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THURSDAY, MAY 12, 1870

A BUILDING FOR THE LEARNED SOCIETIES

THE Statistical Society has done good service to the cause of science in convening representatives of the learned societies, to consider whether it would not be possible to obtain a building for their accommodation worthy of the high position they occupy in this great metropolis. At this moment several societies are under notice to quit, others scarcely know where to look for shelter, and many more are utterly unable to find sufficient room for their libraries, instruments, and museums, though they pay a large portion of their income in rent and taxes. It is calculated that, jointly, upwards of 2,000*l.* a year is now paid in rent, enough, one would think, if properly managed, to supply most ample accommodation for very many societies, to say nothing of the great economy in service that would result from the joint occupation of a proper building. But so long as nothing is done to bring about some understanding and co-operation among the different societies, the evil is irremediable. Nor is it purely a question of finance. Many abstain from joining a learned society when its place of meeting is either inconveniently situated, or altogether too small for the usual attendance at the ordinary meetings. Not a few members of more than one society are unnecessarily driven from one place to another. The libraries for reference are not half utilised. Co-operation among men of science is almost impossible, and the action of each society is rendered thereby comparatively feeble and ineffective. On every ground, whether of convenience, economy, or utility, the learned societies would do well if they could combine in erecting a building sufficiently capacious for their joint accommodation.

Some learned societies have no reason to complain. The Royal Society, the Linnean, the Royal Astronomical, the Geological, the Chemical, the Society of Antiquaries, and a few others, are well accommodated, and a solid structure is being raised for them in Piccadilly. Those whose wants are yet to be supplied are the Statistical Society, the Institute of Actuaries, the Mathematical, Meteorological, Ethnological, Anthropological, Geographical, Archæological, and Juridical Societies, the Social Science Association, and as many more; and it is for them to consider whether it is better to go on as they are doing, paying one, two, or four hundred pounds a year each for their present rooms, or whether they would not do better by combining together for the erection of a proper building for them all. In calculating how many societies could unite for such a purpose, we must take into account the kindred character of their labour and inquiries. The statisticians, actuaries, and mathematicians might well meet together, and so it would be fitting that the antiquaries and archæologists should have a common habitation. But not so those that have nothing in common. Then the number of members and the space required for meetings, libraries, and museums are important elements. The Geographical Society, with its map-rooms and extensive library, would require space enough for a dozen other societies. And further, the frequency of meetings must be considered, when at the most only three or four commodious halls could be secured in any one building. We scarcely imagine, in fact, that any large number of societies could well be united in one building, and that will be a source of difficulty, especially in a financial aspect.

But why should there be any financial difficulty? Surely the erection of one or more buildings for purposes of science is a duty which may well rest with the Government. Nowhere does the State do so little for science as in this country. The estimates for 1870-71 give the entire sum to be applied to the learned societies at 2,370*l.*—a sum distributed among very few of them. Of this 500*l.* goes to the Royal Geographical Society, to provide suitable rooms in which to hold their meetings, and to exhibit to the public, free of charge, their collection of maps; 300*l.* is given to the Royal Society of Edinburgh; 500*l.* to the Royal Academy of Music; and 70*l.* to the Irish Academy of Music. In addition to this 160,000*l.* are appropriated to a building for certain learned societies in Burlington House; but it will serve for very few of them; and if we are rightly informed, the Government will reoccupy all the buildings in Somerset House now used by learned societies.

The chairman of the meeting at the Statistical Society stated that communications had passed between himself and the Chancellor of the Exchequer, and that no encouragement whatever was given for any application of this nature. But it is the clear duty of the societies not to rest satisfied with this, but to get a decided expression of opinion on the subject. By no means should the most natural and proper channel for obtaining the requisite sum for a building so essential to the well-being of the country be neglected.

But supposing the Government should turn a deaf ear to the application of the learned societies, are there no means available within these bodies themselves for getting the amount? It has been estimated that the probable cost of a building sufficiently commodious, though not ornamental, in some eligible locality near Charing-cross, will be, with the ground-rent, 30,000*l.* to 40,000*l.* Why should not a joint-stock company be formed for the purpose, and a large number of shares be taken up by the members of the societies interested? Some societies have moreover an accumulated fund of considerable importance. The Geographical Society has, it is understood, upwards of 20,000*l.* What more natural than to apply such investments in a palace of science, with an income so well guaranteed by the rental of the learned societies? The financial part of the question must be carefully but fearlessly approached. No insurmountable difficulties stand in the way of obtaining any reasonable amount for such a purpose.

What we want is a prompt and vigorous action on the part of the learned bodies. Heaven helps those who help themselves. The delegates at the meeting at the Statistical Society unanimously resolved in favour of co-operation on the subject, but by an unfortunate introduction of too cautious a spirit, they let the opportunity slip without naming a committee to prosecute the necessary inquiries and to digest a suitable scheme. Such a committee could not have committed the parties to any course of action. Its object would have been to place the proposal on a practical basis, so as to

enable the societies to come to a right decision. As it is, the Conference decided to invite the societies—first, to confirm by their separate vote the joint resolve of their delegates, and then to give proof of their interest in the attainment of the object by nominating one or more members to act on a committee to be appointed for the purpose. The evil of such a course is, that much valuable time is lost in correspondence and negotiation before any practical step is taken in the matter. After all, however, the delay may be useful in ripening opinion on the subject. What is wanted in the steps eventually to be taken is energy of purpose and promptitude of action, for we are sure that the object in view will be eminently conducive to the welfare and progress of Science in the United Kingdom.

FOSSIL OYSTERS

Monographie du Genre Ostrea—Terrain Cretacé. Par Henri Coquand, Docteur és-Sciences, Professeur de Geologie et Mineralogie. (Paris: Baillière, 1869.)

OF the many able geologists whom France has produced, few have had better opportunities of observation, or have availed themselves of them to better purpose, than the author of this monograph. Distinguished alike by his skill and long experience as a palæontologist, and by his extensive knowledge of practical geology, M. Coquand has laboured long and well, and far and wide—not only in Provence, and Italy, and Germany, but in far distant regions in Spain and Africa, in valleys and mountains never before resounding to the blows of the geologist's hammer.

Those who are only acquainted with the chalk as it is seen exposed in quarries and cuttings on the green downs and wolds of England, can form but a very imperfect notion of its true character. As M. Coquand has shown in a paper lately read before the Geological Society of London,* the chalk of England, extensive as we are accustomed to regard it, is but a fragment when compared with that which is seen in the South of France. The utmost thickness of the English Cretaceous beds is found to be about 900 feet, while in Provence the same, or rather the equivalent beds are more than 4,000 feet thick. In England we are accustomed to arrange the chalk into three or four divisions, while in France their more extended development requires an entirely different arrangement, and thus we find no less than eleven different beds, the character and limits of which are now ascertained with great accuracy.

The French strata being thus so much more largely developed than the English, the character of the fauna is, as might be expected, infinitely more varied. The difference of nearly three thousand feet is principally represented in France by several marine and freshwater beds altogether unknown in England. In some places, as at La Cadière and Martigues, we find extensive beds of Hippurites and Radiolites—fossils almost unknown in England, lying ranged in close order as when they lived; and again, while we have been accustomed to regard the chalk as altogether of marine origin, we find in Provence a district of about 250 square miles, in which the upper chalk strata of England and the Charentes of France are represented by freshwater deposits 1,400 feet thick. These contain several hundred species of land and freshwater shells unknown elsewhere, associated with beds of lignite as compact as our own Newcastle coal, and like it worked extensively for fuel. Both from the palæontological and the geological evidence it would seem as if, at some time, while our Cretaceous deposits were interrupted and stationary, others of great magnitude, with a succession of faunæ essentially differing, as well from our own as from each other, were accumulating in the South of France, alternately depressed and elevated—sometimes a deep sea, sometimes a great lake, and not improbably at one time dry land.

* Quarterly Journal G. S., Aug. 1869, vol. 25, part 3.

After a careful study of the Cretaceous systems of many countries, M. Coquand, undeterred by the dread of taking charge of a family at once so numerous and so troublesome, has now been induced to prepare this monograph of all the Cretaceous oysters wherever found, to be followed by like monographs of the Tertiary, Jurassic, Triassic, and Permian formations. It is, we believe, the first, or at least the most important attempt to give a synopsis of any one genus occupying so extensive a range.

The results of M. Coquand's researches are sufficiently striking; he describes no less than 255 distinct species of chalk oysters (including Gryphæa and Exogyra), and of these he has given excellent figures in an atlas of 75 plates, in folio. As regards England, he has disclosed the poverty of the land as compared with our neighbours. Our chalk oyster beds have been examined as assiduously as the French, but they have been found much less prolific, While France possesses 115 well-marked species, England. according to Mr. Morris's catalogue, can show but 25, all of which, except one (*O. triangularis* of Woodward), seem to be found also in France.

Nor is the range of some species less remarkable than their abundance. Two of them (*vesiculosa*, and *ungulata* or *larva*) appear to be altogether cosmopolitan; the former being found alike in England, France, Algeria, Belgium, Spain, Poland, Russia, Sweden, North America, and Mexico; and the latter having been also traced through all these countries (except Poland and Mexico), and extending its range also to India.

But while some species are thus prone to wander, others are to be noted for their domestic habits. Out of 49 American species, five only have been met with in Europe; and of 27 in Russia, and 23 in Spain, no less than 10 in each of these countries are not found elsewhere.

It seems evident from our author's observations, that so far as these fossils are concerned the several zones of chalk which he has described are divided by "a hard and fast line," marking the limits of each as clearly as the Tertiaries are separable from the Secondary rocks. Of the several *Dordonien* species, not one is found in the *Campanien* beds, and of ninety-five found in the *Campanien* none are found in the lower beds, and the same observation applies to each of the seven or eight inferior deposits. Although it transcends all our powers of calculation to form even a conjecture, much less an approximate estimate of the ages of ages that should be allowed for the *creation* (or, if that word be not allowable, for the introduction or evolution) of these various forms, and the extinction of their predecessors, we may yet gather from these materials a somewhat better, although still utterly inadequate notion of the extreme deliberation, so to speak, exhibited in building up this portion of the earth's fabric.

M. Coquand's memoir can hardly fail to be welcomed as a valuable addition to our palæontological and geological literature, both for what it is, and for what it suggests. Monographs of the fossils of any one country can only be regarded as so many *Mémoires pour servir*—words and lines, rather than pages—of the geological record. Incomplete as that vast history must ever remain, it would be found far more available than it is if we could have a synopsis like the present of every important genus. Owing to their wide range, and the usually good state of preservation in which they are found, the study of these fossils cannot fail to be of value with reference to some questions of much present interest. As compared with the fauna of the Cretaceous seas, the fossil mammals of the Quaternary period, to which reference is so often made in these discussions, afford but very imperfect materials for testing the various theories which are from time to time put forward as to the succession of species. These Quaternary beds usually exhibit but broken fragments—*disjecta membra*, which, while lying on the surface, or tossed about in company with river or deluge gravels, have been subjected to so many chances and changes that the order of succession is often difficult, if not impossible, to ascertain; while, on the other hand, the fossils of the chalk, slowly accumulating during countless ages in the quiet depths of their seas, exhibit the exact order in which their multitudinous genera and species successively made their appearance and, having endured for their appointed seasons, finally disappeared.

If we could have monographs of other important families arranged upon a plan as comprehensive as M. Coquand's, how much less unsatisfactory might our speculations be upon the perplexed and perplexing questions of the origin, distribution, and extinction of species. When we consider the subjects of this memoir, their great variety and wide dispersion, although we might perhaps think it possible that, as we have heard, an oyster should be "crossed in love," we find it difficult to imagine the creature as existing under such conditions that one species, while engaged in "the struggle for existence," should starve out and extinguish another; or that any process of "natural selection" should avail to alter the formation of the hinge as well as the internal and external structure of the shell. Indeed, if any such change did occur, it must have been *per saltum*, since with these mollusks, numerous as they are, there are no forms that can fairly be recognised as transitional; for just as each zone or region of the chalk is marked by the presence of its peculiar fauna, so each species of this numerous family has a character of its own; it is *sui generis*, apparently without ancestors and without descendants. If, indeed, all the members of this great family, by virtue of some law or process of evolution, did descend from one common ancestor, we should expect to find their forms varied and numerous, instead of being, as to our sorrow we find them, more simple and far less numerous; so that instead of being permitted to choose from the two hundred and fifty-five kinds described by M. Coquand, we are reduced to the pitiful allowance of one poor "*native*," and from what we see and hear of *him* it seems not unlikely that he is to be the last of his race, and that ere long, Oysters, like Mastodons, will be things of the past.

J. W. FLOWER

OUR BOOK SHELF

Mrs. Loudon's First Book of Botany, for Schools and Young Persons. New edition, revised and enlarged. By David Wooster. (London: Bell and Daldy, 1870.)

WE wish we could speak more favourably of this prettily got-up little book. Mrs. Loudon's writings did good service in cultivating a love of plants among the last generation; but when a new edition of an old manual is brought out, with the date of the current year on the title-page, and an editor's name as having "revised" it, we expect that it will be corrected by the light of the present state of scientific knowledge. In the present instance this has not been adequately done; of the inadequacy we may give but two instances. At p. 18 prickles are described as metamorphosed leaves, instead of, as they really are, indurated hairs, or processes of the epidermis. But a more serious erroneous description occurs in the case of the spores of ferns, which are said to differ from seeds "in not requiring to be fertilised by pollen" (do seeds require to be fertilised by pollen?) The reader is left to suppose that the young fern-plant springs direct from the spore, no reference whatever being made to the recent discoveries of the functions of the *pro-thallium*, *archegonia*, and *antheridia*. The arrangement is good, as also are some of the illustrations; but the book cannot be used as a manual by teachers or lecturers, without the errors being corrected from some other handbook.

A. W. B.

The Birds of Asia. By John Gould, F.R.S.

THE twenty-second part of this magnificent work has just been issued to the subscribers. It contains fifteen plates coloured by hand, including the great alced, four owls, two pheasants, three buntings, three piculets, Franklin's barbet, and the long-billed wren, accompanied by letter-press descriptions. Among so much that is beautiful and interesting, it is very difficult to particularise; but we cannot help referring to the charming little owlet dedicated to the late Sir Benjamin Brodie, the eminent surgeon, and named *Athene Brodiei*. Among the peculiarities of the bay owl found in Nepaul and the northern confines of India, Mr. Gould notices its friendship for wild animals, living on good terms with the tiger, and sometimes alighting on its back. We learn that one of the pheasants, the Chinese *Crossoptilon*, or Dallas's eared pheasant, is now domesticated in our Zoological Gardens; also that some eggs have been hatched there, and that female birds may be purchased for 15*l*. The long-billed wren (*Rimator malacoptilus*, Blyth), a small reddish-brown bird, with a droll apology for a tail, is said to be excessively rare, and one of the most curious and highly-interesting species in the Indian avi-fauna.

Zoologie et Palæontologie générales. Par Paul Gervais, Prof. d'Anatomie Comparée au Museum d'Histoire naturelle de Paris. Première Série. 4to. Planches 50. (Paris: Bertrand, 1867—69.)

THIS handsome volume, with its carefully executed plates, is, as the author states, an endeavour to make the treasures accumulated in the Museum of Natural History available for the advance of science. The present part is occupied with the consideration of various living and fossil vertebrated animals, and is introduced by a long account of the arguments, most of them familiar to our readers, respecting the duration of man's habitation of the earth, together with minute descriptions of bones of the animals found in various caverns in France. The second chapter treats of the Fossils of Armissan (Aude); the third of animals living at the present time in the French possessions in the North of Africa; the fourth of some fossil reptiles of the secondary period, especially including the archæopteryx; the fifth and last considers the different species of fossil reptiles.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his Correspondents. No notice is taken of anonymous communications.*]

The late Captain Brome

A SHORT time since I announced in your columns the decease of Captain Fred. Brome, late of Gibraltar, and well known to many of your geological readers for his great and successful labours in the exploration of the caves and fissures of the Rock. I then stated that Captain Brome had left a widow and eight children, wholly unprovided for; and this is literally the case. My object in this communication is to state that his numerous and warm friends in Gibraltar, and at Weedon where he died, have already commenced the collection of a fund for the relief and maintenance of his helpless widow and family, and to request that you will allow me space to say, that I shall be happy to receive and forward any contributions in aid of this fund.

Captain Brome was for twenty-two years Governor of the Military Prison at Gibraltar, from which post he was displaced towards the end of 1868. His removal to England last year with his large family necessarily involved him in considerable expense, incurred in the hope that his new appointment at Weedon might afford him a home and some prospect of providing for his children's education. These hopes, however, were destroyed in less than twelve months by the announcement that the prison at Weedon was to be disestablished. The anxiety lest he should thus be left without prospect of employment, and, as he feared, without any provision for the wants of his family, caused him such distress that, although a strong and energetic man and in the prime of life, he gradually sank, and died from mental depression on the 4th of March.

It is impossible to conceive a case more deserving of sympathy and support than that of his unhappy widow and children, or one more deserving of recognition by all lovers of science than that of Captain Brome, who had gratuitously devoted several years of his life, and the most unwearied personal labour, simply because he believed, and truly believed that he was promoting a scientific object.

Subscriptions will be received by me, and, I am kindly permitted to say, by Mr. W. S. Dallas, at the apartments of the Geological Society, Somerset House.

32, Harley Street, May 6. GEO. BUSK

Relations of the State to Scientific Research.—II.

