic nerve-fibrils. Moreover, between the muscular layers there is a continuation of this plexus, whose ultimate fibrils pass obliquely over the muscular fibres, and either dip between or are lost on them.

The other parts of the *Actinia* are under the examination of the author, but their details are not sufficiently advanced for publication. The nervous system, so far as it is examined, consists of isolated fusiform cells with small ends (Rötteken), and of fusiform and spherical cells which communicate with each other and with a diffused plexus. The plexus at the base is areolar, and its ultimate fibres are swollen here and there, the whole being of a pale grey colour.

Anthropological Institute, Dec. 30, 1873.—Prof. Busk, F.R.S., president, in the chair.—The following paper was read:—"Ethnological Data from the Annals of the Elder Han," Part I. Translated by A. Wylie, of Shanghai, with an introduction by H. H. Howorth. The Imperial Chinese Annals of the various Dynasties which are as yet almost untouched are distinguished by the extreme accuracy of their details, and in them is to be found a minute account of the intercourse of China with its neighbours, reaching back in contemporary annals to at least the second century B.C. The series of Chinese annals begins properly with those of the Han dynasty which reigned from about 202 B.C. to about 220 A.D. That was the golden prime of Chinese history, when the empire reached its furthest limits, when Buddhism was introduced and when a great literature flourished. During the dynasty of Cheou, the old imperial unity had been invaded by the creation of various feudatories who became almost independent. It was the aim of the immediate predecessors of the Han dynasty to destroy those feudatories and to restore the unity of the empire; and to effect that purpose all the ancient books and histories were ordered to be burnt. The annals, in the present communication, contain an account of the numerous conquests from the date of the Elder Han and embrace the history and migrations of a large portion of the peoples of Central and Eastern Asia. Mr. H. H. Howorth communicated the twelfth and concluding paper on the Westerly Drifting of Nomades: the Huns.

EDINBURGH

Royal Society, Jan. 5.—Prof. Sir William Thomson, president, in the chair.—The following communications were read:—A New Method of Determining the Material and Thermal Diffusivities of Fluids, by Sir William Thomson.—Continuants: A New Special Class of Determinants, by Thomas Muir, M.A.—Remarks upon the Foot-Prints of the Dinornis on the Sand Rock of Poverty Bay, New Zealand, and upon its recent Extinction, by T. H. Cockburn Hood.

DUBLIN

Royal Irish Academy, Nov. 29, 1873.—Prof. Jellett, president, in the chair.—Samuel Ferguson, LL.D., read a paper on "The completion of the biliteral key to the values of the Letters in the South British Ogham Alphabet."—The president read a paper on "The question of Chemical Equilibrium," the determination of the law, according to which an acid divides itself between two bases which are present in the same solution, has been long known to be one of the obscure questions of chemistry, it is generally admitted by chemists that there is a division, and that the relative masses of the two bases exercise an important influence upon the law which governs it, but the law itself remains unknown, and the object of Prof. Jellett's paper was to give at least a partial, possibly a final, solution to the problem, treating the question as one of chemical equilibrium, and defining these terms as follows:—Two or more substances may be said to be in chemical equilibrium if they can be brought into chemical presence of each other, without the formation of any new compound or change in the amount of any of the substances which are thus brought together. If an acid be added to a mixture of two bases, four substances will be present, *i.e.* two salts and two portions of bases remaining uncombined, these four are in chemical equilibrium—the question is why—and the author showed that there can be but one equation of equilibrium, inasmuch as the quantities of the four substances which are present in the solution, are functions of three independent variables, namely:—the original quantities of each base (2) and the original quantity of acid (1) denoting by b_1 b_2 the quantities of free base, and by s_1 s_2 the quantities of each salt respectively, the equation of equilibrium is necessarily of the form $U = F(b_1, s_1, b_2, s_2) = 0$, and the object of the author's investigations was to determine the form of the function F. The bases selected for experiment were quinia and brucia. In quinia the rotatory power of any of its salts exceeds the rotatory power of the base. In quinia the reverse is the case, and as the result of careful and long continued experiments, it was proved that equilibrium is not troubled by dilution, for a disturbance could not arise without altering the rotation—there was no alteration, and the equilibrium, therefore, depended only on the ratios of the four substances, hence:—

