THURSDAY, MARCH 30, 1871

FIRST REPORT OF THE ROYAL COMMISSION ON SCIENTIFIC INSTRUCTION AND THE ADVANCEMENT OF SCIENCE.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

May it please your Majesty—

WE, the Commissioners appointed by Your Majesty to make Inquiry with regard to Scientific Instruction and the Advancement of Science, humbly beg leave to present to Your Majesty the following First Report :—

1. We have heard the evidence of witnesses in reference to the following subjects, forming part of our inquiry, viz., the Royal School of Mines, the Geological Survey of Great Britain and Ireland, the Mining Record Office, and the Museum of Practical Geology, at present located in Jermyn Street; and also concerning the Royal College of Chemistry, at present lodged in a building in Oxford Street; which institutions are under one head, entitled Director-General of the Geological Survey of Great Britain and Ireland and Director of the Royal School of Mines.

2. There is no necessary connection between the direction of the Geological Survey of Great Britain and Ireland and the government of the Royal School of Mines.

3. The Royal School of Mines and the Royal College of Chemistry, which practically constitute one School of Pure and Applied Science, are not organised in such a manner as to enable them to perform efficiently the work for which they were originally, or are, at present, intended. We base this conclusion upon three grounds, (*a*) The absence of a chair of Mathematics, (*b*) The absence of Physical or Biological Laboratories in which students can receive practical instruction, (*c*) the insufficiency of accommodation in the Royal College of Chemistry.

4. The officers of the Geological Survey are greatly hindered in their work by want of accommodation; for although their number has been quintupled during the last twenty years, the space originally allotted to them has not been increased.

5. The space allotted to the Mining Record Office is already insufficient for the proper reception and arrangement of the valuable series of documents accumulated there; and for the accommodation of the public who desire to consult them.

6. The collections in the Museum of Practical Geology require greater space for their proper display than is at present afforded.

7. In order to provide a remedy for the inconveniences which have been enumerated, we recommend: (*a*) That the building in Jermyn Street be given up to the Survey and to the Museum, with the reservation that the Lectures to Working Men be delivered as heretofore in the Theatre; (*b*) That the building in Oxford Street be vacated by the Royal College of Chemistry; and (*c*) That the Mining Record Office be lodged with the Statistical Department of the Board of Trade; or, failing accommodation there, in the building now occupied by the Royal College of Chemistry.

8. Without expressing any opinion, at present, as to the policy of Government Schools of Science, your Commissioners, having to deal with the Royal School of Mines and the Royal College of Chemistry as Institutions which have existed for 20 years, and which, during that period, have turned out a large number of well-instructed Students, consider that such steps should be taken as may be necessary to render their Teaching thoroughly efficient.

9. With this object we recommend that the two Institutions be consolidated; that Mathematics be added to the Courses of Instruction now given; and that sufficient Laboratories and Assistance for giving Practical Instruction in Physics, Chemistry, and Biology, be provided.

10. The Institution thus formed (hereinafter called the "Science School") may be conveniently and efficiently governed by a Council of Professors, one of that body acting as Dean.

11. We have further heard evidence concerning the Buildings at South Kensington, now nearly completed, and intended for the reception of a projected School of Naval Architecture and Science; and we recommend that the Science School should be accommodated in these buildings. We have given careful attention to the considerations in favour of the retention in Jermyn Street of the Technical Instruction in certain branches, but we are of opinion that these considerations are outweighed by the great advantages to be derived from concentration.

12. We have further heard evidence concerning the Royal School of Naval Architecture and Marine Engineering, now conducted at South Kensington; and we recommend that the theoretical instruction of that school should in future be given in the Science School, the general instruction in Mathematics, Physical Science, and Mechanical Drawing thus becoming common to both schools. We also recommend that no additional buildings, and no reconstruction of the temporary buildings at present occupied by the Royal School of Naval Architecture and Marine Engineering, should be undertaken, until a further Report has been received from this Commission.

13. We have further heard evidence concerning the system of teaching Elemementary Science under the Science and Art Department; and we are of opinion that the quality of the Instruction given under this Department would be greatly improved if the teachers received Practical Instruction in Elementary Science. Such instruction has, indeed, already been given with marked advantage, although only to a limited extent. The Science School will be available for the instruction of many Science Teachers throughout the country; but we reserve for a Further Report any expression of opinion as to the precise character of such Instruction, and as to the conditions under which it shall be accessible.

14. The organisation of, and accommodation required by, the Science School (including its Technical Branches) and the Royal School of Naval Architecture, will be dealt with in detail in a further Report.

All which we humbly submit for Your Majesty's gracious consideration.

(*Signed*) DEVONSHIRE
LANSDOWNE, JOHN LUBBOCK, J. P. KAY SHUTTLEWORTH, B. SAMUELSON, W. SHARPEY, THOMAS H. HUXLEY, G. G. STOKES, HENRY J. S. SMITH.
J. NORMAN LOCKYER, Secretary
March 9, 1871

THE IRON AND STEEL INSTITUTE

NOTWITHSTANDING the pre-eminent scale on which the mineral and metallic industries of Great Britain are conducted in practice, it must nevertheless be admitted that, as a rule, we have hitherto been long and far behind our continental neighbours in respect to possessing institutions calculated to aid in developing or advancing the scientific or practical bearings of such subjects, or to afford the means of intercommunication between those occupied or interested in such pursuits. To this rule, however, we now have, at least, one honourable exception in the case of the Iron and Steel Institute, now holding its second annual meeting in London, and the establishment of which, in 1869, must be looked upon by all interested in the application of science to the arts, not only as a decided step forward in the right direction, but may even be regarded as inaugurating a new era in the history of the so important iron and steel manufactures of Great Britain.

It has been often the fashion, possibly also with some show of justice, to represent the British manufacturer as a narrow-minded individual surrounded by and, as it were, isolated from even the rest of his own class by a sort of atmosphere heavily loaded with trade jealousy and manufacturing secrets. The experiment of the last two years, however, has amply proved, at least in the iron trade, that it only required the establishment of such an association as the Iron and Steel Institute, to present him in a very different and more favourable light; for the mere fact of bringing together from different parts of the country men all deeply interested in similar pursuits, has at once dissipated the petty jealousy inseparable from a previous state of isolation, and has, besides indicating how much can be effected by combined action, convinced the majority at least, that the interests of the individual manufacturers are intimately bound up with the advancement of the country at large.

The Iron and Steel Institute now numbers some four hundred or more members, including the principal iron-masters and others practically engaged in the production or working of iron and steel, or connected more or less directly with those manufactures by reason of their scientific attainments in metallurgy or the allied sciences; so that, taking into consideration that the Institute has as yet been barely two years in existence, this rapid progress must be regarded as the most convincing proof that a real want for such an association had been very generally felt.

The consideration of what may be termed commercial in contradistinction to technical, questions, such as, for example, those connected with wages, trade regulations, &c., do not come within the sphere of the Institute; the objects of which, besides affording a means of communication between its members, are restricted to the acquisition and dissemination of information, and the discussion of all scientific and practical subjects bearing upon the production and manufacture of iron and steel.

The methods by which these objects are sought to be attained are threefold—viz., by the publications issued by the Institute; the formation of committees to examine into and report upon subjects of special interest; and by general meetings of the members, two at least in each year, one of which is held in London in the spring, whilst the other or autumn meeting is located in the country, in some one of the manufacturing districts, as may be determined by the Council.

The excellent attendance at both the London and the country meetings at Middlesborough and Merthyr Tydvil, under the able presidency of the Duke of Devonshire, as well as in the sustained interest which has been kept up in the proceedings of the Institute, have already proved it to be a success, besides showing how much may be effected by bringing from all parts, into personal contact, those interested in the same occupations, whereby a mutual interchange of ideas and a spirit of generous rivalry is established, which cannot fail to do good to the individual, as well as tend to the progress of the industry of the country at large.

An examination of the publications issued by the Institute up to the present date, will amply justify the assertion that they fully maintain the high position which it aspires to, whether they be judged from a strictly scientific or technical point of view, and that they are entitled to rank alongside any which emanate from even the best institutions of like character on the Continent. For the years 1869 and 1870 they appeared in the form of Transactions; in all seven numbers, which contained the proceedings of the Institute, prefaced by an able inaugural address delivered by its first president, the Duke of Devonshire, who himself is largely interested in iron mines and smelting works, along with a series of well-illustrated papers on various subjects relating to iron and steel-making communicated by members of the Institute.

At the commencement of the present year, however, the Council decided that these Transactions should give way to the more convenient form of a Quarterly Journal, and the first number made its appearance on the 1st of February as a volume of 276 pages, copiously illustrated by well got-up plates, and containing numerous valuable communications to the Institute; as, for example, by Mr. J. L. Bell, on the chemical phenomena of iron smelting; Mr. Siemens on pyrometers; Mr. Kohn on alloys of iron and manganese, &c., whilst in addition to the usual proceedings of the Institute a new and important feature was introduced in the shape of quarterly reports from the two secretaries; the general secretary giving a summary of what has been done in Great Britain in connection with these subjects outside the Institute, whilst the foreign secretary communicates a report on the progress of the iron and steel industries abroad, being an attempt to supply a long-acknowledged desideratum by keeping the public here informed as to what is being done in connection with the production and manufacture of iron and steel in foreign countries.

The present meeting opened on Tuesday with an address from its new President, Mr. Henry Bessemer, so well known in connection with the process which now has effected a world-wide revolution in the manufacture of steel; whilst on the two following days various communications were to be brought forward by Messrs. Bell, Ferrie, Kohn, Tate, Walker, and others, besides a lecture by Prof. Roscoe, F.R.S., on Spectrum Analysis, with special reference to the manufacture of iron and steel.

DAVID FORBES

THE ZOOLOGICAL RECORD ASSOCIATION

A FEW weeks since we announced the establishment of an association for the purpose of continuing the publication of the *Record of Zoological Literature*. Within the last fortnight this new body has been definitely constituted, its rules settled, and a council chosen to manage its affairs. A few words concerning the Association and its objects may, therefore, not be out of place.

The *Record of Zoological Literature* was commenced in 1865 as the private undertaking of its publisher, Mr. Van Voorst, under the editorship of Dr. Albert Günther, F.R.S., who in addition to the superintendence of the whole, himself contributed no small part of the contents of the volume, namely, the portions relating to Mammals, Reptiles, and Fishes. The remaining groups of animals were placed in the hands of Prof. Newton, Dr. Eduard von Martens, Mr. Spence Bate, Mr. W. S. Dallas, Prof. Reay Greene, and Dr. Cobbold. The extreme value of the work to all zoologists was at once recognised by those who became acquainted with it; but, owing to the notorious difficulty of making purely scientific publications known to the persons most desiring them, its sale was limited even in this country, while the high price of the volume kept it almost entirely out of the foreign market. Still publisher, editor, and contributors struggled on, some of the latter even foregoing the scanty pittance they were entitled to receive for their labour. With the third annual volume the undertaking would probably have ceased entirely, but for the generous intervention of the Biological Section of the British Association, which evinced so strong an interest in its continuance that the Committee of Recommendations was prevailed upon to sanction a grant of 100*l.* in its aid—a grant which has since been annually renewed. At the same time, chiefly in consequence of representations made by influential members of the Association, the experiment was made of selling the volume in three separate parts. But this "division of the records" brought no more "comfort" to its supporters than the same process did to the hero of "Locksley Hall;" for the result was that, while no doubt a larger number of zoologists altogether availed themselves of the opportunity of purchasing at a comparatively low price the parts in which they were especially interested, a smaller number of entire copies were sold, and the publisher's loss became so considerable that he positively refused to continue the work.

At this juncture the Zoological Record Committee of the British Association appointed at Liverpool last year, after making several attempts to place the work on a new footing, arrived at the conclusion that the only way of continuing it was by means of an Association with that especial object, and set to work to develop itself accordingly. The process, we believe, was not effected without the normal concomitant symptoms of yelk-cleavage, but these have been got over, and the embryo is now before the world, a promising entity, which, we trust, will, after a little more nursing, maintain an independent existence—for that, of course, is the intention of its producers.

Besides the grant from the British Association before mentioned, aid has been rendered for the forthcoming volume by the Zoological Society of London, in the shape of the interest of a legacy lately bequeathed to the Council of that Society for the furtherance of zoological science, and a very respectable amount of guarantors to the amount of 5*l.* each stand godfathers to the newly-born Association. These consist of nearly all the leading zoologists or well-wishers to zoology of the day, and, glancing over the list, we find upon it such names as assure us that the utmost divergence of views has not hindered their bearers from combining in support of the cause.*

And now a few words as to the objects of the *Zoological Record*, and on the manner in which it has been conducted The enormous range which Biological or even Zoological Science has of late years taken, has produced a correspondingly enormous mass of literature, a compendious knowledge of which is absolutely necessary to every one engaged in the study. Many have been the cases when, after a long and tedious investigation of some abstruse point has been fully or nearly accomplished, the toiling zoologist has found his labours forestalled by some one else, who has been working also in the same direction, and has published the results in some little-known journal mayhap only a short time before. We do not say that such labour is thrown away; but it will be admitted that such anticipation by another is a sore discouragement, and may be anybody's fate. Now, it is one of the main designs of the *Zoological Record* to prevent, so far as it is preventible, this loss of time, and there can be little if any doubt that the publication of an annual volume showing what has been done must most effectually point out what remains to do. An explorer starting off to make geographical discoveries in Africa or the Polar Regions would have little chance of success without knowing what tracts have been already visited. Just then, as the publication of maps or charts is absolutely necessary to produce original geographical researches, so the publication of an annual like the *Zoological Record* is necessary to produce original researches in those regions of Biology to which it refers. The only question is how far the volumes already published have fulfilled their purpose. The recorders, we are sure, are content to have the value of their labours judged by their fellows, and of what nature that judgment is, the unanimous approval of Section D of the British Association is a sufficient test. It must be observed that the ideal "record" of its authors is something more than a mere "report," while it is certainly not a "review." The distinction is somewhat difficult to define, and not easy to maintain. It may be that the recorders, being human, have not always succeeded in maintaining it; but it seems to us remarkable that they have so nearly succeeded. In the first volume this is especially to be observed, and since there was no exemplar before the eyes of the contributors while working, we must attribute this singleness of purpose to the good drilling of Dr. Günther, who originally planned the campaign, wherein he was no less the active man-at-arms than the skilful commander-in-chief. Various changes have been made in the corps of recorders, but of the seven contributors to the first volume four took part in the last, while several recruits have from time to time been enlisted, and the last muster-roll includes Messrs. Rye, Kirby, and Marshall, together with Prof. Percival Wright,—Mr. Spence Bate, Prof.

* To take only a few by way of example, there are Profs. Owen and Huxley, Drs. Gray and Sclater, Canons Kingsley and Tristram, Messrs. Darwin and Jenyns.

Reay Greene, and Dr. Cobbold having retired from the ranks. As regards the future, Dr. Günther, we may state, has resigned the editorship to Prof. Newton, who cannot do better than follow generally in the footsteps of his predecessor, but we are glad to say that the founder will still continue his admirable contributions, for which no one in this country is more fitted. The rest of the administration is not, we believe, definitely settled, but there is little fear that it will not be as efficient as ever, and we wish prosperity to its useful labours.

But before we dismiss the subject, we should like to add a few suggestions, both to the recorders in particular and to the scientific public at large. To the former we would say that as brevity is the soul of wit, so it is of recording. There have been occasions, it must be owned, when this virtue has been disregarded. Let there be no indulgence in "paste-and-scissors-work." It is no doubt a hard and perhaps a dangerous matter to attempt an abstract of what some authors are pleased to term specific or generic "characters"—extending, it may be, over a whole page In such cases by far the best plan would be simply to state that such so-called "characters" are too diffuse for reproduction and too complex for condensation. In this way all chance of misrepresenting an author's meaning—the greatest danger that a recorder has to run—would be avoided, while a gentle hint would be conveyed to a wordy writer that, as it was said of yore, "*verbositas auctoris artis calamitas*." Of course this treatment should not be practised but on proper provocation, or the recorder will justly be held to be angular rather than angelic, and this last is the character he ought to bear, whether he may ever deserve or not the title of the "Recording Angel." To the scientific public we may declare that the present is an occasion when they ought to come forward and freely encourage the new Association. The chemists, we know, are stirring, and very properly, for a similar annual, and we believe our herbaceous brethren would gladly hail a *Botanical Record*. What chance of getting one so good as by showing that the *Zoological Record* can be made to preserve an existence independent of all grants from scientific bodies, though in its time of nonage such extraneous help was still needed?