SCIENTIFIC men are of three kinds: the young, the middle aged, and the old. It is difficult to say which needs help the most; but there is one work in which they can all severally take part, and from which they can each obtain that comfortable leisure which is the one thing needful for original research. That work is simply the work of teaching. And here let me not be misunderstood. By teaching science, I do not mean the miserable practices now carried on, but teaching on a scale commensurate with the great needs of a great nation, and in a way calculated to bring about the blessings that follow inevitably on true, thorough scientific knowledge.

To illustrate my meaning, let me take a particular science, chemistry, as an example. Of the whole population of England there will certainly be a certain number of men whose minds are so set on chemistry that they would be willing to accept, while in the prime of life, with gladness the offer of posts which, while taking up about half their time in teaching chemistry, would enable them to devote the entire other half to original work, and yet bring up their families in decency and order. What the exact number of such men would be, I do not care to know; it probably would never be very great; it certainly would never exceed the demand for men to fill chairs of chemistry at properly organised laboratories established at various points all over the kingdom.

Now a livelihood may be gained, and even a fortune made, by teaching, but this can never be done by working half time. But such a man as we are picturing must work half time only; and therefore the receipts from his actual teaching must be subsidised from elsewhere—the chair must be endowed by the Government, either local or imperial.

The occupant of such a chair would not be an idler. No idler would seek a post which would always entail a large amount of labour, and never would bring wealth. At the very worst, even if he did no original work, he would earn his salary by teaching. If he taught badly, that is a thing which can readily be recognised by competent persons, and he could be dismissed. The very desire of a man to take such a position would be of itself almost a guarantee that he would perform its duties properly, and bring forth the fruit expected of him. And calling to mind the well-known law of human nature that the more work a man has to do, the more he over-abounds in work, we may feel sure that the half life which teaching leaves to such a man will be filled with a whole life's exertion.

The work of such a man would lie almost exclusively in the way of systematic lectures and general superintendence of the laboratory. I need hardly say that that ought to be a small part only of the total teaching done in the place. There must be attached to the professor two, three, or more recognised assistants, who would be always in the laboratory, who would personally direct and nurse the students, who would carry on original work, partly on their own account and partly on behalf of their master, and who would receive a moderate fixed salary, sufficient to enable them to live without having to look to any other extraneous sources of income. Such men would of course be embryonic professors; and I know of no more pressing need than this, of finding livelihoods for young promising men in the interval between the studentship and the professorship. I weep when I think of how many admirable young men become outcasts to science for lack of these. It has been so with myself: full of zeal for science in my youth, and, what is more important, rich in the germs of large ideas, which I have since seen flourishing in other men's minds and bringing forth fruit of fame, I could find no resting place. I threw myself into practical money-getting life, with the hope that after a while my gains would provide me a comfortable afternoon of old age, in which I might return to my former love. I now have both time and money; but, alas! my mind has grown stiff in the ways of the world: the old ideas of my youth are now vain shadows which I cannot grasp. I find myself a wretched puddler, full of egotistic hobbies, productive of little oddities and trifling curiosities, but bringing forth nothing of real value or permanent worth. The young men make fun of me, and the chief men treat me with a courtesy which is at once patronizing and forced.

What is true of chemistry is, with minor differences, true of the other sciences. Under such a scheme as I have pictured, both young and middle-aged would be provided for. With a sufficient number of laboratories, some large and some small, some with eminent, some with useful men at their head, some with many, some with few assistants, it would come to pass that on the one hand the younger men would work under the beneficial influence of their chiefs, while on the other the men full of thoughts would find heads and hands near them to carry out their ideas. Is it not a crying shame that at the present time such a man as Huxley is completely isolated from the younger biological workers, and instead of, like Cuvier, having a large laboratory manned by an enthusiastic body of scholars, ready to dissect everything after its kind, is penned up in an abominable den in Jermyn Street, and distracted by the demands of triflers; has, in fact, to work upon the world through the bars of a prison cage? Is it not also a shame that one of the acknowledged foremost teachers of mathematics in Europe, in the focus of our national life, should feel himself compelled to forsake the work of teaching for a subordinate unscientific appointment in a University, when his right place would have been as instructor of the rising mathematicians of England?

But besides teaching, there is the task of examining the taught. And here again is a source of easy livelihood. I do not mean such kind of examinations as are carried on at present; that wretched system of papers, worked through at the rate of so many dozen a day and paid for at so much a hundred—work done by steam and ending in smoke. I mean a thorough system of *practical* examinations, carried on slowly and quietly, by a staff of professors and their assistants, and paid for in respect of the immense contingencies that hang upon the result and of the vast responsibilities of the examiners. I have not space to dwell on this; but it is a point which wants working out thoroughly and well. The task of examining ought to be one of the richest sources of income to a large number of scientific men, instead as now the odd pence of a few.

I maintain, then, that teaching and examining combined would support all the young and middle-aged scientific men in this country that have sound reasons for devoting themselves to a scientific life, and support them honourably and productively.

Touching the old, little need be said. Every man who has filled one of the above posts worthily while he had force to work ought to be pensioned when he gets old. The matter lies in a nutshell and needs no more words. But there will always be a few old men who for their eminence and their services would require special provision, and that not so much on their own account as for the sake of the younger men of their time. There ought to be some *rewards* for a scientific life, but they should be few and very carefully allotted. At all times, moreover, there will be a few, a very few men whose genius ought to receive plenteous and present recognition. Such men with the older distinguished men might form a small consulting body whose services in the way of advice would be at the command of Government, and the members of which would draw salaries on a scale feebly imitative of those of other Government officials. I believe the legal advisers of Government are pretty well paid, and yet scientific advice is altogether unrewarded. Such men would be then at liberty to work out their ideas; the best means being, of course, taken to choose those men only into whose soul the iron of science has entered, men whom it is impossible to keep from work.

Two more remarks and I have done. It may be objected that this scheme would make scientific success in large measure dependent on the power of teaching, and that original work would thereby go to the wall. I reply that that is altogether a fallacy, and if I had time I could show it.

Lastly, the question of expense of apparatus and other means of inquiry is altogether a secondary one. Government ought of course largely to provide these; but there would be no difficulty in distributing them on a plan similar to that of the grant to the Royal Society. It is the question of "scientific careers" that is the pressing one, and the one most difficult to settle.

IN SICCO

Tails of Comets

In NATURE of 16th December, Prof. Tait advances the opinion that the tail of a comet consists of nothing but meteorites; mentioning in proof of this that the orbits of the August and November meteors have been determined, and found to be identical with those of two known comets. I do not question the importance of this most remarkable fact, but I think the older opinion, that the tail of a comet is gaseous, is demonstrably true. Sir John Herschel, in his "Elements of Astronomy," remarks with wonder how the tail, in the comet's perihelion passage, is *whisked round* in apparent defiance of the law of inertia, so as always to keep pointing away from the sun. Were the comet an assemblage of meteorites this would be impossible; the tail would, in that case, always lie parallel to the direction of the comet's orbit. The fact just mentioned as to the perihelion motion of the tail is, to my mind, a conclusive proof that the tail is not formed once for all, but is a cloud which is constantly in process of formation, and as constantly evaporated. This view is supported by the fact that Halley's Comet was seen to increase in apparent magnitude as it receded from the sun, in consequence, as was suggested, of the conversion of invisible vapour into visible cloud as the heat grew less intense.

Dr. Tyndall's suggestion, that the tail may be a cloud produced by actinic precipitation from an invisible atmosphere is, to my mind, the only plausible suggestion yet made on the subject.

JOSEPH JOHN MURPHY

Old Forge, Dummurry, Co. Antrim, May 4

Left-Handedness

IN reference to the letters which lately appeared in your periodical on "Right and Left-handedness," I beg to draw your attention to some remarks of Professor Hyrtl, the celebrated anatomist of Vienna, which were published several years ago, and the substance of which I now quote from the 4th edition of his "Handbuch der topographischen Anatomie," 2 vol. 1860.

"It happens in the proportion of about two in a hundred cases that the left subclavian artery has its origin *before* the right, and in these cases left-handedness exists, as it also often actually does in the case of complete transposition of the internal organs (Professor Hyrtl describes two cases), and it is found that the proportion of left-handed to right-handed persons is also about 2 to 100. Professor Hyrtl thinks that ordinarily the blood is sent into the right subclavian under a greater pressure than into the left, on account of the relative position of these vessels, that in consequence of the greater supply of blood the muscles are better nourished and stronger, and that therefore the right extremity is more used. In cases of anomalous origin of the left subclavian, &c., the reverse occurs, and therefore the left hand is employed in preference.

Kensington, May 3 ADOLF BERNHARD MEYER

Strange Noises heard at Sea off Grey Town

IN submitting the following to the notice of your readers, I am guided only by the desire of seeking a solution of what to me and to many others appears a very curious phenomenon. The facts related can be vouched for by numbers of the officers and crews of any of the R. M. Company's ships.

I must premise that this phenomenon only takes place with iron vessels, and then only when at anchor off the port of Grey Town. At least, I have never heard of its occurring elsewhere, and I have made many inquiries.

Grey Town is a small place, containing but few inhabitants, situated at the mouth of the river St. Juan, which separates Nicaragua from Costa Rica, and empties itself into the Atlantic, lat. 10° 54′ N., and long. 83° 41′ W. In this town there are no belfries or factories of any kind.

Owing to a shallow bar, vessels cannot enter the harbour or river, and are therefore obliged to anchor in from seven to eight fathoms of water, about two miles from the beach, the bottom consisting of a heavy dark sand and mud containing much vegetable matter brought down by the river. Now, while at anchor in this situation, we hear, commencing with a marvellous punctuality at about midnight, a peculiar metallic vibratory sound, of sufficient loudness to awaken a great majority of the ship's crew, however tired they may be after a hard day's work. This sound continues for about two hours with but one or two very short intervals. It was first noticed some few years ago in the iron-built vessels *Wye*, *Tyne*, *Eider*, and *Danube*. It has never been heard on board the coppered-wooden vessels *Trent*, *Thames*, *Tamar*, or *Solent*. These were steamers formerly employed on the branch of the Company's Intercolonial service, and when any of their officers or crew told of the wonderful music heard on board at Grey Town, it was generally treated as "a yarn" or hoax. Well, for the last two years the company's large Transatlantic ships have called at Grey Town, and remained there on such occasions for from five to six days. We have thus all had ample opportunity of hearing for ourselves. When first heard by the negro sailors they were more frightened than astonished, and they at once gave way to superstitious fears of ghosts and Obeihism. By English sailors it was considered to be caused by the trumpet fish, or what they called such (certainly not the *Centriscus scolopax*, which does not even exist here). They invented a fish to account for it. But if caused by any kind of fish, why only at one place, and why only at certain hours of the night? Everything on board is as still from two to four, as from twelve to two o'clock, yet the sound is heard between twelve and two, but not between two and four. The ship is undoubtedly one of the principal instruments in its production. She is in fact for the time being converted into a great musical sounding board.

It is by no means easy to describe this sound, and each listener gives a somewhat different account of it.

It is musical, metallic, with a certain cadence, and a one-two-three time tendency of beat. It is heard most distinctly over open hatchways, over the engine-room, through the coal-shoots, and close round the outside of the ship. It cannot be fixed at any one place, always appearing to recede from the observer. On applying the ear to the side of an open bunker, one fancies that it is proceeding from the very bottom of the hold.

Very different were the comparisons made by the different listeners. The blowing of a conch shell by fishermen at a distance, a shell held to the ear, an æolian harp, the whirr or buzzing sound of wheel machinery in rapid motion, the vibration of a large bell when the first and louder part of the sound has ceased, the echo of chimes in the belfry, the ricocheting of a stone on ice, the wind blowing over telegraph wires, have all been assigned as bearing a more or less close resemblance; it is louder on the second than the first, and reaches its acme on the third night; calm weather and smooth water favour its development. The rippling of the water alongside and the breaking of the surf on the shore are heard quite distinct from it.

What is, then, this nocturnal music? Is it the result of a molecular change or vibration in the iron acted on by some galvanic agent peculiar to Grey Town? for bear in mind that it is heard nowhere else, not at Colon, some 250 miles distant on the same coast, not at Porto Bello, Carthagena, or St. Marta. The inhabitants on shore know nothing of it. If any of your numerous readers can assign a likely cause, will they be pleased to state by what means, if any, its accuracy may be tested? If required, I can forward a specimen of the mud and sand taken from the anchor.

CHARLES DENNEHY, M.R.C.S.I., R.M.S. *Shannon*

[Our correspondent should dredge.—ED.]

The Newly-Discovered Sources of the Nile

RELUCTANT as I am to meddle with geographical discoveries made by the 'high *priori* road,' I cannot refrain from protesting against erroneous statements, which, if left uncontradicted, may acquire currency. The zealous geographer of former times sought for truth and accuracy. Treasuring truth, his knowledge increased with his information. But fashions are now changed. It has been found that one who starts in ignorance may every day alight on some novelty and wonder; and that since anything may be proved by data made for the purpose, the best mode of treating preceding information is to corrupt, change, and distort it as the case may require, so that instead of fettering invention, it may serve as proof of endless new discoveries. Captains Burton and Speke examined the northern end of what they called Lake Tanganyika. They saw it narrowing to a point and enclosed by hills, called by the latter officer the Mountains of the Moon. Six rivers, they learned, flowed into it from those hills. They did not examine nor approach the southern end of the lake; they differed in their accounts of it; and Captain Burton, in writing that it was often circumnavigated by the Arabs, made a statement repugnant to common sense. The pedlar Arabs cross the lake in ill-built boats, with savage crews, navigating only in daylight. They navigate it no more than is absolutely necessary for their trade with the interior, and not for pleasure or scientific purposes. Captain Speke measured the altitude of the lake, and on his second journey, going to a great extent over the same ground, he saw no reason to be dissatisfied with his previous hypsometrical observations. The result of his observation at Gondokoro was thought to prove the accuracy of his instruments. Yet the account given of the northern end of the lake is now rejected, while that of the southern end is obstinately adhered to; and as to the elevation of the lake, the *à priori* geographers find it convenient to add 1,000 feet to that assigned by Captain Speke.

Among the geographers of the new school, no one holds a higher rank than Dr. Beke. In devoting his labours to the mystery of the Nile, he very properly began at the base. He first adjusted the Mountains of the Moon and their everlasting snows. A warm admirer of Ptolemy, he nevertheless found it expedient to correct a mistake of the old Grecian, who thought that those mountains extended from W. to E. in lat. 12° 30′ S., whereas Dr. Beke discovered that they actually lie in a meridional line across the equator, and not far from the eastern coast. With the boldness of genius he set this chain of mountains, on the alleged authority of the East African missionaries, in a region where these missionaries emphatically declare that there is nothing of the kind. But having removed the Mountains of the Moon from the famed Land of the Moon, he now unaccountably removes the sources of the Nile as far as possible from the mountains supposed to give birth to them. He places them 1,000 miles S.W. of those mountains, on the eastern frontier of Benguela; and this he does, forsooth, because Dr. Livingstone announces the discovery of the real Lakes of the Nile (a batch of 20), just where Ptolemy set them, between lat. 10° and 12° S. Had Dr. Livingstone an opportunity of looking at Ptolemy's map he would have therein seen only two lakes, nine degrees asunder, and respectively in lats. 6° and 7°. But with time to study and understand his author, he would also have perceived that the positions thus indicated in false graduation are really close to the equator, respectively in 11′ N. and 39′ S. In Dr. Livingstone such a mistake is not surprising; in Dr. Beke it is inexcusable. But the latter, being inspired with a new hypothetical discovery, eagerly seizes on anything that will help him to develope it. The river Casabi he deems the chief, as being also the most remote source of the Nile. Its course eastward he concludes on the authority of Ladislaus Magyar, whose scientific attainments and reliability he, of course, rates highly. But the career of the Hungarian proves only his leaning to savage life. From the Brazilian navy Ladislaus passed into the service of the King of Calibar; and thence again he made his way to the interior of Benguela, where, marrying the daughter of a chief, he found himself in a short time the leader of a band of expert hunters. In 1850 he started, with his wife and 280 armed followers, on an excursion to the interior. The province of Kiboque, in which are the sources of the great river Casabi, was soon reached. Its forests, he says, extend far and wide, in lat. 6°S. But as the province in question reaches little north of the 12th parallel, it is evident that the Hungarian's science deserted him at first starting. He continued his march through Bunda, south of the river Lungobungo, in lat. 10° 6′ (13° would be nearer the truth), and at length after a 33 days' march, crossing the Liambegi, he arrived at Ya Quilem, in Kilunda. Now, the Portuguese traveller, Graça, travelling from Bihé in a parallel route, arrived in 33 days at Catende, 100 miles west of the Liambegi, so that we cannot doubt that Ya Quilem was not far east of that river, and not to the north, but probably much to the south of the 11th parallel. Yet Ladislaus places it in 4° 41′ S.! Such is the science on which Dr. Beke relies. When the latter says that in lat. 6° 30′ Ladislaus learned the eastward course of the Casabi, he totally misrepresents the facts. The Hungarian was much further south when he embraced the belief that the great river runs to Nyanza and Lake Mofo (near the Cazembe), that is, that it occupies the valley of the Luapula. Graça, who followed the river down a long way to the north, states his opinion (entirely mistaken by Mr. Keith Johnston), that the Casabi and Lulua are the head-waters of the Rios de Sena (the Zambeze). To these two foolish attempts at a great discovery must be added a third. Dr. Livingstone proclaimed that the Luapula flows into the Liambegi, and deforming their names, he reckoned among its tributaries rivers which run into the Lulua. If the concurrent and invariable testimony of three centuries can make anything certain, it is certain that the Casabi falls into the river of Congo, commonly called the Zaire. From the first visit of the Portuguese to Congo to the present day, the natives, when interrogated respecting the origin of their great river, have always answered that it comes from the Lake (Lobale) a-Kilunda (of Kilunda). This is properly the name of the country about the head-waters of the Liambegi, but the Portuguese, copied by Dr. Livingstone, apply it much more widely. The Casabi certainly does not rise in Kilunda, but it receives many streams from it, and unites with the Lulua, which is swelled by many more. The chief river of Kilunda is, we believe, the Lualaba, which turns westward to join the Lulua, while 8 or 10 days' journey further east the Luviri, a smaller, but still an important river, flows north-eastward to the Luapula. Between them, in about the meridian of 25° E., is a well-marked water-parting. The Lualaba is bordered by extensive salt marshes. One of its affluents—the Luigila—is said to flow over a bed of rock-salt. Hence, the Lulua or Lolo, which collects these waters, is, as its name implies, a salt river, and remarkable for its excellent fish. Lake Dilolo (the cerebral *d* here takes the place of *r*), has, for the same reason, an equal reputation. Fish, salt, and copper are the products which chiefly support the trade of the African interior, and the great emporium of this trade is Katanga, on the River Luviri. I now turn to Mr. Keith Johnston, who rejects, but not on the best grounds, Dr. Beke's hypothesis that the Casabi is the source of the Nile, and at the same time proposes another equally objectionable, namely, that the Chambezi, that is, the Luapula, flows round by the north and west into the river of Congo. Surely such extravagant conjectures would never be brought forward if, in the quarters that exercise an influence on geography, fair play were allowed to the information and common sense of all parties. An ignorant and overbearing patronage has the power of spreading darkness around. Mr. K. Johnston unfortunately fixed his attention on a sentence of Dr. Livingstone's letter, which is fitted only to mislead—a sentence, the dangerous indistinctness of which was pointed out by me in an early number of this paper (NATURE No. 3). Dr. L. plainly says that the Luapula flows down north past the town of the Cazembe, and 12 *miles below it*, enters lake Moero. The traveller here states not what he saw, for the Luapula is some miles west of the Cazembe's town, but what he misconceived. He may have meant that twelve miles from the town, towards the S.W., the river issues from the lake. It is easy to show that Lake Moero (a name made for convenience by strangers, but not used by the natives) lies to the S.W. of the Cazembe. Dr. L., when he first visited the Cazembe,

