

Brachiopods, though every argument on which their former connection was based is demonstrably false.

But to a great extent the whole matter turns upon our conception of *segmentation*, a subject which Mr. Sedgwick's recent speculations (*Q. J. M. S.*, No. xciii. 1884) may very seriously modify. Sedgwick derives all metameric segmentation from a Coelenterate-like ancestor, with a *pouched gut* like that of all the Actinozoa. The blastopore, including both mouth and anus, is derived from the Actinozoan mouth, the double nerve-cord from the aggregation of the nervous system round the mouth of the polyp, and the nephridia from specialised parts of the pouches represented now by the circular canal of *Medusæ* or the mesenteric perforations of Actinozoa and the pores leading to the exterior in those forms from the mesenteric chambers. But it is impossible to discuss this theory fully; it is enough to point out that it postulates segmented ancestors of all animals above Coelenterates. Mollusks, Brachiopods, and *Sagitta* must according to it have been once segmented, just like Vertebrates, Arthropods, and Worms. But surely this is a violent assumption. There is no evidence of segmentation among Mollusks save in *Nautilus*, for even the pedal commissures of *Chiton* in no way indicate a truly segmented condition; nor any among Polyzoa or Brachiopods save the four nephridia of *Rhynchonella*. And it is by no means clear that the development of *Sagitta* indicates its descent from an ancestor with "three pairs of gut-pouches." The vast number of animals with a single pair of nephridia can scarcely all be derived from ancestors with many pairs; and Hatschek's description of the origin of segmented nephridia (in *Polygordius*) from a single pair seems far from supporting Sedgwick's view. The still insufficiently investigated excretory organs of *Rhynchonella*, and the four gills, &c., of *Nautilus*, seem not enough to indicate descent of the groups to which these forms belong from segmented ancestors. On the contrary, it seems far more likely that the types we have more particularly discussed are all derived from some unsegmented trochosphere; and that the segmentation of the *Chaetopods* only became marked after the ancestor of the *Phoronis* type had severed his course from the common stock of Worms. The distinction of segmentation and non-segmentation would thus divide the Invertebrata.

As regards the *Gephyrea*, there is much reason for connecting such members of the group as *Sipunculus*, *Phascolosoma*, and *Bonellia* with the unsegmented *Phoronis* type. But Hatschek maintains that the development of *Echiurus* proves it to be a degenerate *Chaetopod*; and if so, Caldwell (*loc. cit.*) is ready to admit that the others may be further stages in such degeneration. But even as regards *Echiurus* this degeneration is far from clear. The *Platyelminths* seem also never to have been segmented, and their "water-vascular canals" may give us some indication of the organs from which are derived the nephridia of *Phoronis*, *Gephyrea*, Brachiopods, and Mollusks. The larva of *Thysanozoon* has many points in common with the trochosphere, though its want of an anus is strange and difficult to explain. The Rotifers are acknowledged to be persistent trochospheres. And accordingly all these forms may be older and more primitive, by virtue of their lack of segmentation, than all the *Chaetopods*.

D. W. T.

SCIENTIFIC SERIALS

THE *Journal of Anatomy and Physiology*, January 1884, contains:—A. Milnes Marshall, M.D., certain abnormal conditions of the reproductive organs of the frog.—S. A. Waddell, M.B., the urea elimination under the use of potassium fluoride in health.—B. C. A. Windle, M.A., M.D., primary sarcoma of the kidney.—R. J. Anderson, M.D., transverse measurements of human ribs.—Arthur W. Hare, M.B., a method of determining the position of the fissure of Rolando and some other cerebral fissures in the living subject.—G. Hoggan, M.B., new forms of nerve terminations in mammalian skin.—J. Symington, M.B., the fold of the nates.—W. Ainslie Holles, M.D., researches into the histology of the central gray substance of the spinal cord and medulla oblongata.—D. J. Cunningham, M.D., the musculus sternalis.—C. W. Cathcart, M.B., movements of the shoulder-girdle involved in those of the arm on the trunk.—J. B. Sutton, the relation of the orbito-sphenoid to the region pterion in the side wall of the skull.—Anatomical notices.

