

PHYSIOLOGY

Kinship of Ascidians and Vertebrates

THE number of Max Schultz's *Archiv* (v. 4), just published, contains a letter to the editor from Prof. Kupffer, of Kiel, in which that distinguished embryologist asserts that he has been studying the early history of a species of *Phallusia*, and that his results in large measure agree with those of Kowalevsky touching the startling vertebrate features of the early condition of these invertebrata. He reserves for the present the details about the exact formation of the nervous system, but quite confirms the fact of the existence of a notochord. He says: "At this stage one could not imagine a more beautiful model of a vertebrate embryo, with the neural tube on one side of the axis and a visceral tube on the other." He, moreover, describes in his species of *Phallusia* the neural tube as not merely an almost spherical vesicle, but as prolonged in the form of a fine hollow thread into the tail above the notochord or axis. He promises full details shortly, and we hope to be able to return to this most important matter.—M.F.

THE Chloral controversy seems likely to terminate. *Pure* chloral, M. Bouchut informs us, is really a good anaesthetic. On the other hand, M. Laborde says that its frequent administration is attended with danger. Chloral, if mixed with blood outside the body, yields no chloroform until traversed by a current of air.

SOCIETIES AND ACADEMIES

Ethnological Society, November 9.—This society held its first meeting for the present session at the rooms in St. Martin's Place. Professor Huxley, the President, occupied the chair. After some remarks by Colonel Lane Fox, the honorary secretary, on the Megalithic Monuments of Stonehenge, Mr. Gardner, of H.M. Consular Service, China, read a paper before the Society, on the Chinese People, Government, &c. The point on which Mr. Gardner laid most stress—in fact, the leading idea of the whole paper—seemed to be the tenacity with which the Chinese had preserved the usages of antiquity, and the skill with which they had adapted them to the exigencies of modern times. They retain, according to him, the patriarchal theory of government, but make it suitable for an empire of 400,000,000 human beings. And if we allow that the ideographic form of writing is the most ancient of all, then the Chinese, in this nineteenth century, preserve an older principle of expressing thought than is to be found in the most ancient Egyptian hieroglyphics extant, and yet no language in the world is more capable of finding appropriate terms for the latest discoveries in mental and physical science, and the newest inventions of art. Mr. Gardner pointed out some analogies which he fancied existed between Chinese, Egyptian, and Hebrew, leaving it to philologists to decide whether these supposed coincidences were fortuitous, or a confirmation of the theory set forward by Hunter and others, of the original unity of the Aryan and non-Aryan languages. In the Chinese religion, Mr. Gardner stated, that whatever might be the nominal creed of individuals, or even masses, ancestral worship (undoubtedly the most ancient form of religious cult) as an act of devotion is most universally practised in the present day. Underlying all religious forms and creeds, Mr. Gardner stated, was an idea, more or less vague, of one Supreme Being; but he did not express an opinion as to whether this idea is a legacy of ancient times, or one of modern development. Besides this leading idea, Mr. Gardner gave a long account of the Chinese social institutions and benevolent societies: these latter are somewhat remarkable, and though not general enough in their organisation to refute the prevailing idea that the enthusiasm of humanity is peculiar to Christianity, tend to show that the Chinese are more philanthropic than any other heathen nation. Mr. Gardner also read some notes, and gave some anecdotes of personal experience to elucidate his main theories. In conclusion, if Mr. Gardner is correct in his premises, we see no reason to doubt his conclusion, that when the theory of division of labour shall be put in practice with regard to races as well as individuals, the Chinese will play an important part in the world's history as ethical philosophers, merchants, mechanics, and labourers; but that they are unfitted for rulers, soldiers, or the higher walks of art, and will not tend to advance physical or mechanical science.

The President referred to the similarity between certain Chinese

customs and those of the Polynesians; such as the exclusion of a word occurring in the name of a great chief. In like manner, the prohibition of marriage between persons of the same surname is a custom common to the Chinese and the Australians. In concluding the discussion, he alluded to the popular but erroneous notion that the Chinese were modified Mongols, and pointed to the fact that, although both had long black hair on the head, and only scanty hair on the face, yet the Chinese had a long skull, with prominent brow-ridges, whilst the Central Asiatic had a broad skull, deficient in brow-ridges.—Captain Sherard Osborn advocated the introduction of railways and the opening of mines; and pointed to the many other advantages which the Chinese would receive from their intercourse with Europeans.—The Rev. Prof. Summers, Dr. Hyde Clark, Dr. Leitner, and others, took part in the discussion.

Additional interest was given to the meeting by the presence of the Yarkandi brought to this country by Dr. Leitner, the only native of Yarkand who has ever visited Europe.