passed (northwards) up the east side of the lake. He tells the difficulties created by the flooded rivers at its north end; one of these was the Luo, mentioned, as I have elsewhere pointed out, by the Portuguese as five days' distant from the Cazembe. Again, further north Dr. L. had to wade through the Chungu near an old site of the chief's town and where Larcerda died. Now, Father Pinto, when he left the Cazembe on his way homewards, did not reach the Chungu where he disinterred Lacerda's bones (subsequently lost in the retreat), till the 3rd day. Thus it is quite evident that the north end of Lake Moero is south of the Cazembe's residence. With respect to the course of the Luapula northwards, Mr. K. Johnston may rest assured that Dr. L.'s statements have not the slightest foundation. The Luapula does not take the name of Lualaba, nor does it join the Luviri towards the north. That the Chambezi falls into the Luapula was ascertained by Dr. Lacerda 70 years ago, and all that Dr. Livingstone has ascertained is that his own views on the subject were erroneous. As to the further course of these rivers let us take the evidently unbiassed evidence of the Arabs who met Dr. Livingstone in the interior of Africa, and a brief account of whose travels appeared in the transactions of the Geographical Society of Bombay, 1862. From the western shore they travelled in 27 days to the broad river Maroongo. This is the Luapula, which, by strangers reaching it from the north, is named after the Arungo, who dwell on its western side. "Roonda (Lunda) is on the banks of the Rooapoora, which runs north to Tanganyika." Here the rude observers confound the river which does reach the Nyanza, with Lake Mofo. Neither need we believe that the place is called Lunda by the natives. But this among African traders is a wide-spread name. By the Portuguese and their native agents the dominions of the Muata-ya-Nvo and of the Cazembe are all called Lunda. "25 days west (SW) of the Cazembe are the copper mines and the town Katanga. The river Rafira (Luviri) flows past Katanga, and joins the Rooapoora to the N." There is much reason for believing that the Luviri flows south-eastwards from Kanyika, but perhaps the author's meaning is that the river wheels round to the north. Dr. Livingstone saw nothing of Lake Bangweolo. Lake Moero he saw only on the east and north, and not connectedly; most of his statements respecting its size, &c., must be due to hearsay. The mountains that he speaks of are the hills Chimpire, noted in two groups by the Portuguese. It is remarkable that when in his missionary travels he met with the name Mpire, a hill, he supposed it to be the Sichuana numeral mbili, *two* (hills), a flagrant mistake. The Portuguese reported that the elevated country on the way to the Cazembe lies in ridges, with pools of water in the successive hollows. They learned that there was a great marsh at the confluence of the Chambeze and Luapula. Further north they saw numerous swamps and lagoons, and heard of more. They were told that to the west lay the great lagoon which Caetano Pereira spent a whole day in wading through. This was Carucuize, the nucleus of the Moero. The pombeiros, or native commercial travellers from Angola to the Cazembe, marched down the eastern bank of the Luapula five days before they turned eastward to Lake Mofo. That river, therefore, does not ordinarily flow through a lake. Dr. Livingstone evidently found the country in a state of unusual flood, with the fens and lagoons united into great lakes. From the district of the Fumo Moiro, at the north-east margin of the flood, he has made the name of the lake. As he finds every pool to belong to the system of the Nile, it is natural that, in his exalted imagination, the hills should rise into mountains. The Alunda, or Balunda as he calls them, being originally from the banks of the Lualaba, nourish a superstitious regard for that river. While the traveller, therefore, thought of nothing but the Nile, his native hearers knew of no great rivers but the Lualaba and its immediate neighbours, the Luviri and Luburi (in the printed letter misread Soburi.) His inquiries pointed to the N. or N.E.; they answered respecting the S.W. They mistook the object of his ardent curiosity, and he was only too ready to misinterpret their communicativeness. Hence the confusion of rivers, right and left, the lakes Ulenge, Chowambe, &c., of which the less said at present the better. After such a conclusion it may perhaps be consolatory to remark that it would be labour thown away to lead all the great rivers of south tropical Africa to the river of Gondokoro. Dr. Peney, who studied the character of this stream, found that it varied often, but that it never rose in flood more than two feet above its mean level. This increase in a wide spreading river near the equator barely suffices to compensate the loss by evaporation. Consequently, the floods at Gondokoro have no perceptible effect on the river a few degrees lower down. The river of Gondokoro, therefore, contributing nothing whatever to the floods of Egypt, must be regarded as a very subordinate branch of the Nile.

Dr. Beke wonders (NATURE, No. 9) why I give the name Nyanza to Lake Tanganyika. He here touches upon an important subject, interesting in its bearing both on geography and on the intrigues of geographical coteries. The assertion that in the name Lake Tanganyika there lurks some fraudulence, will of course be received with incredulity, and therefore its justification will be impossible without some historical development. But if encouraged, I am prepared to show that, with respect to the lake, the geographical world labours under a delusion designedly produced.

W. D. C.

Apparent Size of the Moon

MY original intention was to put together several *veræ causæ*, which might be found, concurrently, to contribute to the universal impression that the moon's disc is larger or smaller, according as it is nearer to the horizon, or to the meridian. I shall content myself, however, with calling attention to what I am now persuaded is the nature of that impression. "Sweet are the uses of adversity." An attack of hemiopsia is always serious, and may be dangerous (see NATURE, Feb. 24th, 1870; p. 444). I think I owe to it the discovery (for such it was to me), that the variable standard of angular magnitude which infects our visual judgment, can be detected in a small room as certainly as in view of the celestial vault. The distressing affection which succeeds the hemiopsia, as soon as it forms a broken arch around the central hole of the retina, is an instructive spectre in regard to the question I am considering. Being referred to two equally distant sites on the wall of the room, one horizontal and the other considerably elevated, the spectre seems larger in the former than in the latter. I soon proved that this was no accident case. I extemporised a very rough experiment on this wise—I placed a disc $14\frac{1}{4}$ inches in diameter on the wall 7 feet from the ground, and selected a horizon so that the base of the disc and the horizon were equidistant from a fixed point of observation. I found the disc was about 30° above the horizon. I now took six persons successively, and made each person take an observation from that point, first looking at the disc, and then transferring it in mind to the horizon, where I carefully marked the estimated size. The maximum was $13\frac{5}{8}$, the minimum $10\frac{5}{8}$, and the mean $12\frac{1}{2}$ inches. This result is, of course, equivalent to saying that had an equal-sized disc been placed on the horizon, its diameter would, taking the average, have appeared to be $1\frac{3}{4}$ inch greater than when elevated 30° above it. I think it is worth while making this experiment with greater accuracy, and with a greater number of persons. I have no doubt Mr. Abbott's view of the case would be fully borne out. But I do not understand why the augmentation on the horizon is so much greater in the case of the moon and the sun; nor yet why the rising sun does not present so striking an augmentation as the rising moon. The augmentation of the latter may be partly an effect of external conditions; but the *fact* of augmentation, in what I have called visual judgment, is a question for the physiologist. I should much like to know what, for instance, such an authority as Helmholtz has to say on the matter.

The great fault of physicists, *mejudice*, is, and ever was, their inability to see more than one side or aspect of a subject. Metaphysicians, on the contrary, may see all round it, but do not see all sides clearly. Mr. R. A. Proctor (NATURE, March 3rd, 1870; p. 462) affords me an apt example of the former. "The mind," he says, "instinctively assigns to the celestial vault a somewhat flattened figure, the part overhead seeming nearest to us." That is, taking the angular measure of the moon's diameter as a constant quantity, since she seems larger on the horizon than on the meridian, we must (unconsciously) refer her in the former case to a maximum distance. So far so good. But the argument is a thesis admitting of an equally valid antithesis. The case with me is this, that the moon appears to me to be much nearer on the horizon than in any other position! Nor am I singular in this. A lady proposed to me as an explanation of the apparently augmented size of the horizontal moon, that "probably she is nearer to us there than anywhere else!" Here we have the antithesis. We may say, the mind instinctively assigns to the celestial vault a somewhat prolate figure, the part overhead being furthest from us. That is, assuming (erroneously of course) a greater size for the moon's disc on or near the hori-

zon (though she is not visually larger in one place than another), therefore we must infer that she is approaching us when she nears the horizon, thus showing us her size looming larger as she gets nearer. The arguments cut each other's throats, and can be of no use whatever.

Ilford, E., May 1 C. M. INGLEBY

Cross Fertilisation

THE following peculiarities in the flowers of *Helleborus niger* bear upon the same subject as Mr. Hartog's observations on hazel catkins (NATURE, No. 23), and may be worth noticing.

The tubular nectaries by which the petals are replaced are more or less completely hidden by the stamens. The sepals remain for some time half open, and I found that in every case, while the flowers were in this state, pollen readily adhered to the stigmas; and on account of the curved shape of the latter, reaching almost to the half-closed sepals, an insect visiting the nectaries must generally touch them. In such flowers, though the nectaries were full, the anthers had not burst, while in those more fully open, pollen did not so readily adhere to the stigmas, so that in most cases the flowers would be fertilised by pollen from older ones, and probably from distinct individuals. In old and widely-opened flowers, whose anthers had burst, an insect could hardly reach the nectar without being dusted with pollen, while it would probably not touch the stigmas. I may as well mention that I saw a bee visiting these flowers in February last, and in the same month I found a spider in a half-opened flower of *H. fœtidus*.

Mr. Darwin has noticed a case (*Spiranthes autumnalis*, "Fertilisation of Orchids," ch. iii.) in which older flowers are generally fertilised by pollen from younger ones.

CHRISTOPHER J. HAYDEN

Trinity College, Cambridge, April 25

Chamounix

MANY of the readers of NATURE are no doubt preparing for a visit to Mont Blanc; permit me to say to them that the season for making the ascent will, in all probability, be earlier this year than usual, on account of the remarkably fine and hot weather; it is two months within a day or so since any rain fell; but to-day we have had a refreshing shower of three hours' duration, which will prove of infinite service to the little farms in the valleys of Chamounix, St. Gervais, and Sallanches.

Early yesterday morning, accompanied by a guide and my daughter, a nimble girl of 15, I crossed the Glacier de Boissons, at an elevation of 3,000 feet; there was comparatively little snow, the blue ice being repeatedly visible. We made the best of our way up the moraine, and descended through the forest into the valley of Chamounix, where the heat of the sun was oppressive; beetles on the earth and butterflies in the air were numerous.

The cherry, plum, and pear trees, so plentiful near Sallanches, are all in full blossom and doing well—the bees know it.

The ice grotto at the foot of the Glacier de Bois is already diminishing, and a serious-looking crevasse appears at the portal; the *Arve*, which rises from this glacier, is already considerably swollen. Perhaps the most gratifying news to send is the intelligence that the new road from Sallanches to Chamounix is all but finished—a mighty work, worthy of the new ruler of Haute Savoy. S. P.

April 23

PHYSICAL SCIENCE AT CAMBRIDGE

A MEETING of members of the Senate took place here on Saturday last, which is likely to have a considerable influence on the fortunes of Physical Science in this University. About a year ago a Syndicate, or committee of members of the Senate, was appointed to consider in what manner the funds could best be raised requisite for maintaining a Professor of Physical Science, and for providing suitable buildings and apparatus, also for certain other University objects. As the revenues of the University are known to be not more than adequate to maintain the educational machinery already in operation, the appointment of the Syndicate was a tacit adoption of the principle that *College* endowments ought to be made available in order to extend the area covered by professional instruction the advantages of which are open to the members of every college. The Syndicate's report, issued at the end of last term, formed the subject of discussion at the meeting called on Saturday.

The Syndicate informs the Senate that after estimating the sum which would be required to carry out the objects which it was desired to attain, they "decided upon addressing a communication to the several colleges of the University to inquire whether they would be willing, under proper safeguards for the due appropriation of any moneys which might be entrusted to the University, to make contributions from their corporate funds for these objects." The answers to this communication received from the governing bodies of the Colleges are considered as private by the Syndicate, and are not printed in this report. In the opinion of the Syndicate, however, "they indicated such a want of concurrence in any proposal to raise contributions from the corporate funds of Colleges by any kind of direct taxation, that the Syndicate felt obliged to abandon the notion of obtaining the necessary funds from this source." Accordingly they propose another plan for providing the needful funds, or at any rate a portion of them, with which I need not trouble your readers, as it involves technical details, and moreover is in itself so unjust and objectionable that it has not the slightest chance of being adopted.

The one point of real importance on which the discussion on Saturday turned, was whether the Senate ought to acquiesce in the conclusion of the Syndicate, and abandon the notion of obtaining contributions from the corporate funds of the Colleges for University objects. I am glad to be able to inform you that the opinion of the meeting was very decidedly expressed in favour, not of abandoning, but of carrying out this notion. The Master of St. John's said it was a settled matter that the funds requisite for the efficient teaching of Physical Science must be provided by the Colleges, and that the only question was whether they could arrange among themselves some plan for contributing in proportion to their means. Failing this, he held it to be quite certain, that they would be compelled to part with some portion of their corporate revenues for these objects by parliamentary coercion. The Master of Trinity insisted, in the strongest terms, on the urgent necessity of immediate action, if the University was to retain its position in the van of educated opinion. The Vice-Master of Trinity College disputed the statement made by the Syndicate, that the replies of the Colleges were on the whole opposed to making contributions out of their corporate revenues. He said that his own College had at once announced its willingness to contribute, and expressed his belief that a majority of Colleges were in favour of a College contribution, though they were not, as yet, agreed as to the proper principle of assessment. On this point, as the Syndicate has thought fit to withhold from the Senate the answers returned by the governing bodies of the several Colleges to the communication addressed to them, we have no means of forming an independent judgment. Every speaker seemed thoroughly to recognise the urgent and paramount claims of Physical Science to be placed on an effective footing in the University, except indeed the registrars, who urged the superior claims of ecclesiastical history and pastoral theology, and Mr. Perowne, of Corpus, who deprecated exaggerated statements in favour of Physical Science as a disparagement of classics and mathematics, and spoke with effusion of the gratitude which would be earned by "some *rich* College," which should make a present to the University of the funds required, and so save the other Colleges (not so painfully *poor* after all) the pang of putting their hands into their own pockets—a sentiment which drew from Mr. Blore, of Trinity, an amusing sally as to the want of similar benefactors of the common race in the matter of the *Income-tax*.

It seems to be the general impression at Cambridge that the Council will have to appoint a fresh Syndicate to

make a second search for a common ground on which the Colleges may be brought to agreement. Meantime, the very general interest excited on the subject throughout the University is an encouraging sign that the just claims of Physical Science will before long be satisfied.

SEDLEY TAYLOR

THE TRANSIT OF VENUS AND THE ANTARCTIC REGIONS

DR. NEUMAYER has recently been in London, looking after apparatus, and making arrangements, for the proposed Austrian expedition preparatory to the one to the Southern Seas for the purpose of observing the Transit of Venus in 1874. The object is one in which every English man of science will feel a warm interest. The lethargy of our own Government has been described by German astronomers and naturalists by the expressive but not complimentary term "Philistinism."