April contains:—J. B. Sutton, the nature of certain ligaments.—F. Le Gros Clark, F.R.S., some remarks on nervous exhaustion,

and on vasomotor action.—C. B. Lockwood, F.R.C.S. Lond., the development of the great omentum and the transverse mesocolon.—Arthur Thomson, M.B., notes of two instances of abnormality in the course and distribution of the radial artery.—J. W. Barrett, M.B., the cause of the first sound of the heart, and the mode of action of the cardiac muscle.—Prof. Cleland, F.R.S., notes on raising the arm.—R. W. Shufeldt, M.D., osteology of *Ceryle alcyon*.—A. M. Patterson, M.B., notes on abnormalities, with special reference to the vertebral arteries.—Geo. Hoggan, M.B., on multiple lymphatic nævi of the skin, and their relation to some kindred diseases of the lymphatics.—Prof. Cleland, F.R.S., notes on the viscera of the porpoise and white-beaked dolphin.—W. Arbuthnot Lane, F.R.C.S., costal and sternal asymmetry.—Anatomical notices.

THE *Journal of Physiology*, vol. v. No. 1, contains:—E. Klein, M.D., F.R.S., the bacteria of swine-plague.—T. Lauder Brunton, on the rhythmic contraction of the capillaries in man, and on the physiological action of condurango.—J. Blake, on the connection between physiological action and chemical constitution.—H. H. Donaldson, and L. T. Stevens, note on the action of digitalis.—W. H. Gaskell, on the augmentator (accelerator) nerves of the heart of cold-blooded animals.

Archives Italiennes de Biologie, tome iv. fasc. 3, contains:—B. Grassi, the development of the vertebral column in bony fish.—L. Luciani, on the mechanical stimulation of the sensory centres of the brain-cortex.—A. Moriggia, on a new method of isolating the sensibility of the mobility of the nerves.—G. Magini, the induced unipolar current and the stimulation of nerves.—F. Marino-Zuco, upon the ptomaines with regard to toxicological investigations.—S. Richiardi, on the distribution of the nerves in the follicle of the tactile hairs of the ox, which are provided with a vascular erectile apparatus.—Ph. Lussana: (1) on the brain of the boa: considerations on comparative neuro-physiology; (2) on the sensibility of parts uncovered by skin; (3) on colour-hearing.—A. Marcacci, the areola-mammillary muscle.—P. Foà, contribution to the study of the physiopathology of the spleen.—L. Griffini and G. Tizzoni, experimental study of the partial reproduction of the spleen; novel researches into the total reproduction of the spleen: an experimental contribution to the hematopoietic function of the connective tissue.—J. Bizzozero and A. A. Torre, upon the origin of red blood-corpuscles in the various orders of the Vertebrata.—J. Cattaneo, fixation, staining, and preservation of Infusoria.

Tome v. fasc. 1 contains:—C. Giacomini, the fascia dentata of the hippocampus major in the human brain.—A. Borzi, new studies in the sexuality of Ascomycetes (preliminary note).—L. Solera, contribution to the physiology of the succus intestinalis.—F. Selmi, tolerance of arsenic in domestic animals, and its distribution in the organism.—Ph. Lussana, on the quantitative and qualitative secretion of bile in the state of inanition after the section of the two pneumo-gastric nerves.—L. Camerano, (1) on the development of the Amphibia, and on what has been called their "Ncotenia"; (2) researches on the prolongation of the branchial periods of the Amphibia.—G. Romiti, anatomical investigation of a case of death from the bite of a viper.—P. Fanzagio, on the nest of *Geophilus flavus*.—E. Levier, the origin of the tulips of Savoy and of Italy.—P. Albertoni, critical and experimental studies upon the action and metamorphosis of certain substances in the organism, with respect to the pathogenesis of acetonaemia and diabetes.—L. Griffini, (1) an experimental study of the partial regeneration of the liver (preliminary communication); (2) on the total and partial reproduction of the follicular apparatus and of the calyciform papillæ in the rabbit (preliminary communication).—M. H. Peracca and C. Deregibus, note on *Celopeltis insignitus*.—L. Vincenzi, histological note on the true origin of some cerebral nerves.—A. Mosso, employment of the balance in the study of the circulation in man.

SOCIETIES AND ACADEMIES

EDINBURGH

Mineralogical Society, June 24.—This meeting was held at the Museum of Science and Art, Edinburgh.—Prof. Jas. Geikie, F.R.S., in the chair.—The following papers were read:—On forms of silica, by Prof. John Ruskin, D.C.L. The Chairman and Dr. Dudgeon made some remarks.—On the application of the periodical law to mineralogy, by Prof. Thos. Carnelley of Dundee.—On the origin of the Andalusite schists of Aberdeenshire, by