Geological Society, November 10.—Prof. T. H. Huxley, LL.D., F.R.S., President, in the chair. Mr. E. Hartley, of the Geological Survey of Canada, Montreal, was elected a Fellow of the Society. The following communications were read:—"Australian Mesozoic Geology and Palaeontology," by Charles Moore, Esq., F.G.S. The author referred to the observations of Professor M'Coy and the Rev. W. B. Clark, on the occurrence of fossils of Mesozoic age in Australia, and then proceeded to notice the species which he had obtained from that region. Fossils of Mesozoic type occur both in Western Australia and Queensland, but the specimens have hitherto been found in apparently drifted blocks, and nothing is known of the bedded rocks from which they are derived. The author stated that the Australian Mesozoic fossils agree, not only in genera, but also in many cases in species with British forms; and he gave a list of species from Western Australia, identical with British species, from the Middle and Upper Lias, the Inferior Oolite, and the Cornbrash. Of the fossils from Queensland also, many are said to be identical with, or very nearly allied to, British species, but the author regards the general type of the Queensland remains as referring them to the Upper Oolite. A gigantic species of *Crioceras* is regarded by the author as possibly indicative of the occurrence of Neocomian deposits in Australia. The fossil evidence upon which Professor M'Coy inferred the occurrence of the Muschelkalk in Australia, was said by the author to be nugatory, his supposed *Myophoria* proving to be a *Trigonia* nearly allied to *T. gibbosa* of the Portland Oolite, and his doubtful *Orthoceras* a small *Serpula*. The author had found no indications of the existence of Triassic or Liassic deposits in Queensland. The blocks from Western Australia, referred by the author to the Middle Lias, contain *Myacites liassianus* (Quenst.), and are quite as highly ferruginous as the English Marlstone. The species identified by the author with British Oolitic species would indicate a range from the Inferior Oolite to the Cornbrash; the author suggests that the species may have had a longer range in time in Australia than in England, or that the subordinate divisions of the Oolite were not clearly marked in the Australian Mesozoic deposits. He is inclined to refer the fossils to the period of the Inferior Oolite. The author inferred from the occurrence of these Mesozoic fossils in drifted blocks, at the two extremities of Australia, separated by 38° of longitude, that an enormous denudation of rocks of the secondary series has taken place over a considerable part of Australia. Descriptions of a great number of new species were appended to the paper.

"On a Plant- and Insect-bed on the Rocky River, New South Wales," by Charles Moore, Esq., F.G.S. The organic remains noticed by the author were found by him in a small block of chocolate-coloured, micaceous, laminated marl, obtained from a bed about ten feet thick, at a depth of 100–110 feet, in the auriferous drifts of Sydney-flats, on the banks of the Rocky River. The author found the leaves of two forms of Dicotyledonous plants, fragments of a flat narrow leaf, which he refers to the *Conifera*, a seed-vessel, and the impressions of several seeds. The insect-remains consist principally of the elytra of beetles, among which Buprestidae appear to predominate. The vegetable remains seem to indicate that the deposit is of Tertiary age.

Prof. T. Rupert Jones mentioned the discovery of a large *Crioceras* in the Jurassic beds near Port Elizabeth.—Mr. W. Boyd Dawkins suggested that we had hardly a right to apply the European standard in judging fossils from all parts of the world, and doubted whether, if these fossils were examined from the

purely Australian point of view, the same age would be assigned to them.—Mr. Seeley agreed with Mr. Dawkins, and argued from the existence of natural groups in different areas of the globe, that the same must have been the case in former ages.—Mr. R. Tate remarked that if Mr. Moore had compared the Jurassic fauna with those of India, Africa, and Chili, he would have found the same mixture of forms belonging apparently to different horizons. He considered that the Australian fossils probably represented our Middle Oolite. He did not quite agree with the author as to some of the specific determinations.—Dr. Duncan remarked that the same combination of forms separated in Europe was found in the Tertiary fossils of Australia. He thought that further facts were necessary before forming a decided opinion as to the succession of beds in that continent.—The President remarked that when we talked of identity of fauna in Australia and this country, improbable as it might appear, we must remember that at the present time identical species, and, to a great extent, a similar fauna, were to be found in our seas more than 180° apart.—Mr. Moore, in reply, argued that it was the safest plan to follow the well-established standard of Europe even in remote parts of the world. He was inclined to refer the bulk of the specimens rather to the Lower than to the Middle Oolite, but otherwise he agreed in the main with Mr. Tate.