At the sitting of the Vienna Academy of Sciences on March 10th, Dr. Neumayer submitted a proposal for the preparatory arrangements for the observance of the Transit. A map of the circumpolar regions shows that the best points in the Southern Hemisphere for these observations will be the region south of the Indian Ocean, near the circumpolar district. Dr. Oppolzer has established that the most favourable localities for observing the *immersion*, both as to parallax and altitude, can be connected by a curve passing by the great gulf of Australia to the Macdonald Islands, and from these to a point situated in 36° 52′ S. latitude, 43° 23′ E. longitude. The points best adapted for observation of the *emersion* will also be found in a curve passing from the centre of the Indian Ocean to a point situated in 180° E. long., and 79° S. lat.; and from there to another point, 64° 55′ S. lat., and 244° 39′ E. long. The point of intersection of these two curves (48° 5′ S. lat., 99° 3′ E. long.) will evidently be the one most favourable for the observation of the transit in its totality. In this case, the factor of the parallax and of the altitude will be 0°·67, and 48°·0 for the immersion; and 0°·47 and 62°·5 for the emersion. The nearest station to this point will be the Macdonald Islands, situated nearly in 53° S. lat., and 12° E. long. (from Greenwich). M. Neumayer, who visited these islands in 1857, was struck with their relatively high temperature; and has ascertained, by a close examination of the tables of temperature published by the authority of the Dutch Government, that the current of Agulha must terminate near them. The summer and winter isotherms confirm these facts, and there can be no doubt that it is under the meridian of the islands of Macdonald and Kerguelen that the most favourable region must be sought for a route towards the South Pole, in the same manner as Sir James Ross followed, with the same object, a new current which set out from the shores of New Zealand. The map of the southern circumpolar regions, published by Petermann, furnishes very precise information for the equatorial limit of the floating ice, the curve showing two points of depression towards the pole; one under the meridian of Kerguelen's Land, the other under that of New Zealand. It may, however, be said that because floating icebergs have once or twice been found in a locality, these are not sufficient definitely to fix the relations of the floating ice, which depends especially on currents, and which secondary causes, such as winds, can draw into regions ordinarily free of ice. It is the frequency of the ice that must settle the limits in such cases. At the points which have been named the limit of floating ice bends back upon itself as high as 60° S. lat.; and this is an important fact for the determination of the warm currents setting from the north. The position of the limit of maximum density of sea-water, and the presence of spermaceti whales (*Physeter macrocephalus*) which, as is well known, seek in preference warm waters, on the coasts of Termination Land, permit the supposition that the current in question continues towards the South Pole as far as that land and Kemp Island. Admiral Sir John Ross also saw spermaceti whales at the approach towards South Victoria; while Wilkes, Dumont d'Urville, and Ross, only met with few and isolated individuals in the intermediate seas. M. Neumayer thinks that it will be advisable to despatch a small reconnoitring expedition without delay to these regions, and to establish a scientific station on the Macdonald Islands, the first object of which should be to determine the absolute longitude, to serve as a basis for Delisle's method. It would be occupied during the months of November, December, January, and February, with a series of meteorological observations, and with everything relating to physical geography. He proposes that, for this purpose, the Academy should make application to the Government for the fitting out of the expedition, the expense of which would amount to 35,000 florins (87,500 francs.) This has been granted, and the expedition will sail equipped for physical and natural history observations.

THE NATURAL HISTORY OF THE ABYSSINIAN EXPEDITION*

THE Abyssinian campaign will always be an interesting little episode in history. Unlike so many of our military expeditions in bygone times, it was vigorously conceived, energetically carried out, and successfully concluded, and will, we can entertain no doubt, effectively protect us against a repetition of the outrage which led to its organisation. But even if no other advantage resulted from it, the acquirement of so much additional information, both in regard to the zoology and geology of Abyssinia, as is contained in the work before us, would in great measure reconcile all enthusiastic naturalists to the additional trifle of income-tax they have had to pay as their contribution to the expenses of the war; and to all such, we would recommend Mr. Blanford's book, as enabling them at a small outlay to recompense themselves for the annoyance they have experienced.

The author left Bombay for Abyssinia in December 1867, and did not return till the following September, after an absence of nine months and a half, eight of which were spent in Africa. Upon the whole, he appears to have enjoyed unusual advantages in the collection of objects of natural history. He has collected no less than 1,700 specimens of Vertebrata, representing 350 species, besides about 3,500 of Mollusca and Articulata, representing about 500 species. The work is divided into three parts: the first being a personal narrative, the second devoted to the Geology, and the third to the Zoology of the regions traversed.

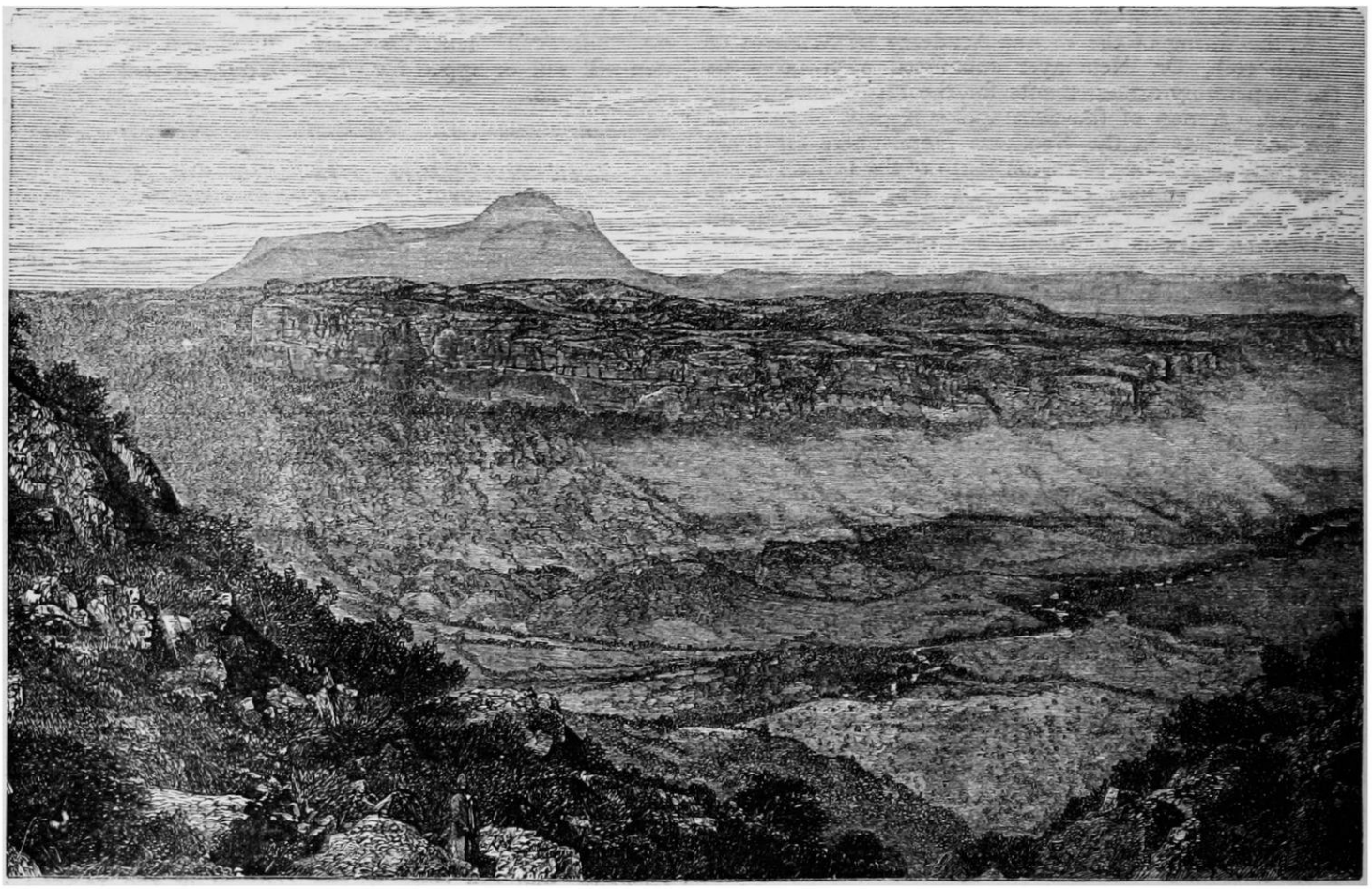
On arriving at Malkatto, in Annesley Bay, he at once set to work to collect specimens. In the vicinity he found larks, chats, shrikes, wagtails, white-breasted crows, kites, and vultures, constituting the commonest land birds, whilst on the shore there were abundance of gulls, pelicans, terns, ring-plovers, curlews, egrets, stints, and sand-pipers, with a little green bee-eater, which frequented the mangroves. Further inland, amongst the thorny acacia trees, he obtained a lovely little Nectarinia, the long-tailed robin, a weaver bird (*Hyphantornis galbula*), and two species of Avadavats (*Pytelia citerior* and *Estrelda rhodopyga*). Amongst the Mammais were hyænas, jackals, gazelles, hares, and Jerboa mice, which, finding unwonted supplies of food in the commissariat stores, increased and multiplied until the ground around the huts and tents was riddled with their holes. The only common reptiles were

* "Observations on the Geology and Zoology of Abyssinia made during the progress of the British Expedition to that country in 1867-68." By W. T Blanford, F.G.S., late geologist to the Abyssinian Expedition, with Illustrations and geological map. (London, Macmillan and Co., 1870.)

a small lizard (a kind of *Acanthodactylus*), and a very venomous little viperine snake (*Echis arenicola*). After the lapse of a few days, he started for the interior, and soon reached Hadoda. On waking the next morning, he saw a large troop of dogfaced baboons (*Cynocephalus hamadryas*), hunting for corn that had been dropped where the horses had been picketed. In the early part of January he was sent forward to examine the water supply, which proved to be abundant. and was obtained in places where there was no running water, by means of Norton's American pumps, and subsequently by an improved kind of chain pump (Brasyer's).

The pass which was selected for the road to the Abyssinian highlands commences at Komayli, situated on the verge of the coast plain, and extends to Senafé, a distance of about fifty miles. At Undul Wells, which is 3,400 feet above the sea, the subtropical fauna was entered, containing some of the animals peculiar to the Abyssinian highlands. Amongst these may be mentioned the *Corvus affinis*, a king crow, a noisy yellow-billed hornbill, a crateropus, a large partridge, and a very handsome bee-eater. A small plain covered with bush jungle, and partly with an aloe-like plant, was haunted with wart-hogs, hyænas, and Beni Israel. At a height of 5,000 feet, the splendid Abyssinian Plantain-eater (*Turacus leucotis*) appeared with a handsome francolin. Senafé itself, at the head of the pass, is 9,050 feet above the sea-level. Here he found the Hyrax, Ichneumon, Klipspringer, and Koodoo.

The drawing shows the Hamas Valley west of Senafé. The lofty hill in the distance is Hasheyat, or, as it is spelt in the excellent geological map which accompanies the work, Kishyat-hill, composed of columnar trachyte, and therefore of volcanic origin. The terrace on the opposite side of the valley is sandstone, while the bottom of the valley lies on metamorphic rocks. The picturesque character of the scenery of this region is here well shown. Leaving Senafé, the road traverses a plain of slaty metamorphic rocks, and presents few points of interest till the valley of Guna Guna is reached, where the scenery becomes very grand, and increases in beauty near Fokada, close to which there is a fine hill of columnar trachyte; and where the road winds round the western side of this, the view over the valley to the westward, exhibited in our second illustration, is one of unusual interest and beauty. The valleys, as usual, are deeply cut into the metamorphics; the flat hill-tops are of sandstone. To the southward, above the sandstone-bed, rise the terraced trap hills of the Harat range, and in the far distance are the strangely-shaped hummocks of the Adowa mountains.



VIEW OF THE HAMAS VALLEY, WEST OF SENAFE

Starting rom Fokada, our traveller, following the track of the army, passed through Adigrat; "a considerable town, with a fine church containing some remarkable mural paintings, in which Scriptural scenes are portrayed as they might have appeared, perhaps, had the scene been Abyssinia and the actors Abyssinians; just as the Italian painters of the Middle Ages introduced the costumes of Italy and the great buildings of Florence and Sienna in the representation of events which occurred in Palestine."

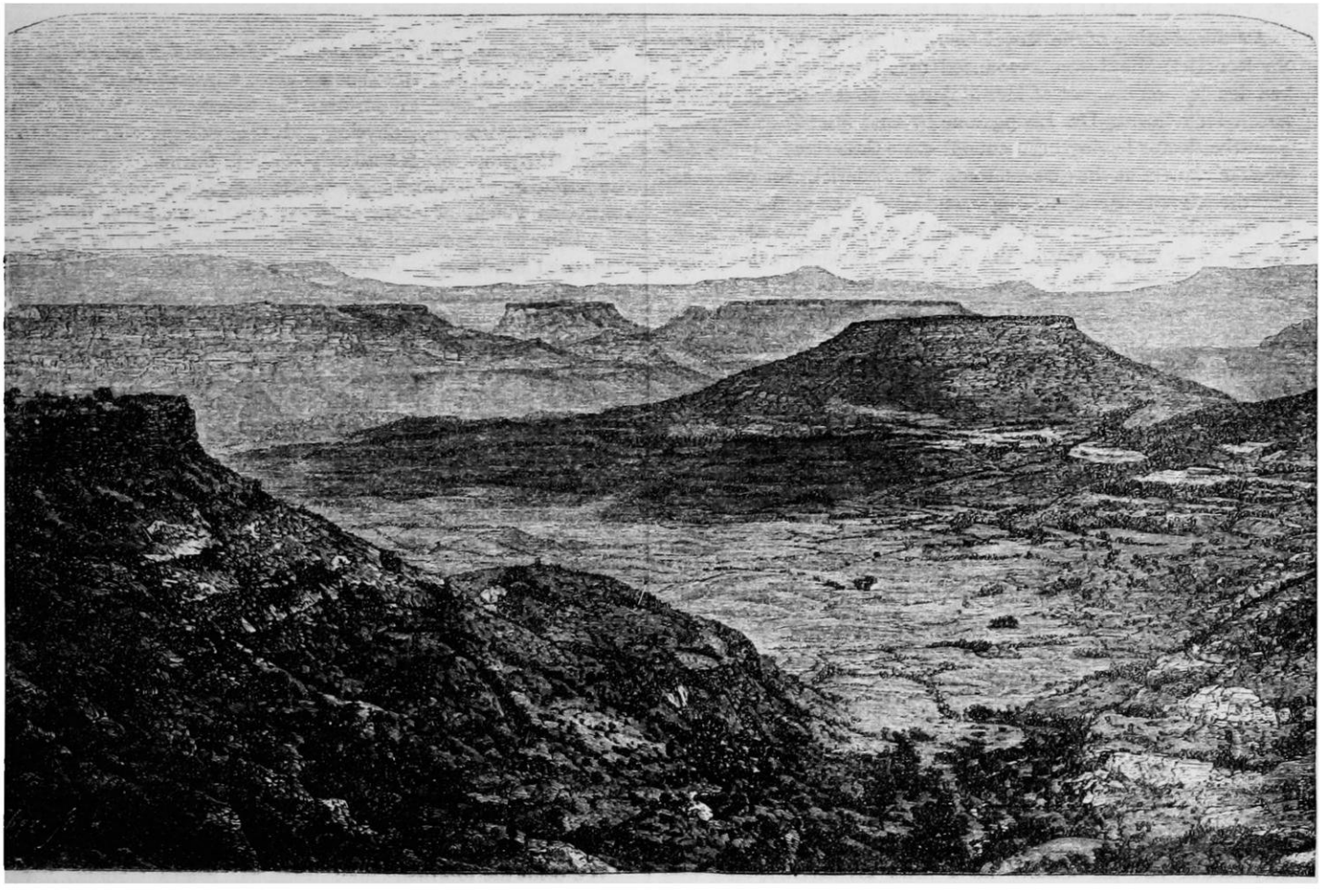
We need not follow Mr. Blanford's progress step by step, as the several camping-grounds are already known to the public through Markham's Abyssinian Expedition, and the correspondent of the *Illustrated London News*.

He describes the scenery as being almost everywhere strikingly beautiful; now bold and romantic—now resembling the undulating character of western England.

Near Bethor (not far from Magdala) they came suddenly on the brink of the mighty chasm in which the Jitta river runs, describing which he says,—

"Of all the grand scenery met with in Abyssinia, none equalled this wonderful gorge. It is 3,500 feet deep, and looks scarcely a mile across. The sides are extremely steep, and in places nearly perpendicular. The horizontal beds on both sides appear to correspond exactly. Half-way down there is a well-marked terrace, evidently formed by the same bed on both sides of the river. At the bottom of the ravine ran a beautifully clear stream in a pebbly bed." He entertains no doubt that this gorge has been formed by the river.