$$U = F\left(\frac{1}{s_1}, \frac{b_2}{s_2}, \frac{b_1}{b_2}\right)$$

By a second series of experiments it was proved—putting r_1 = rotatory power of brucia, ρ_1 = rotatory power of hydrochlorate of quinia, r_2 = rotatory power of brucia, ρ_2 = rotatory power of hydrochlorate of brucia, r = actual rotation for acidulated mixture, a = total amount of acid corresponding to the unit of bulk of solution, x = amount which combines with the quinia, it is easily seen that

$$r = \left(\frac{\beta_1 x}{\alpha}\rho_1 + (b) - \frac{\beta_1 x}{\alpha}\right) r_1 + \frac{\beta_2 (a - x)}{\alpha}\rho_2 + \left(b_2 - \frac{\beta_2 (a - x)}{\alpha}\right) r_2$$

where β_1, β_2, α are the atomic weights of the two bases and the acid respectively, and b_1 b_2 are the quantities of each base contained in the bulk of the solution. Solving this equation for x, we have

$$x = A\,a + B\,(r - b_1 r_1 - b_2 r_2), \text{ where}$$

$$A = \frac{\beta_2 (r_2 - \rho_2)}{\beta_1 (\rho_1 - r_1) + \beta_2 (r_2 - \rho_2)}$$

$$B = \frac{\alpha}{\beta_1 (\rho_1 - r_1) + \beta_2 (r_2 - \rho_2)}$$

If r_0 be the actual rotation caused by the unacidulated mixture, it is evident that $r_0 = b_1 r_1 + b_2 r_2$. The foregoing may therefore be written

$$x = A\,a + B\,(r - r_0)$$

By a third series of experiments it was seen that if a solution of

quinia is acidulated so that the quantity of uncombined base bears to the acid the same ratio as in the foregoing mixture between the uncombined quinia and the quantity x, and a solution of brucia is prepared so as to preserve the ratio of the uncombined brucia to $a - x$. Then the ratios in these of b_1 to s_1 and of b_2 to s_2 are the same as in the case of equilibrium, the rotation caused by these fluids being r_1 and r_2. Let them be mixed in the proportions $m : n$, and the rotation caused by the mixture is $\frac{mr_1 + nr_2}{m + n}$, and whatever be the ratio of $m : n$, there being no rupture of equilibrium, it is evident that if the ratios $b_1 : s_1$ and $b_2 : s_2$ have the values proper for equilibrium, the latter will be preserved, however the ratio $b_1 : b_2$ may vary. Hence, in mathematical language, $U = F\left(\frac{b_1}{s_1}, \frac{b_2}{s_2}\right)$ By a fourth series of experiments a mixture of solution of quinia and brucia was made, in which these bases have to each other the same ratio as the uncombined bases in the second series of experiments. A second mixture is made of the same solutions in which the bases have the same ratio as the combined bases in the second series of experiments. Sufficient acid is added to the latter mixture to convert the bases into salts. Here the ratios $b_1 : b_2$ and $s_1 : s_2$ have the values for equilibrium. If these now be added to each other in the proportion of $m : n$, the rotation caused by the mixture is—

$$\frac{mr_1 + nr_2}{m + n}$$

$r_1 r_2$ being the rotation caused by each of the added fluids separately, it is inferred as before that $U = \int\left(\frac{b_1}{b_2}, \frac{s_1}{s_2}\right)$, but if U satisfy both these conditions it is easily shown mathematically that $U = \int\left(\frac{b_1}{s_1} \div \frac{b_2}{s_2}\right)$, hence it is evident that the required equation of equilibrium is $\frac{b_1}{s_1} \div \frac{b_2}{s_2} =$ constant. The author showed the bearing of the law upon the theory that chemical combination is not statical but dynamical, observing that this theory is quite in accordance with the results obtained by him. (This valuable memoir will appear in full in the Transactions of the Royal Irish Academy.)

PHILADELPHIA

Academy of Natural Sciences, Aug. 19, 1873.—Dr. Ruschenberger, president, in the chair. "The Composition of Trautwinite." The author gave a few additional details concerning this new mineral, which was described in the Proceedings of the Academy for January 1.

Sept. 9.—Mr. Gentry communicated a notice of a great swarm of ephemerids which passed through the town of Lewisburg, on the Susquehanna River, on the afternoon of August 22. The swarm was estimated to be about a mile in length by nearly a half mile in width, and was so dense as even to obscure passers-by on the opposite side of the street.