“On *Hypsilophodon*, a new Genus of *Dinosauria*,” by Prof. Huxley, F.R.S., President. The author described the characters presented by the skull of a small Dinosaurian reptile obtained by the Rev. W. Fox from a Wealden bed at Cowlaze Chine in the Isle of Wight. One of the most striking peculiarities of this skull was presented by the premaxillary bone, which seems to have been produced downwards and forwards into a short edentulous beak-like process, the outer surface of which is rugose and pitted. The author remarked upon the known form of the symphyseal portion of the lower jaw in the *Dinosauria*, and indicated that its peculiar emargination was probably destined to receive this beak-like process of the premaxillaries, which may have been covered either by fleshy lips or by a horny beak. The dentigerous portion of the premaxilla bears five small conical teeth. The alveolar margin of the maxilla bears ten teeth, which are imbedded by single fangs, and apparently lodged in distinct alveoli. The summit of the crown, when unworn, is sharp, and presents no trace of the serrations characteristic of *Iguanodon*, but it is sinuated by the terminations of the strong ridges of enamel which traverse the outer surface of the crown. The teeth thus present some resemblance to those of *Iguanodon*; but the author regarded the two forms as perfectly distinct, and named the species under consideration *Hypsilophodon Foxii*. Of the lower jaw the right ramus is present, but its distal extremity is broken off, and its teeth are concealed. On the outer surface of the lower jaw the centrum of a vertebra is preserved. The author then referred to a fossil skeleton in the British Museum, which has been regarded as that of a young *Iguanodon*. It is from the same bed as the skull previously described. The author remarked that, in form and proportions, the vertebrae were quite different from those of *Iguanodon*, and apparently identical with those of his new genus, as shown by the centrum preserved with the skull; the animal had at least four well-developed toes; and other peculiarities were indicated, which seem to prove that it was quite distinct from *Iguanodon*. This skeleton the author identified with his *Hypsilophodon Foxii*, and described its characters in detail, dwelling especially upon the peculiarities of the pelvic bones, which are singularly avian in their structure.

“Further Evidence of the Affinity between the Dinosaurian Reptiles and Birds,” by Professor Huxley, F.R.S., President. In this paper the author reviewed the evidence already cited by himself and others (especially Prof. E. D. Cope), in favour of the ornithic affinities presented by the *Dinosauria*; and discusses at length the recently ascertained facts which bear upon this question, some of the most important of which are derived from the species described by him in the preceding paper under the name of *Hypsilophodon Foxii*. He summed up his paper by a comparison of the different elements of the pelvic arch and hinder limb in the ordinary reptiles, the *Dinosauria* and Birds, and maintained that the structure of the pelvic bones (especially the form and arrangement of the ischium and pubis), the relation between the distal ends of the tibia and the astragalus (which is perfectly ornithic), and the strong cnemial crest of the tibia and the direction of its twist, furnish additional and important evidence of the affinities between the *Dinosauria* and Birds.

Sir Roderick Murchison, who had taken the chair, inquired as to the habits of the *Hypsilophodon*.—Mr. Hulke mentioned that Mr. Fox had several blocks containing remains of a large portion

of the *Hypsilophodon*, all procured from a thin band of sandstone near Cowlaze Chine. On one the pelvis is almost entire, as well as the right femur, the tibia, which is longer than the femur, four long metatarsal bones, and an astragalus. All the long bones are hollow. Portions of at least eight individuals have been found in the same bed.—Mr. Seeley doubted whether these animals should be called Reptiles at all, as they seemed to him to form a group distinct alike from reptiles, birds, and mammals, but occupying an intermediate position. In the hinder limbs of *Pterodactylus* the analogies were closer with mammals than with birds. He thought it possible that the peculiar structure of the hinder limbs of the *Dinosauria* was due to the functions they performed rather than to any actual affinity with birds.—The President, in reply, stated that *Hypsilophodon*, from the character of its teeth, probably subsisted on hard vegetable food. He expressed a hope that Mr. Fox would allow a closer examination of his specimens to be made. He was unable to agree with Mr. Seeley's views. He was inclined to think that the progress of knowledge tended rather to break down the lines of demarcation between groups supposed to be distinct than to authorise the creation of fresh divisions.

Specimens illustrative of their respective papers were exhibited by C. Moore, Esq., and Prof. Huxley.

Institution of Civil Engineers, November 9.—At the first ordinary general meeting of the session, held on Tuesday, the 9th inst., Mr. Charles Hutton Gregory, the President, made some observations on the action taken by the council with reference to a notification gazetted by the Public Works Department of the Government of India. In this notification it was alleged that the Governor-General in Council was given to understand, that in the civil engineering profession in England it was a recognised practice for civil engineers employed by public companies and otherwise, to receive, in addition to the salaries paid them by their employers, commission on contracts given out, or stores and materials ordered or inspected by them, and other like pecuniary considerations for services done, or intended to be done, which were considered legitimate sources of emolument. The Council had met, and unanimously passed a series of resolutions, emphatically denying that such practices were recognised in the profession, and asserting that any engineer detected in such practices would be held to be guilty of disgraceful conduct, which would disqualify him from being a member of this Institution. Regret was expressed that so grave a charge should have been received and published by the Government of India without proper inquiry, as such inquiry would have shown that the charge was absolutely untrue; and, having reference to the grievous wrong which such an imputation, stamped with such authority was calculated to do to an honourable profession, an appeal was made to the Government of India to cause the scandalous statement to be withdrawn. This protest was transmitted to the Secretary of State for India, who had received a deputation from this Institution, comprising the President and every member of Council then in London. The Duke of Argyll promised to investigate the case, and has put on record that “he regards with implicit confidence the indignant repudiation by the Institution of any recognition of the practice referred to in the notification.”