Magdala fell on the 16th April, and the retreat was so hasty that Mr. Blanford's opportunities of procuring specimens became much limited, especially as Lord Napier seized one of our men. Mockler fired off his rifle to frighten away the beast, which rushed roaring past our tent. On enquiry we were horrified to find that an Abyssinian servant of Jesse's had been killed while asleep, and no alarm had been created until the animal attempted to drag away the body. The unfortunate man had two large tooth-holes in his throat, and must have been either so seized that he was unable to cry out, or else, as is probable, his neck was broken. The assailant was doubtless a leopard, very probably the same small animal which had scratched my servant the night before. We had a low thorn fence round three sides of our camp, and the camels occupied the open side—the usual plan in this part of Africa—but we had no fires, a most necessary precaution, and one we never neglected after this sad lesson."



VIEW OF THE PLATEAUX AND VALLEYS WEST OF FOKADA

would allow no expeditions into the interior. Meeting, however, at Senafé, on the return journey, with Mr. Jesse, the Zoological Society's naturalist, who had been detained by illness and want of transport, they organised, with Lieut. Mockler, a trip to the Bogos territory, about 100 miles N.W. of Massowah, the details of which form the most interesting part of the work.

At Ailat they found a hot spring, the water with a temperature of 140° F., and perfectly tasteless. Here they had a tragical adventure with a leopard, the details of which are thus given :—"On the early morning of the 29th June, one of my servants rising before daybreak, was scratched in the face by some wild animal which had come into the camp. The track resembled that of a large cat. We thought nothing of this at the time, but on the following night we were all aroused by an outcry and shouting, and an alarm was given that a lion had

Subsequently the adventurers had some fine sport with rhinoceroses.

In regard to the Geology of Abyssinia, the various rocks observed in ascending order were : 1, Metamorphic rocks ; 2, Adigrat Sandstones ; 3, Antalo limestones ; 4, Trappean series, including the Magdala and the Ashangi group ; 5, the Aden series of Volcanic rocks bordering the Red Sea ; and 6, Recent formations—soils of the highlands, coral islands of the Red Sea, and alluvial deposits near the coast.

We need scarcely add that the Zoological portion is carefully drawn up, whilst the plates, which include illustrations of the *Hirundo æthiopica*, *Phylloscopus abyssinicus*, *Ruticula fuscicaudata*, *Pratincola semitorquata*, *Alauda prætermissa*, *Crithagra flavivertex*, and some fossils and horns, are admirably coloured, and very expressive.

NOTES

PROFESSOR STOKES will be a member of the Royal Commission to inquire into the present State of Science in this country. Up to the present time then, so far as we are informed, the Commission stands as follows:—President, the Duke of Devonshire. Members: Professors Huxley, Stokes, and W. A. Miller; Dr. Sharpey, Sir John Lubbock, Bart., M.P.; Messrs. Lyon Playfair, M.P., and B. Samuelson, M.P.

THE following is the list of candidates recommended by the Council for election into the Royal Society:—W. Froude, C.E.; E. Headlam Greenhow, M.D.; J. Jago, M.D.; Nevil Story Maskelyne, M.A.; M. Tylden-Masters, M.D.; A. Newton, M.A.; A. Noble, Esq.; Capt. Sherard Osborn, R.N.; Rev. S. Parkinson, B.D.; Capt. R. Mann Parsons, R.E.; W. H. Ransom, M.D.; R. H. Scott, Esq.; G. F. Verdon, C.B.; A. Voelcker, Ph.D.; S. Wilks, M.D.

AT the meeting of the Royal Geographical Society on Monday Sir Roderick Murchison announced that the Earl of Clarendon had decided, on the part of Her Majesty's Government, to provide means for relieving Dr. Livingstone by land from Zanzibar, news from the doctor having been cut off some time since by the outbreak of cholera on the caravan route. Sir Roderick also announced that the annual general meeting would take place on the 23d inst., and that the Royal gold medals would be awarded to Mr. G. W. Hayward for his journey to Yarkand and Kashgar, and to Lieutenant Garnier, of the French navy, for his merits in bringing the great French expedition from Cambodia to Yangtsin after the death of its chief.

SCIENCE is lively at the Royal Society. Last week we had Principal Dawson's very interesting Bakerian lecture; this week we are to have the Croonian lecture by Dr. Augustus Waller, F.R.S., "On the Results of the Method (introduced by the lecturer) of investigating the Nervous System, more especially as applied to the elucidation of the functions of the Pneumogastric and Sympathetic Nerves in Man." The subject is one of which physiologists will recognise the importance.

THERE is a considerable number of papers on hand at the Royal Society, and there remain but two more evening meetings, May 19, and June 16. The question has been asked whether Dr. Bastian's paper on Spontaneous Generation is to be brought forward at one of those meetings. And the same question might be asked in the case of other papers, and it is not the only question by any means. Were not the present arrangements of the Royal Society (including the break from May 19 to June 16) made to meet a condition of things which has long passed away? And since the flow of papers into the Society has largely increased, why should not the outflow be a little accelerated, and why should not the Bakerian and other lectures be given on extra nights, so that common justice may be done to the authors of other papers? One would have thought that the Royal Society would have gladly hailed the many signs of increased scientific activity, and made arrangements accordingly.

MEDICAL Science has sustained a heavy loss in the death of Sir James Young Simpson, Bart., Professor of Midwifery at the University of Edinburgh, and discoverer of the anæsthetic properties of chloroform. He died on Friday last of disease of the heart, in the 59th year of his age.

M. VILLEMAIN, the Perpetual Secretary of the French Academy, died on Sunday morning last, at the age of 80.

THE practical importance to the State of the progress of scientific discovery was happily illustrated in the debate in the House of Commons on Friday evening last, on the question of opening the Public Galleries during certain hours of the evening. The Chancellor of the Exchequer threw out a suggestion that some mode of lighting might, before long, be discovered as efficacious as gas, and not liable to the objection of endangering the safety of the building. "Science," said he, "was advancing very rapidly, and difficulties which seemed insuperable in these matters to-day, might, if we waited patiently for a few years, be met and overcome." It is needless to point out to so acute a reasoner as Mr. Lowe, that in thus proposing to utilise the possible future discoveries of Science, he furnishes the strongest possible argument for that assistance to Science by the State which we so persistently urge.

IN the same debate Mr. Lowe gave some hope that he might, in the course of the present session, state definitely the views of the Government with regard to the removal of the Natural History collections in the British Museum, a removal which he characterised as a "crying necessity." A considerable space of ground has been purchased by the Government behind the National Gallery, which will be used for some such public purpose.

THE Council of the Scientific Association of France at its last meeting appointed a mixed committee, representing the different branches of science, to perform the functions of the old commissions of astronomy, physics, and meteorology, entrusting to it at the same time the executive power, in the sense of regulating the public sittings, receiving requests for grants, &c. The committee, to which, at its own request, the Council has the power of adding the names of *savants* not belonging to its body, is composed as follows:—Astronomy, MM. Puisseux and Tissot; mechanics, MM. Eichens and Haton de la Goupillière; physics and chemistry, MM. Lissajous, Troost, and Cazin; meteorology, MM. Belgrand and Renou; geography, MM. Mouchez and Ploix; geology and palæontology, MM. Elie de Beaumont and Delafosse; botany, M. Lestiboudoix; zoology and zootechny, MM. Milne-Edwards and André Sanson; agronomy, MM. Payen and Barral. The *locale* of the association is at present at M. Le Verrier's, 1, Rue des Saints-Pères, Paris.

THE discussion which followed Principal Dawson's lecture of which we give an abstract in another column,) was sustained by Sir C. Lyell, Sir R. Murchison, and Dr. Hooker. Sir R. Murchison objected to the adoption of the term "Erian" for the series of pre-carboniferous rocks of North America, corresponding to our Devonian or Old Red Sandstone, as an unnecessary innovation; while Dr. Hooker thought that caution was necessary before concluding that the apparently exogenous fragment of wood found in a bed occupying the centre of the "Erian" series must necessarily belong to a dicotyledonous tree. He considered it quite possible that the structure of the wood of some of the higher Cryptogams of this early period might closely resemble that of dicotyledonous Phænogams.

WE print the following note from St. John's College, Cambridge:—"The following have been placed in the first class of the college examination in Natural Science: Blunt, Garrod, and Read. The names are arranged in alphabetical order, and the examiners are the same as for the open exhibition adjudged on Friday last. The second-class contains four names, and the third three."

THE fiftieth anniversary of the Leeds Philosophical and Literary Society was commemorated during last week, in the usual English manner, by a dinner.

THE following Special Meetings of the Ethnological Society will be held during the month of June:—Wednesday, June 1st, at the Royal United Service Institution, Whitehall-yard; "Report on the Prehistoric Antiquities of Dartmoor," by Mr. C. Spence Bate, F.R.S. Tuesday, June 7th, at the Museum of Practical Geology, Jermyn-street; "On the Geographical Distribution of the chief Modifications of Mankind," by Prof. Huxley, President. Tuesday, June 21st, at the Royal United Service Institution, Whitehall-yard; "On the Aymara Indians

of Bolivia and Peru," by Mr. David Forbes, F.R.S. The meetings will commence punctually each evening at 8.30 P.M.

THE planet Lydia (No. 110), discovered by M. Borelly at the Marseilles Observatory on the 19th of April, had at $10^h33^m13^s$ mean Marseilles time, the following position:—Right ascension $12^h2^m39^s{\cdot}22$; north declination 6°50′38″·8. Its horary motion has been determined as follows:—In right ascension $-1^s{\cdot}77$, in declination +2″·20; its magnitude is between 12 and 13. M. Borelly had previously discovered two planets, bearing the numbers 91 and 99 in the system of asteroids revolving between Mars and Jupiter. These two planets had long been nameless, in consequence of the persistent refusal of M. Le Verrier to permit the astronomers under his jurisdiction to bestow any name upon them. The 91st has now received the name of Egina, the 99th that of Dikë.

THE planet which bears the number 109 in the series of asteroids, and which was discovered at Clinton by Mr. C. H. F. Peters, on the 9th of October last, has received the name of Felicitas. The following are the new elements of its orbit, which have been calculated by Mr. William A. Rogers, from three positions, on the 9th of October, 28th of November, and 22nd of January last:—

Epoch: 1869; Oct. 9th, mean Washington time.

Mean anomaly	339° 5′ 45″·21
Longitude of perihelion	55 56 3 ·35
Longitude of ascending node	4 56 4 ·35
Inclination	8 2 56 ·10
Angle (sine = eccentricity)	17 27 2 ·67
Logarithm of half of the greater axis	0·4304068
Mean diurnal motion	802″·41019

WE have received the first sheet of Messrs. W. and A. K. Johnston's new Illustrations for Botanical Lectures, selected and arranged by Professor Balfour. It is occupied with a general ideal drawing of the various organs of a plant; and with illustrations of the embryo plant, cells and vessels, root and stem. If the series fulfil the promise of the first sheet, it will supply a desideratum for the botanical lecturer. The sketches are clear and well executed, and if they are too crowded, it is difficult to see how this could be avoided without making the series of an unwieldy size. We would suggest that their utility would be increased if they are also issued in sheets and uncoloured. The setting on a roller is not always the most convenient, and many would be glad to save the expense of the colouring. The descriptive pamphlet of text accompanying the sheet, by Professor Balfour, is in itself almost an elementary handbook of botany.

IN the last report of the Registrar-General, he gives a valuable classification of the geographical distribution of various diseases in the different districts of England, and concludes by remarking: "It is true that the returns of deaths can never furnish such immediate notice of the origins of epidemic diseases as returns of cases of disease; but it is not true that the information of the death register is necessarily too late; it is too late as regards the individual, but it is not too late as regards the community, which can immediately adopt measures to quench the sparks before they involve it all in flames. The seas which divide this island from the rest of the world no longer ward off diseases, which are landed every day on her shores, and can no more be shut out than the east winds. The nation is associated with all races and nations by its maritime population, and with many by empire. And however much men may indulge the natural pride of nationality, in one respect their solidarity admits of no dispute; they are all subject to the same diseases, and are all interested equally in the mitigation of the sufferings and losses those diseases occasion. How can those evils be mitigated unless their origin is known, and unless science determine the laws by which they are governed? And recorded observation on a European scale is as necessary for the determination in this field of life as observation of the skies in astronomy, without which Copernicus, Newton and Laplace could never have built up the system of the universe, or have given the navigator the means of avoiding shipwreck and finding his destination over the ocean. England is the only country in the world at the present time which publishes weekly and quarterly observations on an extensive scale in time to be available for immediate administrative use. But the Registrar-General hopes soon to get the co-operation of other countries, and in a few years to see in operation among several of the principal nations of the world one well-concerted series of reports of their marriages, births, deaths, and most controllable diseases."

IN the *séance* of the 11th April M. Duchemin brought before the Academy of Sciences of Paris the following curious fact in Natural History:—In the park of the Château de Montigny (Eure) belonging to M. Deroche, there is a large piece of water, through which a gentle current of beautifully clear water flows. In this lake numerous carp are reared, which thrive well, except during the first days of spring, when each year an extraordinary mortality occurs amongst them. In each animal one morbid symptom is always observable in the dead animals as they float on the surface of the water. In every case the animal is blind; a kind of film covers the eyes and even a part of the head. An examination of the body brings to light no internal disease, beyond a slight fatty degeneration of the tissues. The viscera appear healthy, and contain no intestinal worms. The cause of this strange malady has not hitherto received any notice; but from M. Duchemin's researches, in conjunction with M. Deroche, it seems that the toad (*Bufo calamita*) is an enemy, if not of all fishes, at least of the carp in spring. It attacks it, exhausts it, conquers, and kills it. To determine the point, they examined all the carp in the pond, and found squatting on the head of each of those that were diseased an enormous toad, the fore-paws of which were placed on the two eyes of the unfortunate fish. Thus, this ugly Batrachian, which presents so stupid an aspect, has yet sufficient intelligence to assume the offensive, and to overcome a large fish. If it has not agility and energy, it has cunning and perseverance. It would appear to kill by exhaustion, but it remains to be ascertained whether the acrid secretion of its skin assists in the conquest.

IN a still more recent *séance* of the Academy of Sciences, M. Duchemin, reverting to the above communication in regard to the mortality of the carp being in some instances due to the attacks of the toad, supplies observations which have been forwarded to him in support of his statements, and relates that from investigations undertaken at the Château de Montigny, the toad does not always remain permanently fixed on the head of the dead fish, but only so long as it gives signs of life. He observes, too, that all the carps from which the attacking toads had been removed were more or less blind. They were placed with care in another pond, but none of them recovered from the injuries received. No author has hitherto noted this animosity of the toad for the carp, who perhaps themselves consume the eggs of the toad. He has obtained additional evidence from M. Mermet, Directeur des Eaux at Contrexville (Vosges), who states that it has been found impossible to preserve carp in a sheet of water in that neighbourhood in consequence of the presence of numerous toads. M. l'Abbé Caillet, Curé of Rosoy (Haute Marne), whilst confirming the above statements, writes to him, "The toad is a villanous beast. One day I observed one that had crawled beneath a hive. There, with his two forepaws advanced and his throat wide open, he attracted the innocent bees, with which his sides were distended."

THE traffic of the Tower Subway—of the engineering features of which we recently gave an account (see NATURE, Vol. i., No. 11, p. 280)—has not been proceeding very smoothly, owing, we think, to defects in its management, and indeed was altogether suspended for a week or two. The passage through the tube is stated to be

often interrupted by the breakage of the wire rope; for this purpose two engines are used, one at each end of the tunnel, while the obvious and ordinary arrangement would be to employ only one engine driving a shaft with two drums and an endless rope. The arrangements might be very similar to those adopted in mines for raising and lowering the "cage," except that in this case the cage would be the carriage, and would travel on nearly a level line instead of up and down a shaft. The mode adopted for raising and lowering passengers in the shafts attached to the subway is by means of a chain which draws the carriage up and down, various "safety" arrangements being adopted in case of the giving way of the chain. For raising and lowering passengers, a chain or rope is not however the best means. In the apparatus in use in all the best hotels in America, there are no chains or ropes, no catches, springs, or buffers in case of accident. There is a vertical hollow cast-iron column reaching through the whole length of the shaft; in that shaft is the thread or helix of a screw projecting a couple of inches from its surface; the cage forms part of the nut, which rests in the screw or shaft. The shaft is turned by a small engine, controlled by the guard, who travels with the cage; he can moderate, stop, or reverse the motion, and accidents in the ordinary sense are out of the question. It will thus be seen that the problems to be solved as to the best means of transporting passengers through the Tower Subway are of the simplest kind.

WE understand that the late Mrs. Appold has left to the Institution of Civil Engineers, a legacy of 1,000*l.*, payable at the same time as the legacy for a similar amount from her husband, the late Mr J. G. Appold, F.R.S., Assoc. Inst. C.E. It is believed that both bequests have been made "for the general use and benefit of the Society," without being fettered with any conditions.

TO those of our Scientific Societies who annually assure themselves, and others, of their continued existence by a dinner, we commend the "Report of the Speeches at the Annual Dinner of the Institution of Civil Engineers, May 4, 1870," which we have just received,—as an indication of what a little energy can make even of a dinner. Professor Tyndall answered for Science, showing in a clear way how physical research lies at the root of all conquests of Nature, gaining help in turn from the practical man. "Thus does the human intelligence oscillate between sound theory and sound practice, gaining by every contact with each an accession of strength. These two things are the soul and body of science, as far as you and I are connected with it. Sever sound theory from sound practice, and both die of atrophy. The one becomes a ghost, and the other becomes a corpse."

WE have received the first and second volumes of Dr. L. Lindenschmit's "Die Alterthümer unserer heidnischen Vorzeit," from originals in public and private collections, published under the authority of the Roman-German Central-museum at Mayence. The illustrations are most copious, and the work admirably done.