OUR BOOK SHELF

The Land of Charity. A Descriptive Account of Travancore and its People. By the Rev. Samuel Mateer, F.L.S. (London: John Snow and Co. 1871.)

THIS book is the result of material collected and observations made during nine years' residence of a missionary in our great Indian empire. Its pages are, of course, chiefly devoted to an exposition of the different forms of worship and belief, and the progress of missionary work amongst the native population; but the author acknowledges the claims of Science by giving three chapters to the Natural History of Travancore and the economic uses of the plants of the country. With regard to the Animal Kingdom, we are told "a curious story of a crocodile which attempted to seize a cow that was grazing near its haunts, fastened to a stake by a long rope. The monster had nearly reached the wooden post before it was perceived by its intended victim. On discovering its danger the terrified cow rushed round and round, and the rope caught the crocodile in such a manner as to wind around its body and the post, so that it was held firmly until seen and dispatched by the owner of the cow." Snakes are, as we all know, very abundant in India, but it is curious to know that in 1862, in Bengal alone, 2,394 persons met their deaths from the bites of these reptiles, and it is further estimated that, throughout the whole of India, not less than 10,000 persons annually die from this cause. Though it is a fact that heaps of Indian plants, having no truly recognised economic or medicinal value, are reputed by the natives to cure snake-bites, our author tells us that no certain specific is known, ammonia being probably the most useful medicine in these cases. The cultivation of the Tapioca plant, which is a native of S. America, seems to be spreading in India. The best Tapioca comes into this country from Rio de Janeiro, but large quantities are also shipped from Singapore, the plant being cultivated in the Straits on account of its commercial value. It appears also to be grown in Travancore, and yields the natives an abundance of wholesome food. In districts where water is scarce, or in times of drought, they almost exist on the roots. It would appear, from the remark made by the author of the presence of a poisonous juice in the roots, that only one species of the Tapioca or Cassava plant is grown, and that the *Manihot utilissima*, Pohl, or bitter Cassava, the poisonous properties of which, however, are thoroughly dispelled by heat.

J. R. J.

The Food, Use, and Beauty of British Birds, &c. By C. O. Groom-Napier, F.G.S., &c., author of "The Book of Nature and the Book of Man," "Tommy Try," &c. New Edition, 18mo, pp. 88. (London, Groombridge, 1870.)

THE author says that his book was, by an eminent living anatomist, termed a "delightful concentrated essence of British Ornithology;" but it appears that the British public were so wilfully blind to its merits that they refused to buy it, for the so-called "new edition" is simply a re-issue of the original unsold sheets with a new title-page, a little padding in the shape of "opinions of the Press," and a new preface, to eke out which the Sea Birds' Preservation Act has been introduced. The table of contents, and, still more, the list of errata which were to be found in the old issue, have disappeared from the new one, as also has the photograph representing the author in Mr. Miles's starling-haunted shrubbery. The British public, we think, will ratify their former estimate of this book. A good work might certainly be written on the food and use of birds, and, as we know, many volumes are devoted to the illustration of their beauty, but with all deference to the author of "Tommy Try," we doubt if he is the man for the task.

The Forces of the Universe. By George Berwick, M.D. Pp. 127. (London: Longmans and Co., 1870.)

WHAT could possibly have induced the author to "offer this work to the general public" (preface) we cannot tell, unless we are to attribute it to a "sudden seizure of enthusiasm." These sudden seizures, together with "revolutionary movements," "religious revivals," "insane wars" and "sunstroke," arise, as we find on p. 124, from similar causes, and these, it seems, are more than probably due to "an aberration of the normal molecular action of the nerve-centres, or an increased electrical tension or polarisation of the nervous element in the brain itself."

The aim of the work seems to be an attempt to prove the identity of electrical attraction and the attraction of gravitation. The author confesses that the idea is not original, but we may add that his arrangement, to say the least of it, of the English language certainly is, *e.g.* p. 43—"It has been ascertained that the deeper that we descend into the bowels of the earth, the temperature increases at the rate of," &c. On p. 41, "moreover, the

diversified configuration of the earth's surface, formed, as it is, of seas and continents of lands, &c., all which physical conditions having different powers of radiating and absorbing heat, also have the power of causing great local disturbances in this aërial ocean."

It is probably due to a mistake on the part of the printer that the pressure of the air in the latitude of Paris at the level of the sea has risen to 147,304 lbs. per square inch, but we cannot quite account for the statement on p. 39, that the earth revolves daily on its axis "from east to west," or again on p. 12, where common salt is made to consist of sodium and chlorine in "*equal* proportions."

The lines of force in a magnet have often been likened in shape to a double egg-cup, but we doubt if any of our readers have ever seen anything so charmingly *àpropos* as the following similitude. "They (the lines of force) also unite and cross over the equator of a magnet in the same manner that the peripheral nerves of animals decussate over the pons Varolii, and again separate to the opposite hemispheres of the brain." The whole book is written in an absurdly inflated style, such as, for instance, p. 88—"The intensified electricity in these regions will rather pour its fitful beams over the serrated edge of the circular icy continent," &c.; or p. 59—"The blood and the nerves and the muscles that composed his (man's) fabrication (!) moulder into dust, which, in the crucible of time, yields up protoplasm for vegetation." On the last page electricity "carries faithfully the thoughts of men far along the profoundly silent abysses of the deep blue sea." Space, however, compels us to take leave of Dr. Berwick's "bright plateau of cultivated intellectual existence."

LETTERS TO THE EDITOR

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

Botanical Museums

IN your excellent article on Botanical Museums, one point appears to have been overlooked, and to which, with your permission, I should like to call attention. I allude specially to the want of an extensive series of carefully prepared specimens and dissections illustrative of the principal modifications of form and structure to be met with in plants. To the ordinary student of botany, especially to the beginner, a series of herbarium specimens conveys about as much information as a similar collection of postage stamps would do. It is not until the pupil has made some considerable progress that he is in a position to make use of herbarium specimens with advantage to himself for anything more than superficial examination. The supply of fresh specimens in a large town like London is necessarily limited, if not in point of numbers, at least in variety. Would it not therefore be advisable in any future re-organisation of our botanical museums, to meet this want so far as it is possible to do so? A collection, such as I am alluding to, should comprise specimens selected and displayed in such a manner as to show the principal variations in the structure and form of the several organs of plants from the lowest to the highest. It should illustrate, so far as circumstances will allow, the comparative anatomy and physiology of plants much in the same way as the Hunterian Museum of the Royal College of Surgeons illustrates the peculiarities of animal life. In such a museum the system should be subordinated to the plants, not the plants to the system. I am quite aware that in all three establishments to which you call attention some specimens of the kind I refer to are to be found. In the Edinburgh Botanical Museum also are to be seen models and preparations made under the superintendence of Professor Balfour by several of his pupils. It is such specimens as these that for educational purposes it is so desirable to multiply and collect together in a separate department. Where, from the nature of things, such as the delicacy or minute size of the organ or what not, it is not possible to prepare a satisfactory specimen for reference, large models in wax or papier maché might be substituted with advantage. What teacher who has had to initiate the tyro into the complexities of the sphenoid bone or the disposition of the ovules, the structure of the anther, the development of the flower, the arrangements of the flowers in grasses, &c., but has longed for Brobdignagian models whereon to demonstrate the peculiarities of their formation. The organs themselves are often so small, and require so much practice with the use of the dissecting needle before they can be seen by the student, that it is very desirable to aid his preliminary labours as much as possible; to give him, at least, a general idea of what he is to look for in the living specimen. For want of this preliminary help specimens are often wasted by the inexpert pupil, who becomes disgusted because he is unable to see for himself what his books or his teachers tell him he ought to see. A good collection of microscopical preparations should also be provided to illustrate such points as require the use of the compound microscope. Probably the British Museum would be the most fitting place wherein to exhibit such specimens side by side or in conjunction with those illustrative of fossil plants. If some such plan as that hinted at in your article were adopted, we should have the general collections at Kew in conjunction with the gardens and Economic museum, the historical and structural collections at the British Museum, and the Trade Museum at South Kensington. I cannot conclude this letter without adverting to the facilities which exist at Kew for the determination of unknown plants, and particularly of plants cultivated in gardens. Thanks to the admirable arrangements made by former and by the present curator of the herbarium and their assistants, the determination of an unknown plant becomes, comparatively, an easy matter. MAXWELL T. MASTERS

Gardener's Chronicle Office, March 27

Occurrence of Glutton near St. Asaph

A CAVE has long been known to exist close to Plas Heaton, the property of Mr. J. R. Heaton, but as it was filled with brown earth nearly to the roof, and the entrance obstructed by large blocks of limestone, it could not be explored without some labour. Mr. Heaton has recently commenced opening it, and, among a large number of bones, has been rewarded by finding part of a jaw, which has been determined by Mr. Boyd Dawkins to be that of a glutton. This is a discovery of very great interest, as occurring in the district where we have already found the remains of reindeer, elk, &c., upon which the glutton principally feeds. The cave is situated on very much higher ground than any of the other bone-bearing caves of the district, and runs down into the hill with the bedding of the rock. Where the other end may be there is as yet no evidence to show, but it promises to be a cave of great extent, and, judging by the festoons of stalactite already arrived at, of great beauty also. Its chief interest, however, lies in the strong probability, from its size and position, that it will contain a very full record of the early natural history of the district, and the first results certainly encourage further exploration.

T. MCK. HUGHES

Splendid Meteors

ON Saturday evening last, March 25, at about half-past nine local time, I happened to be observing some stars in the eastern quarter of the heavens, when I was astonished by the sudden appearance of a brilliant meteor with a long tail, or streamer, of a reddish hue. The colour of the ball itself was a vivid bluish white. It seemed to start from near ϵ *Virginis*, or a little to the right of that position, and to take a leisurely course in a straight line towards the north under *Arcturus*, α *Coronæ Borealis*, and ϵ *Herculis*, till I lost it behind some houses not far from the northern point of the horizon, if anything, a little to the east of that point. I was most struck with the leisurely pace at which it moved, so different from an ordinary falling star, the velocity appearing to slacken as it proceeded, like that of a railway train after it has passed a spectator. Just when passing under *Arcturus*, the globular head broke up, not unlike one of the fireballs of a rocket, into a string of five or six luminous beads, getting smaller and smaller towards the tail. The entire length of the meteor seemed to be fore-shortened as it receded towards the horizon. Judging without a watch, I estimated the interval between its appearance and disappearance to be about nine seconds. At the same time a second meteor of inferior dimensions and briefer duration took a somewhat parallel course between *Boötes* and *Ursa Major*. EDWIN SMITH

Forest Road, Nottingham, March 26

A FEW minutes after sunset on Thursday last (23rd) I saw a very fine meteor in the direction E.N.E.

Its course at first appeared southerly, then, bending downwards, it seemed slowly to drop in a direction perpendicular to the horizon, and I lost sight of it behind a clump of trees. Its light was exceedingly brilliant. J. F. DUTHIE

Leyton, Essex, March 27

Books Wanted

THE only way in which your correspondent of last week, Mr. H. J. Watson, is likely to obtain the volume of the "Annales de Chimie," containing the paper of Braconnot, (not Bracconot, the misprint is Sir John Herschel's), and that of the "Philosophical Transactions" with Dr. Prout's paper, would be to request some second-hand scientific bookseller to place them on his list of "desiderata," so that they may be brought under the notice of those who are likely to have duplicates.

Perhaps Mr. Watson is not aware that there is a good abstract of Braconnot's paper, occupying just over six pages in the *Quarterly Journal of Science*, vol. viii. 1820, and also short abstracts in the *Edinburgh Philosophical Journal*, No. iv. 1820, and Tulloch's *Philosophical Magazine*, vol. lv. 1820. It has also been reprinted into some foreign scientific periodicals, a list of which may be seen on reference to the "Royal Society's Catalogue of Scientific Papers," vol. i.

Oxford, March 24 JAS. B. BAILEY

Measurement of Mass and Force

PROFESSOR EVERETT, towards the close of his much-needed and exhaustive letter in NATURE (March 2) on the Measurement of Mass and Force, proposes to supply an undeniable want in Dynamics by coining the word *kinit* to denote that force which, acting on an avoirdupois pound of matter for a second, generates a velocity of a foot per second. He then adds, "If we substitute gramme for pound and metre for foot, we obtain a different unit which must be called by a different name."

Now one, and perhaps the only, objection to this is that in the face of the rapidly spreading metrical system it seems injudicious and somewhat savouring of retrogression to appropriate the most suitable root at our disposal to designate a force-unit depending upon the *pound* and *foot* (the abandonment of which is now only a question of time), while that based on the gramme and metre is sent a begging. I would therefore suggest to Prof. Everett that a *kinit* (or simply the monosyllabic *kin*) be defined as *that force which, acting on a gramme of matter for a second, generates a velocity of a metre per second*; and then there would follow as a matter of course *kilokin*, &c., suggestively and conveniently denoting either "the amount of force which, acting on a *kilogramme*, &c., of matter for a second, generates a velocity of a *metre* per second," or, "the amount of force which, acting on a *gramme* of matter for a second, generates a velocity of a *kilometre*, &c., per second."

Besides Kinetics and Heat (see NATURE, vol. i. p. 606) there is another department of science where a similar want exists—less pressing, perhaps, as yet, but felt, nevertheless. This is Electricity. Taking as basis Sir W. Thomson's general definition of unit quantity of frictional electricity (*Camb. and Dubl. Mathematical Journal*, March, 1848) a particular unit (*i.e.* a unit dependent upon previously fixed particular units of force and distance) might be chosen, formally defined, and named.

This question of units of measurement and their names appears to me to be anything but trivial. A science, which, by the choice of *one good system of units*, and the adoption of *a suggestive definite and uniform nomenclature*, has put its house in order for the proper reception of the powerful chief Mathematicus, has laid the foundations of true and rapid progress.

College Hall, St. Andrews THOMAS MUIR

The Earthquake

A RATHER severe shock of earthquake was experienced in this neighbourhood on Friday, March 17. The day in question had been remarkably calm, and a heavy suffocating feeling in the atmosphere noticed. About 11.15 P.M. a somewhat loud rumbling noise was heard as if a heavy waggon was passing over pavement; windows, chandeliers, furniture were violently shaken. Cups and saucers made themselves heard, and beds in some cases were distinctly felt to oscillate and heave like a ship at anchor. Breathing in some cases became difficult, but whether from fright or the oppressive state of the atmosphere does not appear. The vibrations were apparently horizontal, and probably in a direction from N. to S., lasting about three or four seconds. Poultry and cage birds showed particular distress by the noise and fluttering which they made. The temperature, which on the previous Tuesday night had fallen as low as 17°, suddenly changed, and the minimum of Friday night was 41°. Saturday morning was remarkably warm; the black bulb thermometer in vacuo reading 92°. The barometer showed no unsteadiness, but had been gradually rising for some days previously. The shocks seems to have been felt from the south of Scotland as far as the north of Derbyshire, much the same account having been received from each locality. THOMAS FAWCETT

Blencowe, Penrith, March 20

THE earthquake recorded for the night of Friday (17th) last was felt here about 11 P.M., distinct vibration being observed by two members of my household.

In support of the theory that shocks are mainly noted along lines of fault, there is a considerable one within a short distance extending northwards for some miles.

CHARLES HENRY MIDDLETON

Lingen Vicarage, Presteigne, Herefordshire, March 23

A SLIGHT shock of earthquake was felt and heard in this neighbourhood at about 9.55 on Monday night last, the 20th instant.

The duration of the shock was not longer than three seconds; it was accompanied as if by a muffled explosion, followed by a slight rumbling of the earth, and a gradual dying away of the sound, which seemed to be in an easterly direction. The last sensation is obviously not very reliable, as much will depend upon the position in which the hearer was sitting.

HENRY COOPER KEY

Stretton Rectory, Hereford, March 23

The Reality of Species

AMONG the many misconceptions that have arisen in connection with the doctrines of evolution appears to be one that species have no real existence. In a recent review (appearing in one of the best London papers) of Mr. Mivart's work, this mistake is strongly expressed, the writer appearing to entertain a profound contempt for anyone who still retains the foolish notion that there is any such thing as a species in nature. Every working naturalist knows well that most assuredly species do exist, and that in the most positive manner, not being conventional merely, but separated from one another in nature by distinct and real characters.