Mathematical Society, November 11.—The first meeting of the present session was held on Thursday, the 11th inst., Prof. Cayley, F.R.S., President, in the chair, when the following gentlemen were elected to be the council for the session 1869-70:—President: Prof. Cayley, F.R.S. Vice-Presidents: A. De Morgan, F.R.A.S., W. Spottiswoode, F.R.S., Prof. Sylvester, F.R.S. Treasurer: Prof. Hirst, F.R.S. Hon. Secretaries: M. Jenkins, M.A., R. Tucker, M.A. Other members: W. K. Clifford, B.A., T. Cotterill, M.A., M. W. Crofton, F.R.S., Olaus M. F. E. Henriki, Ph.D., S. Roberts, M.A., J. Stirling, M.A., A. Smith, F.R.S.L. and E., Prof. H. J. S. Smith, F.R.S., and J. J. Walker, M.A.

The Rev. James White, M.A., was elected a member. Mr. Tucker read a communication from Mr. G. O. Hanlon, on the “Vena Contracta,” and Mr. Jenkins a letter from Mr. Clerk-Maxwell, containing the question, “Can the potential of a uniform circular disk at any point be expressed by means of elliptic integrals? Suppose V is the potential of the disk bounded by the circle $z=0$, $x^2+y^2=a^2$.

$$\text{Then } \frac{dV}{dx} = 2x \sqrt{\frac{a}{r}} \frac{1}{\sqrt{c}} (E - F)$$

$$\text{where } r^2 = x^2 + y^2;$$

and if AB be a diameter parallel to r ,

$$c = \frac{PB - PA}{PB + PA}$$

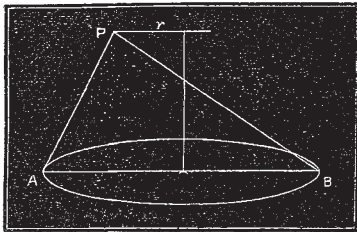
and E, F are complete elliptic functions for modulus c ;

also
$$\frac{dV}{dy} = 2y \sqrt{\frac{a}{r}} \cdot \frac{1}{\sqrt{c}} (E - F)$$

But
$$\frac{dV}{dx} = w,$$

where w is the solid angle subtended at P by the circle, that is the area of the spherical ellipse on a sphere of unit radius cut off by the cone whose vertex is P, and base the circle.

We have expressions for $\frac{dV}{dx}$ and $\frac{dV}{dy}$, can $\frac{dV}{dz}$ also be expressed by elliptic functions, and if so, can V itself be so expressed? I am writing out the theory of electric currents in which these quantities occur. The expression for $\frac{dV}{dz}$ for an elliptic disk can be found if we know it for a circular one; for the spherical ellipses in the one case are no more complicated than in the other. Can $\frac{dV}{dx}$, or V itself, be found for the elliptic disk?"



The President and Mr. C. W. Merrifield spoke on the question, but could not decide for or against it impromptu.

Mr. T. Cotterill then gave an account of his paper on Opposite Points on a Curve. The subject bore reference to two former papers read before the society by the author and by Prof. Sylvester, the Theory of Residuals, not yet, to the regret of the society, put into a shape for publication. Mr. S. Roberts and Mr. W. K. Clifford took part in a discussion upon this paper.

Royal Microscopical Society, November 10.—Rev. J. B. Reade, M.A., F.R.S., President, in the chair. A communication from Dr. Pigott on high power definition with illustrative examples was read. The paper had special reference to the markings on the Podura scale, of which the writer claimed to have discovered the true nature. As the result of close and protracted observation, Dr. Pigott believes that he has resolved these markings into rows of bead-like bodies essentially differing in their character from the "note of exclamation" markings so familiar to microscopists.—Another paper on a cognate subject, entitled the Scales of certain Insects of the order Thysanura, was read by Mr. S. McIntyre. Mr. McIntyre's examinations of the genus of the family of the *poduridae* leads him to express conclusions confirmatory of the views hitherto entertained, as to the nature of the markings seen under the microscope; and in the discussion which followed the opinions expressed by the Fellows were entirely in support of Mr. McIntyre's conclusions. Among the donations announced was an interesting specimen of an Amici reflecting microscope, working on the principle of the Newtonian telescope.