DR. R. CASPARY reprints from the Transactions of the Natural History Society of Halle a paper on the genus *Nuphar*. In examining the water-lilies of the Black Forest, as well as of Prussia and other districts of Northern Europe, he finds an intermediate form between *Nuphar luteum* and *N. pumilum*, which he regards as a true natural hybrid between two distinct species, and not as a mere transitional form. Another reprint from the Transactions of the same society is an essay on the Lennoaceæ, by H. Graf zu Solms-Laubach.

KONER'S *Zeitschrift der Gesellschaft für Erdkunde zu Berlin* contains a number of most valuable geographical papers, accompanied with carefully-executed maps; and a list of all geographical works, maps, and plans in all languages published between December 1868 and November 1869.

THE PHYSICAL CONSTITUTION OF THE SUN

DR. GOULD has addressed an important letter on the above subject to the Journal of the Frankland Institute. In the first part he refers to the new light recently thrown on the sun's physical constitution by the observations of Mr. Lockyer, and agrees with him and Dr. Frankland, both as to the absorption taking place in the chromosphere and photosphere itself, and also as to the possible telluric origin of the corona.

He then proceeds with regard to the probable age of the sun:—

"The researches of Helmholtz and Thomson regarding the age of the sun as a source of cosmical heat have shown us limits within which, in the absence of more decisive evidence, we must restrict our theories as to the length of time during which he has warmed the earth. The contraction-theory has been most ably discussed by these eminent physicists, and seems to afford the only satisfactory mode of accounting for the solar light and heat, now that we know both that the meteors generally revolve in cometary orbits, and that the habitability of the earth, as well as the apparent unchanged mutual attraction of the planets, bears testimony to the incorrectness of the meteoric theory. From Pouillet's data (derived from experiments which ought to be repeated in some year when the solar spots are at a minimum) Helmholtz has shown that, even were the sun's density uniform, a contraction of $\frac{1}{10}$ per cent. in his diameter would evolve 20,000 times the present annual supply of solar heat. But when the sun was hotter the same proportional contraction would have evolved yet more heat; so that we must consider the above estimate as a minimum.

"The expansibility of hydrogen gas for 100° C. is 0·3661. No gas appears to have so small a coefficient as 0·360, which would correspond to a linear expansion of 0·108. The expansibility of glass, the smallest known, I believe, even for a solid, is about $\frac{1}{10}$ part as great; say 0·00244 in volume, or 0·00081 linear. Therefore for glass even, a contraction of 1 per cent. in diameter would imply a fall of temperature by 1230° C., and a mean specific heat of 218. This seems certainly a minimum value.

"But if we suppose the expansion coefficient to be as large as that of hydrogen, a contraction of 1 per cent. would correspond to a change of temperature by 8·2° C. or a mean specific heat of 32,700, if equivalent to 20,000 years' supply. This is out of the question.

"Now Thomson has computed that bodies smaller than the sun, falling from a state of relative rest at mutual distances which are large in comparison with their diameters, and forming a globe equal to the sun, would generate 20,000 times the present annual supply. This would be greater did we consider the unquestionable increase of the sun's density towards his centre. And since it seems out of the question that resistance and previous minor impacts could have consumed more than one-half the heat, he inferred ten million times a year's supply to be the lowest, and one hundred million times to be the highest, estimate of the sun's initial heat.

"Now we have every reason for the belief that radiation is proportional to temperature. Assuming this and taking the temperature of the sun's photosphere as 14,000° C.,

10,000,000 times the present annual supply would be radiated
in 3,650,000 years if the specific heat were 218,
in 7,280,000 ,, ,, ,, ,, 1000.
100,000,000 times the present annual supply would be radiated
in 8,250,000 years if the specific heat were 218,
in 25,500,000, ,, ,, ,, 1000.
500,000,000 times the present annual supply would be radiated
in 11,700,000 years if the specific heat were 218,
in 38,900,000 ,, ,, ,, ,, 1000.

"For vapours, other than hydrogen, the greatest known specific heat, so far as I am aware, is 0·508 (ammonia); and hydrogen, which has less than 3·5, cannot form any considerable portion of the sun's mass.* A specific heat so high as 1,000 seems altogether out of the question; yet it will be seen that, even on this supposition, an amount of initial heat equal to 500,000,000 the present annual supply, would have been radiated in less than forty million years, were the sun's radiative capacity proportional to his temperature. Taking the more probable age, 10,000,000 years, we should find 226 million times the present annual supply to have been radiated within this period if the specific heat were not greater than 218; and even were the specific heat 1,000, the total radiation would have been eighteen million times a year's radiation at present.

* It seems to form certainly not more than the 18,000th part of the mass of the earth.

"Thus the limit given by Thomson, although so vastly below that afforded by the speculations of some geologists, would appear itself to demand a considerable additional reduction. And I cannot see how we can well suppose the sun in its present form to have radiated heat for more than twenty millions of years, while three or four millions would seem to be a far more probable estimate, unless the thermic laws be totally different in those exalted temperatures which we must suppose to have existed at some past epoch.

"The very great diversity of the limiting values for the specific heat seems to afford ample scope for every needful allowance on account of the natural action of the particles within the body of the sun, even conceding to this the immense effect (analogous to the increase of specific heat) which has been assigned to it by some investigators. Even did we conceive a primitive heat equal to 200,000,000 times the amount now yearly radiated, and a specific heat 10,000 times as great as is possessed by any known gaseous body excepting hydrogen, we could not deduce so long a period as 80,000,000 of years for the past duration of the sun's heat."

SCIENTIFIC SERIALS

THE *Geological Magazine* for May (No. 71, or Vol. vii., No. 5) commences with a biographical sketch of Mr. G. Poulett Scrope, whose investigations into the phenomena of vulcanicity certainly entitle him to a distinguished place among eminent living geologists. This article is illustrated with an admirable portrait. Mr. Jenkins communicates an article on the surface geology of Belgium, in explanation of his map, a reprint of which appeared in the April number of the magazine. Mr. Maw notices two sections on the borders of Shropshire and Cheshire, in which Rhætic beds with characteristic fossils are exposed. In a paper on the Lower Silurian rocks of Galashiels, of which only the first part, illustrated with a map, is here published, Mr. Lapworth furnishes an important contribution to the elucidation of this confused group of rocks. The article in this number which will be generally read with most interest is one by Mr. James Croll, upon the boulder clay of Caithness, which he maintains to be a product of the action of land ice. This paper also is incomplete. Professor Rupert Jones notices and figures the species of Entomostraca from the coal measures of South Wales; several of the species are described as new. Lastly, Mr. Judd's paper, on the use and application of the term Neocomian, contains a good discussion of a matter which, although it seems to be merely a question of terminology, is really, especially at the present moment, one of considerable importance to geologists. Besides the usual reviews, notices, &c., the present number contains a supplementary paper by Mr. Samuel Hyde, on deep-mining in the south-west of Ireland, which possesses much economical interest.

THE *Ibis*, a Quarterly Journal of Ornithology, New Series, No. 22, April 1870. (Van Voorst.)—This number contains:—(10) "Notes relating chiefly to the Birds of India," by Mr. Blyth—the results of an examination of the specimens in the Leyden Museum; (11) "Note on the Systematic Position of *Indicator*," by Mr. P. L. Sclater; (12) "Stray Notes on Ornithology in India," by Mr. Allan Hume; (13) "On New and Little-known Birds collected during the Voyage of the *Magenta*," by Drs. Giglioli and Salvadori; (14) "A List of the Birds of Turkey" (continued), by Capt. Elwes and Mr. T. E. Buckley; (15) "On Rare and Little-known *Limicolæ*," by Mr. J. E. Hasting, determining and discriminating two puzzling species of *Eudromias*, *E. asiaticus*, and *E. veredus*; (16) "On the *Oriolidæ* of the Ethiopian Region," by Mr. R. B. Sharpe—a very elaborate article; (17) "On the Ornithology of Hainan" (continued), by Consul Swinhoe; (18) "On existing Remains of *Alca impennis*," by Prof. Newton, showing that there remain to us of this supposed extinct bird 71 or 72 skins, 9 skeletons, detached bones of 38 or 41 individuals, and 65 eggs. (19) "Notices of Recent Ornithological Publications"—English, French, Dutch, German, Russian, and American, wherein more than twenty works are briefly reviewed; and (20) "Letters, &c.," from Messrs. Layard, Hume, Brooks, and R. Gray, Col. Tytler, Lord Walden, Mr. C. Horne, Capt. Fielden, Herr von Pelzeln, Dr. Salvadori, and Messrs. P. L. Sclater, Harvie Brown, Hawkins, H. Saunders, Elliot, Tristram, and Skeat—the last a communication which will interest others than ornithologists, for it explains the etymology of the name "Grey Lag Goose"—the goose that *lagged* behind the others bred in this country when its congeners had departed for their summer quarters. The number is illustrated by some woodcuts, and by five beautiful coloured plates, by Mr. Keulemans, representing eight species of birds, of which six have never been figured before, and the other two in imperfect plumage only.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 5.—The Bakerian Lecture, "On the Pre-Carboniferous Floras of North-Eastern America, with especial reference to that of the Erian (Devonian) Period." By J. W. Dawson, LL.D., F.R.S., &c., Principal and Vice-Chancellor of M'Gill University, Montreal.

The attention of the author was first directed to the Devonian as distinguished from the Carboniferous flora, by the discovery, on the part of Sir W. E. Logan, in 1843, of some remarkable remains of plants in the Sandstones of Gaspé, Canada. In 1859, after visiting Gaspé to study these plants *in situ*, descriptions of them, and more particularly of the two characteristic Lower Devonian genera *Prototaxites* and *Psilophyton*, were published in the Journal of the Geological Society. Subsequently additional material was obtained by personal investigation of the Devonian of Maine and New Brunswick, and through the kindness of Prof. James Hall, from that of New York. These additional plants were also published in the Journal of the Geological Society. Still more recently, a thorough re-examination of the Gaspé beds, the systematic exploration of the plant-bearing beds near St. John by Prof. Hastt, and fresh collections made by Prof. Hall, have enabled the author to prepare a catalogue of 121 species, and to attempt a thorough revision of the Erian flora, and an investigation of its conditions of growth and relations to the Carboniferous flora.

The term "Erian" is applied to the formations included between the top of the Upper Silurian and the base of the Carboniferous, on account of the uncertainties which have attended the subdivision and limitation of the Devonian of Europe, and also on account of the immense area occupied by these beds on the south and west of Lake Erie, and their admirable development with regard to subdivisions and fossils. The name "Erie Division" was also that originally applied to this typical series by the geologists of the Survey of New York.

A large part of the paper was occupied with the revision of the Erian flora, including the description of twenty-three new species, and more ample descriptions of others previously known only in fragments. Large trunks of *Prototaxites*, from the base of the Lower Devonian, were described, and full details given of the form, structures, and fructification of two species of *Psilophyton*. The new genus *Ormoxylon* was described. The genus *Cyclostigma* was noticed, as represented by two species in America, and its foliage and fruit described for the first time. The genera of the Erian Ferns were examined and corrected, and several interesting trunks and stipes belonging to Tree-ferns were described. The fruits of the genus *Cardiocarpum* were illustrated with reference to their structure. The occurrence of *Lepidophloios*, *Calamodendron*, and other forms in the Middle Devonian was noticed for the first time.

The third part of the memoir was occupied with comparisons and general conclusions. At the close of the Upper Silurian period there was a great subsidence of the land in Eastern America, proved by the wide extent of the marine beds of the Lower Helderberg (Ludlow) group. It was on the small areas of Lower Silurian and Laurentian land, remaining after this subsidence, that the oldest land plants known in the region flourished. Re-elevation occurred early in the Devonian period, and the known flora receives considerable extension in the shallow-water beds of the Lower Erian. The subsidence indicated by the great Carboniferous limestone interrupted these conditions on the west side of the Appalachians, but not on their eastern side. At the close of this we find the rich Middle Devonian flora, which diminishes toward the close of the period; and after the physical disturbances which on the east side of the Appalachians terminated the Erian age, it is followed by the meagre and quite dissimilar flora of the Lower Carboniferous; and this, after the subsidence indicated by the Carboniferous limestone, is followed by the Coal-formation flora.

If we compare the Erian and Carboniferous floras, we find that the leading genera of the latter are represented in the

former, but, for the most part, under distinct specific forms; that the Erian possesses some genera of its own, and that many Carboniferous genera have not yet been recognised in the Erian. There is also great local diversity in the Erian flora, conveying the impression that the conditions affecting the growth of plants were more varied, and the facilities for migration of species less extensive than in the Carboniferous.

In comparing the Erian flora of America with the Devonian of Europe, we meet with the difficulty that little is known of the plants of the Lower and Middle Devonian in Europe. There are, however, specimens in the Museum of the Geological Survey which show, in connection with facts which can be gleaned from the works of continental writers, that *Psilophyton* occupied the same important place in Europe which it did in America; and in the Upper Devonian the generic forms are very similar, though the species are, for the most part, different.

In Eastern America no land flora is known below the Upper Silurian; and even in that series the plants found are confined to the genus *Psilophyton*. Independently, however, of the somewhat doubtful Lower Silurian plants stated to have been found in Europe, there are indications, in the Lower Erian flora, that it must have been the successor of a Silurian flora as yet almost unknown to us; and the line of separation between this old flora and that of the Devonian proper, seems to be at the base of the Middle Devonian.

In applying these facts and considerations to the questions relating to the introduction and extinction of species, and the actual relations of successive floras, it was proposed to compare what might be called specific types, that is, forms which in any given period could not be rationally supposed to be genetically related. Of these specific types, at least fifty may be reckoned in the Erian flora; of these, only three or four are represented in the Carboniferous by identical species, while about one half are represented by allied species. The remainder have no representatives.

A Table of specific types of the Erian was given, and its bearing shown on the questions above referred to; and the hope was expressed that by separating such types from doubtful species and varietal forms, some progress might be made towards understanding, at least, the times and conditions in which specific types were introduced and perished, and the range of varietal forms through which they passed.

Royal Institution, May 9.—Sir Henry Holland, Bart., F.R.S., president, in the chair.—T. W. Boord, F.S.A., Miss Eliza Bowman, Miss Margaret Graham, Rev. Brenchley Kingsford, M.A., H. F. Makins, R. Heber Prance, the Earl of Rosse, F.R.S., the Hon. Capt. R. Talbot, M.P., the Hon. P. S. Wyndham, M.P., were elected members of the Royal Institution. John Tyndall, LL.D., F.R.S., was re-elected as Professor of Natural Philosophy.

Geological Society, April 27.—R. A. C. Godwin-Austen, F.R.S., vice-president, in the chair. The following communications were read:—1. "On the species of rhinoceros whose remains were discovered in a fissure-cavern at Oreston in 1816." By George Busk, F.R.S., F.G.S. The object of this paper was to show that the rhinoceros whose remains were discovered by Mr. Whidbey in a fissure-cavern at Oreston, near Plymouth, in the year 1816, and described by Sir Everard Home in the "Philosophical Transactions" for 1817, belonged, not as has hitherto been supposed by every one except the late Dr. Falconer, to *Rhinoceros tichorhinus*, but to *Rh. leptorhinus*, Cuv. (*R. megarhinus*, Christol). The remains in question are in the Museum of the Royal College of Surgeons, and consist of between thirty and forty, more or less, broken portions of the teeth, and of numerous bones of the skeleton. The greater number being hardly in a condition to afford satisfactory diagnostic specific characters, the remarks in the paper were limited to the teeth and to a perfect metacarpal bone, which appeared amply sufficient for the purpose. The teeth mainly relied upon were the first or second upper molars (m^1 or m^2) of the right and left sides. Both the teeth were broken, but what was wanting in one was supplied by the other. The characters exhibited were shown to be unlike those of *R. tichorhinus*, and quite in accordance with those of *R. leptorhinus*. These were the thinness and smoothness of the enamel, the configuration of the dorsal surface, the form and size of the columns, and the disposition and relations of the "uncus" and "*pecten*" ("*crochet*" and "anterior combing-plate);" and the consequent absence of the characteristic "*tichorhine pit*" or *fossette*. The less strongly marked characters by which the teeth could be distinguished from those of *R. hemitæchus*, Falc., and *R. etruscus*, Falc., were also pointed out. The metacarpal bone selected for the illustration of the diagnosis is 9½ inches long, and remarkable for the compression of the shaft and its comparative slenderness, as contrasted with the same bone in *R. tichorhinus*, specimens of which were exhibited on the table, and which, in no case within the author's knowledge, ever exceeds 7½ or 8 inches in length, and is proportionately much thicker than in *R. leptorhinus* or any other extinct species. The size and form of the bone also showed that the species could not be either *R. hemitæchus* or *R. etruscus*, for although the means of direct comparison with the third metacarpal of those species did not, to the author's knowledge, exist in London, its probable general dimensions and proportions could be deduced from those of the corresponding metatarsal, of which bone numerous specimens were available. It was further shown that the Oreston metacarpal exactly corresponded with those of *R. leptorhinus*, from Grays Thurrock, in the British Museum. The determination of the species appears to be of considerable interest, inasmuch as it affords an additional instance of the occurrence in England of the great southern Rhinoceros. This is also the only example of the discovery of that species, except in river or other deposits, either in this country or on the Continent. The Chairman remarked that at one time the Oreston *Rhinoceros* was referred to *R. tichorhinus*, but that Buckland, although mentioning the *Rhinoceros*, never gave it a specific name. The Chairman also said that the Oreston fissures were not caves, but mere fissures which had been filled in; an entire skeleton occurred at one spot, and the animal must have fallen in. Mr. Boyd Dawkins had been struck by the non-tichorhine character of the Oreston specimens some years since. He confirmed Prof. Busk's determination, and remarked that five British species of *Rhinoceros* are known, namely: 1. *R. Schleiermacheri*, from the Red Crag of Suffolk (in the Miocene at Darmstadt); 2. *R. etruscus*, from the Forest Bed = *R. Merckii* (Von Meyer); 3. *R. megarhinus* (Christol) = *leptorhinus* (Cuv.); but the latter name includes also *R. etruscus* and *R. hemitæchus*; so that the adoption of De Christol's name gets rid of a difficulty; 4. *R. hemitæchus*; and 5. *R. tichorhinus* = *R. antiquitatis* (Blum.). Prof. Busk, in reply, stated that Oreston was a fissure-cavern, and noticed the successive openings in 1816, 1821, and 1826. He did not agree with Mr. Boyd Dawkins in preferring the name *megarhinus* to Cuvier's *leptorhinus*. He did not know of the occurrence of two species of *Rhinoceros* at Oreston.