Fortunately for the doctrine of natural selection, it does not in the least question this fact, for did it so, it would be disposed of at once by pointing to a red admiral and tortoiseshell butterfly flitting side by side. It cannot be too distinctly insisted on that natural selection opposes no barrier whatever to the reception of the idea of distinct and separate species. That which it has destroyed is the notion of the constancy of species if the idea of time be set on one side. To argue that species have at the present day no separate existence because they had formerly a common origin, is a foolish confusion. The separate existence of a full-grown and mature animal is not questioned, because at one period it was a bud closely connected with its parent. In point of fact the question of species is really very similar to that of individuality, viewed as a question of origin, the individual and the species are both untenable ideas; but viewed at any one moment, both individual and species are among the most prominent and undoubted facts of our experience. Equally futile is it to argue that species have no existence, because we cannot exactly define what we mean by a species. It is well known that all the efforts of biologists have hitherto failed to produce a satisfactory definition of life. Are we, then, to conclude there is no such thing as a living animal?

The evolutionist contemplates throughout the universe a power underlying all things, indestructible and infinite, most various in its manifestations, always changing and always shifting, but steadily in a given direction, not revealed to man as a separate existence, but known only by its changes and movements, and veiled under the form of matter. Side by side with this universal and unknowable force he sees an opposing power, a tendency in things and matter to be always as they have been, a tendency which the restless force has ever to overcome; but as soon as this has gained its victory, again is it subject to the grasp of its ignoble foe; the struggle, though becoming ever more and more one of detail, is no spasmodic one, though more revealed to us

in some phenomena than in others, and more evident at some moments than at others. The questions of the origin, the existence, and the value of species in such a system are easily appreciated.

D. SHARP

Thornhill, Feb. 23

The Preponderance of West Winds

IN NATURE of the 16th inst. you appear to contest Mr. Laughton's statement that west winds preponderate over east on the entire globe. I believe that Mr. Laughton is right as to the fact. We have no reason to think that the earth's atmosphere is acted on from without by any force except the sun's heat; if this is the case, the winds can have no effect whatever in either accelerating or retarding the earth's rotation; and, consequently, the east and west winds must exactly balance each other's effect, for if either were unbalanced it would have an effect, however small, on the earth's rotation. But "an east wind near the equator has more effect in retarding the rotation of the earth, than a west wind of equal extent and force at a higher latitude in accelerating it, just as a weight at the end of the long arm of a lever outweighs an equal weight at the end of the short arm. It is for this reason that the west winds, which are mostly in the higher latitudes, are of greater force, and probably cover a greater area than the east winds, which, under the name of trade winds, predominate near the equator."

This quotation is from a letter of mine published in NATURE of 16th Feb.

In the same number of NATURE there is a letter from Mr. Laughton, maintaining that rain may be caused by fires or explosions. This is confirmed by a fact mentioned by Humboldt in his *Cosmos*, that he once saw an eruption of the volcano of Cotapaxi in the Andes, during which the cone became red hot, and rain fell at an unusual time of the year.

In the same number is a most interesting account of the Winter Meteorological Observatory on Mount Washington in New England. Mount Washington must be much more isolated than mountains 10,000 feet high generally are; and I hope the opportunity may not be lost of making comparative barometric observations, extending over a considerable time, at the summit and the base. In NATURE of 19th January, you published a letter of mine on the importance of such a comparative series.

JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim, March 18

Morell's Geometry

IT was with no small surprise that I found myself accused by Mr. J. R. Morell, more than once in last week's NATURE, of having overlooked the fact "that all the proofs in the work ('Essentials of Geometry') are taken from French and German sources." Nothing to my mind could be more obvious than that throughout my review in NATURE for Feb. 23, I was criticising the performance of a compiler. In one instance, indeed—Mr. Morell has surely not already forgotten it—I took the trouble to show *how* Amiot's demonstration of the fundamental properties of parallels had been mutilated by him. I must protest, too, against his claim to freedom from censure on the ground that he has merely copied passages from the works of our highest authorities; for it is about as reasonable as a claim to sanctity would be on the part of one who habitually, it is said, quotes Scripture for his own purposes.

Utterly ignoring the italics which I introduced, to save comment, into his definition of a plane angle, Mr. Morell quotes the Greek of Euclid and the English of Thomson, in justification, apparently, of the aptness of the introduction of the notion of revolution, which no one contested. He compels me, therefore, to draw his serious attention to the fact that neither of these geometers, nor any other to my knowledge, ever confused mankind as he has done by speaking of the "inclination of two straight lines *to a common point*."

Mr. Morell has, lastly, the audacity to defend his pretended demonstration, on p. 44, of the theorem that two triangles are equal in every respect when the sides of one are respectively equal to the sides of the other, by stating, *first*, that it "is based on the previous pages (42 and 43), overlooked by the Reviewer;" and, *secondly*, that it "agrees almost word for word with Legendre." The first of these statements is absolutely incorrect; on pages 42 and 43, there is not a word upon which the demonstration in question *could* be based. With respect to the second statement, I admit that Mr. Morell's demonstration substantially differs from Legendre's, as given by Blanchet, in Prop. xi. Bk. I, only by the omission of four words; and to show, by a striking example, what mischief scissors can do in Mr. Morell's hands, I will supply the four missing words, between brackets, in the following reproduction of his demonstration:—

"Let ABC, DEF, be two triangles, having AB = DE, AC = DF, BC = EF, then angle A = D; for if they were unequal, sides BC and EF would be unequal [by the previous proposition]. Therefore A = D."

The fact that Legrendre's most essential previous proposition is *nowhere to be found in* Morell's "Essentials of Geometry," sufficiently accounts for the omission of the four words above inserted. Mr. Morell, however, has yet to realise the fact that these omissions of his have converted a genuine demonstration into a mere assertion, or rather into a flagrant "violation of the most obvious of all logical rules."

Mr. Morell threatens, if space be given him, to show, on his "own authority," that he has "good arguments for what has been advanced." Before he does so let me remind him that logical demonstration, like the multiplication table, is more a subject for direct apprehension than for argument.

THE REVIEWER

A Meteorological Question

WHILE glancing the other day over the article "Meteorology," in the Supplement to the 4th, 5th, and 6th Editions of the *Encyclopædia Britannica*, I was surprised to find under the marginal heading, "Hauhber's Experiment," the following:—"It is conceived that a current of air in sweeping over the surface of the earth, must cease to exert any vertical pressure. But this assumption can hardly be reconciled with any strict principles in science, for the particles of air will not for a moment cease to gravitate, nor will any horizontal motion of them produce the slightest derangement in a perpendicular direction." Is not this a great mistake?

QUÆRE

A SUGGESTED NEW DIVISION OF THE EARTH INTO ZOOLOGICAL REGIONS

IT seems now to be generally agreed among zoologists who are specially conversant with the fauna of India, that "the Indian Region" of Dr. Sclater and others can no longer be regarded as a genuine or natural zoological division of the globe, and that India properly so called (from the Himálya to the sea), is rather a border territory where different zoological regions meet and are variously interposed, at the same time blending, as a matter of course, to some extent.*

This is a subject which has long occupied my thoughts, and I am gradually arriving at the opinion that the present dry land upon our planet may be most naturally divided into seven zoological regions, which again are divisible into sub-regions, and these into provinces and sub-provinces.

I. *The Boreal Region*, which is divisable into: 1. Arctic Sub-region, within the confines of the Arctic Circle, but also inclusive of the whole of Greenland, and of Foxland (west of Davis Strait and north of Hudson Strait). 2. Neo-septentrional Sub-region—North America. 3. Neo-meridional Sub-region—Central America with the Antilles. 4. Andisian Sub-region—the chain of the Andes with Chili, Patagonia, and the Fuegian and Falkland Archipelagos. 5. Palæo-septentrional Sub-region—Europe and Asia south of the Arctic Circle, and north of the Pyrenees, Alps, Taurus, Elburz (south of the Caspian Sea), Hindu Kosh, and Western Himálya, extending from the British Islands to Northern Japan? 6. Palæo-meridional Sub-region—the countries adjacent to the Mediterranean, as Africa north of the Atlas (with Madeira, the Canaries, and the Azores), Spain, Italy, Dalmatia and Illyria, Greece, the islands of the Mediterranean and the Levant, Turkey, Asia Minor,

* Vide Mr. W. T. Blanford in the "Proceedings of the Asiatic Society" for September 1867, p. 145 "The fauna of India at the present day is a remarkable mixture of African and Malay forms. The idea, so commonly expressed in European books, of India belonging to the same geological [qu. zoological?] province as the Malay Peninsula and Southern China, is quite erroneous." Vide also the same "Proceedings" for January 1868 p. 18, January 1869, p. 40, and July 1870, p. 238.

Syria, Egypt, Palestine, Mesopotamia, Persia, N. Afghánstân, Pánjâb, Middle China, Southern Japan? 7. Mongolian Sub-region—Mongolia, Tibet, and Chinese Tartary.*

II. *The Columbian Region.*—South America, minus the chain of the Andes and the extreme south. Divided into —1. Brazilian Sub-region; the forest countries east of the Andes. 2. Pampian Sub-region; the Pampas territory. 3. Peruvian Sub-region; Bolivia, Peru, Chili, and the Gallápagos Archipelago.

III. *The Ethiopian Region.*—Africa, south of the Atlas and of Egypt. Divided into—1. Lybian Sub-region; extending from Senegal to Nubia and Arabia, the country bordering on the head of the Persian Gulf (Mekran), S. Afghánstân, Beluchistân, and the desert country of N.W. Hindustân. An outlying strip of this sub-region extends along the cleft, or wady, continuous with the Gulf of Ormuz, in which is situate the depression of the Dead Sea and beyond it the Valley of the Jordan. 2. Nigritian Sub-region; Negroland. 3. Caffrarian Sub-region; Southern Africa. 4. Indian Sub-region; Hindustân proper, or the plains of Upper India E. and S. of the N.W. desert; Dukhun, or table-land of the peninsula of India; and the intervening territory, inclusive of the Vindhaian ghâts; Coromandel coast; low northern half of Ceylon.

IV. *The Lemurian Region.*—Madagascar, the Mascarine Islands, Seychelles, &c. Probably an extensive region of dry land formerly, but now for the most part submerged, where the coral formations occupy so extensive an area.

V. *The Australasian Region.*† The Indo-Chinese peninsula, together with the Indo-Malayan region of Wallace; the southern watershed of the Himálayas, at least up to the zone of oaks and rhododendrons, and jungle-clad hill country of Southern India and of Ceylon, if not also certain fertile hill territory in Southern Arabia; Lower and Eastern Bengal; Philippine Islands; Chinese islands of Hainan and Formosa (minus its mountain spine), and probably so much of the south of China as is inhabited by the *Manis* or pangolin, the *Palæornis cyanocephalus*, the genus *Centropus*, and other Australasian and Ethiopian forms. Divided into: 1. Indo-Chinese Sub-region—extending southward over one-half of the Malayan peninsula, as far as Pinang and Province Wellesley; Hainan and lowlands of Formosa, and more or less of the southern part of China. 2. Malayan Sub-region—southern half of the Malayan peninsula, Sumatra, Banka, Borneo, Java, and Bali. 3. Philippian Sub-region (which has Melanesian affinities, as indicated by the presence of a peculiar species of cockatoo—mammiferous animals few in number), Philippine Islands. 4. Himályan Sub-region—the southern watershed of the Himályas, with the *tárai* region at its base, Asám, and Eastern and Lower Bengal (*i. e.* the Sundarbáns). 5. Cinghalese Sub-region—the hilly parts of Ceylon (occupying the southern half of the island), those of southernmost India, and the Malabar ghâts; perhaps also the little-known fertile mountain territory of Southern Arabia, from which Mekka is supplied with grapes and other fruit.

VI. *The Melanesian Region.*—Divided into: 1. Australian Sub-region—Australia (minus York peninsula and part of Queensland), Tasmania. 2. Papuan Sub-region—Papua, New Britain and New Ireland, Jilolo or Halmahira, Ceram, Buru, Moluccas, Aru Islands, and Timor Lât; Louisiade Archipelago; York Peninsula and eastern half of Queensland (as far as the dividing range) on the mainland of Australia. 3. Celebesian Sub-region—the very remarkable island of Celebes, which has Australasian affinities, but subordinates to the present region: Islands of Lombok, Sumbáwa, Flores, Wetter, Timor, and Sandalwood Island. (Austro-Malayan region of Wallace.) 4 Antarctic Sub-region, inclusive of Kerguelin's Land.

VII. *The Polynesian Region.*—Divided into: 1. Moarian* Sub-region—New Zealand, with the islets appertaining to it, inclusive of Macquairie Island (upon which far southern land a peculiar species of ground-parrakeet inhabits, of a Polynesian genus—*Cyanorhamphus*). 2. Polynesian Sub-region—comprehending the Archipelagos of the Pacific, excepting those which appertain to the Columbian region.

All of these Zoological Divisions of the dry land upon the surface of our planet might be amply illustrated by an enumeration of the species and genera, or even higher groups, which are respectively peculiar to them. Thus, the presence of the true raven (*Corvus corax*) exactly coincides with the limits which are here assigned to the vast Boreal region, even to the Indian Pánjâb, and assuming that the so-called American species (*C. carnivorus* and *C. mexicanus*) do not really differ, which I believe to be the case, as likewise the so-called *C. tibetanus*; the sole exception being that of the Andisian sub-region, inasmuch as there is no *Corvus* in all South America. Be it always remembered that the major and the minor continents approximate in the Northern Pacific, to say nothing of the connection between them afforded by the chain of the Aleutian islands, and that a remarkable wild mountain sheep (*Ovis canadensis*) inhabits both sides of the Pacific, and not only the peninsula of Kamchatka, but the Stannavoi mountains which lie west of the sea of Ochotsk.

The southern watershed of the Himálya (below at least the zone of oaks and rhododendrons) consists, decidedly, of an extension westward of the Australasian

* It may seem a bold idea to put forward, but I have an exceedingly strong impression that the Stannavoi mountains, and the country eastward of them, the Valley of the Amur and all Mantchuria, with the Korean (or Koriak?) Peninsula, the country of the Tchuktchi who, though pastoral, are veritable Eskimo, (I adopt the spelling of Sir J. Richardson), the peninsula of Kamchatka (as Mr. F. Whymper spells it), the Kurile Islands, the Japanese Archipelago in part, and the Island of Saghalian or Sankhalin, which separates the Gulf of Tahtary from the Sea of Okhotsk, together with the Alaska territory, *eastward* of Bering's Straits (constituting part of the mainland of America) appertain alike to my Neo-septentrional sub-region, however the area may be subdivisible into provinces and sub-provinces; the Palæo-septentrional, the Neo-septentrional, and Arctic sub-regions being there variously interposed, with a certain amount of blending as in all such cases. Be it remarked that the *Ovis canadensis* is identical on the Stannavoi Mountains, those of Kamchatka, and the Rocky Mountain chain in North America; also that the insectivorous genus *Urotalpa* (even the species apparently) is identical in Western North America and Japan, and there are very remarkable ethnological affinities pervading the entire area, to which it is sufficient here thus cursorily to allude. Indeed, the Japanese themselves are more nearly akin to the Columbians (or redskins, the so-called "American Indians") than to the Asiatic nations of pronounced Mongolian type, to which latter the Kimo of Yeso and kindred Kamchatkadales strictly appertain. The *Ovibos moschatus* (or musk-sheep) is asserted to exist on the Island of Saghalian! May not the species prove, however, to be *Ovibos Pallantis* of De Blainville, supposed hitherto to be extinct, rather than *O. moschatus* of the Arctic-American Barren-grounds? If I mistake not (writing from memory) the *O. Pallantis* is identical with the North American *Bootherium bombifrons* of Trans-Atlantic palæontologists. *O. moschatus* would appear at one time to have been distributed over my Palæo-septentrional sub-region even to the area now constituting the British islands. The present Arctic sub-region must at that time have been co-extensive with the existent Palæo-septentrional if not also the existent Neo-septentrional sub-regions. Together with *Ovibos moschatus* on the Arctic American Barren-grounds, the European and Asiatic *Ursus arctos* there exists, which is significant of a former connection with the major continent! The Barren-grounds physically resemble the "Tundras" of Siberia and likewise mountain Lapland. The more that I reflect upon what is known of the fauna and flora of the debatable land in the extreme N.E. of Asia, the more thoroughly do I feel convinced that the Stannavoi mountains constitute the true and real boundary between Asia and America. Southward of the Stannavoi mountains, in Mantchuria, the two continents blend. The Japanese archipelago belongs to America, and not to Asia; at least in great part, as indicated by the presence of the *Urotalpa;* but there is also a true *Talpa* indicative of both Palæo-septentrional and a Palæo-meridional relations, and *Phasianus versicolor* and *P. Sœmmeringii* indicate the latter, while many of the insessorial birds of Japan indicate the former, and the bulbul of the genus *Microcelis* indicates an Australasian element, so that the Japanese Archipelago is, after all, a debatable land where different zoological regions and sub-regions meet and blend more or less: *Cervus pseudaxis* of the mountain spine of Formosa, so nearly akin to the much smaller *C. sika* of Japan and the much larger *C. mantchuricus* of Mantchuria, again indicating the propriety of recognising a Japanese or Korean province of the Neo-septentrional sub-region of the grand Boreal region. All qualified botanists will surely bear me out in this opinion.