Zoological Society, November 11.—Mr. George Busk, F.R.S., V.P., in the chair.—The Secretary made some remarks on the more remarkable additions to the Society's Menagerie during the past summer, amongst which particular attention was called to some Amherst's pheasants, deposited by J. J. Stone, Esq.; an Owen's apteryx, presented by the Acclimatisation Society of Otago, New Zealand; a pair of the newly-discovered Chinese deer (*Elaphurus davidianus*), presented by Sir Rutherford Alcock; and a young male Spanish ibex, presented by Major Howard Irby.—Extracts were read from a letter addressed to Mr. Grote by Dr. John Anderson, C.M.Z.S., containing observations respecting the pigmy hog of the Terai (*Porcula sal-*

vania), and other animals which he is endeavouring to procure for the Society's Menagerie.—A letter was read from Dr. G. Bennett, containing an account of the habits of the wood-hen of Lord Howe's Island, as recently observed by Mr. R. W. Fitzgerald.—Mr. Sclater exhibited a specimen of the so-called wood-hen, which had been forwarded in spirits by Dr. Bennett to the Museum of the Royal College of Surgeons, and stated that it was a rail of the genus *Ocydromus*, apparently hitherto undescribed, which he proposed to call *Ocydromus sylvestris*.—A letter was read from Mr. Morton Allport, F.Z.S., containing an account of the successful introduction of the salmon trout (*Salmo trutta*) into Tasmania.—Mr. Quelch exhibited a remarkable specimen of a fish of the genus *Rhombus*, supposed to be a hybrid between the turbot and the brill.—Mr. J. W. Clark, F.Z.S., exhibited some mounted skeletons of the extinct dodo of the Mauritius, and of the male and female solitary of the Island of Rodriguez, belonging to the Cambridge University Museum.—Mr. E. Ward exhibited a curious melanoid variety of the woodcock (*Scolopax rusticola*).—Professor Flower, F.R.S., read a memoir on the anatomy of the Aard-wolf (*Proteles cristatus*), founded on a specimen recently deceased in the Society's Menagerie. The result arrived at after a careful examination of every part of this animal was that *Proteles* constituted of itself a distinct family of carnivorous animals, allied to the *Hyænidæ* and *Viverridæ*, but more closely to the former than Mr. Flower had previously supposed when he had only the skull of this remarkable animal to judge by. Mr. Flower's paper was illustrated by the exhibition of the stuffed skin, a complete skeleton, and a full series of anatomical preparations of the internal organs of this animal, all taken from the same individual.—A communication was read from Dr. J. G. Gray on the guemul or roebuck, from Tinta in Southern Peru, which Dr. Gray considered to constitute a new genus of deer, proposed to be called *Xenolophus*.—A second communication from Dr. Gray contained a description of *Emys laniaria*, a new species of fresh-water tortoise, from an unknown locality.—A report was read by Dr. A. Günther on two collections of Indian reptiles, recently received by the British Museum, one of which had been formed by Dr. Leith in various parts of Western India; the second by Mr. Barnes in Ceylon. Both were of much interest, and contained various new species, which were characterised in the present paper.—A communication was read from Dr. B. Simpson, containing notes on the habits of *Ailurus fulgens*, as observed by him during his residence in Nepal.—A communication was read from Surgeon Francis Day, F.Z.S., containing the first part of a series of notes on the specimens of fishes in the Calcutta Museum. Mr. R. B. Sharpe read some additional notes on the genus *Ceyx*, in continuation of a former communication on this subject. The principal object of the present paper was to discuss the question of the identification of the true *Ceyx rufidorsa*, Strickland.

BRIGHTON

Brighton and Sussex Natural History Society, November 8.—Mr. T. H. Hennah, President, in the chair. A rare grass, *Gastidium Lendigerum*, obtained in October, in the Weald of Sussex, by Mr. Davies, was presented by that gentleman.—A paper on Mosses was read by Mr. Smith, in which the development, growth, mode of reproduction, and the several parts of mosses were described and illustrated by enlarged drawings and microscopic preparations, while it was pointed out that to the microscopist they opened out fields of research and questions to be settled, unsurpassed by any other branch of natural history. Prior to reading the paper, Mr. Smith handed in a complete Bryological Flora of the county of Sussex, comprising 298 species and sub-species, a brief account of the soils in which the rarer species grow, together with an enumeration of those which, at present as regards Britain, have been found only in Sussex. This list will be published in the next annual report.

BRUSSELS

Royal Academy of Sciences, October 9.—M. Schwann reported on the memoir by MM. Masius and Vaulair on the anatomical and functional regeneration of the spinal cord, of which a notice was given in the last number of NATURE. Besides the immediate subject of their memoir, the authors treat of the histology of the *filum terminale* of the spinal cord in the frog, and of the cutaneous and medullary distribution of the spinal nerves.—M. A. Quetelet communicated notes on the meteors observed at Brussels in August, 1869, and on that of the 1st October, 1869; and M. Terby noticed the meteors observed at

Louvain in August last.—Storm observations, from the 1st of June to the end of September, were presented; for Brussels by M. Quefelet, for Louvain by M. Terby, for Malines by M. Bernaerts, for Antwerp by M. C. Coomans, and for Gerpinnes, near Charleroi, by M. V. van Geel. M. J. Cavalier also communicated a note of storms observed at Ostend in August and September last.—M. Zantedeschi communicated a note on the employment of the outer armature of the submarine cable, while the inner armature, or isolated conducting wire, transmits the telegraphic despatch. The author remarks that the submarine cable represents a Leyden jar, and hence that when the conducting wire conveys a message, say from Europe to America, the same message is reconveyed to the European station by means of the wires forming the outer portion of the cable. He proposes to establish an apparatus at each station for the purpose of receiving this return message, so as to enable the operator to see that his message is correctly transmitted.—M. L. de Koninck stated, that on the 2nd October last, the day of the earthquakes in the Rhenish provinces, he experienced a slight double shock in Liège at about 11.40 p.m.