2. "On two Gneissoid series in Nova Scotia and New Brunswick, supposed to be the equivalents of the Huronian (Cambrian) and Laurentian." By H. Youle Hind, M.A.

This paper described the relations of two gneissoid series in Nova Scotia and New Brunswick, which have hitherto been regarded as intrusive granites and syenites, and have been thus represented on the published geological maps of those provinces. The author considered that these gneisses were in the main of Laurentian age, the Huronian or Cambrian rocks occurring only in patches over a vast area of Laurentian porphyroid gneiss. The old gneiss was stated to be brought to the surface by three great undulations between the Atlantic coast of Nova Scotia and the Laurentian axis of America north of the St. Lawrence. These axes were rudely parallel to one another, and in the troughs which lay between them the Silurian, Devonian, and Carboniferous series occurred in regular sequence, the New Brunswick Coal-field occupying the central trough. On the line of section, in the troughs to the north-west and south-east, the Lower Carboniferous was stated to be the highest rock series which has escaped denudation. The gold-bearing rocks of Nova Scotia are of Lower Silurian age, and rest either on Huronian strata or, where these had been removed by denudation, on the old Laurentian gneiss. The gold is found chiefly in beds of auriferous quartz of contemporaneous age with the slates and quartzites composing the mass of the series, which, in Nova Scotia, is 12,000 feet thick; and the auriferous beds are worked, in one district or another, through a vertical space of 6,000 feet. Besides auriferous beds of quartz, intercalated beds and true veins are found to yield gold, and are worked. A series of sharp and well-defined anticlinals ridge the province of Nova Scotia from east to west, while another series of low broad anticlinals of much later date have a meridional course. At the intersection of these anticlinals the gold districts are situated, because there denudation has best exposed the upturned edges of the auriferous beds of quartz, and rendered them accessible, sometimes exposing also the underlying gneiss. Plans of Waverley and Sherbrooke gold districts were exhibited, showing the outcrop of the edges

of the slates and auriferous beds of quartz in semi-elliptical forms, with the gneiss at the base of the ellipse. On this ground it was suggested that a correct mapping of the gneisses of Nova Scotia would have an important influence on the development of the mineral resources of the province. A plan of some of the lodes in the Waverley gold district showed the result of operations in 1869, subsequently to the publication of a geological map and sections of the district furnished to the Department of Mines by the author in 1868. Citations were made from the annual reports just issued of the Chief Commissioner of Mines and of the Inspector of Mines, confirming the correctness of the author's plans exhibiting the geological structure of Waverley, which is a type of all the Nova Scotian gold districts. Principal Dawson spoke in confirmation of the fact that the Palæozoic rocks are underlain by Laurentian gneiss, &c., quite to the eastern coast of British North America, and stated that the same relation occurred in Newfoundland, and had been traced southwards into Massachussetts. He confirmed Mr. Hind's views generally, and stated that the Lower Silurian of Nova Scotia includes no great fossiliferous limestone, like that of the interior of North America. The supposed *Eozoon* discovered by Dr. Honeyman, was probably distinct from *E. canadense*, but was certainly a Foraminiferal organism allied to *Eozoon;* but as *Eozoon bohemicum* is of later date than *E. canadense*, the presence of *Eozoon* did not necessarily indicate Laurentian age. Prof. Ramsay suggested that other organisms besides *Eozoon* aided in building up these great calcareous masses. He inquired as to the mode of occurrence of gold, and suggested that the gold is obtained at the anticlinals merely because the exposure is better, and that it will be found to pervade the synclinals also. Mr. Henry Robinson had visited the Waverley district in company with Prof. Hind, in the winter of 1868, at which time the mining on the lodes referred to in the map before the society was at a standstill, the lodes having been lost by reason of a fault. He thought it was very satisfactory to find that the explorations of Prof. Hind, and the theoretical position which he assigned to the lodes, had been completely verified. Mr. Robinson also stated that gold is being mined in the synclinals by sinking shafts and driving cross-cuts. Mr. Hind remarked that all the Lower Silurian in Nova Scotia was auriferous, and that the gold was derived from the underlying Laurentian rocks. He stated that Sir W. E. Logan had indicated an auriferous zone in the Laurentian of Canada. Gold was finely distributed in the slates of Nova Scotia, as in Victoria, in the neighbourhood of lodes, according to Mr. R. Brough Smyth.

Chemical Society, May 5.—Prof. Williamson, F.R.S., President, in the chair. The following gentlemen were elected fellows: G. Matthey, T. Steel, T. Allen.—Mr. Brown read a paper on "Vapour densities," wherein he gave a historical review of the various methods employed for the determination of such densities.—Mr. Church communicated the analyses of two Cornish minerals. The one, Restormelite, may be regarded as a variety of kaolinite, standing nearest to the lithomarge group. The analysis gave the following figures:—

H_2O	11·68 per cent.
SiO_2	45·21 ,,
Fe_2O_3	1·11 ,,
Al_2O_3	35·10 ,,
MgO	0·85 ,,
K_2O	2·30 ,,
Na_2O	4·12 ,,

This corresponds pretty well with the formula of kaolinite, Al_2O_3, $2\,SiO_2 + 2$ aq., if we suppose a partial replacement of hydrogen by sodium or potassium, and of aluminium by iron. Restormelite may be considered as preserving in its alkalies more evident traces of its feldspathic origin than are usually found in such alteration products. The second of the above-mentioned minerals is Chalcophyllite. The recorded analyses of this mineral were so unsatisfactory that Mr. Church thought it worth his while to submit to a new investigation. The figures he obtained in his analysis led him to assign to chalcophyllite the formula $8\,CuO$, Al_2O_3, $As_2O_5 + 24$ aq. The mineral cannot be dried even in vacuo without an entire change in its appearance. The beautiful green and transparent crystals become of a more bluish tinge, and quite opaque. This change corresponds to a loss of 13·79 per cent. of water.—Messrs. Bolas and Gloves communicated a paper on their newly-discovered tetrabromide of carbon. This compound is obtained by heating bisulphide of carbon with bromide of iodine in a sealed tube to a temperature of 150° C for about forty-eight hours, adding afterwards caustic soda to the contents of the tube, and submitting the mixture to distillation, when the tetrabromide of carbon will distil over. Bromoform and bromopicrin, when treated with bromide of iodine, yield the same result. The bromide of iodine can be replaced by antimony terbromide. Tetrabromide of carbon is a white crystalline substance, melting at 91° C., insoluble in water, but readily soluble in ether, hot alcohol, benzol, American oil, bromoform, and chloroform. Sodium amalgam reduces it, first to bromoform, then to methylene dibromide. The authors propose to carry on their investigations of this interesting compound.

Anthropological Society of London, May 3.—Dr. R. S. Charnock, V.P., in the chair. Moore A. Cuffe, LL.D., 9, Camden Crescent, Bath, was elected a Fellow. A paper was read by Major W. Ross King, F.R.G.S., F.S.A.S., on the "Aboriginal Tribes of the Nilgiri Hills," namely, the Todas, Khotas, Erulas, and Kurumbas, especially noticing the former, as being the most singular and important. The author, who was three years among these tribes, described in turn the characteristic features and peculiarities of each, with detailed information as to their very curious social customs, and religious rites and ideas; showing the marked distinction existing in every point between tribes occupying one and the same area, and in constant communication with each other; pointing out the fact that each people retained its own language; and their remarkable isolation from the surrounding enormous population of the plains. The striking similarity between the rites, practices, and monuments of the Todas and those of the ancient Celts of Britain was shown; a passing allusion was made to the evidences of an early western migration as traceable through intervening countries in the existence of similar rites and customs; and the presence on the Nilgiri hills of Druidical circles, cromlechs, kistvaens, and tumuli was described, precisely similar to those so well-known in our own country. While commenting on the analogies thus apparent between the ancient Celts and some of these Hill Tribes, the author took occasion also to remark on their similarities in other respects to the Jews of old, to the Kaffirs, and to the ancient Romans, not as being likely to lead to any theory of origin in those quarters, but as possibly qualifying the reliance to be placed on every point of Celtic resemblance. In conclusion, the author, who illustrated his paper by the exhibition of several drawings, and of some interesting native ornaments, &c., summed up the various theories prevailing as to the probable origin of these tribes, of whose history we are still so ignorant, and recommended the subject to the Society as one worthy of their investigation.

Linnean Society, May 5.—The following foreign members were elected in the place of those who have died during the past year:—Prof. Spencer F. Baird, of Washington; Herr George Ritter von Frauenfeld, of Vienna; Dr. William Lilljeborg, Prof. of Zoology at Upsala; Dr. Charles Naudin, of Collioure, Pyrenees; and Sig. Roberto di Visiani, Prof. of Botany at Padua.—A letter was read from Dr. Ernst, of Caracas, on a peculiar plant belonging to that country known as "incense," a small tree forming a striking feature in the scenery. It was described by Humboldt and De Candolle under different names, its affinities not having been accurately determined. Dr. Ernst has established its right to form a distinct genus, to which he gives the name of *Libanothamnus*.—Dr. Hooker read a communication from Dr. Kirk, vice-consul at Zanzibar, on "Copals." One characteristic by which fossil copal is known from the recent resin, in addition to its greater transparency, is the so-called "goose-skin." Dr. Kirk has ascertained that the fossil copal shows no trace of this goose-skin when first dug out of the earth, but that it makes its appearance only after cleaning and brushing the outer surface. Specimens exhibited of both recent and fossil copal contained imprisoned flowers, leaves, and insects, in a beautiful state of preservation. Captain Grant states that the true copal gum-tree is a climber which climbs to a great height among the forest trees, and finally becomes completely detached from its original root, when the copal exudes from the extremities of these detached roots. Large pieces of the resin fetch a very high price even in that country.

Zoological Society, April 28.—John Gould, F.R.S., V.P., in the chair. The Secretary read some notes on the principal additions to the Society's Menagerie during the month of March,

and called particular attention to four Burrowing Owls presented by G. Wilks, Esq., C.M.Z.S., and to a wood-loving antelope (*Cephalophus sylvicultrix*), obtained by purchase.—Mr. J. E. Harting, F.Z.S., exhibited an unusually fine specimen of the Dusky Redshank (*Totanus fuscus*) in summer plumage, recently killed near London.—The Rev. H. B. Tristram exhibited two skins of *Salicaria melanopogon*—a rare European warbler, obtained near Ettawah, north of Agra, being the first recorded occurrence of this species in Central India.—Dr. E. Hamilton communicated an extract from a letter addressed to him by his nephew, Capt. Hamilton, lately commanding detachment at Port Blair, concerning the true locality of the so-called "Andaman Monkey," now in the Society's Gardens, which was stated to have been imported into the Andaman Islands from Burmah.—A letter was read from Dr. John Anderson, F.Z.S., of the Indian Museum, Calcutta, announcing that he had obtained a specimen of the dolphin of the Irrawaddi, which turned out to be a species of the genus *Globiocephalus*.—Mr. St. George Mivart read a memoir on the axial skeleton of the tailed batrachians, containing observations on the development and mode of formation of the spinal column of these animals.—A communication was read from Mr. Gerard Krefft, C.M.Z.S., containing the description of a new and very remarkable animal, allied to *Lepidosiren*, recently discovered in the fresh-waters of Queensland. Mr. Krefft considered this animal to be an Amphibian, and referred it to the genus *Ceratodus* of Agassiz, proposing to call it *Ceratodus Forsteri*, after Mr. Wm. Forster, its discoverer.—Mr. R. Swinhoe, F.Z.S., read a paper on the Mammals of Hainan, as observed during his recent visit to that island. The number of species enumerated was 21, amongst which was a hare, believed to be undescribed, and proposed to be called *Lepus hainanus*.—A second communication was read by Mr. Swinhoe, being a list of reptiles and batrachians found in the same island, with notes on their habits. The species had been determined by Dr. Günther.—Mr. D. G. Elliot, F.Z.S., read a paper on some new genera and species of birds belonging to the families *Formicariidæ*, *Pachycephalidæ*, and *Sylviidæ*. These were proposed to be called *Xenorhynchus pachycephaloides* (from New Caledonia), *Clytoctantes alixii* (from Ecuador), and *Calamoherpe subflavescens* (from Dahouria).—Messrs. Sharpe and Dresser read a paper "On some new or little-known points in the economy of the common swallow" (*Hirundo rustica*). The authors drew special attention to the changes of plumage through which this species passed during its residence in Southern Africa.—Mr. G. B. Sowerby communicated descriptions of 48 new species of shells from various localities.

CARDIFF

Naturalists' Society, April 5.—A paper was read on "Water in its different forms," by Mr. Vivian. A large number of very interesting objects contained in various descriptions of water were shown under the microscope, among which the most interesting were the contents of two vials, both from a shallow, muddy-looking bog on Splottland Moor, which furnished a puzzle for the members of the Society, and a satisfactory solution of which is still a desideratum. One of these was filled with the yellow gelatinous substance which deposits the famous bog iron, consisting chiefly of a very minutely twisted conferva, which Sir C. Lyell, after Ehrenberg, called *Gallionella*, but which is now more commonly named with Griffith *Didymohelix ferruginea*. Within this yellow substance was an innumerable swarm of bluish-green animalcules (*Stentor polymorphus*), with several specimens of two other kinds of Vorticellineæ—viz., *Urocentrum turbo* and *Cænomorpha medusula*. This is a very funny living parasol, worth seeing. The other vial, except the yellow stuff, which was eliminated on purpose, had the same trumpeters (*S. polymorphus*), which, wonderful to say, on being corked disappeared, collapsing all at once, and leaving nothing behind but a milky, bluish-green water, which still keeps its colour after several days. We shall wait to see if any living creature will ever come out of it by spontaneous or hemigerminal generation. From another vial a good harvest of phytozoa (*Euglenæ*) was expected, all the water looking deep yellow green; but this water, too, never settled as it does when living *Euglenæ* are collected, a clear proof that here also the animals come to grief—when and how?—that is the question the members of the Cardiff Naturalists' Society wish to have solved by some of our readers. In reference to the contents of a single drop of water, Prof. Gagliardi remarked:—It was in the same gathering that an extremely minute protoplasmic bit of living matter was seen. Under a magnifying power of 500 diameters this floating atom looked like a little comma, scarcely half the size of the *Surirella minutæ* that was living with it. Another unusually large specimen of *Amœba* came out of a gathering in a pond in Cathays; it looked somewhat like a streaming worm. I have no doubt that it was but a stronger variety of the *Amœba princeps*; yet, seeing how steadily it kept to the vernicular form, with very slight changes now and then, I should call it rather *A. vermicularis*.