Sept. 15.—The following papers were presented for publication:—"On a new American species of Glyptocephalus," by Theo. Gill; "Description of fifty-two species of Unionidæ," by Isaac Lea. The last-named paper was, on report of the committee, ordered to be published in the Journal of the Academy.

BOSTON, U.S.

Society of Natural History, Nov. 5, 1873.—Mr. F. W. Putnam read a paper on *Myxine*, a low genus of fishes, known to fishermen as *hags*, giving an account of its anatomy, which was illustrated by a series of specimens exhibited. The several species described by various authors must be reduced to one, having a wide geographical distribution, being found on both sides of the Northern Atlantic, and also on the southern coast of South America. Mr. Putnam showed that the variations in the number of lingual teeth, which are from eight to eleven in each row in specimens from the North Atlantic and from the Straits of Magellan, could not be considered as of specific importance. The different varieties of this species he considered as follows:—*Var. septentrionalis*, the short and thick form, from the North Atlantic, *var. limosa*, the long and slender variety, also from the North Atlantic; while the southern variety may be called *australis*, the name under which Jennyns described it as a true species.—Dr. Thomas Dwight read a paper on the "Structure and Action of Striated Muscular Fibre." His studies had been made on the muscles of the legs of the small water beetle *Gyrinus*. Their covering is quite transparent, and after the leg has been cut off and put into a drop of water under a covering glass, the contractions can often be observed for over an hour. He found that the fibre, at rest, consisted of narrow granular transverse stripes, with broad light-coloured bands between them. Close to the black stripe there was a glaring white reflection, but midway between two stripes the fibre was gray. When the fibre contracted the black bands came nearer together, and their granular structure became more obscure; the gray band disappeared, so that there was merely an alternation of black and white stripes. The ends of the white stripes bulged out during contraction. As the wave of contraction moved along, it was easy to see that there was no interchange of position between the black and the light substances, and no homogeneous transition stage, as is maintained by Merkel. When one part of the fibre is in contraction, the part from which the wave is running is put upon the stretch; the black bands are divided into two rows of granules, and there is less distinction between the white and gray substances.

PARIS

Academy of Sciences, Dec. 29, 1873.—M. de Quatrefages, president, in the chair.—The following papers were read:—On the formation of equations of the condition which results from the observations of the Transit of Venus on December 8, 1874.—A new answer to M. Pasteur, by M. Trecul. This was a general review of M. Pasteur's views as to the origin of yeast. M. Pasteur briefly replied.—A theoretical essay on the equilibrium and elasticity of pulverulent masses and on the thrust of non-cohesive earth, by M. J. Boussinesq.—On the isomerism of albumenoids, by M. Béchamp. The author gave many details with regard to various albumenoids; he had discovered three in cow's milk. M. Damas confirmed the latter result, which he had himself attained by different means.—Action of water on sheet lead, by H. Marais.—Note on hybernating *Phylloxera* and on their agility and artificial restoration, by M. Max. Cornu.—Observations on a note of M. Menabrea relating to Lagrange's series, by M. Genocchi.—Researches on arsenious hydride, by M. Engel. The author has been repeating Wiederhold's researches on the supposed As_2H; he, however, did not obtain the substance in question.—Note on the action of iodine on uric acid, by M. F. Wurtz. The author found that when these bodies were allowed to act in the presence of water, alloxan and hydriodic acid were formed, and probably also urea with other bodies.—Synthesis of oxalyl urea (parabanic acid), by M. E. Grimaux.—On a new arrangement of the sulphate of copper battery, by M. Trouvé.—Observations on the existence of certain relations between the colouring and geographical distribution of birds, by M. A. Milne-Edwards.—On fossil remains of Batrachia, Lacertia, and Ophidia found in the phosphate of lime deposits at Aveyron, by M. Filhol.—On the development of the *phragmostracum* of the *Cephalopoda* and the zoological connection of the *Ammonites* with the *Spirulæ*, by M. Munier-Chalmas.—On waterspouts and cyclones, by M. E. Mouchez.—On the effects of Indian hemp, by M. A. Naquet.—During the meeting, elections were held for the posts of correspondent of the astronomical section, vacant by the deaths of Encke and Admiral Smyth, to which Messrs. Lockyer and Roche were elected.

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