MANCHESTER

Literary and Philosophical Society. *Microscopical and Natural History Section*, Oct. 11.—Mr. John Watson in the chair. The President delivered an address, from which the following are extracts:—"It will interest all naturalists, and especially entomologists and lepidopterists, to hear that there has very lately been received in this country a fine specimen of the magnificent butterfly *Papilio Antimachus*, of which only one specimen was ever before brought to Europe. . . . The Darwinian theory appears to be making progress among a certain class of naturalists, but its upholders display a disposition to avoid precision of terms, and to enlarge and confuse the meaning of the words they employ, rather than scientifically to limit and define them; they use variability and mutability as having one and the same meaning, instead of distinguishing one as referring to subdivision into varieties, and the other as change of specific forms. Just now, as a development of the theory of natural selection, we hear a great deal from some distinguished entomologists about imitation and mimicry, where resemblance would be the more correct word; and these terms cannot be said to be used figuratively, because it is argued that some species and genera of butterflies mimic the colourings and markings of others for the sake of protection from enemies, and for other aims and ends. Certainly the words imitation and mimicry imply foregone intention. Now it is probable that no butterfly ever saw its parent or ancestor, its offspring or posterity, and it is an absurd stretch of imagination that its own observation could induce and enable it to change the colouring and appearance of its successors; and if it had such ability and reasoning power, it would effect the change for protection from enemies in the larva, and not in the imago. We know that Nature loves to repeat her works, and it is common to find resemblances and repetitions through various and distantly allied families of animals, and they are truly connecting links in the chain of creation. The controversy is still going on between those who affirm and deny the existence of a vital principle of energy or force, and Professor Huxley stands foremost among the latter; very interesting microscopic observations have been made, and ingenious arguments have been deduced from them; but the grand step from the lifeless to the living protoplasm has not been diminished. Physiologists may, perhaps, hereafter discover and explain the difference between organic forms, living and dead; but at present it is not proved that the phenomena of life can be reconciled with the mere functions of matter."

Dr. Henry Simpson exhibited specimens of *Statices spathulata*, gathered by himself this autumn on Hilibree Island, Cheshire.

Mr. Tait sent a portion of the beach from near Alexandria, Egypt, consisting almost entirely of shells. He stated that for many miles along the coast the shore was of a similar character.

Mr. Joseph Sidebotham read a paper on varieties in Lepidoptera, from which the following passage is extracted:—"The questions as to what constitutes a species? where does a species end, and variety begin? and whether a species be a natural or merely an artificial division? are amongst the most difficult of solution in the whole range of natural history, and just at this time are very prominently before the scientific world. With a view to determine the influence which difference of food and light might have in modifying species, the author gives the following as the result of some experiments which he had made. I procured about 2,500 larvæ of the tiger moth, in a young state.