GLASGOW

Geological Society, April 14.—Professor John Young, President, in the chair.—Mr. James Geikie, Vice-President, read a letter from Mr. Croll, of the Geological Survey of Scotland, referring to a paper contributed by him to the transactions of the Edinburgh Geological Society, on "Ancient River Channels buried under Drift," and on which Mr. John Young had made some remarks at a previous meeting. An animated discussion ensued on the points referred to in the letter.—Mr. D. Bell read a paper entitled "Aspects of Clydesdale during the Glacial Period." He gave a sketch of the succession of events which had been made out from the dawn of the glacial epoch, down to a comparatively recent geological time—beginning with the period of land-ice, and ending with the "last elevation" of the land. As to the period of land-ice, he thought the first point which they had to fix in their minds and try to get some adequate notion of, was the great thickness and mass which the ice attained. He did not know where they could get a better or more impressive idea of this than by ascending Ben Lomond. He described the marks of the ice, the grooved and polished surfaces, that may be traced from the shore at Rowardennan to a great height on Ben Lomond, observing that the ice evidently did not come *down* the mountain, but moved *along* or *across* it. He also referred to similar markings on the neighbouring hills, and the conclusion these all led to was, that the entire hollow in which Loch Lomond now lies was at one time filled from side to side with a mass of ice which only the higher mountains overtopped, and from which Ben Lomond itself only rose as a little rocky islet. Having shown that this was quite in harmony with what had been observed in other parts of the country, among the mountains of Perthshire, Aberdeenshire, and Argyleshire, he said he had no doubt the great depth of Loch Lomond in its upper part, where it is not less than 100 fathoms, was due mainly to the action of the ice, which was there compressed and imprisoned, forcing its way between the hills. In the lower part it got spread out more, so that although it had softer rocks to deal with, it produced comparatively a less effect. He then alluded to similar proofs of glacial action in the neighbouring parts of the Firth of Clyde—at Garelochhead and along the shores of that loch, of Lochlong, Lochgoil, and the Holy Loch—on the hills behind Gourock, Greenock, and Port-Glasgow—on Dumbarton Castle rock—on the flanks of the Kilpatrick hills—on the opposite side of the river near Bishopton, and all over the lower grounds from the Gleniffer and Cathkin braes on the one side, to the Campsie hills on the other. The persistency and uniformity of direction of these markings, alike in the valley and over the neighbouring hills, sufficiently proved the great volume the ice must have attained. He then proceeded to consider the formation of the boulder clay, holding that the lower till or clay was the product of this great sheet of land ice, and that the upper boulder clay was more probably due to sea ice during the period which followed, when the land was submerged to a depth of several hundred feet beneath its present level. He referred to the beds of sand found interspersed throughout the boulder clay, and thought that whether the theory of land or sea ice were adopted, these might be explained without supposing, as some did, that there had been so many distinct "breaks" in the glacial period. He pointed out the narrowness of the basis on which such conclusions rested, only a very few of the borings which had been adduced showing more than one or two beds of sand; and maintained that the one "break" of which we seemed to have evidence, between the first and second depression of the land, was sufficient, if we considered and gave due weight to the gradual advance and retreat of the ice in each case, and the accumulations of water that must have been caused thereby, to account for all the beds of sand that had been described. Coming to the "shell-beds" which had been found at various heights in the Clyde valley, from Airdrie, at 510 feet, down to Paisley, and from that to the present sea margin, he was of

opinion that the theory of "unequal elevations," which had been proposed to account for these beds being found at so many different levels, was quite untenable, being a most objectionable and unphilosophical theory in every respect. He believed the true explanation was to be sought, not by supposing the beds to have been strictly *contemporaneous*, or formed at the same level, and afterwards "unequally elevated," but by considering them to have been *successive*, formed at different levels during the gradual sinking or rising of the land, as the depth of the sea, its freedom from ice, and other conditions, became favourable to the various forms of marine life, whose remains are found in the beds referred to.—Mr. John Young then exhibited some specimens of finely-laminated clay from the excavations in the College grounds, pointing out the traces of organisms which they presented, some of which were supposed to be of Annelides, others of Crustacea. Arrangements for the society's excursions during the summer months were afterwards announced, and the proceedings terminated.

PARIS

Academy of Sciences, May 2.—M. Le Verrier communicated a note by M. Aoust on roulettes in general.—The following papers on physical subjects were read :—A memoir by M. Becquerel on the cause of the electrical effects produced by the contact of metals with distilled water, in which the author, after discussing the opinions of previous writers on the subject, and describing his experiments, comes to the conclusion that these effects are due to the reaction of the water upon the gases absorbed by the inoxidisable metals, whilst those furnished by oxidisable metals arise from the presence of a slight coat of oxide upon their surface, which renders them positive relatively to metals not so protected. By M. J. Jamin and M. Cornu, notes in opposition to the results obtained by M. Croullebois with regard to the index of refraction of water; and a a reply by M. Jamin to the recent note by M. Renou on the latent heat of ice. A memoir by M. Lecoq de Boisbaudran on the constitution of luminous spectra, containing a comparison of the spectra of chloride, bromide, and iodide of barium, showing that an augmentation of mean wave-length in some degree proportional to the augmentation of molecular weight, is caused by the substitution of one halogen for another, as well as by the substitution of one metal for another. A continuation of M. P. Desains' researches upon calorific spectra. A note by M. E. Bouchotte, communicated by M. E. Becquerel, on the estimation of the relation existing between the dynamic work expended and the quantity of electricity produced in Holtz's machine, in continuation of a note upon the same subject presented in February last; and a note by M. Limouzin, presented by M. Bussy, relating to a communication by M. Duclaux on the formation of liquid drops, and remarking that the author, more than a year ago, presented to the School of Pharmacy an alcoholometric apparatus constructed upon the principle indicated by M. Duclaux.—A note by M. Lacoine, on the effects produced by the Aurora of the 5th April on the Turkish Telegraphic lines, was presented by M. Leverrier. The author observed a complete stoppage of transmission in the line from Pera to Semlin, the line being traversed by a strong current in the opposite direction, indicating a terrestrial current from north to south.—M. Descloizeaux presented a note on the crystalline form and optical properties of a compound of protochloride of platinum and triethylophosphine analogous to Magnus's salt.—The following strictly chemical papers were also read :—A note by M. Morren to the president on the combustibility of the diamond, and the effects produced upon it by high temperatures. The author stated that when heated by means of common coal, or brought to a white heat in a current of coal gas, diamonds become blackened on the surface, but without change of weight; with pure hydrogen no alteration is produced; with carbonic acid they lose lustre and weight. He added that diamonds burn readily when exposed to the blow-pipe flame of a glass-blower's lamp upon a piece of platinum, and that the whole substance does not burn with equal readiness, so that if the operation is interrupted, the surface of the residue shows numerous small equilaterally triangular faces belonging to minute octahedra.—A note on the solubility of chloride, bromide, and iodide of silver in salts of mercury, by M. H. Debray.—A memoir on a new process for the volumetric determination of copper, by M. F. Weil, communicated by M. Dumas. This process depends on the facts that in presence of an excess of free hydrochloric acid, and at a boiling temperature, the least trace of bichloride of copper gives a distinct greenish yellow tinge to its solution, and that under these circumstances protochloride of tin instantly converts the salts of binoxide of copper into colourless proto-salts. The termination of the reaction is determined by means of bichloride of mercury, which produces the characteristic white precipitate of calomel with the slightest excess of chloride of tin.—A paper on the products of the fermentation of pyrotartaric acid and its homologues, by M. A. Béchamp. The author stated that as succinate of lime by fermentation furnishes butyric acid, with evolution of hydrogen and carbonic acids, its homologue, pyrotartaric acid, might also be expected to produce butyric acid, but that at the close of the operation the apparatus contains only carbonate of lime, whilst the gases evolved are carbonic acid and marsh gas. He also noticed the behaviour of several organic acids when fermented by means of chalk in presence of a small portion of flesh.—A note by the same author on the preparation of pyrotartaric acid. He operates upon anhydrous tartaric acid mixed with pumice, and obtains about 20 per cent. of pyrotartaric acid.—A note by M. F Pisani on the minerals obtained in the copper mine of Cap Garonne (Var) was communicated by M. Descloiseaux. These minerals are Adamine (of which the author gives analyses), Chalcophyllite, Lettsomite, Brochantite, Olivenite, Mimetese, Azurite, Malachite, and Barytine.—M. Prunières forwarded some specimens of charcoal and carbonised wood, collected in the Lozère from a sedimentary deposit between granite and basalt, at a depth of 40 metres. Some of them bore remarkable notches, "which will have to be studied from another point of view."—M. Duméril communicated some observations by M. E. Moreau, on the structure of the *chorda dorsalis* in *Amphioxus lanceolatus*. Appended to the *chorda dorsalis* in this fish, the author finds neurapophyses and hæmapophyses; he also describes the sustaining pieces of the fins, especially the dorsal, which he regards as representing fin-rays amalgamated with interspinous pieces.—M. Brongriart communicated a memoir by M. A. Gris, containing anatomical and physiological observations on the pith in ligneous plants. The author distinguishes three medullary elements, namely, *active*, *inert*, and *crystalligenous* cells. When the first and third of these are present, he calls the pith *homogeneous medulla*; the first and second constitute a *heterogeneous medulla*. From the presence of starch in the active cells of the pith in large branches and trunks showing from eighteen to twenty-eight circles of growth, the author concludes that the supposed inertia of the medulla is by no means certain. He regards it as an organ of reserve.

BERLIN

Royal Prussian Academy of Sciences, January 6.—The following scientific paper was read :—On the theory of the newest Electrophorous machines and on supernumerary conductor. By M. Riess.

January 17.—Professor W. Peters read a memoir on the Ductus pneumaticus of the lower jaw in the crocodile.

February 10.—Professor W. Peters read a memoir on the African monitors and their geographical distribution, in which he indicated the synonymy and distribution of the following species :—*Monitor niloticus*, Hasselqu.; *M. saurus*, Laur.; *M. albogularis*, Daud.; *M. ocellatus*, Rüpp.; *M. exanthematicus*, Bosc; and *M. griseus*, Daud. He adopts the Cuvierian name for the genus, as it is three years earlier than Merrem's *Varanus*. Prof. Peters also read a contribution to the knowledge of the herpetology of South Africa, including a list of a few species of lizards, snakes, and batrachia, chiefly from Hantam, in the Calvinia district. A new species of gecko, *Chondrodactylus angulifer*, is described and figured by the author; it is the type of a new genus, allied to *Stenodactylus*, but destitute of claws. The author also remarks upon the characters and synonymy of *Agama hispida*, Linn.; *A. atra*, Daud.; *Eremias capensis*, Smith; and *Euprepes vittatus*, Oliv.; and figures two small species of tree frogs, namely, *Arthroleptis Wahlbergii*, Smith; and *Hyperolius tuberilinguis*, Sundevall. He proposes to change the name of his *Hemidactylus variegatus* to *H. picturatus*.—A memoir by M. Kostka, on the determination of the ellipsoidal figure of equilibrium of a homogeneous mass of fluid rotating round a fixed axis, when its density and period of rotation are known, was presented by M. Weierstrass.

February 14.—Professor Dove read a note on the compensation of the cold observed in Europe in January of the present year, by an unusual elevation of the temperature in America.—Professor Ehrenberg made a preliminary communication on the beds

of Bacillariæ in the high lands of California, in which he noticed the occurrence of great beds consisting wholly of Diatomaceæ in various parts of the Californian territory.—M. Weierstrass presented a memoir by M. Ketteler on the influence of ponderable molecules upon the dispersion of light, and upon the import of the constants of the dispersion formulæ.

February 17.—The papers read at this meeting were chiefly of historical or antiquarian interest, but they included an important contribution to the history of algebra in Germany, by Prof. Gerhardt, of Eisleben.

February 24.—Prof. A. W. Hofmann read a paper on the preparation of the ethylamines on the large scale. The author finds that the most volatile of the subsidiary products of the manufacture of chloral, if condensed and digested at 212° F. with a strong alcoholic solution of ammonia, furnishes, by a simple subsequent treatment described by him, a considerable proportion of hydrochlorates of the amine bases, which may be isolated by the addition of concentrated solution of soda. Professor Hofmann also read some supplementary remarks upon the products of the desulphurisation of diphenylosulphocarbamide.

German Chemical Society, April 11.—Two papers by L. Carius were communicated. The first describes a new method of preparing dibrominated acetic ether, by the action of bromine on acetic ether. The second announced new syntheses of maleic and phenaconic acids, by the use of disodic acetic ether, $C\ H\ Na_2\ C\ O\ O\ C_2\ H_5$ on bibromoacetic ether, and on bibromosuccinic ether. — Messrs. Schneider and Erlenmeyer have investigated normal iodopropionic acid. Treated with acetate of silver, this acid yields acetoxypropionic acid. —L. Fleury publishes researches on new derivations of allyle, viz. : $C_3\ H_5\ Cl_2\ N\ O_2$, $C_3\ H_5\ I\ Cl_2$ and $C_3\ H_5\ O\ H\ H\ Cl\ O$.—A. Ladenburg has discovered a distannic ethide, $Sn_2\ (C_2\ H_5)_6$. The vapour density serving to establish the formula of this compound was taken by Hofmann's method, the constant temperature being produced by distillation of oil of cloves. Chlorine and iodine separate the molecule producing

$$Sn\ (C_2\ H_5)_3\ Cl,\ \text{or}\ Sn\ (C_2\ H_5)_3\ I.$$

C. Liebermann reported on an easier method patented by himself, in conjunction with Messrs. Graebe and Caro, for preparing artificial alizarine. Instead of brominating anthracene they treat it with sulphuric acid. According to the quantities employed, either one, two, or three atoms of hydrogen are replaced by the group HSO_4. $C_{14}\ H_8\ (SO_3H)_2$ fused with potash yields $C_{14}\ H_8\ (OH)_2$, and this is oxydised into alizarine $C_{14}\ H_6\ (HO)_2\ O_2$. Or they transform anthracene $C_{14}\ H_{10}$ first into anthrachinone $C_{14}\ H_8\ O_2$, and treat this substance with sulphuric acid. The compound $C_{14}\ H_6O_2\ (HSO_4)_2$ may then be transformed by fusion with potash into $C_{14}\ H_6O_2\ (OH)_2$. The compound $C_{14}\ H_5\ O_2\ (HSO_4)_3$ is transformed by this process into purpurine. A process lately patented by Bronner and Gubzkow for preparing alizarine was then severely criticised by Mr. Liebermann ; this process, consisting in fusing anthrachinone with potash, yields only a trace of a blue colouring matter, but no alizarine. He intends to return to this subject.—Professor Rammelsberg reported on the action of periodic acid on the oxides of thallium. Protoxide of thallium treated with periodic acid is partly converted into the iodate, and partly into peroxide of thallium. Sesquioxide of thallium, on the contrary, combines with periodic acid.—V. Meyer has continued his researches on the synthesis of organic acids, by treating sulpho-salts with formiates. Sulphonaphthalate of potassium, when fused with formiate of sodium, produces acid sulphite of potassium and naphtalinecarbonate of sodium. Chlorosalylate of potassium treated in the same way, however, yields chloride of potassium and benzoate of sodium.

April 25.—Messrs. Krämer and Pinner have continued their researches on aldehyde by submitting it to the action of chlorine-gas. Conducted in this way, the reaction takes place in a different manner from that described by Wurtz, who, pouring an excess of aldehyde into large vessels filled with chlorine, obtained chloride of acetyle and its compound with aldehyde. Neither of these substances has been obtained by Messrs. Krämer and Pinner. Nor is ordinary chloral obtained by this reaction, the aldehyde being entirely converted into the chloral of the condensed aldehyde, C_4H_6O, known as crotonic aldehyde. Crotonic chloral is a liquid, boiling at 165°, and forming with water, but not with alcohol, a crystalline compound. By oxydation it forms trichlorocrotonic acid. Caustic potash transforms it into the corresponding chloroform $C_3\ H_3Cl_3$ and its derivative $C_3\ H_2\ Cl_2$ (bichlorinated allylene ?) boiling at 78°. — C. Martius has studied the combinations of chloral with alcohols. Amylic alcohol forms with it a beautifully crystallised compound. Mercaptans also combine with chloral. — F. Rüdorff communicated a method of determining with great exactness the quantities of pure glacial contained in acetic acid of different degrees of concentration. It is founded on the melting-points of pure acetic acid (16°·7 C.) and its mixtures with water. Commercial glacial acetic acid contains often as much as 10 per cent. of water, and then melts at 10°·3 C., or even 15 per cent., and then melts at—0°·2.

DIARY

THURSDAY, May 12.

Royal Society, at 8.30.—On the Results of the method of investigating the Nervous System, more especially as applied to the elucidation of the Functions of the Pneumogastric and Sympathetic Nerves in Man : Dr. A. Waller (Croonian Lecture).

Society of Antiquaries, at 8.30.—On recent Discoveries at Rome : J. H Parker.

Mathematical Society, at 8.—Mechanical description of a nodal bicircular Quartic : Prof. Cayley.

Zoological Society, at 8.30.—Notes on some points in the Anatomy of certain Kingfishers : Dr. Cunningham.—On the taxonomic characters afforded by the muscular sheath of the œsophagus in Sauropsida and other Vertebrates : Mr. George Gulliver.—Notes on the myology of *Platydactylus Japonicus* : Mr. Alfred Sanders.—On the Hirundinidæ of the Ethiopian region : Mr. R. B. Sharpe.

Royal Institution, at 3.—Electricity : Prof. Tyndall.

FRIDAY, May 13.

Royal Institution, at 8.—Descent of Glaciers : Rev. Canon Moseley.

Royal Astronomical Society, at 8.

Quekett Microscopical Society, at 8.

SATURDAY, May 14.

Royal Institution, at 3.—Comets : Prof. Grant.

MONDAY, May 16.

London Institution, at 4.—Botany : Prof. Bentley.

TUESDAY, May 17.

Institution of Civil Engineers, at 8.—Discussion upon Mr. Briggs paper on Rotary Fans.—On Recent Improvements in Regenerative Hot Blast Stoves for Blast Furnaces : Mr. E. A. Cowper.

Royal Institution, at 3.—Moral Philosophy : Prof. Blackie.

Anthropological Society, at 8.—Music considered as a Racial Characteristic : Mr. H. F. Chorley.

Statistical Society, at 8.—On the incidence of Local Taxation in the United Kingdom : Prof. Thorold Rogers.

THURSDAY, May 19.

Royal Society, at 8.30.

Society of Antiquaries, at 8.30.

Royal Institution, at 3.—Electricity : Prof. Tyndall.

Chemical Society, at 8.—On some Bromine Derivatives of Coumarine : W. H. Perkins, F.R.S.

BOOKS RECEIVED

English.—Other Worlds than ours : R. A. Proctor (Longmans.)—A New Manual of Logarithms ; Dr. Bruhns (Williams and Norgate.)—Donkin's Acoustics (Macmillan.)—Thorell on European Spiders, Part 1 (Williams and Norgate.)

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