Mr. John Horne, F.G.S.—On the occurrence of Prehnite and other zeolites in the rocks of Samson's Ribs and Salisbury Crags, by Mr. Andrew Taylor.—On a new locality for zoisite at Loch Garve, Ross-shire, by Mr. Hamilton-Bell.—On diatomaceous deposits in Scotland, by Prof. W. Ivison Macadam. The author drew attention to the vast extent of some of these beds, and gave particulars as to the proportions of silica, &c., contained in them. The deposits were being worked up to yield an absorbent for dynamite manufacture, and gave a material having double the liquid retaining power of samples of "kieselguhr" experimented on.—On the albertite beds of Strathpeffer, Ross-shire, by Mr. Wm. Morrison. Mr. J. Stuart Thomson referred to the fact that an allied jet mineral was found embedded in the oil-yielding bituminous shales of Midlothian. The substance only occurred in small quantities, the largest pieces not exceeding a pound in weight. It is capable of taking a fine polish, being similar to jet. In fact a jet-worker pronounced it at first to be Spanish jet.—On new localities for kyanite in Glen Urquhart, Drumlach Glen, Inverness-shire, and for staurolite at Presholme, Enzie, Banffshire, by Mr. Thomas Walker.—On the crystallography of Bournonite, by Mr. H. R. Miers, British Museum. The paper criticised the history of the subject, and corrected various errors which have crept into the earlier literature. To those crystallographic forms hitherto recorded twenty-nine new forms are added as determined without doubt, and twenty-one as probable. A list of over 1000 angles, calculated from the elements of Miller, is given. The twinning (twin-plate the prism 110) is discussed; the observations of Hessenberg are supported, and it is concluded that the twinning is always by juxtaposition, not by interpenetration, but that Cornish crystals afford an example of composition perpendicular to, as well as parallel to, the plane of composition.—On a peculiar development of tourmaline from Lockport, New York County, by Mr. R. H. Solly, F.G.S.—Notes on the metallic veins of the Upper Hartz, Germany, by Mr. H. M. Cadell.—Scottish localities for actinolites, by Mr. Peyton.—On Welsh gold, by Mr. T. A. Readwin. A specimen weighing 160 grains, from the Mawddach Valley, Merionethshire, was exhibited.

DUBLIN

Royal Society, June 16.—Section of Physical and Experimental Science.—G. Johnstone Stoney, D.Sc., F.R.S., Vice-President, in the chair.—The following papers were read by Prof. G. F. Fitzgerald, M.A., F.R.S., Hon. Sec. :—(1) On a non-sparking dynamo. By applying the principles of Maxwell's modification of Thomson's electrical doubler to a dynamo in which the current passes through two or more coils in parallel circuit, it is possible to arrange the magnetic field and the brushes so that when the terminals of any coil come into contact with their brushes, the terminals shall be at the same difference of potential as the brushes, and that when they break contact there shall be no current running in the coil, thus avoiding all sparking. The energy of self-induction usually wasted on local currents and sparks will in this case be spent in producing useful current.—(2) On dust repulsion. Prof. Osborne Reynolds's theory of the action of the radiometer leads to the conclusion that a very small body in dense gas is subject to similar forces as the vanes of a radiometer in rare gas, and he made experiments which showed that silk fibres in air at considerable pressures were subject to apparent repulsion by radiation: a similar action on dust would explain the dust repulsion observed by Dr. Lodge.—(3) On currents of gas on the vortex atom theory of gases. As the momentum of a simple ring vortex is not proportional to its velocity and varies with its temperature, the momentum of a current of vortex rings would do so too. This and the variations with temperature of the velocity of sound and of the diffusion of gas through small apertures all point to the conclusion that a simple vortex ring is certainly too simple to explain the laws of material atoms. A difficulty is raised as to the amount by which the medium is carried forward by the translation and rotation of the earth.—(4) On a method of studying transient currents by means of an electro-dynamometer. By comparing the initial swing of a ballistic galvanometer which depends on $SCdt$ with the initial swing of an electro-dynamometer which depends on SC^2dt it is possible in many cases to determine, in addition to the total quantity of electricity that passes in the current, several matters as to the distribution of the current during its time of passage.—Prof. E. Hull, LL.D., F.R.S., on the geological age of the North Atlantic Ocean as bearing on the question of the permanency of continents and oceans. After referring to the views