I divided them into six lots, keeping each in a separate cage, and feeding them differently. One lot was fed on willow, another on butter burr (*Petasites vulgaris*), another on hawthorn, another on plum, one on dock, and one on nettle, grass, bramble, and various other kinds of food. A considerable proportion of each became perfect insects, and I could detect no difference whatever in the colours, from the food they had lived upon. That is to say, the variations in colour and marking were not to be traced in any case to the food. I kept several batches of eggs, and reared the larvæ carefully through the winter, and then again divided them, giving each lot a different kind of food. Again the same result. I found that one year the larvæ I had brought from the coast had usually the inferior wings more or less of a yellow shade, instead of the bright scarlet of the Cheshire specimens. Having for many years continued these experiments without obtaining any marked results, I this year tried another of a different nature. I selected the tortoiseshell butterfly, as one of the least variable species we have, and I procured several broods of young larvæ just emerged from the egg. These I kept in a dark box until I had all ready, and then I divided each brood into three lots, putting one-third into a box in my photographic room, which is lighted with orange-coloured glass, one-third into a box lighted with blue glass, and the ventilators carefully shaded so that only light of a blue colour could reach the larvæ, the remainder were put into an ordinary cage, in the natural light. The latter fed up and came out into butterflies in the usual time. Those in the blue light were not healthy, and though every care was taken, at least fifty or sixty died before changing, and a considerable number changed into chrysalides, and then died; those that came out into perfect insects were very much smaller than usual. Those lighted by orange-coloured glass fed up very well, but many of the two first lots had come out before one of them changed into chrysalis; scarcely one of them died, and I examined each one before I allowed it to fly, to see what effect had been produced. I retained a few specimens of each lot to exhibit this evening, and now proceed to describe the difference. Those reared in the blue light differ from the ordinary form in being on an average much smaller; the orange brown is lighter in shade, and the yellow and orange run into each other, instead of being distinct and separate. Those reared in the non-actinic, or yellow light, are also smaller, the orange brown is replaced by a salmon colour, the venation more strongly marked, and the blue dashes at the edge of the wings in the usual form, are in these of a dull slaty colour. A series of specimens of these side by side with those reared in ordinary light, are here for exhibition. One evening I found about 60 butterflies out of chrysalis, of those in the photographic room, and taking each one carefully I examined them all and allowed them to fly; shortly afterwards I found the whole of them had settled against the wall of the house, and presented a most remarkable appearance; they remained there more than half-an-hour, the western sun was shining against the wall, and it is not unlikely when, being suddenly brought from the red light, where they had spent all their lives, to the bright daylight, they have been so dazzled as to act in this peculiar manner. The results of this experiment do not show any very startling change in colour, such as one would have expected from the known effects of light on plants and from the occasional occurrence of very much more strange varieties, one now and then meets with, which cannot have been subject to such severe treatment; still, when we consider that even this difference is caused in one generation, and in the course of a month, it is a very suggestive fact, and leads one to think that light has certainly as much or more effect on the colours of Lepidoptera, than the difference of food, and might in a long series of generations lead to very material changes in both form and colour, and perhaps considerably modify our ideas of what constitutes a species."

MONTREAL

Natural History Society, October 25.—An important paper on the Gaspé fossils was read by Principal Dawson. The Peninsula of Gaspé, between the river St. Lawrence and the Bay des Chaleurs, was the first part of Canada explored by the Geological Survey under Sir William Logan, and it contains rocks representing four great geological periods, the Lower Silurian, the Upper Silurian, the Devonian, and the Lower Carboniferous; all admirably exposed in coast cliffs; and in the case of the Upper Silurian and Devonian abounding in characteristic fossils. The visit of Principal Dawson in the past summer had reference to further study of the interesting fossil plants of the Devonian sandstone, many species of which have been described

in his papers in the *Canadian Naturalist*, and in the Journal of the Geological Society. With Messrs. G. T. Kennedy and G. W. Dawson as assistants, he explored the whole of the north side and the greater part of the south side of Gaspé Bay, and has obtained very large and interesting collections of fossil plants. Among these are two large trunks of *Protaxites Logani*, a new and beautiful species of *Psilophyton*, and a species of *Cyclostigma*, a genus hitherto found only in the Devonian rocks of Ireland. Several interesting animal remains were also found, including numerous species of large fishes (*Mechæracanthus*); and Mr. Kennedy was so fortunate as to find a *Cephalaspis*, the first representative of the genus as yet found in America. The animal fossils have been placed in the hands of Mr. Billings and Dr. Newberry for comparison, and the plant will probably be described in detail in the course of the coming winter. Specimens of some of the more interesting fossils above referred to, were exhibited to the society.—Mr. Ritchie read a paper on the small cabbage-butterfly (*Pieris rapæ*), the caterpillars of which have recently been extremely destructive in Canadian gardens. This insect is not indigenous to America, and was first noticed in Canada some years ago by Mr. W. Couper. Mr. Whiteaves made an interesting verbal communication on dredging in Gaspé, and exhibited a large series of marine invertebrates.