† Austral-Asia as distinguished from Australia: approximately the same as "the Indian region" of Dr. Sclater, but shorn of the greater part of *India* properly so denominated.

* I propose Moaria rather than Maoria, following Dr. Sclater's example of Lemuria; naming the land from the indigenous "moa" genus (*Dinornis*) rather than from the present Maori inhabitants. Of course, it is well known that in the Polynesian languages "moa" merely signifies a fowl: but it has become specialised since the discovery of the extinct *Dinornis* genus by Europeans.

region, and in the bird-class its connection with India is maintained chiefly by migratory species; and very many of the permanently resident species, which have been thought to be specially characteristic of the Himálya, are equally found more or less throughout the Indo-Chinese sub-region, and not a few of them even in the Malayan sub-region, although nowhere met with in India, properly so called (the extensive *Liothrix* series of birds, for instance), while a few of them reappear as the same or as closely proximate (little altered) species in the hilly parts of Southern India and of Ceylon. On the other hand, as may be generally remarked of bordering sub-regions of different regions, there are some cases of mutual representation in the Himályan sub-region of the Australasian region, and the Indian sub-region of the Ethiopian region. The lángur monkey (*Presbytes schistaceus*) of the Himálya; is thus a specialised form of the hunumân group of India, exemplified by the Bengal hunumân (*P. entellus*) and others, this being a characteristic Indian division of the genus which has no representative eastward of the Ganges.

India, properly so called, is a land where sundry sub-regions appertaining to different regions meet, and are variously interposed. The Palæo-septentrional sub-region of the Boreal region extends into the Pánjâb, while the Mongolian sub-region borders upon the S.E. Himálya; the southern flank of the Himálya constitutes the Himályan sub-region of the Australasian region, to which, perhaps, should be referred (as distinct provinces) the mountains of Southern India and of Ceylon; then the Lybian sub-region of the Ethiopian region extends as far as the desert country N.W of Delhi; and the rest of India, with the low northern half of Ceylon, constitutes the main part of the Indian sub-region of the Ethiopian region. The N.W. Himálya again passes northward into the Palæo-septentrional and southward (in the alpine Pánjâb) into the Palæo-meridional sub-regions. In a S.W. direction the Máldive and the Láccadive coral-islands belong strictly to the Lemurian region of Dr. Sclater, and I am not sure that the latter does not reach the mainland of India, to comprehend the Concan or low maritime country constituting the Malabar coast, and lying along the foot of the ghâts. India, therefore, instead of being the nucleus of a distinct zoological region, is a land of extraordinarily complex zoological affinities.

As regards North America, it may be observed that the migratory insessorial birds are of Columbian types, whereas the permanently resident species are of types cognate with those of corresponding latitudes in the major continent: as we likewise find, in Europe, that our feathered summer visitants are of tropical or juxta-tropical forms, as exemplified by the roller, bee-eater, cuckoo, oriole, and the mass of small insectivorous genera; and the same has already been remarked with reference to the Himálya, viz. that as concerns the bird class, the connection of the southern flanks of the Himálya with the plains of India is chiefly maintained by the species which migrate to and fro. Among the gallinaceous birds of North America, the turkeys (*Meleagris*) are the only fowls which have spurred tarsi, indicating their affinity to so many of the major continent genera of poultry-birds, while the partridges of the same sub-region (*Ortyx* and *Lophortyx*) are not more different from major continent forms than are many of the latter from each other. The turkeys are assuredly not more peculiar in any respect than are the peafowl and the tragopans (*Ceriornis*) of Asia, and the same holds true of the North American colins or partridges, even admitting the affinity of the latter for the *Odontophori* of South America. The northern continent, however, has nothing corresponding to the curassows and guans (*Cracidæ*), or to the tinamou (*Tinamidæ*) of the Columbian region, to its great family of toucans (*Rhamphastidæ*), motmots (*Momotidæ*), jacamars (*Galbulidæ*), puff-birds (*Bucconidæ*), cariámas (*Cariamidæ*), trumpeter-birds (*Psophiidæ*), or its nandous (*Rheidæ*); and of the enormous family of humming-birds (*Trochilidæ*) it has only some four or five species as seasonal immigrants! Again, in the class of Mammalia it has no living representative of the *Edentata*, so characteristic of the Columbian region (though it did formerly possess the *Megalonyx*), nor of the marsupial true opossums (*Didelphidæ*), save one species only in the southernmost Atlantic States of the Union; but it has a fair proportion of *Insectivora*, which in South America the *Didelphidæ* completely replace. The rodent families *Chinchillidæ* and *Caviidæ*, I look upon as Andisian forms, even though the viscacha (*Lagostomus tetradactylus*) represents the former in the Pampian sub-region of the Columbian region. The mammalia of the Neo-septentrional sub-region of the Boreal region are surely not more different from those of the Eur-Asian sub-regions of the same region than are those of the latter from one another, say the Mongolian sub-region from either of the rest. With regard to the Andisian sub-region, I am mainly induced from a consideration of its extinct mammalia (so different from those of the Pampas) to consider it as a southern extension of the American portion of the grand Boreal region, and especially from the occurrence not only of such an animal as the *Mastodon andium*, but also of the living llámas and alpácas (*Auchenia*), which have no other known kindred, existent or extinct, than the camels of the major continent. Nevertheless, as usual in bordering sub-regions of different regions, there is an interposition of forms to a certain extent, as illustrated, on the one hand, by the existence of the viscácha on the Pampian sub-region of the Columbian region, and by that of the edentate *Chlamydophorus truncatus* in the Andes.

The Neo-meridional sub-region of the Boreal region has much stronger affinities for the Columbian region upon which it borders than has the Palæo-meridional sub-region of the Boreal region for the Ethiopian region and for the Australasian region upon both of which it borders, which of course is attributable to its nearer proximity to the Equator bringing it within the influence of the tropical and periodical rainfall. The several regions which are subject to that rainfall in different meridians hold relations of analogy with each other, *i.e.* the Nigritian sub-region of the Ethiopian region, the Lemurian region, the whole Australasian region, the Celebesian and the Papuan sub-regions of the Melanesian region, and the Peruvian and Brazilian sub-regions of the Columbian region. Then, southward, in corresponding latitudes beyond the influence of the tropical rainfall, the same analogies hold between the Andisian sub-region of the Boreal region, the Pampian sub-region of the Columbian region, the Caffrarian sub-region of the Ethiopian region, and the Australian sub-region of the Melanesian region; while, again, south of the parallel of 40° S. lat., the analogies (though still considerable) between the Patagonian sub-region and those parts of the Australian sub-region and the Moarian sub-region which fall within the boundary indicated are, to some extent, less prominently marked. *Ptilopachus* and kindred strong-footed passerine birds in Patagonia, nevertheless, most readily call to mind *Menura* and *Orthonyx* in Australia, and *Mohoua* in Moaria or New Zealand.

Having submitted these views I reserve for another occasion the consideration of other classes of the animal kingdom; premising, however, that I am well aware of such facts as the utter absence of the *Cyprinidæ* (or carp family) in all America eastward of Bering's Straits, a group of fishes which is so immensely developed in S.E. Asia. So far as the classes of mammalia and birds are concerned, I think that I have about hit upon the true classification of zoological regions, and I wish, before returning to the subject, to avail myself of the critical remarks of competent naturalists having reference to all classes.

E. BLYTH

THE PLANET JUPITER

SINCE the earliest days of telescopic investigation, there has never been a period in which this magnificent planet has been subjected to such an extended scrutiny as the present. Telescopes of all sizes and powers, and eyes of all degrees of sensitiveness and accuracy, are being directed night after night—or rather would be so, but for the proverbial uncertainty of our English climate—towards the splendid gem of the south-eastern heaven. Such is the natural result of that unexampled diffusion of a taste for astronomy, and of the equally unprecedented multiplication of telescopes of considerable pretensions, which is characteristic of the present time, and which is so gratifying to the lovers of physical science.

This state of things, however, it need not be said, does not date from the present apparition of the planet. It is merely a renewal of the attention which was directed to the same object during the preceding winter, and it is the character of the results obtained during that former period, which has led to the ensuing remarks.

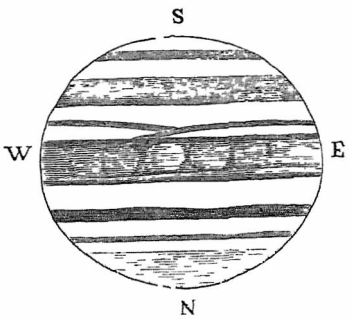
It may be reasonably thought that a comparison of such drawings as are generally attainable, professing to represent the planet during its late appearance, is not very satisfactory; and that greater agreement might fairly have been expected. Every observer must be presumed to have done his best: yet deviations exist of no inconsiderable magnitude. There must be some reason for these discrepancies; and it will be worth our while to inquire into their nature, while, at the same time, we would carefully avoid anything like an implied depreciation of any individual result.

In the first place, as regards colour, there is little difficulty in seeing that a considerable margin must be left for uncertainty. We meet with unpleasant statements from time to time as to the prevalence of colour-blindness, or at least what might be called colour-perversion, or colour-partiality, in some modification or other, to a greater extent than might have been supposed. And independently of this, there may be some dissimilarity of tint in images formed respectively by the achromatic and the reflector, though perhaps less than some persons might expect; since the blue rays which usually go astray in the former instrument are also absorbed by the silver film of the latter, so that there will be a prevailing complementary orange, however feeble, in the light that forms the image in either case. There will, however, be this advantage—and a considerable one—on the side of the reflector, that the blue light, in place of forming an unpleasant fringe, entirely disappears, leaving a delightfully colourless field in the use of the higher powers. Refractors may also differ somewhat in their mode or degree of correction, and consequently in the uncompensated tint; and in either construction eye-pieces may be chargeable with deficient achromaticity. So that on the whole we can scarcely be surprised at some differences in the results as far as colour is concerned.

But there would seem to be other and more influential reasons for the want of correspondence, as affecting form and position. One may be that all observers do not *see* equally well: not referring by this expression to clearness of eye, though in this there may be many degrees, but to the habit of attention. Where one man, for example, merely notes concerning three or four objects that they are not all of the same size; another will almost instinctively estimate their proportionate difference in magnitude. One observer again may be impressed with the proportions of the objects, but may miss those of their mutual distances: nor, again, are the estimates of different observers equally entitled to confidence. There are eyes, too, very good ones for other purposes, which are less successful than would have been expected in the discrimination of minute planetary markings, a fact not easy of explanation.

But besides this source of discrepancy, another exists in the fact that all observers do not draw equally well; or rather it may be feared that but few draw well at all. It is much to be regretted that a certain amount of artistic skill is not considered absolutely necessary in a liberal education; the advantage and pleasure derivable from it in after life are so obvious that it may well be questioned whether some of the time that is spent in mastering classical and mathematical niceties of an extremely unserviceable and unpractical nature, might not be better expended in the acquirement of the most useful art of design. It ought to be remembered, also, that not only a general facility in observation and delineation is requisite, but that something depends upon that special training which results from familiarity with the individual object. Even a careful observer, whose attention had been chiefly turned to objects of another kind, might not recognise as much of planetary markings at first, as after he had studied and learned their character; and on the other hand, a competent artist might produce inaccurate work during his early acquaintance with the telescope, simply from the unfamiliar aspect of what he has to represent, as compared with anything which he has been accustomed to delineate.

When, therefore, all these sources of discrepancy are taken into account, the differences in instruments, in eyes, in hands, and in experience, it is no longer matter of surprise that the results already obtained with regard to this planet are less satisfactory in points of mutual agreement than would have been desirable. It may be hoped, and to a certain degree expected, that we shall do better in future. Inexperience is a fault that will disappear of itself; and it would be well if the unpractised observer would be content to expend a little time and trouble in making tentative drawings before he considers them worthy of taking rank as representations of the planet. Imperfect attempts are, nevertheless, often deserving of preservation, as recording, as far as they go, something that may not be seen again, and thus acquiring a relative value. The remarks which follow may be thought to require some apology, especially after what has been said as to some of the causes of discrepancy; but it is hoped that their purport will not be misapprehended. It is well known that success in observation is much more readily obtained by those who have some previous idea as to what they may fairly expect to see; and on this ground the ensuing suggestions may be permitted, as the result of considerable familiarity with the object. They claim no higher character than suggestions—open as freely to contradiction as confirmation; and their object will be accomplished if they are found to give some aid to the unpractised amateur; the skilled observer will forgive them if he finds them needless, or correct them where they may be in error. They are deduced from the observations of forty-three nights, from 15th October, 1869, to 4th April, 1870, in the use of a With silvered glass speculum of 9½ inches



This sketch is copied from a drawing bearing the date of 1870, December 14d 11h 10m. It may serve as an illustration of some of these remarks, though it makes but little pretension to accuracy.

aperture and power most frequently of 212.* For the sake of convenience we may call the dark streaks *belts* and the luminous ones *zones*; and we may divide the disc into three portions—the equatorial, the northern, and the southern region.

The equatorial region may be described as a coloured girdle surrounding the planet, and consisting of two belts with a lighter space included between them. The relative proportion of these belts—the edges of the girdle—seems not invariable, and should be noted. Especial attention should be paid also to the tint of this region, as a diminution of intensity is suspected. The centre of the girdle is one of the most interesting portions of the disc, containing a number of dark markings projecting into it from the S. (upper as inverted) border, but not reaching the opposite N. edge, and taking the form of the piers of a bridge, or, when more fully developed or perfectly seen, of festoons, in which lighter yellow elliptical areas are included. For atmospheric phenomena, as these appear to be, they maintain a singular degree of uniformity and persistency, although their dimensions seem to vary, on different sides of the globe. An examination of earlier drawings, some of them in private hands, which I have been permitted to inspect, shows that, although at present conspicuous chiefly in the equatorial region, they are by no means restricted to that portion of the planet's surface. And here it may be noted that for the due comprehension of these details, especial attention should be paid to the laws of perspective. The *foreshortening*, as it is technically termed, of the regions approximating to the planet's limb, has a great influence on the apparent form of every marking lying in a meridional direction, while the ordinary belts are entirely unaffected by it. In all probability our familiarity from early youth with the common maps of the globe in two hemispheres may tend to preoccupy us with erroneous impressions in this respect, the exterior portions of those hemispheres being projected on an entirely artificial system, which exhibits them as little foreshortened as may be, and consequently extremely unlike their natural appearance on the globe. For any one unacquainted with perspective, it would be worth while to compare the edges of such a map with the corresponding portions of a terrestrial globe, as regarded from one point of view; or a globe being surrounded with a strip of paper bearing a number of equidistant markings, it will be instructive to notice the wide change in their aspect as the globe is made to rotate on its axis. To this foreshortening, it may be noted, rather than to atmospheric obscuration, as has often been alleged, we may ascribe the invisibility of many features of the planet in the neighbourhood of the limb; the existence of an external hazy envelope may be probable, but the fading of the belts at their extremities, which has often been referred to in this light, cannot be considered conclusive; for it is remarkable that as telescopes have been improved, this alleged fading has been less spoken of. It is not at all shown in the finest drawing hitherto published (that by De La Rue), in the use of an instrument of the most critical defining power; and with my nine-inch speculum it is so doubtful under favourable circumstances that I should not have independently noted it. Attention might well be given to this point, as if a difference should be found with the same eye and telescope in different seasons, it would plainly suggest atmospheric variation.

The northern region commences with a very luminous zone, to my eye the brightest and whitest part of the disc, and usually free from interruptions. Next to this comes a belt of remarkable intensity and permanency, from the edges of which dark but short markings have been, though rarely, seen to project. Its colour formed an uniform contrast with the equatorial belts during the last season; but I have thought this less striking recently. This great belt is commonly divided on the north side by a narrow light zone from a small thin companion of uncertain aspect, and during the present season not invariably parallel to its overpowering neighbour; sometimes, it is a mere edging to a streaky cap reaching to the pole, at others, a light stripe intervenes.