of those who hold the doctrine of "the permanency of oceans and continents" as opposed to those who, with Lyell, hold that continents and oceans have been interchanged during the past history of the globe, the author proceeded to consider how the formation of the North Atlantic Ocean might be adduced in support of one or other of these views. Remarking that this ocean was the only one at present known which could be used in evidence, inasmuch as we were in possession of sufficient knowledge of the geological structure of the regions by which it is bounded to the east and to the west, he proceeded to show how the distribution of the Silurian and Carboniferous rocks of North America, on the one hand, and of the British Isles and Western Europe on the other, pointed to the existence of the derivative lands in the direction of the Atlantic Ocean during these periods. In each case it was shown, by reference to details, that the sedimentary portions of these formations swell out towards the borders of the ocean, and tail out or become attenuated towards the interior of the continents in the opposite directions. From this it was inferred that the lands from which the sediment was derived occupied the region now overspread by the ocean; and, considering the great thickness of the sediments of these formations, the derivative lands were inferred to be of continental proportions. An additional argument in support of this view was also adduced from the distribution of the calcareous with the sedimentary deposits; for it was shown that the calcareous deposits (which were in the main of marine organic origin) swell out and sometimes replace the sedimentary deposits, as we recede from the borders of the ocean on either hand. From these considerations the author concluded that down to the close of the Carboniferous period the North Atlantic was for the most part in the condition of a continent, while the regions of Central and Eastern America, and of the British Isles and Western Europe, were submerged under oceanic waters. After this period, however, the relations were altered. With the upheaval of the Alleghanies at the close of the Palæozoic epoch, and with the terrestrial movement which at the same time affected the Carboniferous and older rocks of the British Islands and Western Europe, the Atlantic continent was converted into an ocean, in which condition it has remained to a great degree ever since. The author inferred from all this that the history of the North Atlantic Ocean might be adduced in support of the views of those who hold the doctrine of the "interchangeability of oceans and continents" rather than of the other.

Section of Natural Science.—Rev. M. H. Close, M.A., in the chair.—Rev. Dr. Houghton, F.R.S., on the possibility of the formation of coloured solar and lunar halos produced by the suspension in the air of volcanic dust caused by the explosion of Krakatoa in August 1883.—Prof. C. R. C. Tichborne, Ph.D., on an argentiferous galenitic blende found at Ovoca, Co. Wicklow. This mineral is very little known; it has been called "kilmacooite" locally in Ovoca, and it is generally termed "blue-stone" in the Island of Anglesey, the only two places in the United Kingdom where it is found. An analysis of the mineral made by the author gave the following results:—

Silver ¹	...	...	...	...	...	0·024
Zinc	...	...	...	...	...	25·27
Lead	...	...	...	...	...	25·18
Iron	...	...	...	...	...	5·51
Manganese	...	...	...	...	...	trace
Antimony	...	...	...	...	...	0·21
Arsenic	...	...	...	...	...	0·08
Copper	...	...	...	...	...	2·50
Alumina	...	...	...	...	...	0·60
Magnesia, with traces of Calcium	...	...	...	...	...	0·02
Sulphur	...	...	...	...	...	23·71
Silica	...	...	...	...	...	16·896
						100·000

This mineral contains various amounts of pyrites according to the situation of the lode. The specific gravity was 4·73—intermediate between blende and galena—but it was harder than either of these minerals, and was therefore raised by blasting. The author finds by experiments that this mineral is a mechanical

¹ Equal to about 8 troy ounces per ton, or 8½ ounces avoirdupois. The mineral may be said therefore to consist of—

Sulphide of zinc	...	...	...	...	37·68 per cent.
Sulphide of lead	...	...	...	...	29·07 "
Sulphide of silver	...	...	...	...	0·0275 "

mixture of microscopic crystals of blende and galena; it forms a fine-grained saccharoidal mass, very homogeneous in structure, except as regards the pyrites, and occurs in isolated crystals easily discernible by the eye. The author objected to the terms which had been applied to this mineral on the grounds that they were too local, and did not describe the ore. He explained his method of determining the actual physical as well as the chemical composition of the ore. In conclusion, he said that he was tempted to quote from his report upon the Dublin International Exhibition of 1865 in connection with the raising of silver in Ireland. At that time he found that this country was a large supplier of silver, but he was almost afraid to make the calculation now that he then made of the silver supplied by Ireland. He stated that in 1865 Ireland yielded 14,000 ounces of silver per annum, or 2.4 per cent. of the whole of the silver raised in the world, and its value might be estimated at 3850/ per annum, exclusive of the accompanying lead. If 1000 tons of this ore could be supplied, which represented of silver alone 8000 ounces, how lamentable it seemed that this valuable industrial resource should remain unworked.—G. H. Kinahan, M.R.I.A., notes on the earthquake that took place in Essex on the morning of April 22, 1884.

SYDNEY

Royal Society of New South Wales, June 4.—H. C. Russell, B.A., F.R.A.S., President, in the chair.—Three new members were elected, and forty-six donations were received.—The following papers were read:—On rain and its causes, by Edwin Lowe, in which he advocated the firing of cannon and of explosives for bringing about the precipitation of rain.—On the removal of bars from the entrances to our rivers, by Walter Shellshear, Assoc. M. Inst. C. E.—A specimen of scum from a pond near Campbelltown was exhibited. It had been noticed that the surface of the water was covered with a rich green growth in the mornings, and that this changed to a deep red in the afternoons. Messrs. Morris, M.R.C.S., and Wright, M.R.C.S., stated that it appeared to be due to *Astasia hamatodes*, Ehr.