PARIS

Academy of Sciences, November 8.—M. Pasteur presented a note in reply to that of M. Thenard on the preservation of wines by heat. A memoir was read by M. H. Marès on the transformations undergone by powder of sulphur (flour of sulphur and powdered sulphur) when it is spread upon the soil, in which the author states that the sulphur which has been abundantly employed in the vineyards of France of late years becomes converted into sulphuric acid which combines with the lime of the soil to form sulphate of lime. The author has not ascertained whether the sulphuric acid is produced by direct oxidation of the sulphur, or by that of sulphuretted hydrogen formed by it in contact with manure, but he states that no odour of sulphuretted hydrogen is perceptible where the sulphur is used. The employment of sulphur appears to be effectual in preserving the vines from disease.—A note by M. J. Personne on the transformation of hydrate of chloral into chloroform in the animal economy was read. The author remarked that whilst M. Liebruch maintains that hydrate of chloral is converted into chloroform by contact with the alkali of the blood, the French observers have generally held an opposite opinion. In his experiments he found that where hydrate of chloral is added to blood, or administered to a dog, no production of chloroform is perceptible, but he obtained chloroform by the distillation of the blood. To avoid the objection that the heat employed in distillation might produce the conversion, he operated at a temperature of 40°–45° C. = 104°–113° F., conveying the vapour by a current of air through a red-hot porcelain tube into a solution of nitrate of silver. The reaction produced demonstrated the presence of chloroform in the vapour, no reaction being caused by vapour of hydrate of chloral conveyed and decomposed in the same way. Unlike M. Bouchet, the author detected no chloroform in the urine of animals to which hydrate of chloral had been administered.—M. J. V. Laborde communicated a note on the ill effects attending the administration of chloral.—In a note on chloride of gold, M. H. Debray remarked that although sesquichloride of gold is decomposed by exposure to a temperature of about 200° C. = 392° F., into proto- and per-chloride, it may, nevertheless, be volatilised by a heat of 303° C. = 572° F., in an atmosphere of chlorine. It then crystallises in long reddish needles.—M. A. Riche communicated a note on the bronze of sonorous instruments, relating chiefly to the production of gongs and cymbals similar to those made in China. Chinese metal contains about twenty per cent. of tin. Alloys made with these proportions of metal are very brittle when cold, but the author found that at a dull red heat they may be forged with ease, and produces very sonorous plates.—M. A. Landrin announced that yellow coralline is not poisonous, so that it may be employed for industrial purposes.—M. Petrequin presented a note on the chemical composition and comparative physiology of the cerumen of the mammalia. Its base is potash in man and the ox, lime in the dog, and magnesia in the horse.—M. A. Petit stated that in the melon the rind contains only glucose, as also the flesh whilst still green. During ripening cane-sugar is gradually developed in the latter, its formation commencing in the most acid part of the pulp surrounding the seeds.

DIARY

THURSDAY, NOVEMBER 18.

ROYAL SOCIETY, at 8.30.—Preliminary Report of the Scientific Exploration of the Deep Sea in H.M. surveying vessel *Porcupine*, during the summer of 1869, conducted by Dr. Carpenter, V.P.R.S., Mr. J. Gwyn Jeffreys, F.R.S., and Prof. Wyville Thomson, LL.D., F.R.S. And other papers. SOCIETY OF ANTIQUARIES, at 8.30.—Ancient British Barrows (Round): Dr. Thurnam. LINNEAN SOCIETY, at 8.—Review of the genus *Hydrolea*, with descriptions of three new species: Mr. A. W. Bennett, F.L.S. NUMISMATIC SOCIETY, at 7. LONDON INSTITUTION, at 7.30.—Architecture, or the Fine Art of Building: Prof. Robert Kerr. CHEMICAL SOCIETY, at 8.—On Namaqualite and Chemical Researches on new and rare Cornish Minerals—No. 6. A new Ferric Silicate: Prof. Church. On Chloranil and Bromanil—No. 2: Dr. Stenhouse.

FRIDAY, NOVEMBER 19.

PHILOLOGICAL SOCIETY, at 8.30.

MONDAY, NOVEMBER 22.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30. LONDON INSTITUTION, at 4.—Elementary Physics: Prof. Guthrie.

TUESDAY, NOVEMBER 23.

ETHNOLOGICAL SOCIETY, at 8.—On some Quartzite Implements of Palæolithic Type from the Drift of the Cape of Good Hope: Sir George Grey, Bart. On the Races and Languages of Dardistan hitherto undescribed: Dr. Leitner.

WEDNESDAY, NOVEMBER 24.

GEOLOGICAL SOCIETY, at 8.—On the Dinosauria of the Trias, with observations on the Classification of the Dinosauria: Prof. Huxley, F.R.S., President. The Physical Geography of Western Europe during the Mesozoic and Cænozoic periods, elucidated by their Coral-faunas: Dr. P. Martin Duncan, F.R.S., Sec. G.S.

THURSDAY, NOVEMBER 25.

ROYAL SOCIETY, 8.30. LONDON INSTITUTION, at 7.30.—Architecture: Prof. R. Kerr. LONDON MATHEMATICAL SOCIETY, at 8. ZOOLOGICAL SOCIETY, at 8.30.—Notes on some Spiders and Scorpions from St. Helena, with descriptions of new Species: Rev. O. P. Cambridge. On a small collection of Birds from the Tonga Islands: Dr. O. Finsch and Dr. G. Hartlaub.

BOOKS RECEIVED

ENGLISH.—Transactions of the International Congress of Prehistoric Archaeology (Longmans).—The Universe; or the Infinitely Great and the Infinitely Little: F. A. Pouchet (Blackie and Sons).—Physical Atlas (A. K. Johnston).—Darwinism tested by the Science of Language: Professor A. Schleichler, translated by Dr. A. V. W. Bickers (Hotten).—The Midnight Sky: Donkin (Religious Tract Society). Æsop's Fables, illustrated by Ernest Griset (Cassell).

FOREIGN.—Die Befruchtung bei den Coniferen: Dr. E. Strasburger.—Die Maschinenfabrication: H. V. Reiche.—Berichte über die Versammlung der Deutschen Ornithologen-Gesellschaft. (Through Williams and Norgate.)

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