Passing now to the other side of the central girdle, we find next to its south border a region of some breadth, less luminous and much less tranquil than the corresponding north zone. It is interrupted by a belt of variable position and aspect, sometimes very feeble and narrow, at others a rival or more to the neighbouring edge of the central girdle. Its origin lies so close to this latter belt that it almost seems to branch out from it, and last season it followed an independent, and, in part, slightly spiral track round the greater part of the globe before its disappearance; at present I have not been able to trace its whole course, but I see that some remarkable changes have taken place. In this zone lay last winter the very curious elliptical marking described by Gledhill and Mayer, but not, I believe, by others. I never saw it, though it must have been repeatedly before my eyes—a valuable caution to myself and other students—for I had supposed myself too familiar with every portion of the disc to have overlooked so singular a feature. It is possible that my failure may have arisen from my having omitted to stop off the extreme margin of my speculum, which lies quite open in its cell without any rim. I had been repeatedly requested to do so by its accomplished maker, but from want of leisure and some difficulty in the arrangement had neglected it till near the close of those observations, when the evident improvement of definition made me regret that I had recourse to the expedient so late. This precaution, which is requisite with all open specula, is in the ordinary mode of mounting rendered needless by enclosure in a cell.

South of this changeable region lies a grey belt of uncertain form and extent, sometimes divided in two, at others partially interrupted by white spots. Between this and the south pole another belt is occasionally seen, and I have thought the colouring of this and the corresponding north area, not identical. The extreme foreshortening of these regions, and the nearly vertical position of the planet's axis, must ever prevent us from obtaining much knowledge of a wide tract surrounding either pole. The north pole is at present the one more exposed, not only to our view but to solar influences; and it may be worthy of notice that there is some existing dissimilarity in the aspect of the two hemispheres. An axial inclination of little more than 3° would indeed cause but little variety of season on the earth; but with the very dissimilar constitution and condition of Jupiter we know not how much may be effected by its influence.

These suggestions need not be carried into further detail. We shall however note, for the benefit of those who are little accustomed to the object, that the optical changes produced by rotation alone are such that we must be on our guard against being misled by their extent and rapidity.

T. W. WEBB

* The results have already been given in detail in the *Popular Science Review*, July 1870.

NOTES

WE have received the first Report of the Royal Commission on Scientific Instruction and the Advancement of Science just as we were going to press. We therefore let the Report, which we print elsewhere, speak for itself. We observe that it is signed by all the Commissioners, and we trust that it is the earnest of other, equally if not more important, ones to follow.

WE are informed that the future of the Kew Observatory is now being considered by the Kew Committee. We would ask whether the occasion is not a fitting one to bring before the Royal Commission on the Advancement of Science, which is now sitting, the disgraceful state of this country in the matter of such

institutions as Kew. All true and disinterested lovers of science would certainly second anything the Kew Committee might urge as to the importance not only of the retention of the Observatory in its present functions, but also of a considerable expansion of them. We fearlessly express the opinion, that in England the attempt to carry on researches "of long breath" by private effort has signally failed, and the sooner this is acknowledged by scientific men the better. Our remark does not apply only to such researches even, for on all sides, in all branches of knowledge, we are conspicuous from our prominent position in the rear. It is not right that in England we should simply teach what Germans and others have discovered.

WE greatly regret to have to record the death, at Vienna, of Prof. Haidinger, the eminent mineralogist. Next week we hope to give a sketch of his life.

WE have already announced the proposed formation of a Society of Biblical Archæology. The Society has now been organised, and the following papers will shortly be read, or are in progress:—On the relations of the Assyrian and Scriptural Chronology; by Sir Henry Rawlinson, K.C.B., &c. On an Eclipse mentioned on the Assyrian Tablets, hitherto unidentified; by Mr. H. Fox Talbot. On the Medical Science of the Ancient Egyptians; by Dr. S. Birch. On the Invasion of Egypt by adjacent Nations in the time of Menephthah I.; by Dr. S. Birch. On the Ancient Connections of Egypt and Assyria; by Mr. G. Smith. On Ancient Chaldean Inscriptions and their History; by Mr. G. Smith. On the Caverns under Jerusalem; by Mr. W. Simpson. On the Flora of Palestine; by Mr. B. T. Lowne. On the Sarcophagus of Oimenephthah I. (Sethos I.); by Mr. Joseph Bonomi. We give in another column a report of the inaugural meeting held on the 21st inst.

WE learn from our Paris correspondent that the leaders of the insurrection have suspended the publication of the *Comptes Rendus*, and have dismissed M. de Parville, the scientific editor of the *Journal Officiel*. Public libraries and scientific institutions are mostly closed, but the museums and galleries have not yet been pillaged. It will be seen, however, from our report in another column that the *Académie des Sciences* continues its sittings with uninterrupted regularity.

WE have received a parcel of numbers of the *Révue des Cours Scientifiques*, the publication of which was also maintained during the Siege of Paris, though not with the same regularity as the *Moniteur Scientifique*. The numbers to hand contain many interesting articles on the supply of food, hygiene, surgical science, and other subjects incident to the state of siege.

A SCIENTIFIC institution has, we learn from *Harper's Weekly*, lately been organised in the city of Washington under the name of the Washington Philosophical Society, the object of which is to furnish to the many persons interested in science, and resident in Washington, the means of convenient communication with each other, in order to exchange discoveries and observations in different branches of learning. Many organisations with the same end in view have been started at various times in Washington, but have not been very successful in accomplishing their purpose, partly on account of the ambition of the founders in endeavouring to give to them too much of a national basis, and partly because the time was not entirely ripe for such an enterprise. It is believed that the prospects of the success of this new society are very good, as Washington possesses, at the present time, a larger number of specialists in the different departments of science than is to be found in any other city in the United States. This is easily accounted for when we bear in mind that the Coast Survey Office, the Patent Office, the Agricultural Department, the United States Medical Department, the Smithsonian Institution, the Library of Congress, the National Observatory, the Scientific Bureaus of the War, Navy, Treasury, and Interior Departments, and other public bodies, all established at Washington, necessarily attract around them men of eminence in the various branches involved in the proper prosecution of their duties. Professor Henry was elected president of the new society, and the usual officers were also chosen.

THE library of the Smithsonian Institution at Washington now numbers about 70,000 volumes, including pamphlets. In this collection are comprised complete series of the Transactions of many of the older societies of England and France; and many works which it would be almost impossible to obtain except by the system of exchange which the Society has organised with the scientific publications of societies and individuals throughout the civilised world.

THE rapid decrease of food fishes on certain parts of the sea-coast and in the lakes of the United States has for a long time been a subject of much solicitude to thoughtful persons: and various causes have been suggested for this state of affairs, and remedies proposed for its correction. Laws have been passed by most of the New England States, and by the British provinces, regulating and protecting the fish and fisheries in the inland waters; but as the jurisdiction of the States does not extend over the high seas, no special effort has been made on their part to protect the marine species by legal enactments. In view of the difficulty referred to, a bill was introduced at the last session of Congress providing for the appointment of a Commissioner of Fish and Fisheries on the part of the United States, to make inquiries as to the alleged facts, and to report upon the same to Congress, together with any suggestions for legislative action in the premises, and the President has just appointed Professor Baird, of the Smithsonian Institution, as the Commissioner in question, with instructions to enter immediately upon the discharge of his duties.

WE regret to learn from a letter from Cairo that Dr. Gedge, the medical man and naturalist of the Viceroy's expedition under Sir S. Baker, fell sick some considerable distance above Khartoum. He was sent back, but did not get farther than Khartoum, where he died of acute mania. Mr. Wood, Sir S. Baker's secretary, was also, on account of sickness, obliged to return, and is now under medical care in Cairo. The last news from Sir S. Baker is to the effect that he is still endeavouring to make a passage through a part of the river that is filled up with dead trees and mud for two or three miles. This is situated about 6° N. lat.

EXAMINATIONS in connection with the Exeter Science Classes will take place at the Albert Memorial Museum on the following dates:—Inorganic Chemistry, May 4th; Animal Physiology, 5th; Machine Construction and Drawing, also Building Construction, 6th; Mathematics, Stage 1, 2, 3, May 8th; Physical Geography, 9th; Acoustics, Light, and Heat, 10th; Navigation and Geology, 11th; Magnetism and Electricity, 12th; Theoretical Mechanics, 16th; Applied Mechanics, 20th; Vegetable Physiology, 18th; Systematic Botany, 12th; Mathematics, Stage 4, 5, May 20th.

AT the recent annual meeting of the American Geographical and Statistical Society, Prof. D. C. Gilman, of Yale College, devoted his annual address to a sketch of the last ten years of geographical work in America. He referred especially to the publication by the Maine Historical Society of an elaborate treatise by Dr. J. G. Kohl on the early voyages to America; the topographical work of the United States' Coast Survey; the new

geological maps of New Jersey, by Prof. Cook; the work of Humphreys and Abbot on the Mississippi river; the geological surveys of Ohio, Indiana, and Nebraska, by Profs. Haydn and Newberry; the topographical survey by the North-west Boundary Commission, from the Rocky Mountains to the Pacific Ocean; and the explorations of Colorado with its wonderful canons.

A PROSPECTUS is being sent out of a new work on Fungology:—Mycological Illustrations, being Figures and Descriptions of new and rare Hymenomycetous Fungi; edited by Mr. W. W. Saunders, assisted in the text by Mr. A. W. Bennett, and in the drawings by Mr. W. G. Smith. The first number will be published by Mr. Van Voorst on May 1st.

THE *Meteorological Magazine* for February contains a paper on certain Variations of Temperature during the Solar Eclipse of December 22, 1870, by Mr. Townsend M. Hall, the conclusions of which are as follows:—"The total amount of depression at the time of the greatest obscuration was 21°·75, and I would submit that these figures represent more exactly the influence of an eclipse, than if the observations had been taken at any other period of the year. During the summer months both the atmosphere and the earth are so charged with heat, that a partial darkening over of the sun for so short a time loses, to a certain degree, its effect—the diminution of warmth being partially neutralised, before it can reach the earth, by reason of its passage through the intervening atmosphere. It is to be hoped that similar observations will have been made at some point along the line of total obscuration, whilst, on a future occasion, it will remain an interesting question to be determined by meteorologists, how far the thermal depression varies with the season of the year and the climate of the locality."

WE have received a paper on a Wind-direction Rain-Gauge, by Mr. J. R. Napier, F.R.S. The principle of this gauge consists essentially in supporting a vessel, like the first receiver of an ordinary gauge, on a pivot, so that it may be turned with the least wind, and having a spout attached to it, leading the rain into vessels in fixed directions surrounding the receiver, so that if it rains, for example, when the wind is between N.N.W. and N.N.E., the north vessel receives it, or when between N.N.E. and E.N.E., the north-east vessel receives it, &c.; for there are eight vessels which show the amount of rain and direction of the wind at the time.

THE Geologists' Association has paid visits during the past month to the British Museum and the Museum of Practical Geology; and have arranged for excursions on April 10 to Cambridge to visit the Woodwardian Museum and the exposures of cretaceous strata in the neighbourhood of Barnwell, under the guidance of Mr. Wiltshire and Mr. Bonney; to the Zoological and Hunterian collections of the Royal College of Surgeons April 18; and on April 29 to Belvedere and Crayford, led by Prof. Morris, the chief object of interest being the Mammalian remains of the newer Pliocene deposits.

OF late years many discoveries have been made in regard to the habits and characteristics of the aborigines inhabiting the coasts of North America prior to the time of Columbus by careful examination of the artificial heaps of refuse shells, bones, &c., accumulated in the vicinity of their villages. The published researches of Professor Wyman and others have proved full of interest; and as the subject continues to excite the attention of American archæologists, we doubt not that much now hidden will yet be brought to light. As these deposits are usually on or very near the sea, they are much exposed to the wearing of the waves; indeed, their discovery is usually due to exposure of a section by this influence. For this reason it is of importance that the examinations in question should be prosecuted before the heaps have entirely disappeared, as a large proportion will probably not outlive the next half century. We learn from *Harper's New Monthly* that a careful search on the shores of Kent and Northumberland counties, on the eastern coast of New Brunswick, has shown that, in consequence of the wearing away of the soft sandstone shale of the coast for many rods, all traces of the shell deposits, believed to have once existed in abundance, have now entirely vanished.

ACCORDING to a recent report by Dr. Stimpson upon the Crustaceans dredged in the Gulf Stream by Count Pourtales, of the Coast Survey, eighty-one species, of forty-seven genera, were obtained, of which fifty-two of the species and nineteen of the genera are to be considered as new. Only a small proportion of the species were from great depths, fifteen alone being recorded as coming from below 100 fathoms. The greatest depth at which any of the species were found was 150 fathoms, these belonging to the family of the *Portunidæ*. The portion of Dr. Stimpson's report on the brachyurous crabs of this collection has just been published in the Bulletin of the Museum of Comparative Zoology at Cambridge, already so well known for the merit of its zoological memoirs, and the remainder will follow at no distant interval.

DR. KESSLER claims to have discovered lately in Cassel the oldest herbarium known, some of the plants having been prepared in 1556. It contains 614 plants, properly fastened down and labelled, and was formed by Caspar Katzenberger.

A PLAN has been introduced at the Society of Arts, which has found favour so far, for instituting a kind of British Association for Indian topics under the name of the Oriental Congress of Great Britain and Ireland. It will embrace geology, natural history, biology, and other branches of science, and their economical applications. The proposal to hold the first meeting at Manchester met with the approval of the representatives of the Cotton Supply Association.

THE Colaba Observatory at Bombay recorded in three nights only in January 2·28 inches of rain. This is said to be unprecedented there, and generally throughout the Presidency there has been a fall of rain threatening the cotton crops.

UNDER the title of "Comision de la Flora Forestal Espanola," a useful account is published of the trees most suitable for forest cultivation in Spain, with remarks on the importance of keeping up the forests to maintain the equilibrium of the climate.

AT a time when the small-pox is so prevalent, and vaccination has become, so to speak, fashionable, it is surprising that we do not hear something of the many reputed remedies of foreign countries, either as a cure for this disease or as an eradicator of its effects. The *Sarracenia purpurea* is well known for its supposed efficacy, and it was even introduced into this country some few years back. But a plant not so well known in Europe is the *Melia Azadir-achta* L. of India, the leaves of which are used by the natives to cover the bodies of patients recovering from small-pox, as they are supposed to prevent the mark becoming permanent. Dr. Wright says of this tree that "the leaves beaten into a pulp, and externally applied, act like a charm in removing the most intractable form of Psora and other pustular eruptions."

IN a recent article, *Harper's Weekly* referred to the fact that torpedoes were being used for killing fish for manure on the coast of Florida. This business is being carried on about six miles below New Smyrna, at Mosquito Lagoon; and the method adopted is said to consist in exploding the torpedoes in the water, under the schools, as they pass by. In addition to the many that are killed outright and float on the surface, large numbers are wounded, and go off elsewhere to die without being caught. This

practice, we are assured, has already resulted in a very marked diminution of the schools of fish in that vicinity, and has been greatly resented by the people of the State, who are endeavouring to drive the operator from its waters.

AN earthquake at Arequipa in Peru, on the 21st December, was strong, and is said to have lasted fifty or sixty seconds. It was attended with much subterranean noise.

AN earthquake shock was felt at Bombay and as far north as Baroda on the night of January 31. It was distinctly noticed over a large area, but did little or no damage.

RECENT telegraphic advices from Havana announce that Captain Selfridge, who is engaged in prosecuting the Darien ship-canal exploration, thinks he has discovered a practicable oute over a line where the elevation of the divide is not more than three hundred feet above the level of the sea. The despatch is dated Paya, on the Tuira River, a stream which empties into the Gulf of San Miguel, on the Pacific.

THE well-known Pinang or Betel nuts, the seeds of *Areca catechu*, a handsome palm cultivated in all the warmer parts of Asia, and used by the natives to chew with lime for the purpose of producing a gentle kind of intoxication, form an important article in the interior trade of the Malayan Archipelago, being exported from Sumatra to other islands in large quantities. The exports from Padang alone in one year amounted to 5,057 piculs.

FROM the twenty-sixth Report of the Proceedings of the Calcutta School-Book Society, we learn that during the two years 1868-1869, more than 179,300 rupees was spent in purchases of books for distribution among the natives, the object of the society being "to supply and distribute, at the lowest possible price, a healthy household literature in the vernacular tongues," in which it is assisted by a small monthly grant from Government. The titles of some of the works circulated sound to us peculiar, as "A Treatise on Spiritualism and its Manifestations," "A Drama against Upstarts," "The Grief of Females on the Departure of their Husbands by Rail on Monday," &c.; while the modicum of science given is very small; and, judging from the titles, we should suppose that the instruction in natural and physical science, thought good enough for the natives of Hindostan, is about on a par with that which prevailed in this country in the time of Oliver Goldsmith.