PARIS

Academy of Sciences, July 21.—M. Rolland, President, in the chair.—Presentation of two unpublished essays of Augustin Fresnel, found among the papers of Ampère, by M. Bertrand. The subjects of these essays are the following:—(1) Comparison of the hypothesis of electric currents round the axis of a magnet with that of electric currents round each molecule of matter; (2) Second note on the hypothesis of particular electric currents. These documents are both in the handwriting of Fresnel, but without title or signature, and one only bears a date, that of June 5, 1821.—A study of the geometrical deformations determined by the crushing of a straight cylinder in the direction of its axis between two planes (two illustrations), by M. Tresca.—On two theorems of Prof. Sylvester in connection with his complete demonstration of the rule of Newton in the form given to it by Newton himself, by M. de Jonquières.—Note on the equation in matrices $\beta x = x\gamma$ (continued), by Prof. Sylvester.—On the solution of the most general case of linear equations in binary quantities, that is to say, in quaternions or in matrices of the second order, by Prof. Sylvester.—Note on the maritime canals of Suez and Panama, by M. de Lesseps. In presenting the report of the International Commission on the widening of the Suez Canal, the author expresses the hope that it will soon be able to afford easy passage to ten or twelve million tons of shipping yearly. The Panama Canal, he expects on the report of Mr. Dangler, will be completed in the year 1888.—On the proposed formation of a so-called inland sea in Algeria and Tunisia, by M. E. Cosson. The author repeats the objections already urged against M. Roudaire's project, which, in the discussion that ensued, was supported by M. de Lesseps.—Remarks in connection with the last letter received from Lapérouse, dated Botany Bay, February 7, 1788, by M. de Jonquières.—On electro-capillary relations, by M. P. Garbe.—Direct measure of the two static components and of the dynamic component of the magnetic field of condensing-machines, by M. G. Cabanellas.—Researches on magnetism, by M. Duter.—On a new electric pile with carbon electrodes, producing an electromotor force equal to 0.6 volt, by MM. D. Tommasi and Radiguet.—On the numerical value of Poisson's coefficient as determined by experiments made with caoutchouc, by M. E. H. Amagat.—Temperature and critical pressure of nitrogen; boiling points of nitrogen and ethylene under slight pressures, by M. K. Olszewski.—On the properties of the liquefied vapour of

ethylene, and on its employment as a refrigerator, by M. S. Wroblewski.—Action of the induction spark on benzene, toluene, and aniline, by M. A. Destrem.—On the production of a crystallised manganite of baryta, by MM. G. Rousseau and A. Saglier.—On the combinations formed by the sesquichloride of chromium with the other metallic chlorides, by M. L. Godefroy.—On a general reaction of the polyatomic alcohols in presence of borax, and of the paratungstates, by M. D. Klein.—Remarks on the disinfecting properties of borax applied inwardly, by M. E. de Cyon. From experiments continued over six years the author concludes that borax is a powerful antiseptic, and that it may be introduced in any required quantity into the system to preserve it from all contagions caused by parasites or microbes. As a prophylactic against cholera he recommends boric acid or a solution of borax to be applied to all the external mucous membranes, and about six grains of borax to be taken every twenty-four hours with the food and drink. It appears not only to act directly on the microbes contained in the intestinal canal, but also to attack the bacilli that may have penetrated into the blood.—Researches on the physiological development of *Cercoama schroberi*, *Stenoria apicalis*, and other insects of the order of Cantharides, by M. H. Beaugard.—Remarks on the action of the heart in insects during their metamorphosis, by M. J. Künckel.—Note on the origin and distribution of phosphorus in coal and cannel-coal, by M. Ad. Carnot.—On the variation, under pressure, of the temperature determining the transformation of the iodide of silver, by MM. Mallard and Le Chatelier.—Researches on the influence of light on the respiration of vegetable tissues destitute of chlorophyll, by MM. G. Bonnier and L. Mangin.

VIENNA

Imperial Academy of Sciences, June 13.—E. Mach and T. Wentzel, on the fixation of a very transitory phenomenon by instantaneous photography.—E. Tangl, on the continuity of protoplasm in vegetable tissue.—M. Loewit, contributions to theory of blood-coagulation, ii., on the importance of the blood-disks.—B. Schudel, on propylidene-dipropyl-ether.

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