THE Berwickshire Naturalists' Field Club, the oldest society of the kind in Britain, has issued its "Proceedings" for 1870. Besides one or two archæological papers, and an address from the President, the Rev. G. S. Thomson, we have the following contributions to Natural History and Ethnology, chiefly connected with these branches as represented in the district:—"The History of the Wolf in Scotland," "Turnip Insects during 1870," "Botanical Notices," and "Contributions to the Entomology of the Cheviots," chiefly in coleoptera; all these from Mr. James Hardy. The Secretary, Mr. George Tate, contributes a carefully worked-out paper on "The Stature, Bulk, and Colour of the Eyes and Hair of Native Northumbrians;" and Mr. Ralph Carr treats of "The Northumbrians between Tyne and Tweed." There are several other short papers of local interest, and a statement of the rainfall concludes the number.

IN a discussion at the Indian Conferences at the Society of Arts, as to a proposition of Col. Wragge to employ Neilghery peat on railways, it was mentioned that the two largest peat bogs near Ootacamund have been swept away in rains. This was alleged to be through cutting them at the wrong end.

WE learn from Nicaragua that the river and port of San Juan del Norte are shoaling in many places. Where there was deep water in the latter ten years ago, there is now a bank above the surface.

ON THE CONNECTION BETWEEN TERRESTRIAL TEMPERATURE AND SUN-SPOT PHENOMENA

MR. STONE, the newly-appointed Astronomer Royal at the Cape of Good Hope, has recently communicated to the Royal Society an important paper and curve, in which the thermometric observations taken there since 1841 are discussed. This curve he has compared with another constructed on Wolf's observations of sun-spots, and with the following result, which we give in his own words:—

"The agreement between the curves appears to me so close that I cannot but believe that the same cause which leads to an excess of mean annual temperature leads equally to a dissipation of solar spots. There is on the whole a curious appearance of logging of the inverse curve of solar spots over that of temperature. At the maximum about 1856, this, however, does not appear to be the case; but when the uncertainties of the data, both of the solar spots near the minimum, and of the mean temperature also, are taken into account, such discrepancies might perhaps fairly be expected, even if there be a physical connection between the two phenomena as results of some common cause. If there be a sensible inequality in the mean temperature with a period of about ten years, then the mean temperature resulting from the observations in the temporary observatory, which were made near a maximum, will be too high. The corresponding ordinates, therefore, will be depressed too much relatively to those corresponding to observations made in the other two observatories. In the curve 2 I have imperfectly corrected the mean of the results for the temporary observatory on the supposition of such an inequality existing. The only result of such a correction is to modify the curve at the points of junction of the observations made in different positions. The general form is unaltered. It should be mentioned that the point about which the curves appear to differ most is near or at the change of exposure from the original observatory to the temporary shed about 1852.

"I may mention that I had not the slightest expectation, on first laying down the curves, of any sensible agreement resulting, but that I now consider the agreement too close to be a matter of chance. I should, however, rather lean to the opinion that the connection between the variation of mean temperature and the appearance of solar spots is indirect rather than direct, that each results from some general change of solar energy. . . . . The problems of meteorology appear to be presented here in a simpler form than in England, and probably systematic photographic self-registering observations extended over a few years might lead to important results."

EXPERIMENTS ON CERTAIN VIBRATORY PHENOMENA

THE apparatus made use of consists simply of a cardboard disc furnished with radial slits, and which can be rotated with any desired velocity. To examine a coal-gas flame singing in a glass tube, the disc is placed in front of the flame, and the eye placed where the slits pass in a vertical position. When the dish rotates with such a velocity that the interval between two slits passing the eye is just equal to the period of a complete vibration of the flame, the flame appears to be motionless; but if the velocity of the disc be slightly reduced, the flame is seen slowly to go through its changes of form, appearing to consist of a series of puffs, resembling those from the funnel of a luggage locomotive. When the interval between the passing of the slits is equal to, or is one-half, one-third, &c., of the period of vibration of the flame, a singular appearance of a phantom disc is seen, having as many or twice or three times the number of slits really in

the disc; this phantom wheel appears motionless if the periods exactly coincide, but if they do not, it slowly revolves in one direction or the other. It is obvious that this affords an easy method of counting the vibrations of the flame. With a sixteen inch tube I thus found the number of complete vibrations per second to be about 453.

When the disc is rotated in front of a vertical vibrating wire, the eye being placed where the slits pass in a horizontal position, the interval of the slits passing being equal to a complete vibration of the wire, the wire appears thrown into undulations and motionless. If the periods do not exactly coincide, the undulations travel up or down the wire. If the velocity of the disc be doubled, or trebled, the apparent number of wires is increased in like proportion; and if it be regarded by the two eyes placed where the slits do not pass in a horizontal position, they assume the form of spirals, which appear to revolve around each other in an extremely beautiful and illusive manner. In the above cases I have supposed the wire to be twanged in the centre, in which case the undulations are beautifully symmetrical curves, and represent a pure note. If, however, the wire be twanged near to one end, the change in the *quality* of the note is manifest, the irregularity of the curves showing the presence of minor undulations superimposed upon the primary one. The best wire for this purpose is a fine spiral one, as it gives vibrations of great amplitude, and of long continuance. A vibrating steel rod also appears thrown into the same undulations.

CHARLES J. WATSON

THE ACTION OF FLUORSPAR ON DIFFERENT QUALITIES OF CAST IRON

IN my articles contributed to NATURE (No. 57, p. 94, and No. 61, p. 233), I have given descriptions of my process of applying fluorspar combined with oxides, and fluorspar combined with oxides containing titanium, to ordinary cast iron.

It is reported that attempts have been made to apply fluorspar alone to ordinary cast iron by eminent chemists in the laboratory, but the results have been of a negative character. These reports have been corroborated by my own experiments. I have discovered,* however, that although fluorspar has no effect when used alone in treating ordinary cast iron, it will act energetically upon cast iron containing titanium. The titaniferous cast iron was made at Glassdale Furnaces, near Whitby, by melting Cleveland white pig iron in a cupola in admixture with Norwegian titanic iron ore, and blast furnace cinder as a flux. This metal was treated here in the laboratory by being melted upon powdered fluorspar. The resulting metal was found to be wrought iron.

These results may be obtained in any suitable vessel, furnace, apparatus, or process; the only conditions necessary to be observed are, that the metal be maintained in the fluid state, and the fluorspar placed so as to act upon the metal from the under side upwards, or placed in admixture with it, and that when apparatus is used having silicious linings, the silicious linings be protected with sheet or cast iron placed upon the silicious lining before the fluorspar and iron to be treated are charged into the vessels. No labour is necessary, except that of "balling" the metal, and removing it from the apparatus.

The results given by this experiment go to prove that by this process superior qualities of wrought iron, which will be purer than the highest standard brands of wrought iron, may be produced from the English Cleveland pig iron, which contains, according to the best metallurgical authorities, from 1·25 to 1·38 per cent. of phosphorus.

One ton of Cleveland pig iron was melted in a cupola with 7 cwts. of Norwegian titanic iron ore, containing, by analysis, about 40 per cent. of titanic acid. The resulting metal was titaniferous cast iron, analysing:—

Titanium	1·2551
Silicon	1·8139
Phosphorus	0·4604
Sulphur	0·3620
Carbon	1·2982

* Patent No. 318, Feb. 3, 1870

Hence it appears that the iron, by being re-melted with titaniferous iron ore, took up 1·25 per cent. of titanium, and lost 0·90 per cent. of phosphorus, and 1·75 per cent. of carbon. It is obvious that the metal in this condition is not available for any purpose without subsequent treatment, as it contains about as great an amount of impurities as it did before treatment.

The advantages gained by re-melting the pig iron with titaniferous iron ore are, a reduction of the amount of phosphorus and carbon, and the alloying of the metal with titanium, which facilitates the removal of the impurities in the subsequent treatment.

The above described titaniferous cast iron was remelted upon fluorspar, and about 30 minutes after the iron melted, or in about an hour after they were both charged, the iron was found to be malleable iron; the button analysing as follows:—

Titanium	0·0215
Silicon	None
Phosphorus	0·1399
Sulphur	0·0620
Carbon	Traces

When worked on a larger scale, so as to produce blooms that can be worked into merchantable shapes, the finished results will show less phosphorus and sulphur than the above analysis, as it is well known to metallurgists, by the experiments of Messrs. Calvert and Johnson, published in full in Kerl's "Metallurgy," vol. ii., "Copper and Iron," 1869, that 0·022 per cent. of phosphorus, and 0·040 per cent. of sulphur, are removed in working blooms into finished iron.

It will be seen that the action of the fluorspar removed 4·9662 per cent. of the impurities contained; and that the resulting metal contains less impurities in amount than the highest standard qualities of wrought iron. The explanation of these effects I leave to chemical investigators, without hazarding an opinion which might be erroneous, and therefore disadvantageous to me.

JAMES HENDERSON

*MR. WALLACE'S ANNIVERSARY ADDRESS**

A CONSIDERABLE portion of this Address is devoted to a discussion of the facts of distribution of beetles, as presented by Mr. Wollaston in his great work, the "Insecta Maderensia," with special reference to the views advocated by Mr. Andrew Murray, in his paper on the Geographical Distribution of Beetles. After touching on the various methods by which insects are known to be distributed, and mentioning several of the instances in which they have been captured some hundreds of miles from land, it is concluded that, in opposition to the view held by Mr. Murray, there is no reason to believe that the Atlantic islands owe their Coleoptera to a former land connection with the continent, more especially as there is such strong evidence against that view in the total absence of mammals and reptiles. Mr. Wallace then applies Mr. Wollaston's facts to a detailed test of these views; and, as this portion of the paper is of general interest to naturalists, we give it at length:—

The most novel and striking facts brought out by Mr. Wollaston's researches in Madeira are, as is well known (1) the affinity with the Mediterranean fauna; (2) the total absence of certain large divisions of Coleoptera abundant in that fauna; (3) the number of new and peculiar species and of new and anomalous genera; and (4) the unexampled preponderance of apterous species. Now accepting, as Mr. Murray does, the theory of slow change of forms by natural causes, we may take the first and third of these facts as proving that the origin of the Madeiran fauna is of very ancient date. Let us see, therefore, how the second and the fourth set of facts bear upon the mode of its origin, whether by a land-connection with Europe or by transmission across the sea. It will be convenient to take first the facts presented by the apterous or winged condition of the species.

This striking peculiarity consists, either in species being apterous in Madeira which are winged elsewhere, or in genera which are usually winged consisting of only apterous species in Madeira, or lastly, in the presence of endemic apterous genera, some of which have winged allies, while others belong to groups

* An Address read at the Anniversary Meeting of the Entomological Society of London, on the 23rd of January, 1871, by Alfred R. Wallace, F.Z.S., F.R.G.S., President.

which are wholly apterous. Such phenomena undoubtedly show that there is something in Madeira which tends to abort wings; and Mr. Wollaston was himself the first to suggest that it was connected with exposure to a stormy atmosphere. His further observation, that many of the winged species had wings more developed than usual, enabled Mr. Darwin to hit upon that beautiful explanation of the facts which commends itself to all who believe in the theory of Natural Selection, while Mr. Wollaston himself admits it as fully accounting, teleologically, for the phenomena. That explanation briefly is, that the act of flying exposes insects to be blown out to sea and destroyed; those which flew least therefore lived longest, and by this process the race became apterous. With species to whom flight was a necessity, on the other hand, the strongest-winged lived longest, and thus their wings became more and more developed in each succeeding generation.

Now this view of the case enables us at once to explain some of the most striking gaps in the Madeiran coleopterous fauna. The Cicindelidæ, for instance, are entirely absent; and almost all the European species are winged insects of somewhat feeble flight, yet to whom flight is necessary. We can readily understand that such insects would be easily exterminated if they arrived singly or in small numbers; though it is not so easy to understand why, in a forest-clad island, some of the sylvan species should not have found a home had the land ever been connected with a continent where they abound. Their total absence is, therefore, decidedly unfavourable to the theory of a land-connection with Europe. To the Melolonthidæ and Cetoniidæ, as well as the Eumolpidæ and Galerucidæ, which are all wanting, the same argument will apply; and also to the Elateridæ and Buprestidæ, which are represented each by one minute species. But if Madeira is the remains of a continent once continuous with the south of Europe and deriving its fauna from such continuity, how are we to explain the absence of extensive genera very abundant in South Europe, and, from their being apterous, specially adapted to the peculiarities of Madeira? Such are *Carabus*, *Lampyris*, *Pimelia*, *Akis*, and many others. But these facts are all consistent with the theory of introduction across the sea. Apterous groups, however abundant on the continent, should, as a rule, be absent; and I find that almost all the European apterous genera are wanting, and among the few exceptions there are some whose presence is easily explained and really prove the rule. We must remember, however, that the apterous condition, except in those cases where it is characteristic of an extensive group, is one of little stability or importance. There are species which are sometimes apterous and sometimes winged, and we may therefore be sure, that if any advantage was to be derived by either condition over the other, Natural Selection would very rapidly render it constant by the repeated survival of the favoured individuals. This is illustrated by the fact that we have winged and apterous species in the same genus, as well as winged and apterous genera in the same family. The coleopterous order being essentially winged, and the vast majority of its members being capable of flight, it is a presumption, if not almost a certainty, that all apterous varieties, species, or groups, have been derived from winged ancestors—comparatively recently in the case of the former, and at a more remote epoch as the character becomes more constant and attached to groups of higher classificational value.

Taking these principles as our guide, let us examine more closely the facts presented by the Madeiran Coleoptera, and their bearing on the rival theories as to their mode of introduction.

There are a large number of European beetles belonging to the very varied genera and families which are apterous, and a large proportion of these inhabit the south of Europe and North Africa. Now, on the theory of land connection, there should be no marked absence of these groups; on the contrary, apterous forms being especially adapted to Madeira, we should expect them to predominate. But, on the opposing theory of transmission across the sea, we should expect them to be wholly absent, or, if there are any exceptions, we should expect to be able to detect some special circumstances which might favour their transmission. A careful examination of Lacordaire's "Genera," and of some works on European Coleoptera, has furnished me with the following list of genera which are wholly apterous, and which abound in South Europe and North Africa.

Carabus possesses about eighty species in these regions; but is wholly absent from Madeira.

Thorictus has ten South European species, and one representative in Madeira, which is an ants'-nest species.

Rhizotrogus (Melolonthidæ), twenty-seven species in Sicily and Algeria, the very country to which the Madeiran fauna is traced, yet it is wholly absent.

Lampyris, *Drilus*, and *Troglops* (Malacoderms), of which the females are apterous, possess twenty-seven South European and North African species; none in Madeira.

Otiorhynchus, *Brachycerus*, and twenty other genera of Curculionidæ, comprising more than 300 South European and North African species, are absent from Madeira, with two exceptions. One is the *Trachyphlœus scaber*, a widely-spread European insect often found in ants' nests; and this, with the case of the *Thorictus*, renders it probable that ants'-nest species have some unusual means of distribution, which are by no means difficult to conceive. The other exception is that of the genus *Acalles*, which has a number of Madeiran species, all peculiar, and is very abundant in all the Atlantic islands. Now we have first to remark that *Acalles* is an isolated form, but is allied to *Cryptorhynchus*, which is often amply winged; so that we may easily suppose that its introduction to Madeira took place before it became completely apterous in Europe. In the second place we have the fact, that many of the species are confined to peculiar herbaceous and shrubby plants, in the stems of which they undergo their transformations, and which habit would afford facilities for their occasional transmission in the egg or pupa state across a considerable width of ocean, while a fragment of dry stem containing egg or larva might possibly be carried some hundred miles or more by a hurricane. Such suppositions would not be admissible to account for numerous cases of transmission, but, as will be seen, this is almost the only example of a genus of large-sized apterous European beetles occurring in Madeira.

Pimelia, *Tentyria*, *Blaps*, and eighteen other genera of Heteromera, comprising about 550 species of South Europe and North Africa, are totally absent from Madeira, with the following interesting exceptions:—two common species of *Blaps*, which are admitted to have been introduced by human agency, and three species of *Meloe*, two of which are European and one peculiar. The means by which the apterous, sluggish, and bulky Meloes were introduced is sufficiently clear, when we remember that the minute active larvæ attach themselves to bees, insects of exceedingly powerful flight, and more likely than perhaps any other to pass safely across 300 miles of ocean. That the solitary exception to the absence of wholly apterous genera of European Heteromera from Madeira should be the genus *Meloe*, is, therefore, one of those critical facts which almost demonstrate that it is not to land-continuity with the continent that the island owes its insect fauna.

Timarcha.—This, the only important apterous genus of Chrysomelidæ, is especially abundant in Spain and Algeria, and possesses forty-four South European and North African species; yet it is unknown in Madeira.

The occurrence of two isolated European species of characteristic Atlantic apterous genera—Tarphius and Hegeter—may seem to favour the opposite theory. The *Tarphius gibbulus* occurs in Sicily, and is the only European species of the genus, of which about forty inhabit the Atlantic islands. It is most nearly allied to the smallest of the Madeiran species, *T. Lowei*, which is abundant among lichen on weather-beathen rocks, and even ascends in the forest regions to the highest branches of the trees. These habits, with its minute size, are all in favour of this species, or some ancestral allied form, having been carried across by the winds or waves, thus transferring to Europe one of the peculiar types elaborated in the Atlantic isles. The *Hegister tristis* is an analagous case, this species of an otherwise exclusively Atlantic genus having occured on the opposite coast of Africa. These instances will furnish a reply to one of Mr. Murray's difficulties,—that all the migration has been in one direction, from Europe to Madeira, never from Madeira to the continent,—a difficulty, it may be remarked, which is wholly founded on an unproved and unprovable assumption; for how can it be determined that, in the case of *Acalles* for example, the genus had not been first developed in the Atlantic islands and then transferred to Europe, instead of the reverse? It is always assumed to have been the other way, but I am not aware that any proof can be obtained that it was so, and it is inadmissible to take this unproved assumption, and base an argument upon it as if it were an established fact.

We will next consider the facts presented by the distribution of those species of Coleoptera which range from Madeira to Europe, or to any of the other Atlantic islands. If their distri-

bution has been effected by land-continuity, we should expect that the proportion of winged and apterous species that extend their range beyond the island, should not be very strikingly different from the proportion that is found on the island. We do not find, for example, that the proportion of the win less *Carabi* that have reached our own country from the continent by former land connection, is very different from that of the winged *Cicindelæ*.

Now, leaving out altogether those species which have certainly been introduced by man, and grouping the remainder for convenience in six divisions, we find that the Madeiran Coleoptera, which are not peculiar to it, may be classed as follows :—

31 species of Carabidæ, of which 26 are winged, 5 apterous. The whole fauna, however, presents the very different proportion of 38 winged, 43 apterous.

93 species of the families from the Hydradephaga to the Tomicidæ inclusive, of which 90 are winged, 3 apterous. Total fauna ; 220 winged, 27 apterous.

28 species of Curculionidæ, of which 26 are winged, 2 apterous. Total fauna ; 35 winged, 74 apterous.

15 species of Longicornia and Phytophaga, of which 15 are winged, none apterous. Total fauna : 48 winged, 1 apterous.

20 species of Heteromera, of which 16 are winged, 4 apterous. Total fauna : 28 winged, 27 apterous.

76 species of Staphylinidæ, of which all are winged, none apterous. Total fauna : 109 winged, 6 apterous.

The totals are, for the wide-ranging species, 249 winged, 14 apterous = 263 ; for the whole fauna, 478 winged, 178 apterous = 656.

It thus appears that, in every case, an immensely smaller proportion of apterous than of winged species are widely distributed. If we take the totals, we find that while about two-fifths of the whole number of species range to other countries, only about one-thirteenth of the apterous species do the same, although among the strictly endemic species there are 160 apterous to only 110 winged ! We can hardly impute such a constant and overwhelming preponderance to the fact that apterous insects have less facilities for extending their range, when we know that nearly every apterous genus possesses species of almost universal European distribution. I may here recall the fact, that of the above-mentioned fourteen apterous species which range out of Madeira, two are Meloes and two ants'-nest beetles, whose presence we have already sufficiently accounted for. It may no doubt be said that much of the difference here shown is due to the fact that the peculiar Madeiran species have had time to become apterous, while the species common to other countries have not yet had time to lose their wings ; but this argument, although a valid explanation of some portion of the facts, if we admit that many of the latter have been *recently introduced by natural causes*, cannot be used by those who maintain a former land-connection as the sole origin of the fauna ; for on that theory all the species now inhabiting the island (and not introduced by man) must date back to the same remote period, and have had equal time in which to be modified.

Let us now consider what are the special relations of the apterous Madeiran species as throwing light upon their possible or probable mode of introduction.

We have three species which Mr. Wollaston himself states to be usually winged elsewhere, but which are apterous in Madeira. These are *Metabletus obscuroguttatus*, *Calathus fuscus*, and *Bradycellus fulvus*. I am inclined to believe that there are a few others which will come under this category, but it is very difficult to get information as to the winged or apterous character of particular species. These insects, however, have evidently become apterous since their introduction into Madeira. We have therefore no difficulty in accounting for their introduction, and, as no other change in their external characters has been effected, we may suppose it to have been comparatively recent.

Next we have those genera which, though apterous in Madeira, are wholly or partially winged elsewhere. These comprise a large number of species, and are twenty-two in number, as follows :— Carabidæ : *Cymindis*, *Dromius*, *Metabletus*, *Scarites*, *Apotomus*, *Loricera*, *Leistus*, *Calathus*, *Olisthopus*, *Argutor*, *Cratognathus*, *Bradycellus*, *Trechus*. Philhydrida : *Hydrobius*. Byrrhidæ : *Syncalypta*. Curculionidæ : *Phlœophagus*, *Tychius*, *Smicronyx*. Heteromera : *Phaleria*, *Helops*. Staphylinidæ : *Homalota* (1 sp.), *Othius*. Here we are carried back to a remoter epoch for the introduction of the winged ancestors of the Madeiran species, since not only have the wings become aborted, but the insects themselves have become modified into distinct and often very well marked species.

The next category consists of apterous genera which are peculiar to Madeira and the other Atlantic islands, but which are allied to winged groups, as follows :—

Elliptosoma.—Closely allied to *Loricera*, winged.

Eurygnathus.—An abnormal form of Licinides, most of which are winged.

Zargus.—An abnormal form of Chlæniides, winged.

Thalassophilus.—Allied to *Trechus*, winged.

Tarphius.—Belonging to the Colydiidæ, most of which, Mr. Pascoe informs me, have wings.

Coptostethus.—Allied to *Cryptohypnus*, winged.

Caulophilus.—Allied to *Phlœophagus*, winged.

Lipommata, *Mesoxenus*, *Caulotrupis*.—Anomalous genera of Cossonides, which are often winged.

Acalles, *Torneuma*.—Aberrant genera of Cryptorhynchides, most of which are winged.

Echinosoma.—Doubtful affinities.

Atlantis, *Cyphoscelis*, *Laparocerus* (Laparocerides).—A very isolated group.

Anemophilus, *Scoliocerus*.—Allied to Trachyphlœides, some of which are winged.

Lichenophagus.—Allied to *Cænoposis* and *Omias*, some of which are winged.

Xenorchestes.—Allied to *Choragus*, winged.

Ellipsodes.—Closely allied to *Crypticus*, some of which are winged.

Hadrus.—Belongs to an apterous group of Opatrides, many of which are winged.

Macrostethus.—Belongs to Cœlometopides, all of which are apterous, but comes next to the *Tenebrionides vrais*, of Lacordaire, which are mostly winged.

Xenomma.—Belongs to the Aleocharides, which are winged.

Mecognathus.—Allied to *Sunius*, winged.

Metopsia.—Allied to *Phlœobium*, winged.

Here we have indications of an introduction of forms at a still more remote epoch. In many cases the modifications of structure have been so great as to produce distinct generic forms, while these remain still allied to winged European genera. In other cases, however, the modifications are still greater, and the affinities are with groups which in Europe are wholly apterous. Such cases as *Hadrus* and *Macrostethus*, which belong to small groups of wholly apterous genera, are difficulties on the theory of transmission over the sea. But two considerations render this difficulty less real than apparent. They all carry us back to a very remote epoch ; and, knowing what we do of the instability of the apterous condition, we may fairly conclude that the groups in question were, at that time, in a partially winged state. At or near this same remote epoch, the Madeiran group, as indicated by the submarine bank now connecting the several islands, probably formed one more extensive island, and the distance of ocean to be traversed would then have been considerably less than it is now.

If the various groups of facts which I have here set forth, respecting the distribution of apterous and winged species and genera, are fairly considered as a whole, I think they will be seen to be quite inconsistent with the theory of that distribution having been effected by a former land connection with Europe ; and, considering that we are necessarily ignorant of many of the ways by which organisms are transmitted across ocean barriers, such transmission seems to be indicated in the case of the Madeiran Coleoptera, not by means of drift wood and ocean currents, which Mr. Murray thinks must be the most efficient means of transport, but by some mode in which their wings are called into play, which can only be by a passage through the air when assisted by gales and hurricanes.

There is one other group of islands which seems well adapted to offer a crucial test of the correctness of the theory of land-connection. The Azores are more than twice as far from Europe as the Madeiras, and, what is of still more importance, they are cut off from it as well as from the Madeiras by a broad belt of ocean of the enormous depth of nearly 15,000 feet. We may feel pretty confident, therefore, that if both groups have once been united to the continent, the separation of the Azores is by far the more ancient event ; and any theory which requires the Azores to be the most recently separated must be strongly supported by independent evidence to render such an improbable supposition acceptable. If the Azores date the origin of their insect population from a remote epoch when they were connected with

Europe, we should expect to find that almost all the species have since become modified, and that these islands would offer us a larger proportion of highly specialised and ultra-indigenous forms than Madeira itself. The exact contrary, however, is the fact, for, out of more than 200 species only about sixteen are peculiar.

Taking the geodephagous group, the species of which, both Mr. Murray and Mr. Wollaston believe, are least liable to be introduced by man, we find that two only are peculiar, while sixteen are European. The Rhynchophora only equal the Geodephaga in number of species, and seven of these are peculiar. Leaving out a large number of species which have, there is little doubt, been introduced through human agency, there remain more than 100 species identical with those of Europe and the Atlantic islands, while only fourteen are peculiar. These facts imply that the insects, as a whole, have been brought to the islands through natural causes, and that the process is probably still going on. On looking to Physical Maps for information, however, a difficulty appears; for the ocean currents, as well as the prevalent regular winds, are all from the westward, while only four of the beetles are American, and these being all wood-borers, have no doubt been brought by the Gulf Stream where they have not been introduced by man. Fortunately, however, we have a means of getting over this difficulty; for our member, Mr. F. Du Cane Godman, who has given us the most recent and accurate information on the natural history of these islands, informs us (in his paper on the birds of the Azores in the "Ibis" for 1866) that the stormy atmosphere, to which we have seen that Madeira owes so many of its peculiarities, is still more marked a feature of the Azores, where violent storms from all points of the compass are frequent, and annually bring to their shores numbers of European birds. As a natural result of this constant influx, the birds of the islands are, all but two, of European species; and, what is very important, they decrease in numbers from the eastern to the western islands of the group. This is just what we should expect if they are stragglers from the eastern continent; but if they are the descendants of those which inhabited the country before its dismemberment, there would be no meaning in such a diminution. Now we can hardly doubt that these same storms also bring Coleoptera and other insects to the Azores, though it may be more rarely and in smaller numbers than in the case of the birds; and the large proportion of European species will then be very intelligible. The same explanation is suggested by the proportions of the most important groups, for while (after deducting all those species believed to have been introduced by man) the Geodephaga and Brachelytra are by far the most numerous, the Rhynchophora and the Heteromera are exceedingly few, a distribution which corresponds with their respective powers of flight. It is also a very important fact that only four non-introduced species can be traced to an American origin, while more than a hundred are European; since it shows of how little importance are ocean currents as a means of conveying insects over a wide extent of sea; whereas the great mass of the non-introduced species have evidently passed through the air, aided by their powers of flight, for a distance of about a thousand miles from Europe. The Azorean Elateridæ form a curious feature of its fauna, considering that the whole family is almost absent from Madeira and the Canaries. Of the six species two are European (one specially Portuguese), so that they may have been introduced with living plants. Two are common South American species, probably introduced in the floating timber, though they may also have come with living plants, which are often brought from Bahia. Two species, however, are peculiar, and one is closely allied to a Brazilian species, so that it must have been introduced by natural agencies before the settlement of the island; the other is of a genus confined to Madagascar.

Now it is a suggestive fact that the Mozambique current, bending round the Cape of Good Hope to the Equator, is one of the sources of the Gulf Stream; so that it is not impossible that a tree, carried down by a flooded river on the west coast of Madagascar, might ultimately reach the Azores. That it should convey living larvæ or pupæ of Elaters may also not be impossible; and if such a log reached the Azores but once in ten thousand years, and but one log in a thousand should convey living Elaters, we should still, if the calculations of geologists have any approximate value whatever, be far within the epoch of existing genera, and even of most existing species. A relation so isolated and extraordinary as that between a single insect of the Azores and those of Madagascar, may well be due to a concurrence of events as rare and improbable as this seems to be.

The Azores, and in a less degree the Madeiras, appear to me to teach us this important lesson in the laws of distribution of birds and insects—that it has been determined neither by the direction of ocean currents nor by that of the most prevalent winds, but almost wholly by such more exceptional causes as storms and hurricanes, which still continue to bring immigrants from the nearest lands.

SOCIETIES AND ACADEMIES

LONDON

Zoological Society, March 21.—Mr. R. Hudson, F.R.S., in the chair. The Secretary read a report on the additions to the Society's Menagerie during the month of February, 1871.—Mr. Sclater exhibited a skin of the Ceylonese *Prinia*, recently spoken of by Mr. W. Vincent Legge in a communication to the Society, and now forwarded by that gentleman, which appeared to be identical with *P. socialis* of continental India.—An eleventh letter was read from Mr. W. H. Hudson, on the ornithology of Buenos Ayres.—Dr. Hamilton communicated an extract from a letter received from China relating to the reproduction of a Chinese Deer, *Hydropotes inermis*.—Mr. Sclater read a paper on the Birds of Santa Lucia, West Indies, containing an account of a collection recently made in that island by the Rev. Mr. Semper, and forwarded to Mr. Sclater by Mr. G. W. des Vœux. Amongst these specimens were two examples of an *Icterus*, believed to be undescribed and proposed to be called *I. laudabilis*.—Dr. R. O. Cunningham read a paper on some points in the anatomy of the "Steamer Duck," *Micropterus cinereus*, based upon specimens of this bird obtained by him during his recent voyage as Naturalist to the Survey of the Straits of Magellan. A communication was read from Mr. R. Swinhoe, containing a revised catalogue of the Birds of China and its islands. To this were added descriptions of new species, together with references to former notes and occasional remarks.

Chemical Society, March 16.—Prof. Williamson, F.R.S., president, in the chair. Mr. C. H. Piesse was elected a fellow. Mr. C. H. Gill read a note "On the examination of Glucose containing Sugars." It is known that coloured sugar solutions are decolourised and clarified by the addition of basic lead acetate before they are submitted to optical examination. Mr. Gill now found that the power of invert sugar to rotate a ray of polarised light is greatly altered by the presence of that reagent. The alteration takes place only on the levulose in the liquid, the dextrose suffers no change of optical properties. This alteration is not permanent—on removing the lead or acidifying the liquid the original rotatory power is restored. Mr. Gill employs these latter reactions in order to obtain correct numbers with the saccharometer. He uses a strong solution of sulphuric dioxide, which removes the lead, and at the same time bleaches the liquid, but is incapable of inverting cane sugar in the cold even in twenty-four hours. The presence of the lead salt in sugar solutions is also disadvantageous when the glucose has to be estimated by Fehling's copper solution, as it partly becomes reduced, and thus necessitates the use of a greater volume of the saccharine solution; the removal of the lead does away with this source of error.—Mr. D. Howard made some remarks on the boiling point of a mixture of amylic alcohol and water.—Mr. Perkin stated that he had succeeded in obtaining bromacetic acid by gradual addition of bromine to heated acetic anhydride, boiling for some time, mixing with water and subsequent distillation.—Mr. Warrington spoke briefly of an easy and sufficiently correct determination of ammonic sulphocyanide in commercial sulphate of ammonia.

Entomological Society, March 20.—Mr. A. R. Wallace, president, in the chair. Prof. P. M. Duncan, F.R.S., and Mr. E. S. Charlton were elected members. The Rev. L. Jenyns, in a letter to Mr. Dunning, made some remarks on the statement of Mr. Bond, at the last November meeting, respecting the swarming of *Chlorops lineata* in the Provost's Lodge at King's College, Cambridge. Mr. Jenyns had a similar swarm in 1831, and occurring probably in the same room.—Mr. Verral exhibited a fly, *Pipiza noctiluca*, from Perthshire, to the head of which a substance was adhering, probably the pollen-mass of an orchid.—Mr. Müller exhibited a gall, in shape like a grain of wheat, on the leaves of a *Carex*, sent to him by Lord Walsingham from Thetford.—Mr. C. O. Waterhouse read a description of *Apterocyclus honolulensis*, a new genus and species of Lucanidæ from

the Sandwich Islands.—Mr. Wollaston communicated a paper on additions to the Atlantic *Coleoptera*, in which he recorded the results of recent observations, with corrections on synonymy, &c. He adhered to his original opinion that the Atlantic archipelagos were the remnants of a former continent, with a possible connection with south-western Europe, and, in this respect, he differed from the views of Mr. Wallace that the islands had received their insect fauna by means of atmospheric agencies, thus agreeing more with the theory enunciated by Mr. Andrew Murray in his recent essay on the geographical distribution of *Coleoptera*. A discussion ensued in which the President, Mr. Bates, and Mr. Murray took part; the two first-named gentlemen considering that the remarkable absence in the islands of reptiles and mammals, was an insuperable objection to the idea of a former Atlantic continent; Mr. Murray, on the contrary, contended that the great homogeneity exhibited in the fauna and flora could only be explained by supposing the islands to have once been connected by a land passage.

Biblical Archæological Society.—The inaugural meeting, which was largely and influentially attended, was held on Tuesday, March 21, at 8.30 P.M. Dr. Birch of the British Museum took the chair, supported by Prof. Donaldson, Captain Wilson, and Messrs. Bonomi, Boyle, Drach, &c. After the usual preliminary business had been transacted the chairman delivered an opening address, enumerating the circumstances which had led to the formation of the Society, and stating the various advantages offered to the scientific world by its institution. A concise summary was then given of the results of past and pending archæological investigations in Assyria, Egypt, Palestine, and Western Asia; these results it was now proposed to extend and systematise by the labours of the Society of Biblical Archæology, while the council hoped eventually to be able to undertake excavations of their own among the still unopened tumuli of Mesopotamia. Prof. Donaldson moved that the inaugural address be printed, and made some excellent remarks upon the necessity of exercising great tact in further investigations, as well as great promptitude in securing such valuable antiquities as were likely to be destroyed by superstitious barbarians.—Mr. Boyle, of Lincoln's Inn, seconded the resolution.—Captain Wilson, in proposing a vote of thanks to the chairman, expressed his pleasure in belonging to two societies, whose labours, though in different spheres, would mutually and materially assist each other.—Mr. S. M. Drach moved that the name of the indefatigable secretary, Mr. W. R. Cooper, should be added in the vote of thanks, seconded by the Rev. T. Gorman, and carried unanimously.—Mr. Bonomi, Rev. A. Mozley, and other gentlemen also addressed the meeting.—A list of papers to be read at future meetings, contributed by Sir Henry Rawlinson, Mr. H. Fox Talbot, Dr. Birch, and Messrs. G. Smith, Bonomi, and Lowne, was then announced, and the society adjourned to Tuesday, 4th April, 1871.

CAMBRIDGE

Philosophical Society, March 13.—"On the Attraction of an infinitely thin shell bounded by two similar and similarly situated concentric ellipsoids on an external point," by Prof. Adams, F.R.S.—"On the theory of the forms of floating leaves in certain plants," by Mr. Hiern, St. John's College. This problem was treated mathematically, the leaf being considered as at its edge a flexible body, acted upon by an outward radial force, that of growth, and an external pressure due to the velocity of the stream. The curves which would be assumed under various conditions were calculated, and shown to agree closely with the forms which are to be found in certain aquatic plants.—"On the effect of exhaustion and inflation of the tympanum in deadening sounds, and on the test of loudness," by Mr. Moon, Queen's College.

MANCHESTER

Literary and Philosophical Society, March 7.—Mr. E. W. Binney, F.R.S., president, in the chair.—"The Action of Sulphurous Acid on Phosphates," by Dr. Wilhelm Gerland, Macclesfield.—"Further observations on the Strength of Garden Nails," by Dr. J. P. Joule, F.R.S. The author thought it desirable to ascertain how far hardness had to do with the strength and elasticity of these small specimens of cast iron. For this purpose he plunged some of them at a heat near the melting point into water, then selecting those which had been hardened sufficiently to resist the action of the file. Others he cooled slowly from a bright red heat. The experiments were conducted in the manner described in the last number of the Proceedings:—

	No. of Experiment.	Length of Nail between Supports.	Breadth of Nail at Fracture.	Depth of Nail at Fracture.	Deflection.	Breaking Weight. lbs.
Hard Nails.	1	1·0	0·11	0·122	·0067	129
	2	1·04	0·12	0·12	·0037	84
	3	1·0	0·12	0·122	·0028	81
	4	1·02	0·143	0·102	·0077	129
	5	1·1	0·138	0·13	·0071	203
	Average	1·032	0·1262	0·1192	·0056	125·2
Soft Nails.	6	1·0	0·112	0·117	·0088	141
	7	1·05	0·139	0·114	·0087	150
	8	1·02	0·130	0·138	·0051	176
	9	1·04	0·117	0·090	·0101	101
	10	1·04	0·121	0·108	·0073	113
	Average	1·03	0·1238	0·1134	·008	136·2

Reducing to a length of 3ft. and 1in. square section, and making a deduction of one-eighth from the deflections, on account of the taper of the nails, the above results, along with those in the last number of Proceedings, become

	Breaking Weight.	Deflection.
Nails in original state .	2673	·922
Hardened ditto . .	2002	·677
Softened ditto . .	2448	·924

—Dr. Joule exhibited three photographs of the sun taken on the 1st December, 1858. The images, ·43in. diameter, were produced by the achromatic object-glass of a telescope with half-inch stop. Exposure, by means of an apparatus completely detached from the camera, during a small fraction of a second. He had been induced to examine them after seeing the beautiful photograph of the late eclipse by Mr. Brothers. On examining the three images a nebulosity is observed, very similar to that in Mr. Brothers' photograph. In all three, taken at an interval between each of about a minute and a half, the nebulous appearance appears situated on three quarters of the limb, the remainder being quite free. There are also indications of a radial structure, so that he thinks it highly probable that the representations are actually those of the corona. Since communicating the above, he has carefully examined the two other photographs of the sun which he possesses, and which were taken early in the month of November 1858. These, one of which must have been exposed at about two hours twenty minutes after the other, present nothing remarkable to the naked eye; but when viewed through a glass of moderate power, a thin crescent-shaped envelope is observed on each, with this remarkable circumstance, viz., that in the two it appears on opposite limbs, suggesting the idea of a semi-revolution in the above interval of time at a velocity not much less than that due to Kepler's law of planetary motion. In one of the photographs there is, under the crescent and apparently on the rim of the sun itself, a narrow band in breadth about $\frac{1}{300}$ of the diameter of the disc, and of at least double the intensity of the sun. This may probably be referred to the actinic action of the chromosphere and the red flames.—"On Anthraflavic Acid, a Yellow Colouring Matter accompanying Artificial Alizarine," by Edward Schunck, Ph.D., F.R.S.

DUBLIN

Royal Dublin Society, March 20.—Professor R. Ball in the chair. Prof. Traquair read a paper on the restoration of the tail in *Protopterus annectens*. Two specimens of moderate size were exhibited and described, in both of which the caudal extremity of the body had been evidently truncated by violence, and a restorative process had taken place. In the first specimen the reproduced portion measured half-an-inch in length, and contained a prolongation of the notochord of the lateral muscle, and of the spinal cord, but neither vertebral arches, spines, nor fin rays. In the second the reproductive process had gone on to a much greater extent, the new portion being two inches long, and contained besides a notochordal axis, a reproduction of all the other essential parts of the normal tail of Protopterus. The neural and hæmal arches, spines, and fin supports were, however, entirely cartilaginous and rather irregular in their disposition. They were not traceable beyond a distance of one-and-a-half inches from the origin of the reproduced part, while the notochord extended to the very tip.—Dr. Moore read a paper on a Fungoid Disease which attacks and destroys plants belonging to the Pandaneæ; he also exhibited a

specimen of *Silenipedium caudatum*, which had flowered in the Glasnevin Gardens for the first time in Ireland.—Professor Dyer read a paper on the Germination of Seeds While it was true that in most Dicotyledons the root end of the embryo is developed into a tap-root, and that in most Monocotyledons the radicle was not developed, but the roots were pushed out through the base of the cotyledon; there could be no doubt that there were exceptions to this rule, which were both sufficiently numerous and important to be borne in mind, and which it was a great mistake not to find noticed in our Manuals of Botany. Many examples were given, such as palms with their exorrhizal roots, and Tropæolum with its endorrhizal roots. Prof. Dyer, in the course of his interesting paper, alluded to and illustrated Prof. Dickson's news on the embryo of Zostera.—Mr. W. F. Kirby read some notes on three species of trap-door spiders whose nests are in the Museum of the Society.—The Royal Dublin Society ordered a letter to be written to the Director of the Jardin des Plantes, Paris, informing him that Dr. Moore, Director of the Botanical Gardens, Glasnevin, had received instructions from the Council to assist as far as he possibly can in supplying the losses incurred by the recent bombardment.—A letter has been received by the Society from Prof. Milne-Edwards, stating that Prof. Decaisne will send over lists of their desiderata, and that in a few days the venerable Director of the establishment, M. Chevreul, will forward to the Society a letter of thanks for the warm sympathy and extreme kindness shown to the Jardin des Plantes by the vote of the Society.

EDINBURGH

Botanical Society, January 12.—Alexander Buchan, M.A., President, in the chair. "Note on the Practical Application of Meteorology to the Improvement of Climate." By Alexander Buchan, M.A. "Notes on the Structure and Measurements of Cells in Hepaticæ." By James Williamson Edmond, M.B. "Notes on the Distribution of Algæ." By George Dickie, M.D., Professor of Botany, Aberdeen. "On the Flora of the South of France." By Mr. James F. Robinson. "Memoranda on Fir Cones in the Museum at the Royal Botanic Garden." By Alexander Dickson, M.D., Professor of Botany, Glasgow.

PARIS

Academy of Sciences, March 20.—M. Faye, president, in the chair. Baron Thénard, who had been arrested by the Prussians as a hostage, was present at the sitting. After the reading of the *procès verbal*, he made a speech, in which he thanked the Academy for the protest entered by it against his arrest by Prussians when Paris was actually besieged by Prussian guns.—M. Chevreuil delivered a very long and very able speech on the changes of different kinds which silk undergoes from chemical agents when passing through different colouring processes.—M. Mathieu, the oldest member of the Institute, presented the *Annuaire des Bureaux des Longitudes*, which should have appeared on the 1st January.—M. Delaunay said he had been to inspect the Villejuif pyramid, which was erected on one of the extremities of the basis measured by Picard two centuries ago. The pyramid was not destroyed, owing to the precautions taken for its protection. The meteor of the 17th March was seen from several stations, viz., at Paris by M. Prevot, surgeon to the marines, at $10^h\ 58^m$, the luminous track remained visible for more than a hour; M. Samberg, Professor of Physics, at Rochelle, gives for the time $10^h\ 30^m$. The track was visible for an hour; no explosion took place. The colour was green, and the duration of the apparition was twenty seconds. Many sparks were noticed.—A discussion took place between MM. Delaunay, Becquerel, and Saint-Claire Deville on the temperature of the past winter. It was proved that the temperature is always less severe at the Jardin des Plantes than at the Astronomical Observatory, and that at the Astronomical Observatory it is less severe than at Montsouris. It results from this discussion that it is useless to attempt to find the absolute temperature of any region independently of local circumstances, and it is only by the comparison of many different observations that the facts relating to temperature can be ascertained.—M. Quatrefages presented a description of some helminthoid worms which locate themselves in the throats of snakes. These helminthoids cause such an irritation that the throat is closed, and the animal perishes by suffocation. In the secret committee, which was opened at five o'clock, a sharp discussion was raised between members with respect to M. Deville's proposition.

BOOKS RECEIVED

ENGLISH.—Essays on Darwinism: T. R. Stebbing (Longmans).—A Manual of Structural Botany: M. C. Cooke (Hardwicke).—Aunt Rachel's Letters about Air and Water (Longmans).—Dynamics of Nerve and Muscle: Dr. Radcliffe (Macmillan).—Cassell's Natural History, new ed. part I. (Cassell).

FOREIGN.—(Through Williams and Norgate)—Handbuch der Chemie: D. K. Kraut —Vorlesungen über nautische Astronomie 1er Band, 1te Abthielung: Dr. J. D. C. Weyer.—Handbuch der Anatomie des Menschen; J. Henle.—Atti della r. universitā di Genova, vol. I. Epilogio della Briologia Italiana: G. de Notaris.—Die Elemente der Krystallographie: J. M. Matzdorff.—Ueber Entwickelung und Bau des Gehörlabyrinthe: Dr. A. Boettcher.—Archiv für Anthropologie, 4er Band, 1870.

DIARY

THURSDAY, MARCH 30.

ROYAL SOCIETY, at 8 30.—Experiments in Pangenesis, by breeding from rabbits, of a pure variety, into whose circulation blood, taken from other varieties, had previously been largely transfused: F. Galton, F.R.S.—Contributions to the History of Orcin. No. 1. Nitro-substitution Compounds of the Orcins: Dr. Stenhouse, F R.S.

SOCIETY OF ANTIQUARIES, at 8.30.—Ballot for the Election of Fellows.

CHEMICAL SOCIETY, at 8.—Anniversary Meeting.

ROYAL INSTITUTION, at 3.—Davy's Discoveries: Dr. Odling.

LONDON INSTITUTION, 7.30.—On Economic Botany: Prof. Bentley.

FRIDAY, MARCH 31.

ROYAL INSTITUTION, at 9.—Solar Myths: Prof. Max Müller.

SATURDAY, APRIL 1.

ROYAL INSTITUTION, at 3.—Spirit of the Age: Mr. O'Neil.

ROYAL SCHOOL OF MINES, at 8.—Geology: Dr. Cobbold.

MONDAY, APRIL 3.

ANTHROPOLOGICAL INSTITUTE, at 8.—Report on Settle Cave Explorations: W. Boyd Dawkins, F.R S.—On the Anatomical Writings of Prof. Calori: D. Barnard Davis, F.R.S.—Builders of Megalithic Monuments in Britain: A. L. Lewis.

ENTOMOLOGICAL SOCIETY, at 7.

LONDON INSTITUTION, at 4.—On Astronomy: R. A. Proctor.

ROYAL INSTITUTION, at 2.—General Monthly Meeting.

TUESDAY, APRIL 4.

ZOOLOGICAL SOCIETY, at 9.—On some new and little-known species of Madrepores, or Stony Corals, in the British Museum collection: W. Saville Kent, F.Z.S.—Notes on some Indian Siluroid Fishes: Francis Day.

WEDNESDAY, APRIL 5.

GEOLOGICAL SOCIETY, at 8.—On a new Chimæroid Fish from the Lias of Lyme Regis: Sir P. de Malpas Grey Egerton Bart., M.P., F.R.S.—On the Tertiary Volcanic Rocks of the British Islands: Archibald Geikie, F.R.S. On the formation of "Cirques," and their bearing upon theories attributing the excavatipn of Alpine Valleys mainly to the action of Glaciers: Rev. T G. Bonney, F.G S.

ROYAL MICROSCOPICAL SOCIETY, at 8.—On the Mode of working out the Morphology of the Skull: W. K. Parker, F.R.S.—On Linear Projection considered in its application to the delineation of objects under Microscopic Observation: Charles Cubitt, C.E.

THURSDAY, APRIL 6.

ROYAL SOCIETY, at 8.30.

SOCIETY OF ANTIQUARIES, at 8.30.

LINNEAN SOCIETY, at 8.—On the stigmas of *Proteaceæ*: G. Bentham, Pres. L. S.—On the generic nomenclature of *Lepidoptera*: G. R. Crotch.

CHEMICAL SOCIETY, at 8.—On Burnt Iron and Burnt Steel: W. Mattieu Williams.—On the formation of Sulpho Acids: Henry E. Armstrong.

ROYAL INSTITUTION, at 3.—Davy's Discoveries: Dr. Odling.

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